Curriculum and Credit Framework
As per NEP 2020

For

Bachelors in Cardiac Care Technology (BCCT)

(To be effective from the Academic Session 2025-26)

Faculty of Life Sciences
Gurugram University, Gurugram
(A State Govt. University Established Under Haryana Act 17 of 2017)

SEMESTER I

Course Code	Course Title	Course ID	L	T	P	CR	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
250/BCCT/CC/101	General Anatomy-I-Theory		2	1	-	3	50	25	-	-	75
250/ BCCT /CC/102	General Physiology-I – Theory		2	1	-	3	50	25	-	-	75
250/ BCCT /CC/103	General Biochemistry		3	-	-	3	50	25	-	-	75
250/ BCCT /CC/104	Introduction to Quality And patient Safety- Theory		3	-	-	3	50	25	-	-	75
250/ BCCT /CC/106	General Anatomy-I- Practical		-	-	4	2	-	-	35	15	50
250/ BCCT /CC/107	General Physiology-I- Practical		-	-	4	2	-	-	35	15	50
250/ BCCT /CC/108	General Biochemistry -Practical		-	-	4	2	-	-	35	15	50
Minor (MIC) /Vocational Courses (VOC)											
250/ BCCT /MI/101	Introduction to Healthcare		2	-	-	2	35	15	-	-	50
Multidisciplinary courses(MDC)											
250/ BMLS /MD/101	Yoga – practical		-	-	6	3	-	-	35	25	75
Ability Enhancement Course (AEC)											
250/ BCCT /AE/101	English & Communication skills		2	-	-	2	35	15	-	-	50
Value Added Courses(VAC)											
250/BCCT/SE/101	Human Rights &Professional Values		2	-	-	2	35	15	-	-	50
Skill Enhancement Course (SEC)/ Internship/Dissertation											
250/ BCCT /VA/101	Clinical Education – I(studentship)		-	-	15	5	-	-	-	-	-
Total Credits						32	Total Marks			675	

SEMESTER II

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BCCT/CC/201	Human Anatomy Part II		2	1	-	3	50	25	-	-	75
240/BCCT/CC/202	Human Physiology Part II		2	1	-	3	50	25	-	-	75
240/BCCT/CC/203	General Microbiology		3	-	-	3	50	25	-	-	75
240/BCCT/CC/204	Basic Pathology & Haematology		3	-	-	3	50	25	-	-	75
PRACTICAL											
240/BCCT/CC/205	Human Anatomy Part II		-	-	4	2	-	-	35	15	50
240/BCCT/CC/206	Human Physiology Part II		-	-	4	2	-	-	35	15	50
240/BCCT/CC/207	General Microbiology		-	-	4	2	-	-	35	15	50
240/BCCT/CC/208	Basic Pathology& Haematology		-	-	4	2	-	-	35	15	50
Minor (MIC) / Vocational Courses (VOC)											
240/BCCT/MI/201	Organizational Behavior-Theory		2	-	-	2	35	15	-	-	50
Multidisciplinary courses(MDC)											
240/BCCT/MD/201	Principals of Management - Theory		2	-	-	2	35	15	-	-	50
Ability Enhancement Course (AEC)											
240/BCCT/AE/201	Basic Computers and Information Science - Theory		2	-	-	2	35	15	-	-	50
Skill Enhancement Course (SEC)/Internship/Dissertation											
240/BCCT/SE/201	Clinical Education – II(studentship)		-		15	5	-	-	-	-	-
Value Addition Course(s)											
250/BCCT/VA/201	Medical Transcription – Practical		-	-	4	2	-	-	35	15	50
Total Credits						33	Total Marks			700	

SEMESTER III

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BCCT/CC/301	Applied Anatomy, Physiology, Pharmacology in Cardiac care		2	1	-	3	50	25	-	-	75
240/BCCT/CC/302	BasicElectrocardiography		2	1	-	3	50	25	-	-	75
240/BCCT/CC/303	Basic Echocardiography		2	-	-	2	35	15	-	-	50
PRACTICAL											
240/BCCT/CC/305	Basic Electrocardiography		-	-	4	2	-	-	35	15	50
240/BCCT/CC/306	Basic Echocardiography		-	-	4	2	-	-	35	15	50
Minor (MIC) / Vocational Courses (VOC)											
240/BCCT/MI/301	Environmental Science-Theory		2	-	-	2	35	15	-	-	50
Ability Enhancement Course (AEC)											
240/BCCT/AE/301	Medical Terminology and Record Keeping - Theory		1	1	-	2	35	15	-	-	50
Skill Enhancement Course (SEC)/ Internship/Dissertation											
240/BCCT/SE/301	Basic Computers and Information Science – Practical		-	-	4	2	-	-	35	15	50
Value Addition Course(s)											
240/BCCT/VA/301	Clinical Education-III (Studentship)		-	-	15	5	-	-	-	-	-
Total Credits						23	Total Marks			450	

SEMESTER IV

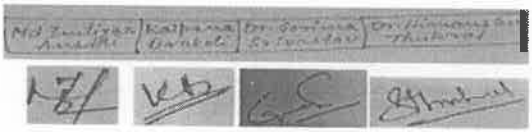
Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BCCT/CC/401	Development of Cardiovascular system fetal & Neonatal		2	1	-	3	50	25	-	-	75
240/BCCT/CC/402	Cardiovascular diseases pertinent to Cardiac care technology		3	1	-	4	75	25	-	-	100
240/BCCT/CC/403	Medical Instrumentation relevant to Cardiac care		3	-	-	3	50	25	-	-	75
PRACTICAL											
240/BCCT/CC/405	Medical Instrumentation relevant to Cardiac care				4	2	-	-	35	15	50
Minor (MIC) / Vocational Courses (VOC)											
240/BCCT/MI/401	Medical Law and Ethics		2	-	-	2	35	15	-	-	50
Multidisciplinary courses(MDC)											
240/BCCT/MD/401	Critical pathology Correlation		2	-	-	2	35	15	-	-	50
Value Addition Course(s)											
240/BCCT/VA/401	Professionalism and Values		2	-	-	2	35	15	-	-	50
Skill Enhancement Course (SEC)/ Internship/Dissertation											
240/BCCT/SE/401	Clinical Education-IV (Studentship)		-	-	15	5	-	-	-	-	-
Total Credits						23	Total Marks			450	

SEMESTER V

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BCCT/CC/501	Advance Electrocardiography		2	1	-	3	50	25	-	-	75
240/BCCT/CC/502	Advance Echocardiography		2	1	-	3	50	25	-	-	75
240/BCCT/CC/503	Invasive cardiology		3	1	-	4	75	25	-	-	100
PRACTICAL											
240/BCCT/CC/505	Advance Electrocardiography				4	2	-	-	35	15	50
	Advance Echocardiography				4	2	-	-	35	15	50
Minor (MIC) / Vocational Courses (VOC)											
240/BCCT/MI/501	Hospital Waste Management – Theory		2	-	-	2	35	15	-	-	50
Value Addition Course(s)											
240/BCCT/VA/501	Clinical Education-IV (Studentship)		-	-	15	5	-	-	-	-	-
Total Credits						21	Total Marks			400	

SEMESTER VI

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
240/BCCT/CC/601	CardiacCatheterization		2	1	-	3	50	25	-	-	75
240/BCCT/CC/602	PediatricInterventions		2	1	-	3	50	25	-	-	75
PRACTICAL											
240/BCCT/CC/605	CardiacCatheterization				4	2	-	-	35	15	50
	PediatricInterventions				4	2	-	-	35	15	50
Minor (MIC) / Vocational Courses (VOC)											
240/BCCT/MI/601	Biostatics and Research Methodology		2	-	-	2	35	15	-	-	50
Skill Enhancement Course (SEC)											
240/BCCT/MD/601	Basic of Clinical Skill Learning		2	-	-	2	35	15	-	-	50
Ability Enhancement Course (AEC)											
240/BCCT/SE/601	Infection Control		2	-	-	2	35	15	-	-	50
Value Addition Course(s)											
240/BCCT/VA/601	Clinical Education-IV (Studentship)		-	-	15	5	-	-	-	-	-
Total Credits						21	Total Marks		400		



SEMESTER VII

CourseCode	Course Title	CourseID	L	T	P	Credits	TE	TI	PE	PI	Total
DisciplineSpecificCourses (DSC)											
250/ BCCT /CC/701	Internship -I		-	-	480	16	Continuous assessment				400
Minor Courses(MIC)											
250/ BCCT /MI/701	Digital Marketing		3	1	-	4	75	25	-	-	100
TotalCredits						20	TotalMarks				500

SEMESTER VIII

CourseCode	Course Title	CourseID	L	T	P	Credits	TE	TI	PE	PI	Total
DisciplineSpecificCourses (DSC)											
250/BCCT/CC/801	Internship -II		-	-	480	16	Continuous assessment				400
Minor Courses(MIC)											
250/ BCCT /MI/801	First Aid		2	2	-	4	75	25	-	-	100
SkillEnhancementCourse(SEC)/ Internship/Dissertation											
250/ BCCT /SE/801	Field Training / Awareness camp for villages and public places				8	4	-	-	75	25	100
TotalCredits						24	TotalMarks			600	

SYLLABUS

FIRST SEMESTER

Course Title: GENERAL ANATOMY-I- THEORY	
Semester : I	Credits:03

Unit 1

Introduction to Anatomical terms of the human body-Basic anatomical terminology, anatomical position, anatomical planes, levels of organization in the body, organ systems, skeleton, and cavities of the body.
Organization of the human body at the cellular level- Structure of the cell comprising of cell membrane, cytoplasm, cell organelles, nucleus, cell extensions etc. Organization of the human body at the tissue level- Epithelial, Connective, Muscular& Nervous tissue.

Unit 2

Blood-Composition of blood, Features of redblood cells,white blood cells, platelets.
Lymphatic system - Features of lymph vessels, lymphatic tissue & organs, lymphatics, spleen, tonsil, thymus.
Nervous system - Central nervous system, brain, cerebellum, spinal cord, cranial nerves, autonomic nervous system.
Muscular system- Skeletal muscle, cardiac muscle, smooth muscle, muscles of the body. **Skeletal system**- Features of bones, axial skeleton, appendicular skeleton, Musculoskeletal system-

Unit 3

Respiratory system- Nose & paranasal sinuses, pharynx, larynx, trachea, lungs.
Cardiovascular system- Heart & blood vessels.
Digestive system- Oral cavity, pharynx, salivary glands, esophagus, stomach, small intestine, Large intestine, Liver, Gallbladder.
Urinary system- Kidneys, juxtaglomerul arapparatus,ureters,urinarybladder,urethra.

Unit 4

Introduction to genetics-Features of chromosomes, DNA.
Reproductive system in females-External & internal genital organs, breast.
Reproductive system in males- Penis, scrotum, testes, prostate gland.
Endocrinesystem-Hormones,-pituitary-gland,-thyroid-gland,-para-thyroidg lands, adrenal glands, endocrine pancreas.
Special senses- Olfactory system, taste apparatus, external middle & internal ear, eye.
Skin-Features of skin, hair, sebaceous glands, sweat glands, nails.
Theclasseswillbetwotheoriesandtwopracticalsincludingthetutorialsinaweek

Reference books:

Sampath Madhyastha's Manipal manual of anatomy for allied health sciences
Krishna Garg & Madhu Joshi's Practical anatomy workbook
Dixit's Atlas of Histology for Medical Students
Basic Histology: A Color Atlas &Text
Jana's Exam Oriented Practical Anatomy Krishan's Anatomy Mnemonics

Course Title: GENERAL PHYSIOLOGY-I THEORY	
Semester: I	Credits:03

Unit 1

Introduction to physiology of the human body –Composition of body, Homeostasis, Introduction to chemistry of life.
Organization of the human body at the cellular level- Function of lipids, carbohydrates, proteins & cell organelles.
Organization of the human body at the tissue level – Function of Epithelial, Connective, Muscular & Nervous tissues.

Unit2

Blood- Haemopoesis, haemostasis, coagulation of blood, blood transfusion.
Lymphatic system-Function oflymph vessels, lymphatic tissue &organs, lymphatics, spleen, tonsil,thymus.
Resistance&immunity-Innateimmunity,acquiredimmunity,humoral&cell mediated immunity.

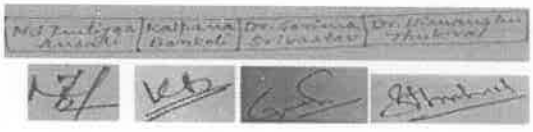
Unit 3

Nervous system -Properties of nerve fibres, function of neuroglia, synapse, CNS, CSF, brain, cranial nerves, demonstration of reflexes.
Muscularsystem-Propertiesofskeletalmuscle,cardiacmuscle,smoothmuscle, muscles of the body.
Skeletal system- Functions of bones, axial skeleton, appendicular skeleton.
Musculo skeletal system-Movement in the joints of upper & lower limb.
Respiratory system-Physiology of respiration, pulmonary function tests, gas exchange in lungs, transport of gases between lungs & tissues, regulation of respiration.
Cardiovascular system-Heart & blood vessels: Systemic circulation, pulmonary circulation, ECG, cardiac output, blood pressure.

Unit 4

Digestive system -Process of digestion, function of oral cavity ,pharynx, salivary glands,esophagus,stomach,smallintestine,largeintestine,liver,gallbladder,pancreas.
Urinary system - Function of kidneys, juxta glomerular apparatus, ureters, urinary bladder, urethra, physiology of urine formation, glomerular filtration, tubular reabsorption, water balance, micturition.
Introductiontogenetics-Featuresofchromosomes,DNA,proteinsynthesis,dominantinheritance, recessive inheritance, sex linked inheritance.
Reproductive system-female: Physiology offemale reproductive system.
Reproductive system-male: Physiology of male reproductive system.
Endocrine system - Mechanism of action of hormones, function of pituitary gland, thyroid gland, parathyroid glands, adrenal glands, endocrine pancreas.
Specialsenses-Physiologyofolfaction,taste,hearing,balance&vision.
Skin - Function of skin, hair, sebaceous glands, sweat glands, nails, temperature regulation.

Reference Books:
CCChatterjee's Human Physiology
CCChatterjee's Practical Physiology for Paramedical Courses
CNChandra Shekhar's Manipal Manual of Medical Physiology,
RKMaurya's Medical Physiology



Course Title: GENERAL BIOCHEMISTRY THEORY	
Semester: I	Credits:03

UNIT 1

Introduction and scope of biochemistry

Chemistry of carbohydrates, proteins, lipids and nucleic acid–

Chemistry of Carbohydrates: Definition, Functions, Properties, Outline of classification with eg.(Definition of Monosaccharides, Disaccharides, Polysaccharides and their examples).

Chemistry of Proteins: Amino acids (total number of amino acids, essential and non essential amino acids).Definition, Classification of Proteins Structural orgnisation of protein, Denaturation of Proteins.

Chemistry of Lipids: Definition, functions, Classification (Simple Lipids, Compound Lipids, Derived Lipids.) Essential Fatty Acids.

Chemistry of Nucleic acid: Nucleosides and Nucleotides, Watson and Crick model of DNA,

RNA- it's type along with functions

UNIT 2

Eementary knowledge of enzymes - Classification, mechanism of enzyme action, Factors affecting activity of enzymes, enzyme specificity, Enzyme inhibition, Isoenzymes and their diagnostic importance.

Biological oxidation - Brief concept of biological oxidation: Definition of Oxidative phospoylation Electron transport chain. Inhibitors and Uncouplersbriefly

Metabolism of Carbohydrate: Glycolysis, TCA cycle, Definition and significance of glycogenesis and glycogenolysis. Definition and significance of HMP shunt, definition and significance of gluconeogenesis. Regulation of blood Glucose level, Diabetes Mellitus, Glycosuria.Glucose Tolerance Test.

UNIT 3

Metabolism of Proteins: Transamination, Transmethylation reactions. Urea cycle, Functions of glycine, tyrosine, phenylalanine, tryptophan and Sulphur containing aminoacids.

Metabolism of Lipid: Outline of beta oxidation with energetic, Ketone bodies (Enumerate) and
its importance. Functions of cholesterol and its biomedical significance. Lipid profile and its diagnostic importance. Fatty liver, lipotropic factor, atherosclerosis.

Metabolism of Nucleic acid: urinecatabolism (Formation of uric acid), Gout

Vitamins and Minerals- RDA, Sources, functions and deficiency manifestations of Fat soluble vitamins. RDA, sources, functions and deficiency manifestations of Water soluble vitamins. RDA, Sources, functions and deficiency manifestations of Calcium, Phosphorous, Iron, Iodine

Principle and applications of: Colorimeters, pH Meter

UNIT 4

Pre examination Skills - Collection and preservation of samples (Anticoagulants),
transportation & separation of biological specimens, Sample rejection criteria, Disposal of biological Waste materials.

Nutrition: History of Nutrition, Nutrition as a science, Food groups, RDA, Balanced diet, diet planning, Assessment of nutritional status,

Energy: Units of energy, Measurements of energy
and value of food, Energy expenditure, Total energy/calorie requirement for different age groups and diseases, Satiety value, Energy imbalance- obesity, starvation, Limitations of the daily food
guide, Role of essential nutrients in the balanced diet

Textbooks:

Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by PrafulGhodkar
Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by PrafulGhodkar
Medical Laboratory Technology (Volume 1): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
Medical Laboratory Technology (Volume 2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
Medical Laboratory Technology (Volume 3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee

PRACTICALS

Course Title: GENERAL BIOCHEMISTRY PRACTICLE	
Semester: I	Credits:02

Introduction to Personnel protective equipments used in laboratory and their importance (LCD)
Handling of colorimeters – operation and maintenance (LCD)
Serum electrolytes measurement (only demo)
Demonstration of semi automated / fully automated blood analyser
Demonstration of tests for carbohydrates (Monosacchrides, disaccharides and polysaccharides) 6 Precipitation Reactions of protein (only demonstration)
Test on bile salts (only demonstration)
Tests on Normal constituents of Urin (only demo)
Tests on Abnormal constituents of Urin (only demo)

Course Title: GENERAL ANATOMY-I- Practical	
Semester : I	Credits:02

Practical
Demonstration of various parts of body
Demonstration of tissues of body
Demonstration of parts of digestive system
Demonstration of parts of respiratory system
Demonstration of parts of skin
Demonstration of parts of excretory system
Demonstrationofvariouspartsofcirculatorysystem(Demonstrationfrommodels)
Examination of blood film forvarious blood cells from stained slides
Blood pressure estimation

Course Title: GENERAL PHYSIOLOGY-I Practical	
Semester: I	Credits:02

Practical:demonstration/observation

Blood test: Microscope ,Haemocytometer
Blood,RBCcount,Hb,WBC count,Differential
Count,Hematocrit
demonstration,ESR,Blood group &
Rh.Type,Bleeding time and clotting time.

Digestion

Test salivary digestions

Excretion

Examination of Urine,Specific gravity,Albumin ,Sugar
Microscopic examination for cells and cysts

Respiratory System:

Clinical examination of respiratory system,Spirometry,Breath holding test

Cardio Vascular System:

Measurement of blood pressure and pulserate
Effect of exercise on blood pressure and pulse rate

ReferenceBooks:

CCC hatterjee's Human Physiology
CCC hatterjee's Practical Physiology for Paramedical Courses
CNC handra Shekhar's Manipal Manual of Medical Physiology
RK Maurya's Medical Physiology

Course Title: Introduction to Quality and Patient Safety- Theory	
Semester : I	Credits:03

Unit1

Quality assurance and Management

Introduction, Quality improvement approaches, standards and norms, quality improvement tools, introduction to NABH guidelines.

Unit2

Basic of Emergency care and Life support skills

Basic life support (BLS) following cardiac arrest, recognition of sudden cardiac arrest and activation of emergency response system, early cardiopulmonary resuscitation (CPR) and rapid defibrillation with an automated external defibrillator (AED)

Unit 3

Basic emergency care

First aid, choking, rescue breathing methods, ventilation including use of bag valve master (BVMs) Sterilization, Disinfection, Effective hand hygiene, use of PPE, Prevention and control of common health care associated infections, Guidelines (NABH) and JCI for hospital infection control.

Unit 4

Biomedical Waste Management

Definition, waste minimization, BMW-segregation, collection, transportation, treatment and disposal (Including color coding); Liquid BMW, Radioactive waste, metals/chemicals/drug waste, BMW management and methods of disinfection, use of Personal protective equipment

Course References

Turgeon, Mary Louise.(2015).ClinicalLaboratoryScience,7th ed. MarylandHeights, MO: Mosby

Course Title: Introduction to Healthcare	
Semester: I	Credits:02

Unit-1

Healthcare delivery system in India at primary, secondary and tertiary care
Community participation in health care delivery system
Health system in developed countries.
Private Sector

Unit-2

National Health Mission
National Health Policy
Issues in Health Care Delivery System in India
National Health Programme-Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.

Unit-3

Introduction to AYUSH system of medicine
Introduction to Ayurveda.
Yoga and Naturopathy
Unani
Siddha
Homeopathy
Need for integration of various system of medicine
Health scenario of India – past, present and future, Public health – India (epidemiology and demography)

Unit -4

Demography – its concept
Vital events of life & its impact on demography
Significance and recording of vital statistics
Census & its impact on health policy
Epidemiology
Principles of Epidemiology Natural History of disease Methods of Epidemiological studies
Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

Course Title: English & Communication Skills – Theory	
Semester: I	Credits:02

Unit-I

Basic Language Skills: Grammar and Usage.
Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.

UNIT-II

Basic concepts & principles of good communication
Special characteristics of health communication
Types & process of communication
Barriers of communication & how to overcome

UNIT-III

Soft Skills - with important sub-elements:
Communication Styles
Team work
Leadership Skills
Effective & Excellent Customer Service

UNIT-IV

Decision Making & Problem Solving
Managing Time and Pressures
Self-Management & Attitude

Suggested readings:

1. Effective Communication and Soft Skills by Nitin Bhatnagar Pearson Education India, 2011
2. Communication N Soft Skills Paperback – 2014 by Niraj Kumar, Chetan Srivastava

Course Title: Yoga– Practical - Theory	
Semester : I	Credits:03

Unit 1:

Preparatory Practices (Loosening & Warming Up) ,Sukshma Vyayama (Joint Movements – head to toe) ,Surya Namaskar (12-step classical form) ,Breathing synchronization with movement, Standing, sitting, and dynamic drills for flexibility

Unit 2:

Asanas (Yogic Postures),**Standing Asanas:** Tadasana, Vrikshasana, Trikonasana, Ardha Chakrasana and Utkatasana, **Sitting Asanas:** Padmasana, Vajrasana, Ardha Matsyendrasana, Baddha Konasana and Paschimottanasana

Unit 3

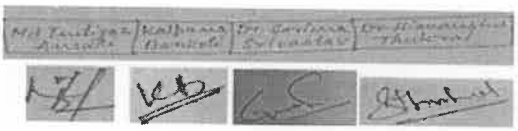
Prone Postures: Bhujang asana, Shalabh asana, Dhanur asana and Makar asana

Supine Postures: Pavanamuktasana asana, Setu Bandhasana, Hal asana, Sarvang asana and Shavasana

Unit 4

Pranayama (Breathing Practices)

Nadi Shodhana, Anulom Vilom, Bhastrika, Bhramari, Kapalabhati, Ujjayi, Sheetali & Sheetkari



Course Title: Human Rights &Professional Values	
Semester: I	Credits:02

Unit I

Background - Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights
Human rights at various level- Human Rights at Global Level UNO, **Instruments**: U.N. Commission for Human Rights, European Convention on Human Rights

Unit II

Human rights in India - Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman

Unit III

Human Rights Violations -Human Rights Violations against Women, Children, Violations against Minorities SC/ST and Trans-genders, Preventive Measures.
Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality

Unit IV

Personal values- ethical or moral values, Attitude and behavior- professional behavior, treating people equally
Code of conduct- professional accountability and responsibility, misconduct, Cultural issues in the healthcare environment

SEMESTER II

Course Title: General Anatomy-II- Theory	
Semester: II	**Credits:03**

Unit-1

Classification of nervous system Nerve- structure, classification, microscopy with examples. Neurons, classification with example Parts of a typical spinal nerve/Dermatome: Central nervous system - disposition, parts and functions Cerebrum, Cerebellum, Midbrain & brain stem Blood supply & anatomy of brain.

Unit 2

Spinal cord-anatomy, blood supply, nerve pathways Pyramidal, extra pyramidal system, Thalamus, hypothalamus, Structure and features of meninges Ventricles of brain, CSF circulation Development of nervous system & defects.

Unit -3

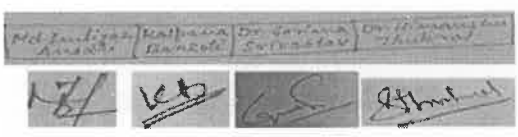
Cranial nerves -(course, distribution, functions and palsy) Sympathetic nervous system, its parts and components Parasympathetic nervous system Applied anatomy

Unit -4

Structure and function of Visual system, Auditory system, Gustatory system, Olfactory system, Somatic sensory system. Pelvic floor, innervations Kidney, Ureter, bladder, urethra. Reproductive system of male, Reproductive system of female.

Reference books:

Sampath Madhyastha's Manipal manual of anatomy forallied health sciences
Krishna Garg &MadhuJoshi's Practical anatomy workbook
Dixit's Atlas of Histology for Medical Students
Basic Histology : A Color Atlas &Text



Course Title: GENERAL PHYSIOLOGY-II- Theory	
Semester: II	Credits:03

Unit -1
PhysiologyofkidneyandurineformationGlomerularfiltrationrate,clearance, Tubular function, Ureter , bladder, urethra

Unit-2
Physiologyoftheendocrineglands-Hormonesse creted by these glands, their Classifications and function

Unit-3
Male-Functions of testes, pubertal changes in males, testosterone-action& regulations of secretion.

Unit 4
Female-Functionsofovariesanduterus, pubertal changes, menstrual cycle, estrogens and progesterone -action and regulation.

Reference Books:

CCC hatterjee's Human Physiology
CCC hatterjee's Practical Physiology for Paramedical Courses
CNC handrashekhar's Manipal Manual of MedicalPhysiology
RK Maurya's Medical Physiology

Course Title: General Microbiology Theory	
Semester: II	Credits:03

Unit 1

Concepts and Principles of Microbiology - Historical Perspective, Koch's Postulates, Importance of Microbiology, Microscopy, Classification of Microbes.
General Characters of Microbes - Morphology, staining methods, Bacterial growth & nutrition, Culture media and culture methods +ABS, Collection of specimen, transport and Processing, Antimicrobial mechanism and action, Drug Resistance minimization.

Unit 2

Sterilization and Disinfection - Concept of sterilization, Disinfection asepsis,Physical methods of Sterilization, Chemical methods (Disinfection), OT Sterlization, Biological waste and Biosafety & Biohazard.
Infection and Infection Control - Infection, Sources, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Hospital acquired infections & Hospital Infection Control
Immunity - Types Classification, Antigen, Antibody – Definition and types, Ag-Ab reactions – Types and examples, Procedure of Investigation & Confidentiality, Immunoprophylaris – Types of vaccines, cold chain, Immunization Schedule.

Unit 3

Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests) – Introduction, Gram Positive Cocci & Gram Negative Cocci, Enterobacteraecea& Gram negative bacilli, Mycobacteria, Anaerobic bacteria &Spirochaetes, Zoonotic diseases, Common Bacterial infections of eye.
Mycology - Introduction, Classification, outline of lab diagnosis, List of Fungi causing:Common fungal infections of eyes, Superficial Mycoses, Deep mycoses & opportunistic , Fungi.

Unit 4

Virology - Common Viral infection of eye, Introduction, General Properties, outline of lab diagnosis& Classification, HIV Virus, Hepatitis -B Virus.
Parasitology – Morphology, Life Cycle & Outline of Lab Diagnosis & Classification, Common parasite infection of eye, Protozoa- E, histolytica,Malarial Parasite, General properties, classification, list of diseases caused by:Cestodes and Trematodes, Intestinal Nematodes& Tissue Nematodes, Vectors.

Course Title: Basic Pathology & Hematology	
Semester: II	**Credits:03**

Unit 1

- Introduction to Pathology
- Working and maintenance of instruments
- General principles of Haematology techniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working

Unit 2

- General principles of Histopathology techniques collection, fixation, processing & routine staining
- General principles of Cytopathology techniques collection, fixation, processing & routine staining
- General principles of Clinical Pathology techniques sample collection, processing for routine test, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)
- General principles of Blood Bank techniques antigen, antibody, ABO & Rh system
- General principles of Autopsy & Museum

Unit 3

- **General Pathology including introduction to :**
- I)Cell Injury (Reversible, Irreversible cell injury)
- II)Inflammation(Acute inflammation, cells, Chronic inflammation, granuloma and
- Examples
- III)Circulatory disturbances(Thrombosis, Embolism ,Edema- ascetic, pleural, pericardial- effusions, Shock, Allergy, Anaphylaxis-Definition, Morphological features, And distinguishing features)
- IV)Neoplasia (Definition of Anaplasia, dysplasia, metaplasia and metastasis and difference between benign and malignant lesions)

Unit 4

- **Systemic pathology basis and morphology of common disorders like** I)Anemia(types-Iron deficiency, megaloblastic, Aplastic-Etiology, Pathogenesis Investigation)-
- II)Leukemia (Acute and chronic, Peripheral smear), AIDS(Definition, Pathogenesis, Mode of transmission, Two Confirmatory test Tridot, Western blot), Hepatitis (Types, Etiology, Mode of spread)
- III)Malaria-(Mode of spread
- IV)Tuberculosis-(Primary and secondary tb, Granuloma formation, Mode of transmission, Organs involved
- Maintenance and medico legal importance of records and specimens, Lab information system (LIMS)
- Biomedical Waste, Universal Safety Precaution (Protocol to be followed after -Needle injury, chemical injury

Course Title: General Anatomy-II- Practical	
Semester: II	**Credits:02**

ANATOMYPRACTICAL

Identification and description of all anatomical structures.

Demonstration of dissected parts

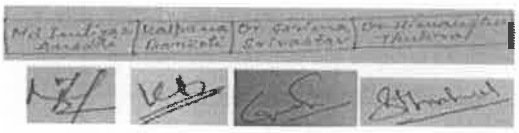
Demonstration of skeleton-articulated and disarticulated.

Surface anatomy: Surface and mark-bony, muscular and ligamentous .Surface anatomy of major nerves, arteries of the limbs.

Reference books:
Sampath Madhyastha's Manipal of anatomy for allied health sciences
Krishna Garg &MadhuJoshi's Practical anatomy workbook
Jana's Exam Oriented Practical Anatomy

Course Title: GENERAL PHYSIOLOGY-II- Practical	
Semester: II	**Credits:02**

PRACTICAL:
To study circulatory system from charts and transverse section (TS) of artery and vein from permanent slides.
To study digestive system from charts and TS of liver, spleen and pancreas from permanent slides.
Study of Urinary system(charts)
Study of Genital system (male &female) from charts and TS of test is and ovary from permanent slides.
To study nervous system (From models/charts)
To study various body fluids.
Other practical's based on the theory paper.



Course Title: General Microbiology Practical	
Semester: II	**Credits:02**

Concepts and Principles of Microbiology
General Characters of Microbes
Sterilization and Disinfection
Infection and Infection Control
Immunity
Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory test)
Mycology
Virology
Parasitology

Text Book:
1. Text Book of Microbiology for Nursing Students, AnantNarayanPanikar 2. Text Book of Ophthalmology, Khurana
Reference Book:
1. Text Book of Microbiology, Baveja.

Course Title: Basic Pathology & Hematology– Practical	
Semester: II	**Credits:02**

- Working and maintenance of instruments,
- General principles of Haematology techniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working
- General principles of Histopathology techniques collection, fixation, processing
- & routine staining
- General principles of Cytopathology techniques collection, fixation, processing & routine staining
- General principles of Clinical Pathology techniques sample collection, processing for routine test, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)
- General principles of Blood Bank techniques antigen, antibody, ABO & Rh system
- General principles of Autopsy & Museum

Reference Books:

1. A *Handbook of Medical* Laboratory (Lab) Technology: *Editor*) *Second Edition. V.H. Talib* (Ed.).
2. Comprehensive Textbook Of Pathology For Nursing: Pathology Clinical Pathology Genetics. Ak Mandal Shramana Choudhury, Published by Avichal Publishing Compnay | Language English
3. Textbook of Medical Laboratory Technology- PrafulB. Godkar, Darshan P. Godkar
4. Medical Laboratory Technology. Methods and Interpretations – RamnikSood (volume 1&2)

Course Title: Organizational Behavior– Theory	
Semester :II	Credits:02

Unit I

Organizational Behavior - Definition - Importance - Historical Background - Fundamental concepts of OB - 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive

Unit II

Organization Structure and Design - Authority and Responsibility Relationships - Delegation of Authority and Decentralization - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organizational design - Mechanistic vs Adoptive Structures – Formal and Informal Organization

Unit III

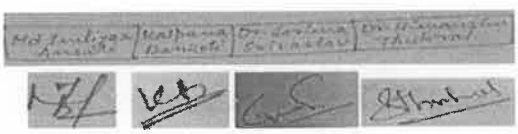
Perception Process - Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception - Impression Management

Learning - Process of Learning - Principles of Learning - Organizational Reward Systems - Behavioral Management

Unit IV

Motivation - Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity – Morale Indicators

Leadership - Definition - Importance - Leadership Styles - Models and Theories of Leadership Styles



Course Title: Principals of Management – Theory	
Semester :II	Credits:02

Unit-I
Introduction to management
Strategic Management
Foundations of Planning
Management processing hospital and health care department
Legal and ethical aspect of health care management

Unit-II
Planning Tools and Techniques
Decision Making, conflict and stress management
Managing Change and Innovation
Supervision and guidance of staffing
Conflict management

Unit-III
Understanding Groups and Teams
Leadership
Time Management
Cost and efficiency
Recruitment and selection of staffing(tanning and development)

Unit-IV
Evolution of management theories classical behavioral and modern
Levels and types of management
Roles and responsibilities of a manager.
Meaning and importance of planning (steps in planning process)
Importance of staffing in organization

Course Title: Basic Computers and Information Science – Theory	
Semester: II	**Credits:02**

Unit-I

1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. Processor and memory: The Central Processing Unit (CPU), main memory.

Unit-II

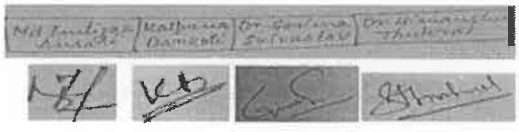
1. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices. 5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
2. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

Unit-III

1. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
2. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
3. Introduction of Operating System: introduction, operating system concepts, types of operating system.

Unit IV

1. Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
2. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
3. Application of Computers in clinical settings.



Course Title: Medical Transcription	
Semester : II	Credits:02

Unit-I
Introduction to Transcription
Role of transcriptionists in Cardiac Care departments
Introduction to Cardiac Care workflow and reporting formats
Familiarity with PACS/RIS systems and dictation software

Unit-II
Cardiac Care Terminology Practice
Basic anatomy of heart
Common pathologies in heart
Proofreading and Error Correction
Common transcription errors in reports
Medical abbreviations (e.g., H/O, R/O, N/C, NAD, C/O)
Spell-checking tools and error-flagging conventions

Unit-III
Typing & Listening Skills
Typing practice with real dictations
Accent training (Indian, American, British cardiologist)
Listening and transcribing from noisy, fast, or unclear audio
Voice Recognition Editing
Editing reports generated by voice recognition (Dragon, Nuance)

Unit-V
Report Formatting and Style
Standard formatting for:
Header (Patient ID, Date, Referring Physician)
Body (Findings, Impression)
cardiologist-preferred terminology and style
Difference between Findings and Impressions
Identifying software misinterpretations and correcting them
Blending manual and AI-assisted transcription

SEMESTER III

Course Title: Applied Anatomy, Physiology, Pharmacology in Cardiac care	
Semester : III	Credits:03

UNIT 1

ANATOMY OF CARDIOVASCULAR SYSTEM:
arterioles, Anatomy of Aorta, Capillaries and sinusoids, Anastomoses, Veins and venules, Anatomy of Coronary arteries: Left and Right
PHYSIOLOGY OF CARDIOVASCULAR SYSTEM: Physiology of Aorta, Physiology of Carotid Bifurcation, Systemic, Pulmonary, Coronary and Portal circulation, Nerve supply of the heart, Major Arteries and Veins supplying Head, Neck and Thorax, Major Arteries and Veins of Upper limb, Major Arteries and Veins of Pelvis and Lower Limb. 6

UNIT 2

ANATOMY OF HEART: Surface anatomy of heart, Structure of the heart, Surface and Borders, Pericardium, Myocardium and Endocardium, Chambers: Right Atrium (Venous Area, Septum, Atrial Appendage), Right ventricle: (Inflow, Atrial Sinus, Outflow), Left Atrium (Venous, Ventricular Septum, Appendage, MV), Left Ventricle (Inflow, Body, Outflow), Anatomy of SA node and AV node, Anatomy of Cardiac Valves: Eustachian, Thebesian, A-V Valves, Semilunar Valves, Valve Apparatus
BLOOD VESSELS AND HEMODYNAMICS: Regulation of Blood pressure: Hormonal and Neural regulation, Pulse and sites for pulse assessment, Shock and Homeostasis, 4
CLINICAL PATHOLOGIES IN PHYSIOLOGY OF CVS: Coronary Artery Disease (CAD), Congestive Heart Failure (CHF), and Atherosclerosis, Shock and Hemorrhage, Syncope, Hypertension.

UNIT 3

GENERAL PHARMACOLOGY: Sources of drugs, Route of drug administration, Pharmacokinetics, Pharmacodynamics, First pass metabolism, Adverse drug reactions 8
DRUGS USED IN CARDIOVASCULAR SYSTEM (with its MOA, ADRs, Indications and complications): Anti-Hypertensives, Anti- Anginal Agents, Anti-
Failure Agents, Anti-Arrhythmic Agents, Antithrombotic Agents

UNIT 4

DRUGS USED IN NERVOUS SYSTEM (with its MOA, ADRs, Indications and complications):
Anticholinergics & Adrenergic, Narcotics, Sedatives & Hypnotics 6
MISCELLANEOUS: IV Fluids, Neuromuscular blockers, Electrolyte supplements, Antihistamines, Protamine, Emergency drugs- Atropine, Adrenaline, Steroids, Sodium bicarbonate

Recommended Learning Resources: Text Books: 1. Textbook of Anatomy (Vol.1,2,3): B.D. Chaurasia
2. Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and Allison Grant
3. Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora& Bryan Derrickson
4. Textbook of Physiology (Vol.1,2): Dr. A.K. Jain
5. Essentials of Medical Physiology, Sixth Edition by K Sembulingam and PremaSembulingam
6. Physical Examination of the Heart and Circulation, Fourth Edition by Joseph K. Perloff

Course Title: Basic Electrocardiography		
Semester : III	Credits:03	I Core

UNIT 1

BASIC ELECTROPHYSIOLOGY: Heart: An electrical field, Electrical and Mechanical properties of the heart, Cardiac electrical field generation during activation, Cardiac wave fronts - Action potential: Repolarization and Depolarization, Cardiac electrical field generation during ventricular recovery, Conduction system of the heart

BASICS OF ELECTRODE PLACEMENT AND LEAD SELECTION AND AXIS DEVIATION: Basics of Electrodes and Leads, ECG deflections: Isoelectric, Upright, Negative and Biphasic, Types of ECG leads- Standard limb leads, Precordial leads and the Wisdom central, Augmented limb leads, Unipolar V/S Bipolar leads, Placement of leads with universal color code, Hexa-axial reference frame and Electrical axis, X axis – time presentation, Y axis – voltage presentation, Right & Left axis in normal ECG, Einthoven's Triangle, Deviation of Axis.

UNIT 2

BASICS OF STRESS TEST: Protocols, lead placement, instruction to the patient, rhythm analysis.

ECG COMPONENTS-WAVES AND INTERVALS: ECG waveforms: Rate, Rhythm and Normal time intervals-The Normal Electrocardiogram, The Normal P wave & Atrial repolarization, Atrioventricular node conduction and the PR segment, Ventricular activation and the QRS complex, Genesis of QRS complex, Ventricular recovery and ST-T wave, Normal variants and Rotation of the heart, ECG PAPER,Rate measurement: Six second method, Large box method, Small box method

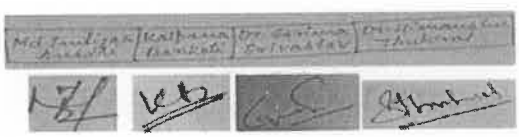
UNIT 3

SINUS RHYTHMS & ATRIOVENTRICULAR BLOCKS (Description, Possible causes, ECG criteria, Plan of assessment, Potential treatments): Normal Sinus Rhythm, Sinus Bradycardia, Sinus Tachycardia, 1st Degree AV block, 2nd Degree AVblock: Type-I or Mobitz-I, 2nd Degree AV block: Type-II or Mobitz-II, 3rd Degree AV block/ CHB

BASICS OF ECG INTERPRETATION: Basic steps for interpretation- Rate, Rhythm, P-wave examination, P to R interval, QRS width, Rhythm interpretation

UNIT 4

ATRIAL & VENTRICULAR ARRHYTHMIAS (Description, Possible causes, ECG criteria, Plan of assessment, Potential treatments): Premature Atrial Contractions (PACs), Atrial Flutter (AF), Atrial Fibrillation (A. Fib), Paroxysmal Atrial Tachycardia, Premature Ventricular Contractions (PVCs), Ventricular Tachycardia (V. Tach), Supraventricular Tachycardia (SVT), Ventricular Fibrillation (V. Fib), Asystole



Course Title: Basic Echocardiography	
Semester : III	Credits:02

UNIT 1

INTRODUCTION TO ECHOCARDIOGRAPHY: Basics Of Ultrasound Waves, Characteristics Of: Sound Wave, Frequency And Attenuation, Basic Principle Of Echocardiography, Indications Of Echocardiography, Types Of Echocardiography, Importance Of Gel In Echocardiography
MURMURS: Types Of Murmurs Heard In Echocardiography- Systolic And Diastolic Murmurs, Possible Causes Of Murmurs, Conditions Associated With Murmurs, Features Of Murmurs Suggesting Echocardiography
ECHOCARDIOGRAPHY TECHNIQUES: BASIC PRINCIPLES, INDICATIONS AND USES OF: 2D Transthoracic Echocardiography, M-Mode, Echo Windows And Views Used
In Transthoracic Echocardiography, Doppler Echocardiography In Detail: Pulsed, Continuous Wave And Color Flow Mapping

UNIT 2

KNOBOLOGY AND INSTRUMENTATION: Transducer: Basic Principle And Working, Types Of Transducers, Piezoelectric Crystals And Its Effect, Various Knobs Used On Echo
Machine With Its Description And Application
CARDIAC ASSESSMENT: Measurement Of Cardiac Dimensions, Basics Of: Evaluation Of Systolic And Diastolic Left Ventricular Function, Ejection Fraction, Fractional Shortening, Regional Wall Motion Abnormalities: Classification, Stroke Volume And Cardiac Output Assessment, Transvalvular Gradients And Orifice Area
DOPPLER EFFECT: Basics Of Doppler, Applications Of Doppler, Types Of Doppler, Continuity Equation

UNIT 3

ECHOCARDIOGRAPHY ASSESSMENT IN VALVULAR HEART DISEASE: Role Of Echo In Assessment Of Valvular Heart Diseases, 2D Findings, Doppler Calculations, M-Mode Findings And Views Seen In: Mitral Regurgitation, Mitral Stenosis With Different Types Of M-Mode Pattern, Mitral Valve Prolapse, Aortic Regurgitation, Aortic Stenosis: Types Of AS, Infective Endocarditis, Tricuspid Regurgitation, Tricuspid Stenosis, Pulmonary Regurgitation Pulmonary Stenosis
BASICS OF TOE, STRESS ECHO &CONTRAST ECHO: Advantages & Disadvantages,
Applications, Indications &Contraindications, Complications, Patient Positioning And Medications Used
ECHO IN SPECIAL HOSPITAL SETTINGS: Clinical Uses Of Echocardiography In: Preoperative Cases, Intraoperative Cases, Intensive Care Unit (ICU), Coronary Care Unit (CCU), Cardiac Catheterization Laboratory (CCL), Accident &Emergency (A&E) Department, Portable (Hand-Held) Echo.

UNIT4

ECHO ASSESSMENT IN CAD: Assessment Of Ischemia, Assessment Of Myocardial Infarction, Complications Of MI Detection By Echo, Myocardial Hibernation
ARTIFICIAL (PROSTHETIC) VALVES: Basics Of Artificial Valves, Types Of Artificial Valves, Echo Examination Of Prosthetic Valve, Basics Of Prosthetic Valve Malfunction, Echo
Assessment Of: Endocarditis, Thrombus, Dehiscence, Regurgitation, Variance, Degeneration
HYPERTENSION AND LVH: Indications For Echo In Hypertension, Echo Findings In
Hypertension, Left Ventricular Hypertrophy: Echo Findings
SCREENING AND FOLLOW-UP ECHO: Good Indications For Screening Echo, Less Clear-Cut Indications For Screening Echo, Follow-Up Echo

Course Title: Basic Electrocardiography- Practical	
Semester : III	Credits:02

Steps to perform an ECG
Patient positioning according to various conditions.
Proper communication with patient to find out the history
ECG machine operating and maintenance
Maintain ECG catalogue for self-assessment
Common errors in ECG recording

Recommended Learning Resources:
Text Books: 1. ECG Made Easy –AtulLuthra 2. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test 3. An Introduction to Electrocardiography:Schamroth Colin 4. Clinical Electrocardiography: Goldberger. A

Course Title: Basic Echocardiography- Practical		
Semester : III	Credits:02	I Core

Learn about Probe and Scanner settings.
Learn about Structural and Functional assessment of the heart.
Learn about various windows and views used in Echocardiography.
Learn about qualitative reporting system along with various
software's associated with Echo reporting

Recommended Text Books:
1. Echo Made Easy: Sam Kaddoura
2. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
3. Feigen Baum's Echocardiography
4. Tajik Jamil for Echocardiography.

Course Title: Environmental Science- Theory	
Semester: III	**Credits:02**

Unit 1

Fundamentals of Environmental Science
Scope, importance, and multidisciplinary nature
Concepts of sustainability and sustainable development
Ecosystems: Structure, function, energy flow, food chains/webs, ecological succession
Types of ecosystems: Forest, grassland, desert, aquatic

Unit 2

Natural Resources and Biodiversity
Land, water, forest, energy resources: Use, exploitation, and conservation
Biodiversity: Levels, hotspots, threats (habitat loss, poaching, invasive species)
Conservation strategies: In-situ and ex-situ methods
India's biodiversity and biogeographic zones

Unit 3

Environmental Pollution and Waste Management
Air, water, soil, noise, nuclear pollution: Causes, effects, control
Solid waste management: Urban, industrial, biomedical waste
Case studies on pollution and mitigation
Role of technology and individuals in pollution control

Unit 4

Environmental Policy, Human Impact & Sustainable Practices
Environmental legislation: EPA 1986, Air & Water Acts, Forest Conservation Act
International conventions: Montreal Protocol, Kyoto Protocol, CBD
Environmental movements in India (e.g., Chipko, Narmada Bachao)
Disaster management and urban environmental issues
Role of NGOs, media, and public awareness

Course Title: Medical Terminology and Record Keeping - Theory	
Semester: III	Credits:02

Unit-I

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals.

Unit-II

1. Basic medical terms.
2. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
3. Interpret basic medical abbreviations/symbols.

Unit-III

1.Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.

Unit-IV

1. Interpret medical orders/reports.
2. Data entry and management on electronic health record system

Course Title: Basic Computers and Information Science - Practical	
Semester: III	**Credits:02**

1. Computer Basics and File Management
2. Introduction to computer hardware and software
3. Operating systems: Basic operations (Windows/Linux)
4. File and folder management: Creating, saving, copying, renaming, deleting
5. Basic troubleshooting and computer safety practices
6. Creating and editing documents using MS Word / Google Docs
7. Text formatting: Font styles, sizes, colors, alignment, bullets, numbering
8. Inserting tables, images, headers, footers, page numbers
9. Page setup and printing
10. Creating worksheets using MS Excel / Google Sheets
11. Entering and formatting data
12. Basic formulas and functions (SUM, AVERAGE, MAX, MIN)
13. Creating simple charts (bar, pie, line)
14. Sorting and filtering data
15. Presentations, Internet, and Email
16. Creating and designing slides using PowerPoint / Google Slides
17. Adding text, images, animations, and transitions
18. Introduction to internet browsing and search techniques
19. Creating and using email accounts (Gmail/Outlook)
20. Attaching files and understanding online safety

Semester IV

Course Title:Development of Cardiovascular system fetal &Neonatal	
Semester: IV	Credits:03

Unit 1

EARLY DEVELOPMENT OF EMBRYO: Early development of embryo, Early blood vessel formation, Intra-embryonic blood vessel, Extra-embryonic blood vessel
DEVELOPMENT OF THE HEART: Formation and position of the heart tube, Formation and position of the heart loop, Mechanism of cardiac looping, Formation of the embryonic ventricle, Development of the sinus venosus, Formation of the cardiac septa, Atrial septation, The atrio-ventricular canal, The muscular interventricular septum, The septum in truncus arteriosus and the cordis conus

Unit 2

FORMATION OF THE CARDIAC VALVES: Formation of the cardiac valves, The atrioventricular valve, The semilunar valve.
FORMATION OF THE GREAT SYSTEMIC VEINS: The cardiac veins, The vitelline veins, The umbilical veins, The vena cava

Unit 3

FETAL & NEONATAL CIRCULATION: Blood flow pattern, oxygenation &venous return to the heart, Cardiac output and its distribution, Intra - cardiac vascular pressure, Myocardial function & its energy metabolism
CHARACTERISTICS OF FETAL CIRCULATION AND CHANGES OCCUR AT BIRTH: Postnatal circulation in detail

Unit 4

ETIOLOGY OF CARDIOVASCULAR MALFORMATION: Congenital anomalies in detail
ADULT CIRCULATION: Systemic Circulation, Pulmonary Circulation

Recommended Learning Resources:
Text Books: 1. Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and Allison Grant
2. Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora& Bryan Derrickson
3. Human Embryology; Inderbir Singh

Course Title: Cardiovascular Diseases Pertinent to Cardiac Care Technology	
Semester: IV	Credits:04

UNIT 1

VALVULAR HEART DISEASE: Acquired Valvular heart disease, **Rheumatic fever and Rheumatic heart disease:** Aortic stenosis, Aortic regurgitation, Mitral valve disease, Mitral stenosis, Mitral regulation, Combined valvular heart disease, Tricuspid valve disease, Infective endocarditis
CORONARY ARTERY DISEASE: Pathophysiology and clinical recognitionof Angina Pectoris, Pathophysiology of Coronary Artery Disease, Myocardial Infarction, Treatment for Coronary Artery Disease

UNIT 2

HYPERTENSION: Etiology of Hypertension, Systemic hypertension, Essential and secondary hypertension, Treatment for hypertension, DASH diet, Pulmonary Hypertension, Pulmonary thrombo-embolism
HEART FAILURE: Types of Heart failure- Left, Right, Biventricular, Acute Decompensated Heart Failure, Pathophysiology of Heart failure, Causes, Signs and symptoms, Medical management, Surgical treatment
MYOCARDIAL DISEASES: Dilated cardiomyopathy, Hypertrophic cardiomyopathy, Restrictive cardiomyopathy, Myocarditis

UNIT 3

CONGENITAL HEART DISEASES: Acyanotic heart disease -Atrial septal defect (ASD), Ventricular septal defect (VSD), Patent ductus arteriosus (PDA), Coarctation of Aorta (CoA), **Cyanotic congenital heart disease** - Tetralogy of Fallot (TOF), Double Outlet Right Ventricle
(DORV), Pulmonary Atresia, Transposition of Great Arteries (TGA), Total Anomalous Pulmonary Venous Connection (TAPVC)

UNIT 4

PERICARDIAL DISEASES: Pericardial effusion, Constrictive pericarditis, Cardiac tamponade, Pericardiocentesis
PERIPHERAL VASCULAR DISEASE: Atherosclerotic peripheral vascular disease, Aortic aneurysms, Aortic dissection, Takayasus arthritis
CARDIAC ARREST: Classification, 6 H's and 6 T's, Signs and Symptoms, Diagnosis, Treatment.
COPD: Causes,Stages of COPD (Stage 1-4),Signs and Symptoms, Diagnosis, Treatment: Medication, Dietary changes, Lifestyle changes

Recommended Learning Resources:
Text Books: 1. Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and
Allison Grant 2. Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora& Bryan Derrickson 3. Essentials of Medical Physiology, Sixth Edition by K Sembulingam and Prema Sembulingam 4. Physical Examination of the Heart and Circulation, Fourth Edition by Joseph K. Perloff

Course Title: Medical Instrumentation relevant to Cardiac Care	
Semester: IV	Credits:03

UNIT I

INTRODUCTION TO MEDICAL PHYSICS: Basics, Indications, Outcome, Machines related to Medical Physics.

UNIT II

ELECTRO – PHYSIOLOGICAL MEASUREMENTS: Electrodes – Limb electrodes, floating electrodes, pregelled disposable electrodes, Microneedle and surface electrodes, ECG: Lead systems and recording methods, Typical waveforms, Electrical safety in medical environment: shock hazards, leakage current, Instruments for checking safety parameters of biomedical equipment, Transducers:selection criteria, Piezo electric ultrasonic transducers.

UNIT III

NON-ELECTRICAL PARAMETER MEASUREMENTS: Measurement of blood pressure, Cardiac output, Stethoscope: Heart rate, Heart sound, ACT, Pulmonary function measurements – Spirometer, Photo Plethysmography, Body Plethysmography, Blood Gas analyzers: pH of blood, measurement of blood pCO_2, pO_2, finger-tip oximeter - ESR, GSR measurements.

UNIT IV

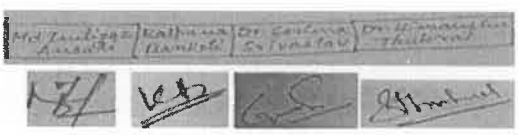
ASSISTING AND THERAPEUTIC EQUIPMENTS: Types of Pacemakers, Types of Defibrillators, Ventilators-Types of Ventilators
MEDICAL IMAGING: C-Arm, Coronary Computer tomography & MRI, TLD, Radiographic and fluoroscopic techniques: Echocardiography: TTE, TEE, Stress Echo, Coronary Angiography, PTCA

Course Title: Medical Instrumentation relevant to Cardiac Care – Practical	
Semester: IV	**Credits:02**

1ECG Machine
2 Stress Test Machine
3 Patient monitor
4 Central Monitoring System
5 Sphygmomanometer
6 Pulse Oximeter
7 Stethoscope
8 Defibrillators
9 Pressure transducers
10 Techniques of monitoring radiation exposure

Recommended Learning Resources:
Text Books:
R. S. Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co Ltd.,2003. 2. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II edition, Pearson Education, 2002 / PHI

Reference books or related websites: 1. M. Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003. 2. L.A. Geddes and L.E. Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley & Sons, 1975. 3. J. Webster, 'Medical Instrumentation', John Wiley & Sons, 1995. 4. C. Rajarao and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities press (India) Ltd, Orient Longman ltd, 2000.



Course Title : Medical Law and Ethics - Theory	
Semester: IV	Credits:02

Unit-I

1. Medical ethics - Definition - Goal - Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality

Unit-II

1. Malpractice and negligence - Rational and irrational drug therapy
2. Autonomy and informed consent - Right of patients
3. Care of the terminally ill- Euthanasia

Unit-III

1. Organ transplantation
2. 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 - other various aspects.

Unit-IV

1. Professional Indemnity insurance policy
2. Development of standardized protocol to avoid near miss or sentinel events
3. Obtaining an informed consent

Course Title: Critical pathology Correlation - Theory	
Semester: IV	Credits:02

Unit-I

Introduction and classification of critical pathologies

Definition and scope of critical pathologies, importance in clinical diagnosis, role of technologist and pathologist in the critical care.

Correlation of critical and pathological data

Clinical history and interpretation of patient, laboratory data, imaging data and other ,clinical presentation.

Unit-II

Classification: Congenital, Inflammatory, Neoplastic, Degenerative, Traumatic

Terminologies: Lesion, Mass, Infiltrate etc .

Mechanisms of Disease

Cellular injury, inflammation, infection, tumor formation

How pathologies alter normal anatomy in imaging

Unit-III

Hematological disorders

Definition and classification of anemia's, lab diagnosis of anemia,

Definition and classification of leukemia's and lymphomas

Coagulopathies (DIC), thrombocytopenia, thrombocytosis, infection and sepsis.

Definition and types of pathogens in critical conditions, sepsis markers (CRP, procalcitonine)Histopathological features in severe infection

Unit IV

Cardiovascular pathologies (myocardial infarction, endocarditic and myocarditis, pulmonary embolism)

Respiratory system pathologies (pneumonia, ARDS,TB , pulmonary neoplasm's)

Renal pathologies (acute and chronic renal failure, glomerulonephritis, urinary analysis and biopsy correlation,)

Hepatic and GI pathologies (cirrhosis, hepatitis, acute and chronic pancreatitis, GI bleeding)

oncopathologies(correlation of tumor markers with pathology, biopsy interpretation in critical cases, staging and grading system)

Course Title: Professionalism and Values	
Semester: IV	Credits:02

UNIT – I

Definition and concept of professionalism, characteristics and importance of professionalism in health care system.

Accountability and responsibility, definition and significance of ethics.

Principle of medical ethics, ethical dilemmas in health care practice, respect for patients colleague and diversities.

Team work and cooperation

UNIT-II

Attitude and behavior- professional behavior, treating people equally

Code of conduct, professional accountability and responsibility, misconduct

Verbal and non verbal communication, active listening and empathy in communication , dealing with patients families and co-workers, handling conflict and criticism professionalism

UNIT-III

Dress code and hygiene, punctuality and discipline, positive attitude and work place etiquette, maintaining boundaries and avoiding misconduct, code of conduct in health care system , reporting error and maintaining records, regulatory bodies and licensing

UNIT-IV

Service mindedness and social responsibilities, patient centered acre approach copping with stress and burnt out altruism and lifelong learning, real life studies and role plays, maintaining professionalism under pressure, reflection and self assessment

Adapting to change and technology in health care system

SEMESTER V

Course Title: Advance Electrocardiography	
Semester: V	Credits:03

UNIT 1

ANATOMY OF THE CONDUCTION SYSTEM &BASICS OF ELECTROPHYSIOLOGY:SA node, AV node, Internodal and Inter-atrial conduction, Bundle branches, History, Equipment used, Procedure, Resting interval measurements, Management of Arrhythmias by EP study

UNIT 2

GENESIS OF CARDIAC ARRHYTHMIAS AND MANAGEMENT: Various Mechanisms of Arrhythmogenesis & disorders of impulse formation: Artifacts, Electrical interference, Somatic tremor, Wandering baseline, Ant arrhythmic agents class I, class II, class III, class IV, Implantable electric devices for treatment of cardiac arrhythmias, Ablation theory for cardiac arrhythmias: Basic

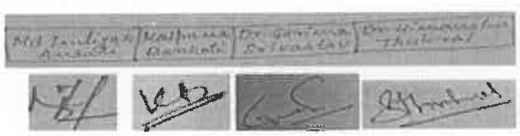
ECG IN ISCHEMIC HEART DIESEASE: Coronary events and ECG, ECG changes in IHD and Myocardial Infarction, Investigations: Stress test- Indications, Contraindications, Pre-test probability, Exercise Protocols, Interpretation of reports

UNIT 3

DISORDERS OF IMPULSE CONDUCTION: Reentry mechanism, Tachycardia's caused by reentry, Electrical remodeling of atria, Sinus reentry, Atrial reentry, AV node reentry, Pre-excitation syndrome, Ventricular tachycardia caused by
reentry, PACEMAKERS: Types of Pacemakers, Components of Pacemaker, Single and Double Timing cycles, Pacemaker Troubleshooting

UNIT 4

CARDIAC PACING & RADIOFREQUENCY ABLATION THERAPY: Indications, Temporary and Permanent Pacing, NBG codes, Types of Pacing, Complications, Common sites of Ablation, Management of A. Flutter, V. Tach, A. Fib, AVNRT



Course Title: Advanced Echocardiography	
Semester: V	Credits:03

UNIT 1

HEART FAILURE, MYOCARDIUM AND PERICARDIUM: Heart failure, Assessment of LV systolic function, Coronary Artery Disease, Cardiomyopathies and Myocarditis, Diastolic function, Right heart and lungs, Long-axis function, Pericardial disease, Device therapy for heart failure – Cardiac Resynchronization Therapy
TRANSESOPHAGEAL ECHOCARDIOGRAPHY: Standard views used in TOE, Indications for TOE, Advantages and Disadvantages of TOE, Patient preparation and care during TOE, Uses of TOE, Contraindications to TOE, Complications of TOE,

UNIT 2

CARDIAC MASSES, INFECTION AND CONGENITAL ABNORMALITIES: Cardiac masses - Tumors (primary or secondary), Thrombus, Infected material (vegetation or abscess), Congenital Abnormalities- Shunts: ASD, VSD, PFO, Coarctation of the aorta, Congenital valvular abnormalities- Ebstein's Anomaly, Pulmonary Stenosis, Bicuspid Aortic valve.

UNIT3

SPECIAL SITUATIONS AND CONDITIONS: Pregnancy, Rhythm disturbances: A. Fib, V. Fib, Syncope, Palpitations, LVH, Stroke, TIA and Thromboembolism, Breathlessness and Peripheral edema

UNIT 4

ECHO ABNORMALITIES IN SOME SYSTEMIC DISEASES AND CONDITIONS: HIV infection and AIDS, Chagas' disease, Lyme disease, Rheumatic heart disease, Obesity
RECENT ADVANCES IN ECHOCARDIOGRAPHY: 3D Echo, 4D Echo, Tissue Doppler Imaging

Course Title: Invasive Cardiology	
Semester: V	Credits:04

UNIT 1

CONTRAST MEDIA: Basics, Definition of Hydrophilicity, Osmolarity, and Viscosity, Contrast Agents used in the CCL, Uses, Complications, Contrast medium reactions: Mild, Moderate, Severe, Allergies: Anaphylactic and Anaphylactoid Reaction, Contrast-Induced Nephropathy (CIN)
HEMODYNAMICS: Introduction to Hemodynamics, Pressure Measurement System, Sources of Error and Artifacts: Fluid Artifacts, Electronic and Electrical Artifacts, Human Error: Leveling and Balancing, Slope calibration, Hemodynamic waveforms, Gradient, Valve Area Calculations, Cardiac output formulas- Fick, Ejection fraction
IVUS: History, Angiography vs. IVUS, IVUS systems, Diagnostic Applications of IVUS, Complications of IVUS, Optical Coherence Tomography (OCT)

UNIT 2

FUNCTIONAL ASSESSMENT OF CORONARY DISEASE: Intravascular Pressure Measurement: Coronary Pressures and Fractional Flow Reserve
PTCA: History, Indications, Materials used, Types of Angioplasty balloons (OTW, SOE, Fixed-wire balloons, Perfusion balloons, Compliant and Non-Compliant balloons, Stent Implantation, Contraindications, Complications
IC HARDWARES: Stents: Composition, Types, Guidewires: Composition, Types, Catheters: Diagnostic and Guiding

UNIT 3

IABP AND OTHER CARDIAC ASSIST DEVICES: IABP- Physiologic Principles of Counter pulsation, Indications, Contraindications, Insertion, Timing: Timing errors, Troubleshooting, Weaning and Balloon Removal, Complications, Basics of Percutaneous ventricular assist devices: Tandem Heart, Impella, Percutaneous Coronary Bypass

PERIPHERAL CAROTID ANGIOGRAPHY: Introduction, Cerebrovascular Anatomy and pathology, Diagnosis and patient selection, Patient preparation Diagnostic procedure,.Post procedure Care.

UNIT 4

CARDIAC PHARMACOLOGY: Local Anesthetics, Analgesics And Sedatives: Opioids, Morphine, Fentanyl, Diazepam, Midazolam, Lorazepam, Vasodilators: Nitroglycerine, Sodium Nitroprusside, Beta receptor blockers: Metoprolol, Propranolol, Esmolol, Labetalol, Calcium Channel Blockers: Diltiazem, Verapamil, Nicardipine, Anticoagulation Agents: Platelet Aggregation Inhibitors, Aspirin, Clopidogrel, Glycoprotein IIb/IIIa Inhibitors, Tirofiban, Heparin, Warfarin, Thrombolytics: Streptokinase, Urokinase, Anistreplase, rTPA, Reteplase, Tenecteplase
RECENT ADVANCES IN INVASIVE CARDIOLOGY

Recommended Text Books:
Invasive Cardiology, 3rd Edition by Sandy Watson.
Reference books or related websites:
The Interventional Cardiac Catheterization Handbook, 3rd Edition By Mortonj. Kern

Course Title: Advance Electrocardiography- Practical	
Semester: V	**Credits:02**

Learn about 12-lead ECG
Learn about various software's associated with ECG.
Learn various conditions indicated for Electrocardiography

Course Title: Advanced Echocardiography - Practical	
Semester: V	**Credits:02**

Learn about advance Echo settings.
Learn about qualitative reporting system along with various software's associated with Echo reporting.
Learn various conditions indicated for Echocardiography

Recommended Text Books:

1. Echo Made Easy: Sam Kaddoura
2. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
3. Feigen Baum's Echocardiography
4. Tajik Jamil for Echocardiography.

Course Title: Hospital Waste Management - Theory	
Semester: V	Credits:02

UNIT-I

Introduction to healthcare delivery system
Healthcare delivery system in India at primary, secondary and tertiary care
Community participation in healthcare delivery system
Health system in developed countries.
Private Sector
National Health Mission
National Health Policy
Issues in Health Care Delivery System in India

UNIT-II

National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.
Introduction to AYUSH system of medicine
Introduction to Ayurveda.
Yoga and Naturopathy
Unani
Siddha
Homeopathy
Need for integration of various system of medicine

UNIT-III

Health scenario of India – past, present and future, Public health – India (epidemiology and demography)
Demography & Vital Statistics-
Demography – its concept
Vital events of life & its impact on demography
Significance and recording of vital statistics
Census & its impact on health policy

UNIT-IV

Epidemiology
Principles of Epidemiology
Natural History of disease
Methods of Epidemiological studies
Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

SEMESTER VI

Course Title: Cardiac Catheterization	
Semester: VI	Credits:03

UNIT 1

ASEPSIS IN THE CARDIOVASCULAR CATHETERIZATION LABORATORY
Sterile Equipment, (catheters, guidewires, and sheaths, should be sterile), (sterile drapes and covers for equipment)
Personal Protective Equipment (PPE) (gloves, sterile gowns, face masks)

UNIT 2

DIAGNOSTIC CATHETERIZATION ATHERECTOMY AND THROMBECTOMY: Atherectomy devices- Directional Coronary Atherectomy, Rotational Atherectomy, Components, Procedure, Complications, Thrombectomy devices- Angio Jet, Manual Aspiration devices

UNIT 3

RENAL ARTERY INTERVENTION FOREIGN BODY RETRIEVAL: Various Instruments- Amplatz Goose Neck Snare, Curry Intravascular Retriever, Dotter Intravascular Retriever, Vascular Retrieval Forceps, Welter Retrieval Loop, Biopsy Forceps

UNIT 4

EMERGENCIES IN THE CARDIAC CATHETERIZATION LABORATORY: Complications encountered in CCL, ACLS and BLS algorithm
Hemorrhage or Bleeding: - Management, Prevention

Arterial Dissection and its management

Pseudoaneurysm and its management

Course Title: Pediatric Interventions-Theory	
Semester: VI	Credits:03

UNIT 1

Introduction to Pediatric Cardiology and Interventions

Pediatric anatomy and physiology, including differences between pediatric and adult cardiovascular systems. Fetal circulation and how it changes after birth. Embryology of congenital heart defects (CHD). Normal and abnormal cardiovascular development.

UNIT 2

TOOLS TO DIAGNOSE CARDIAC CONDITIONS IN CHILDREN: History- General principles of the cardiovascular history, Chief complaint and/or presenting sign, Physical examination- Vital signs, Cardiac examination, Laboratory examinations

UNIT 3

PERCUTANEOUS VALVE COMMISSUROTOMY, REPAIR, AND REPLACEMENT: Cardiac Valves from the left to the right: Mitral, Aortic, Pulmonic & Tricuspid valves, their pathologies: MS, MR, AS, PS, TS and treatment.
PEDIATRIC INTERVENTIONAL CARDIOLOGY: Introduction, General Anesthesia Versus Sedation and Analgesia, Diagnostic procedures, Interventional Procedures, Device Placement.

UNIT 4

CARDIAC DEFECT CLOSURE DEVICE: Device closure procedures in Patent Foramen Ovale (PFO), Atrial Septal Defect (ASD), Ventricular Septal Defect (VSD), Patent Ductus Arteriosus (PDA), Left Atrial Appendage (LAA)

Course Title: Cardiac Catheterization- Practicle	
Semester: VI	**Credits:02**

1 Sterilization techniques
2 Hardwares used in Cardiac Catheterization
3 Procedures involved in Cardiac Catheterization

Recommended Text Books Invasive Cardiology, 3rd Edition by Sandy Watson. **Reference books or related websites:** 1. THE INTERVENTIONAL CARDIAC CATHETERIZATION HANDBOOK, 3rd Edition by MortonJ. Kern

Course Title: Pediatric Interventions-Practical	
Semester: VI	**Credits:02**

Diagnosis of Cardiac conditions in children
Cardiac Defect Closure Devices 15
Valve repair and replacement procedures
Drugs used in Pediatric Interventions

Recommended Text Books: 1. Invasive Cardiology, 3rd Edition by Sandy Watson. 2. Pediatric Cardiology, The Essential Pocket Guide, 3rd Edition by Walter H. Johnson, Jr., MD **Reference books or related websites:** 1. THE INTERVENTIONAL CARDIAC CATHETERIZATION HANDBOOK, 3rd Edition by MortonJ. Kern

Course Title: Biostatistics and Research Methodology	
Semester: VI	**Credits:02**

Unit-I

Introduction: Meaning, Definition, Characteristics of Statistics; Importance of the Study of Statistics. Branches of Statistics; Descriptive and Inferential Statistics; Variables and Their Types. Measurement Scales. Tabulation of Data: Raw Data, the Array, Frequency Distribution. Basic Principles of Graphical Representation; Types of Diagrams - Histograms, Frequency Polygons, Smooth Frequency Polygon, Commutative Frequency Curve, O give; Normal Probability Curve.

Unit-II

Measure of Central Tendency: Need for Measures of Central Tendency; Definition and Calculation of Mean; Ungrouped and Grouped Meaning, Interpretation and Calculation of Median Ungrouped and Grouped; Meaning and Calculation of Mode; Comparison of the Mean, and Mode; Guidelines for the Use of Various Measures of Central Tendency.

Unit-III

Measure of Variability: Need for Measure of Dispersion. The Range, the Average Deviation, The Variance and Standard Deviation; Calculation of Variance and Standard Deviation, Ungrouped and Grouped.
Probability and Standard Distributions: Meaning of Probability of Standard Distribution, The Binominal Distribution. The Normal Distribution; Divergence from Normality - Skewness, Kurtosis

Unit-IV

Sampling Techniques: Need For Sampling - Criteria for Good Samples. Application of Sampling in Community, Procedures of Sampling and Sampling Designs Errors. Sampling Variation and Tests of Significance.

Course Title: Infection Control - Theory	
Semester: VI	Credits:02

Unit-I
Basics of Infection Control
Definition of infection, source, transmission, and chain of infection
Types of infections: hospital-acquired (HAI), cross-infection, airborne, droplet, etc.
Introduction to microbiology relevant to radiology
Common pathogens in imaging departments (e.g., MRSA, TB, COVID-19)
Importance of infection control in diagnostic and interventional radiology

Unit-II
Standard Precautions and Aseptic Techniques
Hand hygiene: techniques (WHO 7-step), when and how to wash/sanitize
Use of PPE (gloves, aprons, face shields, masks) in radiology
Cleaning and disinfection of radiology equipment and cassettes
Safe injection practices and sharps disposal
Spill management and environmental cleaning

Unit-III
Infection Control in Radiology Settings
Infection control in digital radiography (DR), CT, MRI, ultrasound, and fluoroscopy rooms
Protocols for suspected/confirmed infectious cases (e.g., TB, COVID-19)
Zoning and patient flow to reduce infection spread
Cleaning of ultrasound probes, MRI coils, and CT gantry
Radiology protocols during pandemics and outbreaks

Unit-IV
Policies, Guidelines, and Surveillance
Hospital Infection Control Committee (HICC) roles and responsibilities
National and international guidelines (CDC, WHO, NABH, AERB)
Infection surveillance and reporting systems
Biomedical waste segregation and disposal
Post-exposure prophylaxis (PEP) and vaccination (e.g., Hepatitis B, Tetanus)

Course Title: Basic of Clinical Skill Learning	
Semester: VI	Credits:02

UNIT 1

MEASURING VITAL SIGNS: Temperature: Axillaries Temperature, Pulse: Sites of pulse, Measurement, Respiratory, Blood Pressure, Pain: Pain Scale
PHYSICAL EXAMINATION: Observation, Auscultation (Chest), Palpation, Percussion, History Taking

UNIT 2

FEEDING: ENTRAL FEEDING, NG TUBE: Measurement, Procedure, Care, and Removal of Nasal-Gastric Tube, Nasal-Gastric Tube Feeding, and Parentral Nutrition.

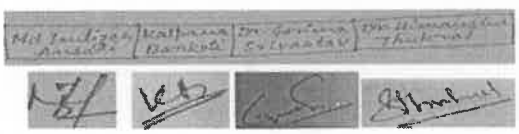
MOBILITY AND SUPPORT: Moving and Positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints

UNIT 3

ADMINISTRATIONS: Oral, Intravenous, Intramuscular, Subcutaneous, Recapping of Syringe, Loading of Drugs, Calculation of Drugs, Venipuncture, IV Infusion, Cannula, Attachment of IV infusion Set, Fluid Collection, Heparin Lock, Maintenance of IV set, Performing Nebulizer Therapy, Inhaler, Oxygen Therapy (Nasal, prongs, nasal Catheter,Venturi Mask, face mask)

UNIT 4

ASEPSIS: Hand wash Techniques,(Medical, Surgical) Universal Precaution, Protecting Equipments: Using Sterile Gloves, Opening a Sterile package and Establishing a Sterile Field, Sterile Dressing Changes, Surgical Attire ,Wound Dressing, Suture Removal, Cleaning and Application of Sterile Dressing, Wearing and Removal of personal protective Equipment



SEMESTERVII

CourseCode	Course Title	CourseID	L	T	P	Credits	TE	TI	PE	PI	Total
DisciplineSpecificCourses (DSC)											
250/ BCCT /CC/701	Internship - I		-	-	480	16	Continuous assessment				400
Minor Courses(MIC)											
250/ BCCT /MI/701	Digital Marketing		3	1	-	4	75	25	-	-	100
TotalCredits						20	TotalMarks			500	

Course Title: Digital Marketing – Theory	
Semester: VII	Credits:04

UNIT-I

Foundations of Digital Marketing in Healthcare

Introduction to Digital Marketing: Definition, Components, and Relevance in Radiology

Traditional vs. Digital Marketing: Transition in Healthcare Promotion

Understanding the Online Patient Journey: Awareness to Appointment

Brand Building for Diagnostic Imaging Centers and Radiologists

Online Reputation Management for Imaging Facilities

UNIT-II

Content Marketing and Social Media Strategy for Radiology

Creating Patient-Centric Educational Content: Articles, Infographics, Videos

Social Media Platforms: Instagram, Facebook, LinkedIn, YouTube for Radiology

Post Planning and Scheduling Tools (Canva, Meta Business Suite)

Developing Social Media Campaigns: CT Awareness, MRI Safety, Women's Imaging, etc.

Ethical Do's and Don'ts in Online Patient Engagement

UNIT-III

Search Engines, Website Optimization, and Paid Promotions

Creating and Managing a Professional Website for a Radiology Clinic

Introduction to SEO: Keywords, Meta Tags, Radiology-specific Optimization

Google My Business Optimization for Local Reach

Introduction to Google Ads & Facebook Ads for Diagnostic Campaigns

Online Booking Systems and CRM Tools in Diagnostic Practice

UNIT-IV

Analytics, Legal Guidelines & Future Trends

Introduction to Web and Social Media Analytics (Google Analytics, Meta Insights)

Key Performance Indicators (KPIs) in Digital Campaigns: CTR, Engagement Rate, ROI

Legal and Ethical Aspects: MCI/NMC, HIPAA, AERB Guidelines on Digital Health Communication

Cybersecurity and Patient Data Privacy in Online Platforms

AI, Tele-Radiology, and the Future of Digital Marketing in Radiology

SEMESTER VII

Course Code	Course Title	Course ID	L	T	P	Credits	TE	TI	PE	PI	Total
Discipline Specific Courses (DSC)											
250/BCCT/CC/801	Internship - II		-	-	480	16	Continuous assessment				400
Minor Courses(MIC)											
250/ BCCT /MI/801	First Aid		2	2	-	4	75	25	-	-	100
Skill Enhancement Course(SEC)/ Internship/Dissertation											
250/ BCCT /SE/801	Field Training / Awareness camp for villages and public places				8	4	-	-	75	25	100
Total Credits						24	Total Marks			600	

Course Title: First Aid – Theory	
Semester: VIII	Credits:04

Unit-I
Introduction to First Aid & Radiology-Specific Emergencies
Definition, objectives, and legal considerations of first aid
Roles and responsibilities of radiology personnel in emergencies
Hazards and emergency scenarios in radiology (e.g., contrast reactions, MRI projectile accidents, syncope)
Patient transport and positioning safety
Emergency first aid protocols for bleeding, burns, fractures, seizures, and falls in imaging areas

Unit-II
Basic Life Support (BLS) – Theory & Practice
Introduction to BLS: importance, CAB (Circulation-Airway-Breathing) approach
Cardiopulmonary Resuscitation (CPR): adults, children, infants
Airway management: head tilt-chin lift, jaw thrust, recovery position
Use of Automated External Defibrillator (AED)
Choking relief methods and post-resuscitation care
Practical CPR sessions using mannequins

Unit-III
Advanced Cardiovascular Life Support (ACLS)
Overview of ACLS and the clinical chain of survival
ECG basics: recognition of shockable vs non-shockable rhythms
Use of emergency drugs (e.g., adrenaline, atropine, amiodarone)
Defibrillation and cardioversion in radiology cardiac arrest cases
Airway and ventilation support: BVM, intubation overview
ACLS algorithms: bradycardia, tachycardia, cardiac arrest
Interdisciplinary coordination during a code blue in radiology

Unit-IV
Infection Control, Preparedness & Documentation
Infection prevention during emergency response in radiology
Use of PPE and hand hygiene in CPR and emergency care
Structure and stocking of first aid kits and crash carts in radiology
Emergency response planning and mock drills (Code Blue, Fire, MRI safety)
Documentation of incidents, patient handover, and medico-legal record keeping
Ethical responsibilities and patient communication during emergencies

Pavitra Institute of Health Sciences

Question Paper Format

Student Name: Total no. of Questions: Branch: Course Title: Paper ID : Maximum Marks	Roll no. Total No. of Printed Pages: Year/Semester: Course code:
Instruction for Candidates: Section A is compulsory. It carries....marks. It consists of.... Questions of ...marks each. Section B consists of .....Questions of....marks each. The students have to attempt any...question out of it Section C consists of .....Questions of....marks each. The students have to attempt any...question out of it.	
SECTION- A	(.....Marks each)
SECTION- B	(.....Marks each)
SECTION- C	(.....Marks each)