



Department of Paramedical Sciences
Faculty of Allied Health Sciences
SGT UNIVERSITY

Shree Guru Gobind Singh Tricentenary University

Gurgaon-122505

Syllabus

B.Sc. CARDIAC CARE TECH.

Duration: 3 years (6 Semester)

1 year Compulsory Internship

W.e.f. Academic Session 2022-23

PROGRAM INTRODUCTION

B.Sc. Cardiac Care Technology is a 3+1 year degree program that deals with diagnosing and monitoring diseases related to the heart and the circulatory system.

In this program, students will get familiar with various complex procedures such as performing stent implants, setting up cardiac pacemakers and defibrillators in the treatment of heart diseases.

The B.Sc. Cardiac Care Technology syllabus includes subjects such as Human Anatomy, Cardiovascular System, Physiology, Pathology, Pharmacology, Electrocardiography, Echocardiography and catheterization. To be considered eligible to apply to this course, students must have passed Class 12 or equivalent from a recognized board with an aggregate of at least 50% marks.

B.Sc. Cardiac Care Technology degree holders will be able to find work in various sectors such as Hospitals, Universities, Health organizations etc.

They may also serve as Cardiovascular technicians, Cardiovascular technologist, Medical Sonographer, etc. Graduates have the opportunity to work in India or Abroad to pursue graduate studies and to get involved in research activities.

PROGRAM OBJECTIVES/OUTCOMES

Students learn about Human Anatomy, Human Physiology, Pathology of disease, Microbiology of causing pathogens, Pharmacology of drugs used in Human being.

Students learn about Electrocardiography monitoring and applications in diagnosis and prognosis of cardiac diseases.

Students learn about Echocardiography monitoring and application in diagnosis and prognosis of disease.

Students learn about Holter monitoring and other ambulatory monitorings like ABPM, Loop recorders etc.

Students learn about cardiac pacemaker, insertion, monitoring, indications, contraindication and complications.

Students learn about defibrillator and transluminal interventional procedure.

Students learn about catheterization in coronary angiography, coronary angioplasty, angiography of peripheral vessels for cardiovascular diseased patients.

SCHEME OF EXAMINATION

SEMESTER - 1

PAPER	SUBJECT	PAPER CODE	THEORY EXAMINATION		PRACTICAL EXAMINATION		TOTAL	CREDIT
			UNIV.EXAM	INT.EXAM	UNIV.EXAM	INT. EXAM		
1	HUMAN ANATOMY-I		60	40	30	20	150	4+1
2	HUMAN PHYSIOLOGY-I		60	40	30	20	150	4+1
3	BASIC BIOCHEMISTRY		60	40	30	20	150	4+1
4	GENERAL MICROBIOLOGY		60	40	30	20	150	4+1
5	COMMUNICATION SKILLS & PERSONALITY DEPARTMENT		60	40			100	4
	TOTAL		300	200	120	80	700	24

SEMESTER - 2

PAPER	SUBJECT	PAPER CODE	THEORY EXAMINATION		PRACTICAL EXAMINATION		TOTAL	CREDITS
1	HUMAN ANATOMY-II		60	40	-	-	100	4
2	HUMAN PHYSIOLOGY-II		60	40	-	-	100	4
3	APPLIED BIOCHEMISTRY		60	40	30	20	150	4+2
4	PATHOLOGY		60	40	30	20	150	4+2
5	PHARMACOLOGY-I		60	40	-	-	100	4
5	FUNDAMENTALS OF COMPUTER SCIENCE		60	40			100	4
	TOTAL		360	240	60	40	700	28

SEMESTER -3

PAPER	SUBJECT	PAPER CODE	THEORY EXAMINATION		PRACTICAL EXAMINATION		TOTAL	CREDITS
1	Applied PATHOLOGY		60	40	30	20	150	4+2
2	PHARMACOLOGY-II		60	40	-	-	100	4
3	BASIC OF CARDIAC CARE TECH.		60	40	30	20	150	4+2
4	MEDICAL EMERGENCIES & PATIENT CARE		60	40	-	-	100	4
5	ENVIRONMENTAL SCIENCE		60	40	-	-	100	4
	TOTAL		300	200	60	40	600	24

SEMESTER – 4

PAPER	SUBJECT	PAPER CODE	THEORY EXAMINATION		PRACTICAL EXAMINATION		TOTAL	CREDITS
1	BASICS CARDIAC EVALUATION		60	40	30	20	150	4+2
2	CORONARY ANGIOGRAPHY		60	40	30	20	150	4+2
3	MEDICAL DISORDERS & INTENSIVE CARE		60	40	30	20	150	4+2
	TOTAL		180	120	90	60	450	18

SEMESTER – 5

PAPER	SUBJECT	PAPER CODE	THEORY EXAMINATION		PRACTICAL EXAMINATION		TOTAL	CREDITS
1	CARDIAC EVALUATION		60	40	30	20	150	4+2
2	CARDIAC THERAPIES		60	40	30	20	150	4+2
3	CARDIAC CARE TECHNOLOGY CLINICAL		60	40	30	20	150	4+2
4	RESEARCH METHODOLOGY & BIOSTATICS		60	40			100	4
5	HOSPITAL MANAGEMENT & MEDICAL ETHICS		60	40			100	4
	TOTAL		300	200	90	60	650	26

SEMESTER – 6

PAPER	SUBJECT	PAPER CODE	THEORY EXAMINATION		PRACTICAL EXAMINATION		TOTAL	CREDITS
1	EVALUATIVE CLINICAL TRAINING & INTERNSHIP				160	240	400	16
2	Technical writing				40	60	100	04
	TOTAL				200	300	500	20

SEMESTER

1st

HUMAN ANATOMY-I

Course Objective: The course focuses on anatomical terminology, anatomical identification, and physiological processes of human body systems. After learning this subjects students are able to understand the anatomical position, histology and structure of different of the human body.

PAPER – 1
PAPER CODE
Semester I

L T P Credits
3 1 4

Examination: 60 Marks
Internal Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

08 Hours

Introduction: human body as a whole

Definition of anatomy and its subdivisions

Anatomical nomenclature and terminology (planes & positions)

Surface Anatomy of main structures and vessels

Applied anatomy & Joints

Musculoskeletal system

Connective tissue & its modification, tendons, membranes, special connective tissue.

Bone structure, blood supply, growth, ossification, and classification.

Muscle classification, structure and functional aspect.

Joints classification, structures of joints, movements, range, limiting factors, stability, blood supply

Nerve supply, dislocations and applied anatomy

UNIT-II

10 Hours

Extremity (Lower & Upper extremities)

Bony architecture

Joints – structure, range of movement

Muscles – origin, insertion, actions, nerve supply

Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies

Radiographic identification of bone and joints Applied anatomy

Lower extremity

Bony architecture

Joints – structure, range of movement

Muscles – origin, insertion, actions, nerve supply

Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies

Radiographic identification of bone and joints Applied anatomy

UNIT-III

10 Hours

Spine and thorax

Back muscles -Superficial layer

Deep muscles of back, their origin, insertion, action and nerve supply.

Vertebral column – Structure & Development, Structure & Joints of vertebra. Thoracic cage

Head and neck: Cranium

Facial Muscles – origin, insertion, actions, nerve supply Temporal mandibular Joints – structure, types of movement

UNIT-IV

10 Hours

Cardiovascular system (with relevant applied anatomy)

Heart-Size, location, chambers.

Circulation -Systemic & pulmonary

Great vessels of the heart, branches of aorta.

Overview of blood vessels of upper extremity and lower extremity

Lymphatic system- (with relevant applied anatomy)

Salient features of lymphatic organs (spleen, tonsil, thymus, lymph node)

UNIT-V

10 Hours

Gastro-intestinal system (with relevant applied anatomy)

Parts of the gastrointestinal tract

Gross anatomy of Tongue, stomach, small and large intestine, liver, gall bladder Pancreas and other digestive organ& related applied anatomy

Respiratory system (with relevant applied anatomy)

Parts of respiratory system with salient gross features of lung

Brief description of intercostal muscles and Para-nasal air sinuses

HUMAN ANATOMY I-PRACTICAL

**PAPER – 2
PAPER CODE-
Semester I**

L T P Credits
- - 1 1

Examination: 20 Marks
Internal Assessment: 30 Marks
Total: 50 Marks

- 1) Identification and description of all anatomical structures.
- 2) Demonstration of dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face and brain).
- 3) Demonstration of skeleton-articulated and disarticulated.
- 4) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

HUMAN PHYSIOLOGY-I

Course Objective: The course focuses on general physiology of blood, cells & tissue of organs in human bodies. After learning this subject the students able to understand the functions of different organs of human bodies.

**PAPER 3
PAPER CODE
Semester I**

L T P Credits
3 1 - 4

Examination: 60 Marks
Internal Assessment: 40 Marks
Total: 100 Marks

Duration of Examination: 3 Hours

UNIT-I **10 Hours**

General Physiology

Cell: morphology, Structure and function of cell organelles Structure of cell membrane
Transport across cell membrane Intercellular communication Homeostasis

Blood

Introduction-composition & function of blood

W.B.C., R.B.C., Platelets formation & functions, Immunity

Plasma: composition, formation & functions, Plasma Proteins: -types & functions, Blood Groups-
types, significance, determination.

Hemoglobin, Heamostasis

Lymph-composition, formation, circulation & functions

UNIT-II **10 Hours**

Cardiovascular system

Conducting system-components, impulse conduction Heart valves Cardiac cycle-definition, phases of
cardiac cycle.

Cardiac output-definition, normal value, determinants.

Stroke volume and its regulation.

Heart rate and its regulation:

Arterial pulse, Blood pressure-definition, normal values, factors affecting blood pressure.

Shock-definition, classification, causes and features, Basic idea of ECG, Cardiovascular changes
during exercise

UNIT-III **14 Hours**

Respiratory System

Mechanics of respiration Lung volumes and capacities

Pulmonary circulation, transport of respiratory gases

Factors affecting respiration, Regulation of respiration-neural regulation, voluntary control and
chemical regulation

Hypoxia, Hypercapnoea, Hypocapnoea,

Artificial respiration Disorders of respiration- dyspnoea, orthopnoea, hyperpnoea, hyperventilation,
apnoea, Tachypnoea, Respiratory changes during exercise.

Digestive System Digestion& absorption of nutrients, Gastro-intestinal secretions & their regulation

Functions of Liver & Stomach

UNIT-IV **14 Hours**

Nervous system

Introduction, central and peripheral nervous system, functions of nervous system
 Reflexes-monosynaptic, polysynaptic, superficial, deep & withdrawal reflex Sense organ, receptors, electrical & chemical events in receptors.
 Sensory pathways for touch, temperature, pain, proprioception & others.
 Control of tone & posture: Integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions.
 Motor mechanism: motor cortex, motor pathway: the descending tracts -pyramidal & extrapyramidal tracts-origin, course, termination & functions. Upper motor neuron and lower motor neuron paralysis.
 Special senses-eye, ear, nose, mouth
 Water excretion, concentration of urine-regulation of Na⁺, Cl⁻, K⁺ excretion
 Nerve Muscle Physiology
 Muscles-classification, structure, properties, Excitation, contraction, coupling, Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise .
 Nerve – structure and function of neurons, classification, properties Resting membrane potential & Action potential their ionic basis, All or None phenomenon Neuromuscular transmission Ionic basis of nerve conduction.
 Concept of nerve injury & Wallerian degeneration Synapses.
 Electrical events in postsynaptic neurons Inhibition & facilitation at synapses .
 Chemical transmission of synaptic activity Principal neurotransmitters. Chemical transmission of synaptic activity Principal neurotransmitters.

HUMAN PHYSIOLOGY I-PRACTICAL

**PAPER – 4
 PAPER CODE
 Semester I**

L	T	P	Credits		Examination:	20 Marks
-	-	1	1		Internal Assessment:	30 Marks
					Total:	50 Marks

1. Haemoglobinometry
2. White Blood Cell count
3. Red Blood Cell count
4. Determination of Blood Groups
5. Leishman's staining and Differential WBC count
6. Determination of packed cell Volume
7. Erythrocyte sedimentation rate[ESR]
8. Calculation of Blood indices
9. Determination of Clotting Time, Bleeding Time
10. Blood pressure recording
11. Auscultation for Heart Sounds
12. Artificial Respiration

BASIC BIOCHEMISTRY

Course Objective: The course focuses on chemical analysis of human bodies on cellular level. After learning this subject students are able to understand the biomolecules like carbohydrates, fats, proteins & vitamins.

PAPER -5
PAPER CODE
Semester I

L T P Credits
3 1 4

Examination: 60 Marks
Internal Assessment: 40 Marks
Total: 100 Marks

Duration of Examination: 3 Hours

Unit-I 12 Hours

Carbohydrates: Definition, function and classification of carbohydrate. Monosaccharide, glycoside formation, oligosaccharides and polysaccharides. Glycolysis, catabolic fates of pyruvate, metabolic fate of Acetyl-CoA and Citric acid cycle, gluconeogenesis, glycogen metabolism, pentose phosphate pathway.

Unit-II 12 Hours

Amino acids and proteins: Definition, structure, classification, essential & non essential amino acids. Proteins definition and classification. Primary, secondary, tertiary and quaternary of proteins of proteins

Unit-III 12 Hours

Vitamins: Definition and classification of vitamins, difference between fat soluble and water soluble vitamins. Water soluble vitamins and fat soluble vitamins

Unit-IV 12 Hours

Lipids: Definition, classification and function of lipids. Fatty Acids, Triacylglycerols or Triacylglycerides or neutral fat. Fatty acid metabolism. Ketone body metabolism.

BASIC BIOCHEMISTRY-PRACTICAL

PAPER-6
PAPER CODE
Semester I

L T P Credits
- - 1 1

Examination: 20 Marks
Internal Assessment: 30 Marks
Total: 50 Marks

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1. Identification of carbohydrates by Molisch's test.
 2. Identification of reducing sugar by Benedict's test.
 3. Identification of protein by Biuret's test.
 4. Identification of ketose sugars by Seliwanoff's test.
 5. Identification of reducing sugar by Osazone test.
 6. Identification of cholesterol by Salkowski's test.

GENERAL MICROBIOLOGY

Course Objective: The course focuses on study of micro-organisms. After learning this subjects students are able to understand how micro-organism affect the human being and How can we sterilize the medical equipment to prevent from infection

PAPER -7
PAPER CODE
Semester I

L T P Credits
3 1 4

Examination: 60 Marks
Internal Assessment: 40 Marks
Total: 100 Marks

Duration of Examination: 3 Hours

UNIT-I

Safety measures in laboratory

Microscopy: Principle, working and applications of Light microscope, Dark field, Phase contrast microscopy, Fluorescent & Electron microscopy

Sterilization and Disinfection: Physical Methods of Sterilization, Chemical Methods of Sterilization, Methods of Disinfection

UNIT-II

Introduction and classification of Bacteria, Morphology of bacteria, Growth, Nutrition & Metabolism of Bacteria

Normal microbial flora of human body, role of normal flora, probiotics.

Bacterial genetics- Bacterial DNA & RNA, Replication of bacteria.

Microbial pathogenicity

UNIT-III

Bacterial Culture and Identification: Culture Media & Transport Media, Aerobic Bacterial Culture Techniques, Anaerobic Bacterial Culture Techniques, Sample collection and transport methods

Bacterial identification techniques: Conventional methods, Automated culture techniques.

UNIT-IV

Smear preparation & Staining methods: Gram stain, Acid fast stain, Negative stain, Spore stain

Antimicrobial susceptibility testing: Principle and techniques of Diffusion Methods
Dilution Methods

Preservation techniques of bacteria

GENERAL MICROBIOLOGY-PRACTICAL

PAPER-8

PAPER CODE

B. Sc. Semester I

L T P Credits
- - 1 1

Examination: 30 Marks
Int. Assessment: 20 Marks
Total: 50 Marks

1. Microscope : Light & Compound Microscope
2. Staining: Grams staining , ZN staining, Negative stain
3. Preparation of commonly used culture media : Nutrient Agar, Blood Agar, Chocolate agar, Mac Conkey agar, Muller Hinton agar
4. Culture methods : Streak method, Lawn method, Stroke method, Stab method, Pour Plate method, Liquid method
5. Antibiotic susceptibility test: Diffusion methods, Dilution Methods

COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

Course Outcome : to prepare students to be confident communicators for different real-life contexts, through repetitive oral practices and student-student cooperation.

**PAPER – 9
PAPER CODE**

Semester I

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks

Duration of Examination: 3 Hours

Unit I

10 Hours

Listening Comprehension

- Speeches
- Interviews
- audio-video clippings followed by exercises
- Introduction to Communication
- Importance of Communication
- Barriers to Communication and ways to overcome them

Unit II

10 Hours

Conversation Skills

- Greetings and introducing oneself
- Framing questions and answer
- Role play
- Buying: asking details etc
- Word formation strategies
- Vocabulary building: Antonyms, Synonyms, Affixation, Suffixation, One word substitution

Unit III

10 Hours

Reading Comprehension

- Simple narration and Stories
- Simple Passages
- Newspaper and articles clippings
- Note Making
- Paragraph Writing

- Comprehension
- Report Writing: types, characteristics
- Introduction to Letter Writing

Unit IV

08 Hours

Pronunciation

- Pronunciation
- Syllable and Stress
- Intonation and Modulation

UNIT V

10 Hours

Writing Comprehension

- Letters: types, format, style
- Précis Writing
- Paragraph: Order, Topic sentence, consistency, coherence
- Report and Proposal

Project Writing: Features, Structure

SEMESTER

2nd

HUMAN ANATOMY-II

Course outcome: The course focus on anatomy of urinary system, reproductive system, endocrine system & nervous system. After learning this subject students are able to understand the anatomical location and histology of mentioned organ.

PAPER-1
PAPER CODE
Semester II

L T P Credits
3 1 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I **08 Hours**

Urinary system (with relevant applied anatomy)

Parts of urinary system

Salient gross features of kidney, urinary bladder, ureter and urethra.

UNIT-II **10 Hours**

Reproductive system

Parts of male and female reproductive system with salient gross features of testis & uterus, ovary and fallopian tube

UNIT-III **10 Hours**

Endocrine glands

List of the endocrine glands, their position and salient gross features

Hormones produced by each endocrine glands

Embryology

Spermatogenesis & oogenesis

Ovulation, fertilization, Placenta, Fetal circulation

UNIT-IV **10 Hours**

Nervous system

Classification of the nervous system, Definitions of central, peripheral and autonomic nervous system

Neuron- structure and classification, neuroglia

Names of lobes of Cerebrum and cerebellum, Parts of brainstem (salient features only)

.Cerebrospinal fluid and its circulation, names of cranial nerves, spinal nerve, meninges, ventricles (salient features only)

UNIT-V **10 Hours**

Sensory organs

Skin: Its appendages and functions

Eye: Parts of eye and its structure

Ear: Parts of ear- external, middle and inner ear and contents.

HUMAN PHYSIOLOGY-II

Course outcome: The course focus on physiology of excretory system, endocrine system, reproductive system & nervous system. After learning these subjects students are able to understand functions and how they affects other organs of the human bodies of mentioned system.

PAPER CODE-3
B. Sc. Semester II

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I **10 Hours**

Excretory system:

Functions of kidneys,
Composition of urine
Mechanism of urine formation
Regulations of body temperature
Fluid and electrolyte balance
Alterations in disease

UNIT-II **10 Hours**

Sensory Organs:

Functions of skin, eye, ear, nose, tongue
Alterations in disease

UNIT-III **10 Hours**

Endocrines

Functions of pituitary, Pineal gland, Thymus, Thyroid, Parathyroid,
Pancreas,
Suprarenal & placenta
Alterations in disease

UNIT-IV **10 Hours**

Reproduction

Reproduction of cells-DNA, Mitosis, Meiosis, Spermatogenesis, Oogenesis
Functions of female reproductive organs:
Functions of breast, female sexual cycle
Introduction to embryology
Functions of male reproductive organs:
Fertility system
Alterations in disease

UNIT-V **08 Hours**

Lymphatic and Immunological system:

Circulation of lymph
Immunity
Formations of T- Cells and B- Cells
Types of Immune response
Antigens
Cytokines

APPLIED BIOCHEMISTRY

Course outcome: This course is focus on the application of biochemistry in the diagnosis method use to diagnose disease related to human serum, fluid, blood and urine. After learning this subject students are able to understand the collection method of sample, procedure and normal values for an accurate diagnosis

**PAPER-5
PAPER CODE
Semester II**

L T P Credits
3 1 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

10 Hours

Collection Of Specimen

Types of specimen(blood plasma, serum , urine , body fluid , CSF), there variables and normal range use of anticoagulant & types of vial

Unit II

10 Hours

Introduction to lab apparatus

Pipettes, biurettes & beakers

Flasks types and uses

Reagent bottles, funnels types & uses

Chemical balance

Unit III

10 Hours

Concepts of Acid - Base & salt reaction and hydrogen ion concentration, pH meter & buffer.
Enzymes- Definition, general classification, clinical and therapeutic significance of enzymes
Basic principles and estimation of blood gases and ph
Basic principles and estimation of electrolytes.

Unit IV

10 Hours

Chemistry of Carbohydrates

Chemistry of Lipids

Chemistry of Proteins- classification and examples

UNIT V

08 Hours

Liver function tests and their assessment

Renal function tests and their assessment

Cardiac profile- biochemical markers of myocardial infarction, basic principles, evaluation and application

APPLIED BIOCHEMISTRY-PRACTICAL

PAPER-6
PAPER CODE
Semester II

L T P Credits
- - 2 2

Examination: 20 Marks
Int. Assessment: 30 Marks
Total: 50 Marks
Duration of Examination: 3 Hours

Introduction to apparatus, instruments and use of chemical balance

Qualitative analysis, Identification of Carbohydrates, Proteins & substances of biochemical importance

Demonstration of colorimeter, spectrophotometer, pH meter, single pan balance

Urine examination for the detection of normal and abnormal constituents.

Interpretation and diagnosis through charts.

- a. Liver function tests.
- b. Lipid profile
- c. Cardiac markers
- d. Blood gases and electrolytes.

Estimation of blood sugar

Estimation of blood urea.

PATHOLOGY

Course outcome: This course focus on studies of pathogens. How they affects the cells, tissue and organs of human body. After learning this subject students are able to understand cause and pathology of any particular disease.

PAPER – 7
PAPER CODE
Semester II

L T P Credits
3 1 4

Examination: 60 Marks
Internal Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit I

10 Hours

Introduction of pathology

Cell injury - types, etiology, morphology, Cell death-autolysis, necrosis, apoptosis, Cellular adaptations-atrophy, hypertrophy, hyperplasia, metaplasia.

Inflammation- acute inflammation-vascular events, cellular events, chemical mediators, chronic inflammation-general features, granulomatous inflammation, tuberculosis.

Healing and repair - Definition, different phases of healing, factors influencing wound healing, fracture healing.

Haemodynamic disorders-Oedema, hypermia, congestion, haemorrhage, embolism, thrombosis, infarction. Neoplasia - defintion, nomenclature, features of benign and malignant tumors, spread of tumors, dysplasia, carcinoma in situ, precancerous lesions. Environmental and nutritional pathology - smoking, radiation injury, malnutrition, obesity, vitamin deficiencies.

Unit II

10 Hours

Haematological Disorders, Introduction and Haematopoiesis,

Anaemia - introduction and classification (morphological and etiological), iron deficiency anemia: distribution of body iron, iron absorption, causes of iron deficiency , lab findings, megaloblastic anaemia: causes, lab findings, haemolytic anemias: definition. Causes, classification and lab findings.WBC disorders - quantitative disorders, leukemia - introduction and classification, acute leukemias, chronic leukemias. Bleeding disorders - introduction, physiology of hemostasis. Classification, causes of inherited and Causes, classification and lab findings.WBC disorders - quantitative disorders, leukemia - introduction and classification, acute leukemias, chronic leukemias. Bleeding disorders - introduction, physiology of hemostasis. Classification, causes of inherited and acquired bleeding disorders, thrombocytopenia, DIC, laboratory findings. Pancytopenia.

Unit III

10 Hours

Basic Hematological Techniques : Blood collection - methods (capillary blood, venipuncture, arterial puncture) complications, anticoagulants, transport of the specimen, preservation, effects of storage, separation of serum and plasma, universal precautions, complete hemogram - CBC, peripheral smear, BT, CT, PT, APTT, ESR, disposal of the waste in the laboratory.

Unit IV**08 Hours**

Transfusion Medicine Selection of donor, blood grouping, Rh typing, cross matching, storage, transfusion transmitted diseases, transfusion reactions, components - types, indications

UNIT V**10 Hours**

Clinical Pathology collection, transport, preservation, and processing of various clinical specimens.

Urinalysis - collection. Preservatives, physical, chemical examination and microscopy. Physical examination; volume, color, odor, appearance, specific gravity and ph, Chemical examination; strip method- protein - heat and acetic acid test, sulfosalicylic acid method, reducing sugar-benedicts test, ketone bodies - rotheras test, bile salt - hays method, blood - benzidine test, urobilinogen and porphobilinogen - ehrlich aldehyde and schwartz test, bence jones protein.

PATHOLOGY

PAPER – 8

PAPER CODE

Semester II

L T P Credits
- - 2 2

Examination: 20 Marks
Int. Assessment: 30 Marks
Total: 50 Marks
Duration of Examination:

HAEMATOLOGY

Hb Estimation-Sahli's method & Cyanmethhaemoglobin method

RBC Count

Retic count

Preparation of blood smears and staining with Leishman stain

WBC Count

WBC-Differential Count

Platelet Count

Absolute Eosinophil Count

ESR-Westergrens & Wintrobe's method

PCV

Sickling test-Demonstration

Bone Marrow Smear Preparation & staining procedure

CLINICAL PATHOLOGY

Urine Examination (Physical, Chemical, Microscopic)

PHARMACOLOGY-I

Course outcome: This course focus on introduction of drugs and drugs used for nervous system, cardiovascular system and renal system. After learning this subject students are able to understand how body react to drugs and vice versa

PAPER-7
PAPER CODE
Semester II

L T P Credits
3 1 4

Examination: 60 Marks
Internal Assessment 40 Marks
Total: 100 Marks

UNIT-I

10 Hours

GENERAL PHARMACOLOGY : Principles of drug administration and routes of administration and routes of administration, Pharmacokinetics : absorption, distribution, metabolism, excretion of drugs, factors influencing drug action, dosage and factors modifying it. Pharmacodynamics Drug allergy , poisoning & toxicity, synergetic antagonistic effect of drugs plasma half life , drug efficacy & potency , mechanism of drug action, adverse drug reaction

Unit II

10 Hours

ANS : Cholinergic & anticholinergic drugs , skeletal muscle relaxant, Sympathomimetics drugs(adrenergic drugs) , alpha & beta blockers

Unit III

10 Hours

CNS : Sedative & hypnotics , local & general anesthetics , Antiepileptic & Antipsychotics, Antidepressent & Analgesics

Unit IV

10 Hours

CVS : Antihypertensive drugs , Anti-anginal drugs , Anti arrhythmic drugs, Cardiac glycosides, plasma expensors

UNIT V

08 Hours

Antiemetic & Diuretics , UTI DRUGS

FUNDAMENTALS OF COMPUTER SCIENCE

Course outcome: This course focus on basic knowledge of computer science. After learning this subject students are able to understand usage of computer and its techniques in medical and research.

PAPER-8
PAPER CODE
Semester II

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I **10 Hours**

Introduction:

What are computers, Application areas, Characteristics & limitations, Evolution of computers, Classification & generations of computers, Data representation in computer memory (numbering system)

Computers Architecture /Organization:

Basic architecture, Functional Block diagram, Types of computers on the basis of purpose, Signal and Portability.

UNIT-II **10 Hours**

Hardware:

CPU their generations and performance parameters, Input, output and storage devices. Primary (Main) Memories (RAM, ROM, Types of RAM and ROM, Cache Memory, Registers and types of registers, Storage Evaluation Criteria, Memory Capacity), Secondary Storage Devices: (Magnetic Disk, Floppy and Hard Disk, USBs, Optical Disks CD-ROMs)

Software:

Types: System Software (Machine Level Languages, Operating Systems, Device Specific Drivers), Higher Level Languages, and Applications

UNIT-III **10 Hours**

Languages: Machine Language, Assembly Languages, Programming Languages. Use of Compilers, Assemblers, Linkers, Loaders and interpreters in programming languages

Operating System: Booting/Start Up Procedure of machines, Introduction to Operating System, Functions and Classification of Operating Systems, Basic introduction to DOS, UNIX/LINUX OS, Windows

HTML, Use of Multimedia, Computer aided teaching and testing
Application Software MS office (Word, Excel and Powerpoint)

UNIT-IV **10 Hours**

Basic Introduction to Computer Networks:

Data Communication, Network devices (Hub, Switches, Modems, and Routers etc), LAN, LAN topologies, WAN, MAN, Internet: Introduction, Basics of E-mail, Web browsers (IE, Google Chrome, and Mozilla Firefox),

Structure of Universal Resource Locator, Domains (.com, .in, .country specific, .org and rationale behind them), IP address, Backbone network, Network connecting devices, HTTP, DNS, Network Security and Search Engine.

SEMESTER

3rd

APPLIED PATHOLOGY

Course outcome: This course is focus on application of pathology in diagnosis of diseased organ of human body. After learning this subject students are able to learn about disease of cardiovascular system, respiratory system and renal system.

**PAPER-1
PAPER CODE
Semester III**

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit-I

10 Hours

Atherosclerosis-definition, risk factors, pathogenesis, morphology and complications, Ischemic heart disease: Myocardial infarction- definition, pathogenesis, morphology and complications, Hypertension- Benign and malignant hypertension: pathogenesis, pathology and complications

UNIT-II

10 Hours

Heart failure-Right and left heart failure: causes, pathophysiology and morphology, Rheumatic heart disease and infectious endocarditis- definition, etiopathogenesis, morphology and complications, Congenital heart disease- Types and atrial septal defect; aneurysms- types and morphology; cardiomyopathies in brief.

UNIT-III

10 Hours

Atelectasis - types, Adult respiratory distress syndrome - causes , pathogenesis and morphology; pulmonary edema- classification, causes and morphology, Chronic obstructive pulmonary disease- Chronic bronchitis, emphysema, asthma, bronchiectasis: Definition, etiopathogenesis and morphology, Restrictive pulmonary diseases- Definition, categories, pathogenesis and morphology

UNIT-IV

10 Hours

Pneumoconiosis-types, asbestosis, coal workers pneumoconiosis- Pneumoconiosis-types, asbestosis, coal workers pneumoconiosis-etiopathogenesis and morphology, Pulmonary embolism, infarction, pulmonary hypertension-Definition, etiopathogenesis and morphology, Pneumonia-Classification of pneumonias; Lobar pneumonia and bronchopneumonia - etiology, pathology and complications

UNIT V

08 Hours

Clinical manifestations of renal diseases, Glomerular lesions in systemic diseases- diabetes, amyloidosis and systemic lupus erythematosus, Pericardial and pleural effusions- causes and microscopy.

APPLIED PATHOLOGY-PRACTICAL

PAPER-2
PAPER CODE
Semester III

L T P Credits
- - 2 2

Examination: 20 Marks
Int. Assessment: 30 Marks
Total: 50 Marks
Duration of Examination: 3 Hours

Urine examination: physical, chemical, microscopy

Blood grouping & Rh typing

Hemoglobin estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR)

Specimens : HEART & GREAT VESSELS SPECIMENS, LUNGS SPECIMENS , KIDNEY SPECIMEN , LIVER SPECIMENS

PHARMACOLOGY-II

Course outcome: This course focus on drugs used in chemotherapy, respiratory system, GIT & endocrine system. After learning this subject students are able to understand mechanism, indication, contraindication and adverse effect of drugs used in mentioned system.

**PAPER-3
PAPER CODE
Semester III**

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit-I

10 Hours

CHEMOTHERAPY OF INFECTIONS : BACTERIOSTATIC & BACTERIOCIDAL DRUGS , SULPHONAMIDES , PENICILLIN, CEPHALOSPORINS MACROLIDES, AMINOGLYCOSIDES, ANTITUBERCULER DRUGS , ANTIVIRAL , ANTIRETROVIRAL , ANTIFUNGAL , ANTIMALARIAL, ANTIAMOEBIC , ANTI-CANCER DRUGS

UNIT-II

08 Hours

ANTICOAGULANT AGENTS. HEPARIN WARFARIN , ANTIPLATELET AGENTS, ANTIFIBRINOLYTICS , THROMBOLYTICS

UNIT-III

10 Hours

ANTI-HISTAMINIC AGENTS , RESPIRATORY DRUGS : Introduction- modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone

- a. Mucokinetic and mucolytic agents
- b. Use of bland aerosols in respiratory care

Pharmacotherapy of bronchial asthma PROSTAGLANDINS, NSAIDS

UNIT-IV

10 Hours

Endocrine pharmacology: Thyroid hormones, glucocorticoids, anabolic steroids, calcitonin, insulin and oral hypoglycemic agents.

UNIT V

10 Hours

GIT DRUGS : ANTIDIARRHOEAL DRUGS, LAXATIVES , PHARMAVOTHERAPY OF PEPTIC ULCE

BASIC OF CARDIAC CARE TECH.

Course outcome: This course focus on anatomy & physiology of heart and introduction of different techniques to measure cardiac functioning. After learning this course students are able to understand electrocardiography, treadmill testing & echocardiography.

PAPER - 4
PAPER CODE
Semester III

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit-I

12 Hours

Applied Anatomy and Physiology -

1. Applied Anatomy

- a) Structure of the heart and gross anatomy, normal position situs solitus, situs inverses with dextrocardia, situs solitus with dextrocardia, situs inversus with levocardia.
- b) Systemic and pulmonary circulation, coronary structure, coronary sinus structure and circulation.
- c) Chest topography - identification of imaginary lines, topographical landmarks over thorax, topography of heart and lungs.
- d) Surface marking of heart, aorta, pulmonary artery, precordium, heart valves, subclavian.

2. Applied Physiology

- a) Control of heart rate.
- b) Concepts of congenital heart (ASD, VSD, PDA, TOF and transpositions).
- c) Blood circulation, cardiac output, pulmonary circulation, pulmonary oedema
- d) Concepts of myocardial functions.
- e) Control of circulation
- f) Conduction system of the heart

UNIT-II

12 Hours

Noninvasive ECG and TMT -

ECG

- a) Technique of ECG recording
- b) ECG Leads system
- c) ECG waves - PQRSTU, Osborn wave, delta wave, epsilon wave.
- d) ECG rates, rhythm, axis calculation, lead positioning.
- e) Intervals and segments - PR interval, PR segment, ST segment, QT interval, J point and QRS complex.
- f) ECG anatomy - Chambers enlargement.
- g) Technical artefacts

- h) ECG reporting Exercise Testing to Diagnose Obstructive Coronary Artery Disease
- Rationale and Guidelines, Pretest Probability (true positive, false positive, true negative and false negative ST-Segment Interpretation, Confounders of Stress ECG Interpretation.

a) Result Reporting

UNIT-III

12 Hours

Noninvasive Echocardiography -

- a) Introduction and purposes, demonstration of machine parts,
b) Basic windows
c) Echocardiographic views
d) parts,
e) Basic windows
f) Echocardiographic views

Imaging modes - two-dimensional (2D) imaging, M-mode imaging, and Doppler imaging, color - flow mapping

UNIT-IV

12 Hours

Invasive technologies -

- a) Orientation to the Cath - Lab and biomedical equipments, Introduction and purposes of the Cath - Lab.
b) Radiation safety and protocols.
c) Vascular access - arterial in femoral, radial and ulnar, venous in femoral.
d) Catheterization left heart and right heart, Angiography - Chambers.
e) Transducers balancing, measurement of pressures, Calculations of gradients
f) Blood flows, cardiac output and Calculations of cardio shunts, resistances.
g) Management of patient in the Cath - Lab, coronary angiogram views.
h) Prerequisites of cat lab procedures: CBC, RFT, Serology, ECG, Echo, and customised list for all types of procedures.
i) Maintaining sterility, PPE - Personnel protective equipments.

BASIC OF CARDIAC CARE TECH.-PRACTICAL

PAPER - 5

PAPER CODE

Semester III

L T P Credits
- - 2 2

Examination: 20 Marks
Int. Assessment: 30 Marks
Total: 50 Marks
Duration of Examination

INTERPRETATION OF ABNORMAL & NORMAL ECG

P-WAVE , QRS COMPLEX, PR INTERVAL , ST SEGMENT , QT INTERVAL , CARDIAC AXIS (LAD & RAD)

TREADMIL TEST , CARDIAC STRESS TEST , BRUCE PROTOCOL , BICYCLE ERGOMETRY TEST

ECHOCARDIOGRAPHY : BASIC OF CARDIAC WINDOW AND AXIS, M-MODE , 2D THORASTHORACIC ECHO, DOPPLER ECHO : PULSE & CONTINUOUS

CARDIAC CATH LAB: ORIENTATION OF CARDIAC CATH LAB

MEDICAL EMERGENCIES AND PATIENT CARE

Course outcome: This course is focus on pathophysiology of complex patient conditions requiring intensive care,as well as assessment,monitoring and advance therapeutics.After learning this course students are able to understand general ICU care & monitoring,infection control care,systemic disease & trauma care.

PAPER-6 PAPER CODE Semester III

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

Unit – I:

Introduction to Emergency Services

Organization of Emergency Department, Guidelines in Emergency, Clinical Monitoring, Fluid Therapy and Blood Transfusion, Airway Management, Cardiopulmonary Resuscitation, Principal of Mechanical Ventilation, Injection – An Infusion Method, Acid Base and Electrolyte Imbalance

Unit – II:

Handling of Different Emergencies

Cardiogenic Shock, Congestive Cardiac Failure, Myocardial Infarction, Head Injuries, Vasovagal Syncope, Seizer, Epilepsy, Conjunctival and Corneal Foreign Body, Foreign Body in Nose & in Ear, Epistaxis, Asthma, COPD, Haemoptysis, Rib Fracture, Tear Gas Exposure, Food Poisoning, Diarrhea, Urine Retention, Blunt Scrotal Trauma, Hypo & Hyperthermia

Unit – III:

Fundamentals of Patient Care

Concept of health & Illness, Health Determinants, Concept of Patients & Their Types, Patient Centred Care & Fundamentals of Communications, Reporting & Recording of Patients, Rights of Patients , Concepts of Disease & Its Types, General Concept, Care & Prevention of Accident, Trauma & Infections

Unit – IV:

Patient Care, Associated Units & Departments

Ambulatory Units, Critical Care Units ,Paediatric, Neonatal Intensive Care Unit (NICU), Emergency Department, Inpatient Units, Haematology/Oncology and Immunology Unit , Orthopaedic Unit, Psychiatry Unit ,Neurology and Neurosurgical Unit, Renal, Dialysis Unit, Gastroenterology/Endocrinology Unit, Life Flight Critical Care Transport Program, Radiology Department, Surgical Units, Cardiac Catheterization Lab, Operating Room, Post Anaesthesia Care Unit, Managing patients with disabilities, Geriatric Care, Care of Critically Ill Patients, Tracheotomise Patients. Nutritional Support in ICU

ENVIRONMENTAL SCIENCES

Course outcome: This course is focus on environmental studies. After learning this course students are able to understand nature of environmental studies, ecosystem,environment of pollution,social issues & enviroment

PAPER - 7

PAPER CODE

Semester III

L T P Credits
3 1 - 4

Examination: 60 Marks

Int. Assessment: 40 Marks

Total: 100 Marks

Duration of Examination:

Unit 1:

10 Hours

The Multidisciplinary nature of environmental studies

- Definition, scope and importance.
- Need for public awareness.

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 forests 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, case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
- Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Unit 2:

10 Hours

Ecosystems

- 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.

Biodiversity and its conservation

- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit 3**10 Hours****Environmental Pollution**

Definition, causes, effects and control measures of:-

- a. Air pollution
 - b. Water pollution
 - c. Soil pollution
 - d. Marine pollution
 - e. Noise pollution
 - f. Thermal pollution
 - g. Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
 - Fireworks, their impacts and hazards
 - Pollution case studies.
 - Disaster management : floods, earthquake, cyclone and landslides.

Unit 4 :**10 Hours****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.
- Consumerism and waste products.
- Environmental Legislation (Acts and Laws)
- Issues involved in enforcement of environmental legislation

Human Population and the Environment

- Population growth, variation among nations with case studies
- Population explosion – Family Welfare Programmes and Family Planning Programmes
- Human Rights.
- Value Education.
- Women and Child Welfare.

SEMESTER

4th

BASIC CARDIAC EVALUATION

Course outcome: This course is focus on basic cardiacevaluation after learning this course students are able to understand heart related diseases & disordes, cardiovascular non invasive investigation & interventional therapies

PAPER - 1 PAPER CODE Semester IV

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

12 Hours

Heart diseases and related disorders

- a) Ischaemic heart disease
- b) Rheumatic heart disease
- c) Congenital heart disease
- d) Arrhythmias
- e) Peripheral vascular disease
- f) Pericardial disease
- g) Pulmonary hypertension and embolism

- h) Shock state
- i) Cardiomyopathy
- j) Hypertension, diabetes, dyslipidaemias
- k) Infective endocarditis
- l) Heart failure

Unit II

12 Hours

Cardiovascular investigations: Noninvasive

- a) ECG - cardiac diagnosis by ECG: Chambers enlargement, arrhythmias, myocardial ischaemia and infarction.
- b) Echocardiography - cardiac diagnosis: valvular heart diseases, myocardial diseases, ischaemic heart diseases, Cardiomyopathies
- c) Pulmonary hypertension, infective endocarditis, intracardiac masses.
- d) Stress test- treadmill test review, pharmacological stress testing.
- f) Tilt table test
- g) Ankle-Brachial Index

Unit III

12 Hours

- a) Diagnosis of coronary artery disease

- b) Diagnosis of valvular heart diseases in the cath-lab - stenosis, regurgitation and mixed
- c) Diagnosis of shunts
- d) Evaluation of pulmonary hypertension
- e) Diagnosis of pericardial constriction
- f) Diagnosis of peripheral and aortic diseases
- g) Complications of cardiac catheterization

Complications and management of Contrast

Unit IV

12 Hours

Cardiovascular interventional therapies

- a) Coronary angioplasty
- b) Peripheral angioplasty
- c) Mitral valvoplasty
- d) Pulmonary and aortic valvoplasty
- e) Device closures
- f) Pacemakers
- g) Pericardiocentesis
- h) Myocardial biopsy
- i) Retrieval of foreign bodies
- j) Clot aspiration

BASIC CARDIAC EVALUATION - PRACTICAL

**PAPER - 2
PAPER CODE
Semester IV**

L T P Credits
- - 2 2

Examination: 20 Marks
Int. Assessment: 30 Marks
Total: 50 Marks
Duration of Examination:

Non invasive Technology;

- a) ECG recording basic
- b) ECHO evaluation basic
- c) Preparation for treadmill test
- d) Preparation for 24 hours Holter monitoring
- e) Preparation for ABPM

Invasive Technology;

- a) Cardiac Cath right Heart
- b) Cardiac Cath Left Heart
- c) Cardiovascular Angiography
- d) Cardiac Pacing

- e) Relevant instrumentation in Cath Lab
- f) Cardiac Emergencies in Cath Lab

CORONARY ANGIOGRAPHY

Course outcome: This course is focus on coronary angiography of the heart after learning this course students understand about coronary angiography & procedure, pre & post procedure care.

PAPER - 3
PAPER CODE
Semester IV

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

10 Hours

Introduction to coronary angiogram

History of coronary angiography
Instrumentation in coronary angiography
Indications for coronary angiography
Contraindications for coronary angiography

Unit II

12 Hours

Procedure

Approach

Seldinger technique
Catheters for coronary angiography
Views for coronary angiography

Unit III

12 Hours

Evaluation of a coronary lesion
Reporting of coronary angiography
Decision making on management
Revascularization PTCA or CABG
Planning review of protocol

Unit IV

12 Hours

Post procedure care

Drugs
Groin care (femoral approach)
Wrist care (radial approach)
Complications and management

CORONARY ANGIOGRAPHY

PAPER - 4

PAPER CODE

Semester IV

L T P Credits
- - 2 2

Examination: 20 Marks

Int. Assessment: 30 Marks

Total: 50 Marks

Duration of Examination:

Cath lab orientation

Instruments of coronary angiography

Catheter and their sterilization

Views of coronary angiography

Reporting of coronary angiography

MEDICAL DISORDER & Intensive Care

Course outcome: This course is focus on heart & other diseases after learning this course students are able to understand cardiovascular diseases, respiratory diseases, health related diseases, pulmonary diseases & electrolyte imbalance.

PAPER - 5
PAPER CODE
Semester IV

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

10 Hours

Cardiac and Respiratory diseases

1. Cardio vascular diseases

- a. Hypertension, Ischemic heart diseases, Myocardial Infarction, arrhythmias
- b. Heart failure, shock - types, causes
- c. Cardiac care in ICU: hypertension, hypotension, arrhythmias, cardiac arrest, ACLS

2. Respiratory diseases

- a. Pneumonia, tuberculosis,
- b. Chronic obstructive pulmonary disease, asthma
- c. Pleural effusion, pneumothorax
- d. Interstitial lung disease
- e. Pulmonary Oedema, Acute Lung Injury and Acute Respiratory Distress Syndrome
- f. Respiratory care in ICU: airway care, tracheostomy care, endotracheal intubation, mechanical ventilation, care of ventilated patient, complications and weaning.

Unit II

10 Hours

Neurological, Renal, GI and infectious diseases

3. Neurological diseases

Polio myelitis, Gullian Barre Syndrome, Myasthenia Gravis, epilepsy / seizure disorder, cerebro vascular accident / stroke
Head injury and Trauma Care: Glasgow coma scale, care of head injury patient, poly trauma patient

4. Renal Diseases

- a. Acute kidney injury
- b. Chronic Kidney Disease
- c. Renal failure: types, etiology, complications, corrective measures
- d. Urinary tract infections: Definition, types of UTI, risk factors, diagnosis, treatment
- e. Renal stone diseases, inherited and cystic renal diseases

- f. Nephrotic syndromes- definition, clinical features, causes & types

5. Gastro intestinal and Liver Diseases

- a. Gastritis / APD, peptic ulcer
- b. Acute gastroenteritis
- c. Hepatitis, Hepatic failure, alcoholic liver disease

Infectious diseases: Dengue, malaria

Unit III

10 Hours

Blood, fluid, electrolyte and acid base abnormalities

Blood loss and Anemia, thrombocytopenia

Fluid and electrolyte disorders-

Hyponatremia, hypernatremia, hypokalemia & hyperkalemia: Etiology, clinical presentation and management

Disorders of calcium, phosphorous & magnesium ions.

Acid- base disorders : Basics of ABG

Metabolic acidosis & metabolic alkalosis: pathophysiology, etiology , clinical features and management.

Unit IV

08 Hours

Infection Control and Nutrition in ICU

Infection control in ICU: prevention of cross infection, personal protection, antibiotics and policy. Sepsis, multi-organ failure, Multi-organ dysfunction syndrome

Nutrition and Fluid balance - total parenteral nutrition, nasogastric tube,

Unit V

10 Hours

Health problems in Specific conditions and Toxicology –

. Health problems in specific conditions

- a. Pregnancy - antenatal care, disorders in pregnancy
- b. Obesity
- c. Diabetes mellitus
- d. HIV infections and AIDS

Poisoning and drug over dosing

- a. Classification of poisons, Principles of treatment of poisoning and Primary care. Poisons and drug over dosing requiring ventilation,
- b. Drowning & Hanging

MEDICAL DISORDER & Intensive Care

PAPER - 6
PAPER CODE
Semester IV

L T P Credits
- - 2 2

Examination: 20 Marks
Int. Assessment: 30 Marks
Total: 50 Marks
Duration of Examination:

1. Monitoring of Patients
 2. Operating devices, ventilator and monitor settings for different clinical conditions
 3. Drugs used in Intensive Care
 4. Trouble shooting and maintenance of monitors, equipments and ventilators
- General care and transport of ICU patient - eye, skin, bladder care, position, airways, drains, catheters. Transport of critically ill patient to and out of ICU, transport of patient with drains, airway, inotropes, mechanical ventilator.
- Monitoring in critical care: vital signs, drains, ECG, fluid intake & output, invasive hemodynamic and central venous pressure monitoring
central venous pressure monitoring

SEMESTER

5th

Cardiac Evaluation

Course outcome: This course is focus on evaluation of the cardiovascular system after learning this course students are able to understand cardiac drugs, patient cardiac care, ECG, stress test & Holter monitoring

PAPER - 1
PAPER CODE
Semester V

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

10 Hours

Drugs and Nutrition in Cardiac Care

Drugs acting on cardiac system and emergency cardiovascular drugs

- a. Antiplatelets drugs
- b. Antiischaemic drugs
- c. Thrombolytic drugs
- d. Antiarrhythmic drugs

Nutrition assessment and management

Unit II

10 Hours

Patient monitoring in cardiac care

Monitoring of a patient with cardiac disease

- a) Cardiac Rhythm and rate.
- b) Trans-cutaneous oxygen monitors and Pulse oximeters.
- c) Invasive hemodynamic monitoring
- d) Multi parameter monitoring
- e) ACT monitoring
- f) Monitoring response to therapy and progression of disease

Unit III

10 Hours

Electrocardiography

Optimum recording of 12 leads ECG and computerised interpretation

PR interval

QT interval

Calculation of heart rate

Analysis of ST segment

Chamber hypertrophy

Acute coronary syndromes

Bradyarrhythmia

Tachyarrhythmias

Pericardial diseases

Diagnoses of acute myocardial infarction

Diagnoses of hyperkalemia

Diagnoses of WPW syndrome
ECG - Review of ECG patterns in ischaemic heart diseases, hypertensive heart disease
Trouble shooting & Documentation of ECG artefacts

Unit IV

08 Hours

**Stress test- treadmill test
tread mill, bicycle and others**

Indications/ contra indications, Complications
Preparation for treadmill test
Artefacts & documentation in tread mill ECG

Unit V

10 Hours

Holter monitoring

24 hours Holter monitoring
Ambulatory BP monitoring
Loop recorders
Defibrillators & CPR
Newer technologies for monitoring the patients with heart diseases

Cardiac Evaluation - Practical

PAPER - 2

PAPER CODE

Semester V

L T P Credits
- - 2 2

Examination: 20 Marks

Int. Assessment: 30 Marks

Total: 50 Marks

Duration of Examination:

Diagnostic patterns of ECG changes in a patient with chest pain
Diagnostic patterns of ECG changes during stress test
Evaluation of rheumatic mitral stenosis by echocardiography
Evaluation of Pericardial effusion by echocardiography
Pacemaker interrogation
Demonstration of estimation of severe mitral stenosis by echocardiography

CARDIAC THERAPIES

Course outcome: This course is focus on evaluation of the cardiovascular system includes non invasive & invasive cardiac technique after learnin this course students are able to understand echocardiography, invasive cardiac technique procedure & nuclear cardiology.

PAPER - 3
PAPER CODE
Semester V

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

10 Hours

Echocardiography

Evaluation of left ventricular studies - 16 segment model

Evaluation of left ventricular studies - systolic and diastolic functions

Evaluation of right ventricle

Echocardiography - A review of Evaluation of valvular heart diseases, ischaemic heart diseases, Cardiomyopathies and pericardial diseases

Basics of pediatric echocardiography.

Echocardiography in acute rheumatic fever

Echocardiography in chronic rheumatic heart disease

Echocardiography in cardiac tamponade

Echocardiography in Congenital heart diseases

ASD

VSD

PDA

Coarctation of aorta

Pulmonary and aortic stenosis

Tetralogy of Fallot

Transesophageal echocardiography

Stress echocardiography (pharmacological)

3D echocardiography

Unit II

10 Hours

Invasive techniques

Guide wires

Diagnostic catheters for coronary angiography

Diagnostic catheters for carotid, /cerebral angiography

Diagnostic catheters for renal angiography

Diagnostic catheters for abdominal vessels

Invasive techniques Procedures

Carotid and cerebral angiography

Renal angiography
Studies of abdominal aorta, mesenteric, iliac and others

Unit III **10 Hours**

Care of patient undergoing vascular procedures

Indications, contraindications for angiographic studies
Patient education of the invasive procedures, consent processes and preparation
Monitoring physiological variables during cath lab procedures
Post procedure protocols
Reporting and data management of the cath procedures

Unit IV **10 Hours**

Pacemaker

Cardiac pacing indications
Cardiac anatomy and its importance in pacing
Cardiac pacing physiology
Cardiac pacing temporary
Cardiac pacing permanent
Programing of pacemakers
Common problems associated with pacemakers.
External cardiac pacing

Unit V **08 Hours**

Basics of Nuclear cardiology

- a) Principles of nuclear cardiology
- b) Tracers used in nuclear cardiology
- c) Imaging techniques in nuclear cardiology
- d) Indications of nuclear diagnostic procedures in cardiology

CARDIAC THERAPIES (Part-1)

PRACTICAL

PAPER - 4

PAPER CODE

Semester V

L T P Credits
- - 2 2

Examination: 20 Marks

Int. Assessment: 30 Marks

Total: 50 Marks

Duration of Examination:

1. Pacemaker interrogation
2. Demonstration of estimation of severe mitral stenosis by echocardiography
3. Nuclear cardiology
4. different kind of angiography

Cardiac Care Technology Clinical

Course outcome: This course is focus on different kind cardiac care technology which used in cardiac patients. After learning this course students are able to understand different cardiac technology like IABP, FFR, rotational atherectomy, IVUS and OCT.

PAPER
PAPER CODE
Semester V

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

12 Hours

Cardiovascular investigations: Invasive

- a) Coronary angiography
- b) Diagnosis of mitral stenosis, regurgitation and mixed
- c) Diagnosis of shunts A review
- d) Diagnosis of peripheral and aortic diseases
- e) Complications of cardiac catheterization
- f) Contrast induced nephropathy prevention and management

Unit II

12 Hours

Invasive technologies

- a) Coronary angiogram for performing angioplasty
- b) PTCA
- c) Coronary Stents
- d) Optimizing the results of PTCA

Unit III

12 Hours

Invasive technologies

- a) Intra-aortic balloon pump
- b) Fractional flow reserve
- c) Rotational atherectomy
- d) Intra vascular ultrasound
- e) Optical coherence tomography

Unit IV

12 Hours

Invasive

Organization of cath lab services
Data management of cath lab

Management of intra coronary thrombus
Management of hypotension
Management of vasovagal attack
Management of coronary perforation
Management of retrieval of dislodged foreign materials in the vessels

Cardiac Care Technology Clinical

PAPER

PAPER CODE

Semester V

L T P Credits
- - 2 2

Examination: 20 Marks
Int. Assessment: 30 Marks
Total: 50 Marks
Duration of Examination:

Demonstration of various varieties of myocardial infarction by ECG
Demonstration of ASD various types
Demonstration of VSD various types
Demonstration of PDA and Coarctation of aorta
Stent booster technology
Foreign body retrieval methods in the cath lab
Balancing transducer
Pressure traces, pressure gradients
Steps of PTMC
Steps of PTCA

RESEARCH METHODOLOGY AND BIostatISTICS

Course outcome: This course is focus on the research methodology & biostatistics after learning this course students are able to understand the introduction and measurement of statistics, variability, data, central tendency & central technique.

PAPER - 7
PAPER CODE
Semester V

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks
Duration of Examination: 3 Hours

UNIT-I

10 Hours

Introduction

Meaning, definition, characteristics of statistics
Importance of the study of statistics
Branches of statistics
Statistics and health science including nursing
Parameters and estimates
Descriptive and inferential statistics
Variables and their types
Measurement scales

UNIT-II

10 Hours

Tabulation of Data

Raw data, the array, frequency distribution
Basic principles of graphical representation
Types of diagrams - histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, Normal probability curve

UNIT-III

10 Hours

Measure of Central Tendency

Introduction: Uses, applications and practical approach
Definition and calculation of mean - ungrouped and grouped data
Meaning, interpretation and calculation of median ungrouped and grouped data
Meaning and calculation of mode
Comparison of the mean, and mode
Guidelines for the use of various measures of central tendency

UNIT-IV

08 Hours

Measure of Variability

Introduction: Uses, applications and practical approach

The range, the average deviation or mean deviation

The variance and standard deviation

Calculation of variance and standard deviation for ungrouped and grouped data

Properties and uses of variance and Standard deviation

UNIT-V**10 Hours****Sampling Techniques**

Introduction: Uses, applications and practical approach

Criteria for good samples

Application of sampling in Community

Sampling methods, sampling and non-sampling errors

Sampling variation and tests of significance

HOSPITAL MANAGEMENT AND MEDICAL ETHICS

Course outcome: This course is focus on the principles of medical ethics & hospital management after learning this course students are able to understand introduction to hospital staffing, legal & medical issues, handling of patients, department safety & infection control & anesthesia.

**PAPER - 8
PAPER CODE
Semester V**

L T P Credits
3 1 - 4

Examination: 60 Marks
Int. Assessment: 40 Marks
Total: 100 Marks

UNIT-1

10 Hours

Introduction to hospital staffing- Hospital staffing, administration, PACS, HIS, RIS, DICOM. Medical records and documentation.

UNIT-2

10 Hours

Legal & medical issues- Legal and Ethical issues towards patient rights, patient responsibility, legal concerns, History taking, patient monitoring, inform consent, mal-practice, patient privacy issues. Professional ethics and Code of conduct of radiographer. Medical legal issues (MLC).

UNIT-3

08 Hours

Handling of patients Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients/ psychologically issues, infectious patients, critical/trauma patients, pregnant patient, patient with implant. Handling of patient with life threatening diseases like HIV, STD, HBsAG, etc.

UNIT-4

10 Hours

Departmental Safety & Infection Control Safety and hazards from material and electricity etc. Biomedical waste management and control. **Infection control** Skin care, donning of gowns, gloves, face masks, head caps, shoe covers. **Vitals signs-** Vital signs. How to measure vital signs. **Body mechanics and transferring & shifting of patient** Draw sheet lift, use of slide boards, wheelchair to couch, couch to wheelchair, couch to table, three men lift and four men lift Orthodox & Austrian method etc. **First aid-** Artificial respiration, hemostasis, first aid techniques, ABCD management.

UNIT-5

10 Hours

Anesthesia- Local anesthesia and general anesthesia, uses in hospital, Facilities regarding general Anesthesia in different department of hospital. Management of adverse.

SEMESTER

6th

Clinical Training/Hospital Posting

Total Duration : 6 months

Area: Noninvasive Cardiac Technology

Duration: 3 months

Area: Invasive Cardiac Technology

Duration: 3 Months

SEMESTER

7th & 8th

Internship

Total Duration : 12 Months

Area: Noninvasive Cardiac Technology

Duration: 6 months

Area: Invasive Cardiac Technology

Duration: 6 Months