



Department of Paramedical Sciences
Faculty of Allied Health Sciences
SGT UNIVERSITY

Shree Guru Gobind Singh Tricentenary University

Gurgaon-122505

Syllabus

B.Sc. MEDICAL TECH. (PERFUSION TECH)

Duration: 3 years (6 Semester)

W.e.f. Academic Session 2020-21

B.Sc PERFUSION TECHNOLOGY

Semester I Paper 1

Semester – 1

Human Anatomy – I

Paper code -

Total Marks- 60

Hours- 50

S.No.	Topics To Be Covered	Teaching Hours
Chapter 1	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	4
Chapter 2	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	4
Chapter 3	Upper 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	4
Chapter 4	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	4
Chapter 5	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	4
Chapter 6	Head and neck: Cranium Facial Muscles – origin, insertion, actions, nerve supply Temporal mandibular Joints – structure, types of movement	4
Chapter 7	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	4

Chapter 8	Lymphatic system- (with relevant applied anatomy) Salient features of lymphatic organs (spleen, tonsil, thymus, lymph node)	4
Chapter 9	Gastro-intestinal system (with relevant applied anatomy) Partsofthe gastrointestinal tract Gross anatomy of Tongue, stomach, small and large intestine, liver, gall bladder Pancreas and other digestive organ& related applied anatomy	4
Chapter 10	Respiratory system (with relevant applied anatomy) Partsof respiratory system with salient gross features of lung Brief description of intercostal muscles andPara-nasal air sinuses	4

ANATOMY PRACTICAL

- 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.

**Semester – 1
Human Physiology– I
Paper code -**

Total Marks- 60

Hours- 50

Chapter 1	General Physiology Cell: morphology, Structure and function of cell organelles Structure of cell membrane	2
	Transport across cell membrane Intercellular communication Homeostasis	2
Chapter 2	Blood Introduction-composition & function of blood	2

	W.B.C., R.B.C., Platelets formation & functions, Immunity	1
	Plasma: composition, formation & functions, Plasma Proteins: -types & functions, Blood Groups-types, significance, determination.	2
	Hemoglobin, Haemostasis	2
	Lymph-composition, formation, circulation & functions	2
Chapter 3	Cardiovascular system Conducting system-components, impulse conduction Heart valves Cardiac cycle-definition, phases of cardiac cycle,	2
	Cardiac output-definition, normal value, determinants.	1
	Stroke volume and its regulation.	2
	Heart rate and its regulation: Arterial pulse, Blood pressure-definition, normal values, factors affecting blood pressure.	2
	Shock-definition, classification, causes and features, Basic idea of ECG, Cardiovascular changes during exercise	2
Chapter 4	Respiratory System Mechanics of respiration Lung volumes and capacities	2
	Pulmonary circulation, transport of respiratory gases	2
	Factors affecting respiration, Regulation of respiration-neural regulation, voluntary control and chemical regulation	2
	Hypoxia, Hypercapnoea, Hypocapnoea,	1
	Artificial respiration	1
	Disorders of respiration- dyspnoea, orthopnoea, hyperpnoea, hyperventilation, apnoea, Tachypnoea, Respiratory changes during exercise.	2
Chapter 5	Digestive System Digestion & absorption of nutrients, Gastrointestinal secretions & their regulation Functions of Liver & Stomach	2
Chapter 6	Nervous system Introduction, central and peripheral nervous system, functions of nervous system.	1
	Reflexes-monosynaptic, polysynaptic, superficial, deep & withdrawal reflex Sense organ, receptors, electrical & chemical events in receptors.	2
	Sensory pathways for touch, temperature, pain, proprioception & others.	2
	Control of tone & posture: Integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions.	1
	Motor mechanism: motor cortex, motor pathway: the descending tracts -pyramidal & extrapyramidal tracts-origin, course, termination & functions. Upper motor neuron and lower motor neuron paralysis.	2
	Special senses-eye, ear, nose, mouth	
	Water excretion, concentration of urine-regulation of Na ⁺ , Cl ⁻ , K ⁺ excretion	1

Chapter 7	Nerve Muscle Physiology Muscles-classification, structure, properties, Excitation, contraction, coupling, Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise .	2
	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.	2
	Concept of nerve injury & Wallerian degeneration Synapses. Electrical events in postsynaptic neurons Inhibition & facilitation at synapses .	2
	Chemical transmission of synaptic activity Principal neurotransmitters. Chemical transmission of synaptic activity Principal neurotransmitters.	1

**SEMESTER 1
PAPER 3**

BASIC BIOCHEMISTRY

50HRS

Basic concept of metabolism and their applied aspects

Unit-I

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

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

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

Unit-IV

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

BASIC BIOCHEMISTRY-PRACTICAL

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.

SEMESTER 1

PAPER 4

Communication skill and personality development

Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Listening Comprehension, Speeches, Interviews, audio-video clippings followed by exercises, Introduction to Communication, Importance of Communication, Barriers to Communication and ways to overcome them.		

2	Conversation Skills, Greetings and Introducing oneself, Framing questions and answers, Role play, Buying: asking details etc, Word formation strategies, Vocabulary building: Antonyms, Synonyms, Affixation, Suffixation, One word substitution		
3	Reading Comprehension, Simple narration and Stories, Newspaper and articles clippings, Sentence types, Note Making, Paragraph Writing, Comprehension, Report Writing: types, characteristics.		
4	Pronunciation, Pronunciation, Syllable and Stress, Into nation and Modulation.		
5	Writing Comprehension, Letters: types, format, style, Précis Writing, Paragraph: Order, Topic sentence, consistency, coherence, Report and Proposal, Project Writing: Features, Structure.		

**B.SC PERFUSION TECH.
SEMESTER 2
PAPER 1**

PATHOLOGY

S.NO	TOPIC	METHOD	HOURS
1	<p>Introduction of pathology</p> <p>Cell injury - types, etiology, morphology, Cell death-autolysis, necrosis, apoptosis, Cellular adaptations-atrophy, hypertrophy, hyperplasia, metaplasia.</p> <p>Inflammation- acute inflammation-vascular events, cellular events, chemical mediators, chronic inflammation-general features, granulomatous inflammation, tuberculosis.</p> <p>Healing and repair - Definition, different phases of healing, factors influencing wound healing, fracture healing.</p> <p>Haemodynamic disorders-Oedema, hypermia, congestion, haemorrhage, embolism, thrombosis, infarction. Neoplasia - definition, 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.</p>		
2	<p>Haematological Disorders, Introduction and Haematopoiesis,</p> <p>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 acquired</p>		

	bleeding disorders, thrombocytopenia, DIC, laboratory findings. Pancytopenia.		
3	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.		
4	Transfusion Medicine Selection of donor, blood grouping, Rh typing, cross matching, storage, transfusion transmitted diseases, transfusion reactions, components - types, indications		
5	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 - rothas test, bile salt - hays method, blood - benzidine test, urobilinogen and porphobilinogen - ehrlich aldehyde and schwartz test, bence jones protein.		

PRACTICAL PATHOLOGY

S.NO	TOPIC	METHOD	HOURS
1	I. HAEMATOLOGY Hb Estimation-Sahli's method & Cyanmethaemoglobin method RBC Count Retic count Preparation of blood smears and staining with Leishman stain WBC Count WBC-Differential Count Platelet Count Absolute Eosinophil Count		

	<p>ESR-Westergrens & Wintrobe's method</p> <p>PCV</p> <p>Sickling test-Demonstration</p> <p>Bone Marrow Smear Preparation & staining procedure</p> <p>Demonstration of Malarial Parasite</p>		
2	<p>I. CLINICAL PATHOLOGY</p> <p>Urine Examination (Physical, Chemical, Microscopic)</p>		

**SEMESTER 2
PAPER 2**

MICROBIOLOGY

50 HOURS

S.NO	TOPIC	METHOD	HOURS
	<p>Principles of Microbiology:</p> <p>Microscope- Different types including electron microscope.</p> <ul style="list-style-type: none"> - General introduction, and History of Microbiology - Classification of Microbes - Bacteria Cell - Bacterial Growth and Variation - Antibacterial Agents, and Anti-septics & Disinfection (Chemical Sterilization) - Sterilization (Physical)-Heat, Filters, Radiation. - Equipments of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization - Antibiotics, Chemotherapy and Drug Resistance <p>Immunology - antigen, Antibodies, Immunity, vaccines, types of vaccine and immunization schedule. Hospital acquired infection - Causative agents, transmission methods, investigation, prevention and control of hospital Acquired infections.</p> <ul style="list-style-type: none"> - Collection & Transportations of specimens. 		

PRACTICAL MICROBIOLOGY

S.NO	TOPIC	METHOD	HOURS
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1	Compound microscope and its application in microbiology.		
2	Demonstration of sterilization equipments: hot air oven, autoclave, bacterial filters.		
3	Grams staining. Acid fast staining.		
4	Principles and practice of Biomedical waste management.		

**SEMESTER 2
PAPER 3**

APPLIED ANATOMY & PHYSIOLOGY THEORY			25 HOURS
S.NO	TOPIC	METHOD	HOURS
1	EXCRETORY SYSTEM PARTS OF EXCRETORY SYSTEM SHAPE OF KIDNEY, BLOOD SUPPLY COMPONENTS OF KIDNEY , NEPHRON ,NERVE SUPPLY. URINE FORMATION (FILTRATION , ABSORPTION & SECRETION) ACID , BASE MANAGEMENT . RENAL DISEASE (AKI, CKD & STONES)		
2	Male & female reproductive system Parts of male and female reproductive system with salient gross features of testis & uterus, ovary and fallopian tube Male -Functions of testes, pubertal changes in males, Testosterone -action & regulations of secretion.Female -Functions of ovaries and uterus, pubertal changes, Menstrual cycle, estrogens and progesteron -action and regulation Embryology Spermatogenesis & oogenesis Ovulation,fertilization, Placenta, Fetalcirculation.		
3	Endocrinology Physiology of the endocrine glands – Hormones secreted by these glands Their classifications and functions Adrenal, Gonads Thymus, Pancreas. Pituitary Thyroid, Parathyroid		
4	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) 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		

ANATOMY PRACTICAL

- 5) Identification and description of all anatomical structures.
- 6) Demonstration of dissected parts
- 7) Demonstration of skeleton-articulated and disarticulated.
- 8) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

SEMESTER 2 PAPER 4

PHARMACOLOGY

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	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		
2	ANS : Cholinergic & anticholinergic drugs , skeletal muscle relaxant, Sympathomimetics drugs(adrenergic drugs) , alpha & beta blockers		
3	CNS : Sedative & hypnotics , local & general anesthetics , Antiepileptic & Antipsychotics, Antidepressent & Analgesics		
4	CVS : Antihypertensive drugs , Anti-anginal drugs , Anti arrhythmic drugs, Cardiac glycosides, plasma expandors		
5	Antiemetic & Diuretics , UTI DRUGS		

SEMESTER 2 PAPER 5

BIOCHEMISTRY

50HRS

S.NO.	TOPIC	METHO	HOURS
1	Collection Of Specimen Types of specimen(blood plasma, serum , urine , body fluid , CSF), the variables and normal range use of anticoagulant & types of vial		
2	Introduction to lab apparatus Pipettes, biurettes & beakers Flasks types and uses Reagent bottles, funnels types & uses Chemical balance		
3	Concepts of Acid Base & salt reaction and hydrogen ion concentration, pH meter & buffer.		

4	Chemistry of Carbohydrates		
5	Chemistry of Lipids		
6	Chemistry of Proteins- classification and examples		
7	Liver function tests and their assessment Renal function tests and their assessment		
8	Cardiac profile- biochemical markers of myocardial infarction, basic principles, evaluation and application		
9	Enzymes- Definition, general classification, clinical and therapeutic significance of enzymes		
10	Basic principles and estimation of blood gases and pH Basic principles and estimation of electrolytes.		

PRACTICAL

BIOCHEMISTRY

25 HRS

S.NO.	TOPIC	METHOD	HOURS
1	Introduction to apparatus, instruments and use of chemical balance		
2	Qualitative analysis, Identification of Carbohydrates, Proteins & substances of biochemical importance		
3	Demonstration of colorimeter, spectrophotometer, pH meter, single pan balance		
4	Urine examination for the detection of normal and abnormal constituents.		
5	<p>Interpretation and diagnosis through charts.</p> <ul style="list-style-type: none"> a. Liver function tests. b. Lipid profile c. Cardiac markers d. Blood gases and electrolytes. <p>Estimation of blood sugar Estimation of blood urea.</p>		

PAPER 6

FUNDAMENTALS OF COMPUTER SCIENCE

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	<p>Introduction about computers What are Computers? Its various characteristics, applications and limitations. Functional Block Diagram of computer. Computer Architecture: Classification of computer on basis of Purpose, signal and size and portability. Evolution of computer from 1st generation to fourth generation. Some description about fifth generation. Data representation in memory</p>		
2	<p>Hardware: To study the various input devices used: Keyboard, mouse, OMR, OCR, MICR, BCR, Scanner etc. To study the internal structure of CPU: Registers, ALU, Motherboard, HD, Memory, Cache, and Virtual Memory. TO study the various Secondary storage devices: Magnetic Disk, Optical Disk, Flash memory, To cover what are Monitor, Its types, Printer: Dot matrix, Daisy wheel. Line printer, Laser printer, Thermal Printer, Ink Jet printers etc.</p>		
3	<p>To cover the types of Software, Languages and their types (High level and low level language.) To cover the definition of operating system, its types and what are the various functions and types of operating system. Basic introduction about Interfaces: its types character user and graphical user interface (DOS and Windows) Basic introduction about linux, Unix operating system To study the various HTML tags (Bold tags, Italic, Underline, Marquee, Img, anchor etc.)</p>		
4	<p>Network: Data Communication, Structure of Universal Resource Locator, Domains (.com, .in, .country specific, .org and rationale behind them), HTTP Practicals: TO cover the various MS Excel Formulas and preparation of spreadsheets. Basics of E-mail, Web browsers (IE, Google Chrome, Mozilla), LAN, LAN topologies, WAN, MAN, Internet: Introduction, Internet, extranet and Intranet. Network devices (Hub, Switches, Modems, Routers etc), DNS, Network Security and Search Engine IP address, Structure of IP Address Backbone network, Network connecting devices</p>		

B.Sc PERFUSION TECH.

SEMESTER 3

PAPER 1

APPLIED PATHOLOGY (THEORY)

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	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		
2	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.		
3	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		
4	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		
5	Clinical manifestations of renal diseases, Glomerular lesions in systemic diseases- diabetes, amyloidosis and systemic lupus erythematosus, Pericardial and pleural effusions- causes and microscopy.		

PRACTICAL

25 HOURS

S.NO	TOPIC	METHOD	HOURS
1	Urine examination: physical, chemical, microscopy		
2	Blood grouping & Rh typing		
3	Hemoglobin estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR)		
4	Specimens : HEART & GREAT VESSELS SPECIMENS, LUNGS SPECIMENS , KIDNEY SPECIMEN , LIVER SPECIMENS		

B.Sc PERFUSION TECHNOLOGY

SEMESTER 3

PAPER 2

PHARMACOLOGY (PART 2)

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	CHEMOTHERAPY OF INFECTIONS : BACTERIOSTATIC &		

	BACTERIOCIDAL DRUGS , SULPHONAMIDES , PENICILLIN, CEPHALOSPORINS MACROLIDES, AMINOGLYCOSIDES, ANTITUBERCULER DRUGS , ANTIVIRAL , ANTIRETROVIRAL , ANTIFUNGAL , ANTIMALARIAL, ANTIAMOEBCIC , ANTI-CANCER DRUGS		
2	ANTICOAGULANT AGENTS. HEPARIN WARFARIN , ANTIPLATELET AGENTS, ANTIFIBRINOLYTICS , THROMBOLYTICS		
3	ANTIHISTAMINIC 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		
4	Endocrine pharmacology: Thyroid hormones, glucocorticoids, anabolic steroids, calcitonin, insulin and oral hypoglycemic agents.		
5	GIT DRUGS : ANTIDIARRHOEAL DRUGS, LAXATIVES , PHARMAVOTHERAPY OF PEPTIC ULCER		

**B.Sc. Perfusion Technology
Semester III
Paper 3-**

Introduction to Perfusion Technology Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	History and evolution of Cardiac Surgery & Cardiopulmonary Bypass. Dr John Gibbons Heart Lung Machine, Cross circulation (Gross Well) technique Hypothermic Cardiac Surgery, Advent of Cardiopulmonary Bypass		
2	Basic Principles of: Extracorporeal Circulation, Extracorporeal gas exchange Biocompatible Materials used in Perfusion Aseptic techniques and Sterility in perfusion		
3	Basics of diagnostic techniques, Chest X-ray, ECG, Echo, Coronary Angiography Laboratory investigations- arterial blood gas, Venous blood gas, Renal function test, liver function test, coagulation profile, Haemoglobin, haematocrit, platelet, RBC, WBC, Electrolytes		
4	Basic components used in CPB- Heart lung machine, Oxygenator, Heater cooler unit Blood cardioplegia device ACT Machine, Basics of general Anaesthesia., Types of anaesthesia - general anaesthesia, regional anaesthesia ,local anaesthesia Drugs in anaesthesia- Propofol, Thiopentone, Keatamine, Etomidate, Muscle relaxants- Vercuronium, Pancuronium, Atracurium, Benzodiazepine- Midazolam, Diazepam, Inhalations agents - Halothane, Sevoflurane, Isoflurane		
5	Basics of monitoring, Setting up of ECG machine, Pressure transducer, Syringe and peristaltic pumps, Anaesthesia Monitors, Pulse oximeters, Temperature probes and Thermoregulatory monitoring, Defibrillators, Fibrillators, ACT (Activated Clotting Time)		

PRACTICAL

50HOURS

S.NO	TOPIC	METHOD	HOURS
1	Chest X-ray ECG Echocardiography Coronary Angiography		
2	ACT Machine Laboratory investigations- arterial blood gas, Venous blood gas, Renal function test, liver function test, coagulation profile.		
3	Haemoglobin, haematocrit, platelet, RBC, WBC, Electrolytes		
4	Heart lung machine: <ul style="list-style-type: none"> • Oxygenator • Heater cooler unit • Blood cardioplegia device • ACT Machine • Setting up of ECG machine • Pressure transducer • Syringe and peristaltic pumps • Anaesthesia Monitors • Pulse oximeters • Temperature probes and Thermoregulatory monitoring • Defibrillators • Fibrillators • ACT Activated Clotting Time 		

SEMESTER 3

PAPER 4

ENVIRONMENTAL SCIENCE

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	The Multidisciplinary nature of environmental studies <ul style="list-style-type: none"> • 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 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		
	Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers Energy flow in the ecosystem.		

	<p>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</p>		
	<p>Environmental Pollution Definition, causes, effects and control measures of:-</p> <p style="padding-left: 40px;"> a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. . Noise pollution f. . Thermal pollution g. Nuclear hazards </p> <p>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.</p>		
	<p>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.</p>		

B.Sc PERFUSION TECH.
SEMESTER 3
PAPER 5
Medical Emergencies & Patient Care

S.NO	TOPIC	METHOD	HOURS
1	<p>Introduction to Emergency Services</p> <p>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</p>		

	and Electrolyte Imbalance		
2	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		
3	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		
4	Patient Care, Associated Units & Departments		

**B.Sc PERFUSION TECH.
SEMESTER 4
PAPER 1**

Basic Intensive care

Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Introduction, Communication and Documentation - Introduction to Patient Care: Principles of patient care. Types of patients (gender, age, diseases, severity of illness, triage). Communication & Documentation: Communication with doctors, colleagues and other staffs. Non-verbal communication, Inter-personnel relationships. patient contact techniques, communication with patients and their relatives, Documentation: Importance of documentation, initial and follow up notes; documentation of therapy, procedures and communication		
2	Universal Precautions and Infection Control - Universal Precautions and Infection Control: Hand washing and hygiene, Injuries and Personal protection, Insulation and safety procedures, Aseptic techniques, sterilization and disinfection, Disinfection and Sterilization of devices and equipment, Central sterilization and supply department, Biomedical Medical waste management		
3	Medication Administration and Transport of patient -Medication Administration: Oral/Parenteral route, Parenteral medication administration: Intra venous, intra muscular, sub-cutaneous, intra dermal routes, Intra venous Infusion, Aerosol medication administration, Oxygen therapy, Intravenous fluids, Blood and blood component transfusion. Position and Transport of patient: Patient position, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, bed making, rest and sleep. Lifting and transporting patients: lifting patients up in the bed, transferring from bed to wheel chair, transferring from bed to stretcher. Transport of ill patients (inotropes, intubated / ventilated patients)		
4	Bedside care and monitoring-Bedside care: Methods of giving nourishment: feeding, tube feeding, drips, transfusion. Recording of pulse, blood pressure, respiration, saturation and temperature. Bed side management: giving and taking bed pan, urine container.		

	<p>Observation of stools, urine, sputum, drains. Use and care of catheters and rubber goods. Care of immobile/bed ridden patients, bed sore and aspiration prevention</p> <p>Monitoring of Patient: Pulse, ECG (Cardiac Monitor), Oxygen Saturation, Blood Pressure, Respiration, Multi parameter monitors, Capnography and End Tidal CO₂ (ETCO₂), Hydration, intake and output monitoring Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures, Compliance, Resistance.</p>		
5	<p>Dressing and wound care: Bandaging: basic turns, bandaging extremities, triangular bandages and their application. Surgical dressing: observation of dressing procedures. Suture materials and suturing techniques, Splinting. Basic care of patient with burns</p>		

PRACTICALS

25 HOURS

S.NO	TOPIC	METHOD	HOURS
1	<p>Demonstration of Patient care Procedures:</p> <p>a) Positioning of patient, transport of the patient, Dressing and Bandaging, Care of inter costal drain tube, Insertion of naso-gastric tube and feeding</p> <p>b) Phlebotomy and obtaining blood samples, Arterial Blood sampling for ABG</p> <p>c) Injections: intra muscular, intra venous, sub cutaneous, intra dermal</p> <p>d) Insertion of intra venous catheter and infusion of medications, blood transfusion</p> <p>e) Recording of ECG and monitoring of patient</p> <p>f) Oxygen therapy: oxygen cannula, masks. Aerosol therapy: nebulization, inhalers</p> <p>g) Suctioning and care of artificial airway</p> <p>h) Insertion of urinary bladder catheter</p>		
2	<p>Uses, principles, advantages and disadvantages of instruments and Devices in patient care</p>		
3	<p>First aid and Basic Life Support (BLS)</p>		
4	<p>Spotters, Drugs, Instruments and devices - identification and usage, demonstration of patient care procedures</p>		

**B.Sc. Perfusion Technology
Semester IV**

Paper 2-

Basics of Pumps, Oxygenators and Blood Components

50Hrs

S.NO	TOPIC	METHOD	HOURS
1	<p>Oxygenators-History of Oxygenators, Types of Oxygenators, Disc and Screen Oxygenators, Bubble Oxygenators, Membrane Oxygenators, Design & function of various Oxygenators</p>		
2	<p>Pumps- History of Pumps, Characteristics of an Ideal Pump, Types of Pumps Roller pumps, Centrifugal pumps, Peristaltic pumps, Design & function of Roller pumps, Design &</p>		

	function of Centrifugal pumps.		
3	Filters-Arterial filters, Cardiotomy filters, Gas line filters, Leucocyte filters, Types of tubing's used in CPB, Heat Exchangers.		
4	Blood components-Blood grouping and Cross Matching, PRBC, Whole blood, Platelets, FFP, Cryoprecipitate		
5	Coagulation system-Platelet Disorders- Thrombocytopenia, Thrombophilia, Coagulation pathway disorders - Von willibrands diseases Haemophilia, DIC- Disseminated intravascular coagulation, Fibrinolytic system and its disorders.		

PRACTICAL 25 HOURS

S.NO	TOPIC	METHOD	HOURS
1	Design & function of Roller pumps		
2	Arterial filters * Cardiotomy filters * Gas line filters * Leucocyte filters		
3	Types of tubing's used in CPB Heat Exchangers		

B.Sc. PERFUSION Technology

Semester IV

Paper 3

Basics of Medical Disorders

Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Cardiac and Respiratory diseases 1. Cardio vascular diseases a. Hypertension, Ischemic heart diseases, Myocardial Infarction, arrhythmias b. Heart failure, shock - types, causes 2. Respiratory diseases a. Pneumonia, tuberculosis, b. Chronic obstructive pulmonary disease, asthma c. Pleural effusion, pneumothorax d. Interstitial lung disease		
2	Neurological, Renal, GI and infectious diseases 3. Neurological diseases a. Polio myelitis, Gullian Barre Syndrome, Myasthenia Gravis, epilepsy / seizure disorder, cerebro vascular accident / stroke 4. Renal Diseases a. Acute kidney injury b. Chronic Kidney Disease 5. Gastro intestinal and Liver Diseases a. Gastritis / APD, peptic ulcer		

	<ul style="list-style-type: none"> b. Acute gastroenteritis c. Hepatitis, Hepatic failure, alcoholic liver disease Infectious diseases: Dengue, malaria, leptospirosis		
3	Blood, fluid, electrolyte and acid base abnormalities <ul style="list-style-type: none"> 7. Blood loss and Anemia, thrombocytopenia 8. Fluid Electrolyte imbalance and corrective methods 9. Acid Base abnormalities and corrective methods 		
4	Pulmonary Oedema, Sepsis and MODS <ul style="list-style-type: none"> 10. Pulmonary Oedema, Acute Lung Injury and Acute Respiratory Distress Syndrome 11. Sepsis, multi-organ failure, Multi-organ dysfunction syndrome 		
5	Health problems in Specific conditions and Toxicology – <ul style="list-style-type: none"> . Health problems in specific conditions <ul style="list-style-type: none"> a. Pregnancy - antenatal care, disorders in pregnancy b. Children and new born c. Obesity d. Diabetes mellitus e. HIV infections and AIDS f. Elderly subjects and disability g. Brief mention about endocrine disorders 13. Poisoning and drug over dosing <ul style="list-style-type: none"> a. Classification of poisons b. Principles of treatment of poisoning and Primary care c. Poisons and drug over dosing requiring ventilation 14. Miscellaneous <ul style="list-style-type: none"> a. Drowning b. Hanging 		

PRACTICAL

25 HOURS

S.NO	TOPIC	METHOD	HOURS
1	History Taking and clinical examination, monitoring of patient.		
2	Therapeutic options for various diseases and conditions		

B.Sc. Perfusion Technology

Semester IV

Paper 4-

CONDUCTION OF CARDIOPULMONARY BYPASS

50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	PRIMING SOLUTION : CRYSTALLOID & COLLOID SOLUTION		
2	PREBYPASS CHECKLIST PREPARATION OF PATIENT		
3	INITIATION OF BYPASS : PROTOCOLS		
4	EQUIPMENT OF CPB : OXYGENATORS SIZE ,CANNULA SIZE & TUBING SIZE		

5	BLOOD CARDIOPLEGIA DEVICE : TYPES OF CARDIOPLEGIA SOLUTION		
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PRACTICAL 25 HOURS

S.NO	TOPIC	METHOD	HOURS
1	CONDUCTION OF BYPASS : INITIATION , MAINTENANCE & TERMINATION OF BYPASS		
2	EVALUATION OF DIFFERENT PERFUSION STRATEGIES		

**B.Sc. Perfusion Technology
Semester V
Paper 1-**

Conduct of Cardiopulmonary Bypass and Cannulation Techniques

**Total
Hours 50**

S.NO	TOPIC	METHOD	HOURS
1	Cardiopulmonary Bypass Circuitry: Adult circuit, Paediatric circuit, Neonatal circuit		
2	Cannulation Techniques Arterial cannulation- Aortic, femoral, iliac, Venous cannulation- SVC, IVC, RA, femoral vein, Cardioplegia cannulation- Antegrade, Retrograde, Osteal		
3	Priming solutions and Haemodilution in CPB Crystalloids, Ringer lactate, Normal saline, Plasmalyte A, Dextrose, Colloids – Hetastarch Albumin, FFP. Additional drugs used in them - Mannitol, Heparin, Bicarbonate		
4	Conduct of CPB-Chart Review and selection of Equipments, Assembling the circuit: Priming and Setting occlusion, Initiation of CPB and Gas management. Venting of the Heart and Cardiomy Suction, Pre-CPB checklist, Pre weaning off, bypass checklist, Cardioplegia dosage and management, ABG and ACT management, Adequacy of Perfusion, Weaning From CPB.		
5	Renal System - Presentation, Diagnosis and Management ARF Acute renal failure, CRF Chronic renal failure, Why and when do we do, Haemodialysis, Types of Dialysis, CNS Aetiology, presentation and diagnosis of, Hemiplegia, Paraplegia, Stroke, Cerebral haemorrhage		

PRACTICAL 50 HOURS

S.NO	TOPIC	METHOD	HOURS
1	1 Adult circuit 2 Paediatric circuit 3 Neonatal circuit		
2	Arterial cannulation- Aortic, femoral, iliac Venous cannulation- SVC, IVC, RA, femoral vein		
3	Cardioplegia cannulation- Antegrade, Retrograde, Osteal		
4	Assembling the circuit: Priming and Setting occlusion		
5	Initiation of CPB and Gas management. Venting of the Heart and Cardiomy Suction Cardioplegia dosage and management ABG and ACT management Adequacy of Perfusion		

B.Sc. Perfusion Technology

Semester V
Paper 2-
Myocardial Protection and drugs used in CPB
Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Myocardial protection Crystalloid Cardioplegia - St Thomas solution, Del Nido solution, Custodiol HTK solution -Histidine-Tryptophan-Ketoglutarate Blood cardioplegia delivery Devices-MPS myocardial protection system, Cardioplegia reservoir		
2	Drugs used in CPB: Vasodilators- Sodium Nitroprusside, Nitroglycerine, Vasoconstrictors- Phenylephrine, Anti Arrhythmics- Amiodarone, Magnesium, Lignocaine Diuretic- Frusemide, Mannitol. Anticoagulants- Heparin, Low molecular Weight heparin, Dabagantrin Argatroban, Protamine, Steroids- Dexamethasone		
3	Coagulation management during CPB and its reversal Heparin Pharmacology Heparin Dosing And Monitoring Heparin Resistance Alternatives To Unfractionated Heparin –Heparin Induced Thrombocytopenia Protamine Pharmacology Protamine reaction Temperature management during CPB Temperature monitoring sites Types of hypothermia Temperature gradient.		
4	Inhalation agents-Sevoflurane, Isoflurane, Analgesics- Fentanyl, Morphine, Sedatives- Midazolam, Thiopentone, Antiplatelets- Aspirin, Clopidogrel, Ticlopidine, Prasugrel.		
5	Sodium Bicarbonate, Potassium Chloride, Heparin and its alternatives- Bivalirudin, Argatroban, Lepirudin Inotropes- Adrenaline, Noradrenaline, Dopamine, Dobutamine, Milrinone, Vasopressin, Levosimendan.		

PRACTICAL **50 HOURS**

S.NO	TOPIC	METHOD	HOURS
1	St Thomas solution, Del Nido solution, Custodiol HTK solution - Histidine-Tryptophan-Ketoglutarate MPS myocardial protection system, Cardioplegia reservoir,		
2	, Vasodilators- Sodium Nitroprusside, Nitroglycerine, Vasoconstrictors- Phenylephrine, Anti Arrhythmics- Amiodarone, Magnesium, Lignocaine Diuretic- Frusemide, Mannitol		
3	Anticoagulants- Heparin, Low molecular Weight heparin Protamine Steroids- Dexamethasone Sodium Bicarbonate, Potassium Chloride ,Heparin and its alternatives- Bivalirudin, Argatroban		
4	, Adrenaline, Noradrenaline, Dopamine, Dobutamine, Milrinone, Vasopressin, Levosimendan		

B.Sc. Perfusion Technology
Semester V
Paper 3-
Cardiac, Thoracic and Vascular Surgical
Disorders **Total Hours 50**

S.NO	TOPIC	METHOD	HOURS
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1	IHD (Ischaemic Heart Disease), ACS - angina types - typical, atypical, STEMI, NSTEMI, MI, Cardiomyopathy-Types, presentation, diagnosis and management of Presentation, Diagnosis and Management of Left ventricular failure, Right ventricular failure		
2	Rheumatic Heart Disease-Causes, presentation, diagnosis and management of Mitral stenosis, Mitral regurgitation, Aortic regurgitation, Aortic stenosis, Tricuspid, regurgitation, Tricuspid stenosis		
3	Congenital Heart Disease, presentation, diagnosis and management of, Atrial septal defect, VSD, PDA, TOF, TGA, TAPVC, Coarctation of aorta.		
4	Vascular Diseases-Classification, presentation, diagnosis and management of Aneurysms and dissections, Ascending aorta, Arch of aorta, Descending thoracic aorta.		
5	Respiratory System, Presentation, Diagnosis and Management, Chronic obstructive airway diseases, Bronchial asthma, Pneumonia, H ₁ N ₁ , Pneumothorax, Haemothorax, Basics of PFT and its interpretation		

Practicals syllabus

Case scenarios of adult heart disease, congenital heart disease and thoracic vascular disease and lung diseases mentioned in the above units.

Practicals, Identify and Discuss - CXR, CT thorax, angiogram, CT angiogram and PFT and ECHO findings of the above diseases

B.Sc. PERFUSION Technology
Semester V
Paper 4-

Skill Enhancement-2 Research

Methodology and Biostatistics Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Introduction and Presentation of data Meaning , Branches of Statistics, Uses of statistics in medicine, Basic concepts, Scales of measurement, Collection of data, Presentation of data; Tabulation, Frequency Distribution, Diagrammatic and Graphical Representation of Data.		
2	Measures of central tendency and Measures of Variation Arithmetic Mean (Mean), Median, Mode, Partition values, Range, Interquartile range , Mean Deviation, Standard Deviation, Coefficient of Variation		
3	Probability and standard distributions Definition of some terms commonly encountered in probability, Probability distributions; Binomial distribution, Poisson distribution, Normal distribution, Divergence from normality; Skewness and kurtosis		
4	Census and Sampling Methods Census and sample survey, Common terms used in sampling theory, Non-probability (Non random) Sampling Methods; Convenience sampling, Consecutive Sampling, Quota sampling, Snowball		

	sampling, Judgmental sampling or Purposive sampling, Volunteer sampling, Probability (Random) Sampling methods; Simple random sampling, Systematic Sampling, Stratified Sampling, Cluster sampling, Multi-stage sampling, Sampling error, Non-sampling error		
5	Inferential statistics Parameter and statistic, Estimation of parameters; Point estimation, Interval Estimation, Testing of hypothesis; Null and alternative hypotheses, Type-I and Type-II Errors.		

Hospital Management & medical ethics (Theory)
Semester V
PAPER 5

UNIT-1 Introduction to hospital staffing- Hospital staffing, administration, PACS, HIS, RIS, DICOM. Medical records and documentation.

UNIT-2 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 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 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 Anesthesia- Local anesthesia and general anesthesia, uses in hospital, Facilities regarding general Anesthesia in different department of hospital. Management of adverse.

B.Sc. Perfusion Technology
Semester VI
Paper 1-

Effects on Various Organs during CPB and Introduction to IABP and ECMO

Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	Effect of CPB, Effect of CPB on CNS, Effect of CPB on Respiratory System, Effect of CPB on Renal system, Effect of CPB on Hepatic system		
2	Effect of CPB on Immune system, Effect of CPB on Endocrine system, Systemic Inflammatory Response Syndrome, Heparin Resistance, Heparin Induced Thrombocytopenia, Protamine Reactions		
3	Introduction to IABP, Parts of IABP machine, Parts of IABP balloon, Insertion sites, Different IABP sizes, Indications, steps of insertion and removal, complications and contraindications		

4	Introduction to ECMO, Components of ECMO circuits, Indications and contraindications to ECMO, Types of ECMO. Cardiac Support Devices, Extra Corporeal Life Support (ECMO / ECLS), Ventricular Assist Devices (LVAD / RVAD), Artificial Heart		
5	Safety devices in CPB, Level detector, Bubble detector Pressure sensor, Pump slave, Hand cranks, Pulsatile, Perfusion		
6	Minimal Invasive Cardiac Surgeries, CPB for Minimal Invasive Cardiac Surgeries, CPB for Non Cardiac Surgeries, Recent advances in Perfusion		

PRACTICAL

50HOURS

Level detector, Bubble detector, Pressure sensor, Pump slave, Hand cranks, Pulsatile Perfusion, Introduction to IABP, Indications, steps of insertion and removal, complications and contraindications: Identification, Uses, Principles, Discussion and Demonstration of above practical syllabus- Connecting and setting up the IABP

B.Sc. Perfusion Technology

Semester VI

Paper 2-

Special Situations in Perfusion Technology Total Hours 50

S.NO	TOPIC	METHOD	HOURS
1	CPB CHECK LIST, Prebypass check list, Initiation of CPB, Maintenance of CPB, Weaning of CPB		
2	CPB special conditions, Foetal circulation, CPB in pregnancy, Reperfusion injury		
3	CPB in Infants & Children, Selection of circuit, Selection of cannulae Blood prime		
4	Management of CPB in Cyanotic patients, Blood Gas Management, ABG, VBG calculation of circulating haematocrit, Various priming options		
5	Hemo-concentration, Conventional ultrafiltration CUF, Modified Ultra filtration MUF. Blood conservation techniques in Cardiac Surgery, Preoperative, Peri Operative, Post Operative, Cell Saver		
6	Deep Hypothermic Circulatory Arrest (DHCA), Steps Taken Before Going On DHCA, Antegrade & Retrograde Cerebral Perfusion, Alpha stat management Ph stat management, Non hypothermic cardiac surgeries		

PRACTICAL

50HOURS

- Assembling of CPB circuit
- Initiation of CPB
- Maintenance of CPB
- Weaning of CPB Conventional ultrafiltration CUF
- Modified Ultra filtration MUF
- Identification, Uses, Principles, Discussion and Demonstration of above practical

S.NO	METHOD	TOPIC	HOURS
1	Intra Aortic Balloon Pump (IABP)		
2	Deep Hypothermic Circulatory Arrest (DHCA)		
3	Antegrade & Retrograde Cerebral Perfusion		
4	Setting up of DHCA circuit for ACP and RCP		
5	Identification, Uses, Principles, Discussion and Demonstration of above		

	practical syllabus		
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