

SRI GURU RAM DAS UNIVERSITY OF HEALTH SCIENCES, SRI AMRITSAR
Revised March 2026

Course Structure for the Bachelors in Perfusion Technology (Code-BPERT.2.13)					
Session 2025					
Course No.	Course Title	Course Type	L+T+P	Credits / week	Weightage Theory/ Practical
Semester-I					
BPert-ANT.201	Anatomy of cardiovascular system & respiratory system	Foundation	3+0+0	3	30+70=100
BPert-PHY.201	Physiology of cardiovascular system & respiratory system	Foundation	3+0+0	3	30+70=100
BPert-BIC.201	Biochemistry- Cycles & pathways	Foundation	2+0+1	3	30+70=100
BPert.201	Introduction to Perfusion technology -History of CPB & equipments used in CPB	Core	3+0+0	3	30+70=100
ECO.250	English and communication skills	Elective	2+0+0	2	NC*
BPert.225	Practical in CPB	Core	0+0+5	5	30+70=100
Total Credits			13+0+6	19	500
Semester-II (revised)					
BPert-ANT.202	Anatomy-II	Foundation	3+0+0	3	30+70=100T
BPert-PHY.202	Physiology-II	Foundation	3+0+0	3	30+70=100T
BPert-BIC.202	Applied Biochemistry	Foundation	2+0+1	3	30+70=100T 10+40=50P
BPert-PHA.201	Applied Pharmacology	Foundation	3+0+0	3	30+70=100T
BPert.202	Introduction to Perfusion Technology-I	Core	2+0+3	5	30+70=100T 10+40=50P
BPert.203	Introduction to Quality and patient safety	Elective	2+0+0	2	NC
COM.250	Computer Applications	Elective	2+0+0	2	NC
Total Credits			17+0+4	21	600
Semester-III					
BPert-PAT.301	Pathology	Foundation	3+0+2	5	30+70=100T 10+40=50P
BPert-301	Introduction of Perfusion Technology-II	Foundation	3+0+2	5	30+70=100T 30+70=100P
BPert.302	Asics of pumps & oxygenators & blood component	Core	3+1+2	6	30+70=100T 30+70=100P
BPert.303	Medical Emergencies and Patient care	Core	3+0+0	3	10+40=50T
Total Credits			12+1+6	19	600
Semester-IV					
BPert-PAT.302	Applied Pathology	Foundation	2+1+1	4	10+40=50T 10+40=50P
BPert-PHA.302	Pharmacology drugs	Foundation	3+0+0	3	30+70=100T
BPert.304	Conduction of CPB	Core	3+0+3	6	30+70=100T 30+70=100P
BPert.305	Medical Disorders & Intensive Care	Core	3+0+2	5	30+70=100T 30+70=100P
CRP.350	Community Rehabilitation practice	Elective course	2+0+0	2	NC
Total Credits			11+1+6	18	600
Semester-V					
BPert.401	Myocardial protection & drugs in CPB	Core course	3+1+2	6	30+70=100T 30+70=100P

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BPERT.402	Special Situations in Perfusion Technology	Core course	3+1+0	4	30+70=100T
BPERT.403	Mechanical Circulatory Support Device	Core course	2+1+2	5	30+70=100T 30+70=100P
BPERT.404	Medical Law and Ethics	Elective course	2+0+0	2	NC
Total Credits			10+3+4	17	500
Semester-VI					
BPERT.405	Advanced perfusion	Core course	3+1+2	6	30+70=100T 30+70=100P
BPERT.406	Recent advances in Cardiopulmonary bypass & Perfusion	Core course	3+1+2	6	30+70=100T 30+70=100P
RMB.401	Research Methodology & Biostatistics	Elective course	2+1+0	3	30+70=100T
BPERT.407	Hospital management	Elective course	2+1+0	3	NC
Total credits			10+4+4	18	500
7semester+8semester					
Perfusion internship	1 paper presentation or 1 case report Internship (Six Month) -Minimum 1800 hours (calculated based on 6 hours per day for one year of internship)				
Grand Total			73+9+30	112	3200

Course Structure for the Bachelors in Perfusion Technology (Code-BPERT.2.13)
Session 2024

Course No.	Course Title	Course Type	L+T+P	Credits / week	Total credits	Weightage IA/Theory/ Practical
Semester-I						
BPERT-ANT.201	Anatomy of cardiovascular system & respiratory system	Foundation course	3+0+0	3	45	50+50=100
BPERT-PHY.201	Physiology of cardiovascular system & respiratory system	Foundation course	3+0+0	3	45	50+50=100
BPERT-BIC.201	Biochemistry- Cycles & pathways	Foundation course	2+0+1	3	45	50+50=100
BPERT.201	Introduction to Perfusion technology -History of CPB & equipments used in CPB	Core course	3+0+0	3	45	50+50=100
ECO.250	English and communication skills	Elective course	2+0+0	2	32	NC*
BPERT.225	Practical in CPB	Core course	0+0+5	5	80	100
Total Credits			14+0+6	20	292	500
Semester-II						
BPERT-ANT.202	Anatomy of renal system & CNS	Foundation course	3+0+0	3	45	50+50=100
BPERT-PHY.202	Physiology of renal system & general hematology	Foundation course	3+0+0	3	45	50+50=100
BPERT-BIC.202	Biochemistry - Buffer system metabolic acidosis/ alkalosis hemostasis	Foundation course	3+0+0	3	45	50+50=100
BPERT.202	Introduction to Perfusion technology -Components and functioning of CPB with diagrams	Core course	3+0+0	3	45	50+50=100
COM.250	Computer Applications	Elective	2+0+0	2	32	NC*

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		course				
BPERT.226	Practical in CPB	Core course	0+0+5	5	80	100
Total Credits			14+0+5	19	292	500
Semester-III						
BPERT-ANT.301	Embryology of Heart	Foundation course	3+0+0	3	45	50+50=100
BPERT-PHA.301	General Pharmacology	Foundation course	3+0+0	3	45	50+50=100
BPERT.301	Pathophysiology- Anomalies and diseases of aorta	Core course	3+0+0	3	45	50+50=100
BPERT.302	Effects of CPB on various organ systems, haematological aspects of CPB	Core course	3+0+0	3	45	50+50=100
HVE.350	Human Values & ethics	Elective	2+0+0	2	32	NC*
BPERT.325	Practical in CPB	Core course	0+0+5	5	80	100
Total Credits			14+0+5	19	292	500
Semester-IV (Revised)						
BPERT-PAT.302	Applied Pathology	Foundation	2+1+1	4	10+40=50T 10+40=50P	
BPERT-PHA.302	Pharmacology drugs	Foundation	3+0+0	3	30+70=100T	
BPERT.303	Conduction of CPB	Core	3+0+3	6	30+70=100T 30+70=100P	
BPERT.304	Embryology of Cardio-Respiratory Systems	Core	3+0+2	5	30+70=100T 30+70=100P	
CRP.350	Community Rehabilitation practice	Elective course	2+0+0	2	NC	
Total Credits			11+1+6	18	600	
Semester-V						
BPERT.401	Myocardial protection & drugs in CPB	Core course	3+1+2	6	30+70=100T 30+70=100P	
BPERT.402	Special Situations in Perfusion Technology	Core course	3+1+0	4	30+70=100T	
BPERT.403	Mechanical Circulatory Support Device	Core course	2+1+2	5	30+70=100T 30+70=100P	
BPERT.404	Medical Law and Ethics	Elective course	2+0+0	2	NC	
Total Credits			10+3+4	17	500	
Semester-VI						
BPERT.405	Advanced perfusion	Core course	3+1+2	6	30+70=100T 30+70=100P	
BPERT.406	Recent advances in Cardiopulmonary bypass & Perfusion	Core course	3+1+2	6	30+70=100T 30+70=100P	
RMB.401	Research Methodology & Biostatistics	Elective course	2+1+0	3	30+70=100T	
BPERT.407	Hospital management	Elective course	2+1+0	3	NC	
Total credits			10+4+4	18	500	
7semester+8semester						
Perfusion internship	1 paper presentation or 1 case report Internship (Six Month) -Minimum 1800 hours (calculated based on 6 hours per day for one year of internship)					
Grand Total Credits			73+9+30	112	3100	

BACHELORS IN PERFUSION TECHNOLOGY

The duration of the study for Bachelors in Perfusion Technology will be of 4 years (3 years Academics +1 year Internship).

BPRT-ANT.201: HUMAN ANATOMY-I

CREDITS-03

Unit	Content	Hours
UNIT-I	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	13
UNIT-II	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. Radiographic identification of bone and joints Applied anatomy. Bony architecture Joints – structure, range of movement Muscles – origin, insertion, actions, nerve supply	6
UNIT-III	Spine and thorax Back muscles -Superficial layer Deep muscles of back, their origin, insertion, action and nerve supply. Vertebral column – Structure & Joints of vertebra. Thoracic cage	3
UNIT-IV	Head and neck: Cranium Facial Muscles – origin, insertion, actions, nerve supply Temporal mandibular Joints – structure, types of movement	3
UNIT-V	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	6
UNIT-VI	Lymphatic system- (with relevant applied anatomy) Salient features of lymphatic organs (spleen, tonsil, thymus, lymph node).	4
UNIT-VII	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	6
UNIT-VIII	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	4
	Total	45

HUMAN ANATOMY I-PRACTICAL

CREDIT 02

Sr. No.	Practical	Hours
1	Identification and description of all anatomical structures.	10
2	Demonstration of dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face and brain)	20
3	Demonstration of skeleton-articulated and disarticulated	10
4	Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.	20
		60

BPERT-PHY.201: HUMAN PHYSIOLOGY-I CREDIT-03

Unit	Content	Hours
UNIT-I	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 Groupstypes, significance, determination. Hemoglobin, Heamostasis Lymph-composition, formation, circulation & functions	10
UNIT-II	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.	10
UNIT-III	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	12
UNIT IV	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.	13
Total		45

HUMAN PHYSIOLOGY I- PRACTICAL	60 Hours
<ol style="list-style-type: none"> 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 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 	

BPERT-BIC.201: BASIC BIOCHEMISTRY

CREDIT-02

Unit	Content	Hours
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.	8
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	13
UNIT-III	Vitamins: Definition and classification of vitamins, difference between fat soluble and water soluble vitamins. Water soluble vitamins and fat soluble vitamins	10
UNIT-IV	Lipids: Definition, classification and function of lipids. Fatty Acids, Triacylglycerols or Triacylgcerides or neutral fat. Fatty acid metabolism. Ketone body metabolism	14
Total		45

BASIC BIOCHEMISTRY-PRACTICAL

Unit	Content	30 Hours
UNIT-I	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.	30

BPERT-MIC.201: GENERAL MICROBIOLOGY

Unit	Content	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	8
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	13
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.	10
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	14
Total		45

GENERAL MICROBIOLOGY-PRACTICAL

Unit	Content	30 Hours
UNIT-I	<ol style="list-style-type: none"> 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 	

BPERT.201: INTRODUCTION TO NATIONAL HEALTHCARE SYSTEM CREDIT.02

Teaching Objective	<ul style="list-style-type: none"> • To teach the measures of the health services and high-quality health care • To understand whether the health care delivery system is providing high-quality health care and whether quality is changing over time. • To provide to National Health Programme- Background objectives, action plan, targets, operations,in various National Heath Programme. • To introduce the AYUSH System of medicines.
Learning Outcomes	<ul style="list-style-type: none"> • The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Sr. No.	Topics	Hrs.
1	Introduction to healthcare delivery system - Healthcare delivery system in India at primary, secondary and tertiary car; Community participation in healthcare delivery system; Health system in developed countries; Private / Govt Sector; National Health Mission; National Health Policy; Issues in Health Care Delivery System in India	5
2	National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.	5
3	Introduction to AYUSH system of medicine - Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various system of Medicine	6
4	Health scenario of India- past, present and future	4
5	Demography & Vital Statistics- Demography – its concept; Census & its impact on health policy	5
6	Epidemiology - Principles of Epidemiology; Natural History of disease; Methods of Epidemiological studies; Epidemiology of communicable & non-communicable diseases, disease, transmission, host defense immunizing agents, cold chain, immunization, disease, monitoring and surveillance.	5
Total		30 hrs

BPERT.202: MEDICAL TERMINOLOGIES AND RECORD KEEPING

This course introduces the elements of medical terminology.

Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes.

Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests.

Topics to be covered under the subject are as follows:

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic medical terms.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical orders/reports.
9. Data entry and management on electronic health record system.

SEMESTER-II

BPRT-ANT.202: HUMAN ANATOMY-II

Unit	Content	Hours
UNIT-I	Urinary system (with relevant applied anatomy) Parts of urinary system Salient gross features of kidney, urinary bladder, ureter and urethra	5
UNIT-II	Reproductive system Parts of male and female reproductive system with salient gross features of testis & uterus, ovary and fallopian tube	5
UNIT-III	Endocrine glands List of the endocrine glands, their position and salient gross features Hormones produced by each endocrine gland.	10
UNIT-IV	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)	10
UNIT-V	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.	8
UNIT-VI	General Embryology: Spermatogenesis & oogenesis Ovation, fertilization, Placenta, Fetal circulation. Embryology of lungs & Heart in detail	7
	Total	45

BPRT-PHY.202: HUMAN PHYSIOLOGY-II

Unit	Content	Hours
UNIT-I	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	8
UNIT-II	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-III	Sensory Organs: Functions of skin, eye, ear, nose, tongue Alterations in disease	13
UNIT-IV	Endocrines Functions of pituitary, Pineal gland, Thymus, Thyroid, Parathyroid, Pancreas, Suprarenal & placenta Alterations in disease	10
UNIT-V	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	14

UNIT-VI	Lymphatic and Immunological system: Circulation of lymph Immunity Formations of T- Cells and B- Cells Types of Immune response Antigens Cytokine	
	Total	45

BPERT-BIC.202: APPLIED BIOCHEMISTRY CREDIT.03

Unit	Content	Hours
UNIT-I	Collection of Specimen, Types of specimen (blood plasma, serum, urine, body fluid, CSF), there variables and normal range use of anticoagulant & types of vials.	8
UNIT-II	Introduction to lab apparatus Pippetes, biurettes & beakers Flasks types and uses Reagent bottles, funnels types & uses Chemical balance	13
UNIT-III	Concepts of Acid - Base & salt reaction and hydrogen ion concentration, pH meter & buffer.	10
UNIT-IV	Chemistry of Proteins- classification and examples Vitamins: Definition and classification of vitamins, difference between fat soluble and water soluble vitamins. Water soluble vitamins and fat soluble vitamins	14
UNIT-V	Liver function tests and their assessment. Renal function tests and their assessment Cardiac profile- biochemical markers of myocardial infarction, basic principles, evaluation and application	
	Total	45

APPLIED BIOCHEMISTRY-PRACTICAL

Content	30 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. 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.	

BPERT-PHA.201: APPLIED PHARMACOLOGY CREDIT.03

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

Unit	Content	Hours
UNIT-I	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	8

	antagonistic effect of drugs plasma half life, drug efficacy & potency, mechanism of drug action, adverse drug reaction	
UNIT-II	ANS: Cholinergic & anticholinergic drugs, skeletal muscle relaxant, Sympathomimetics drugs (adrenergic drugs), alpha & beta blockers	13
UNIT-III	CNS: Sedative & hypnotics, local & general anesthetics, Antiepileptic & Antipsychotics, Antidepressant & Analgesics	10
UNIT-IV	CVS: Antihypertensive drugs, Anti-anginal drugs, Anti arrhythmic drugs, Cardiac glycosides, plasma expanders	14
UNIT-V	Antiemetic & Diuretics, UTI DRUGS	
	Total	45

BPERT.201: INTRODUCTION TO PERFUSION TECHNOLOGY CREDIT.03

Unit	Content	Hours
UNIT-I	History of CPB, set up of Heart lung machine & its components, pumps, line diagrams	20
UNIT-II	Oxygenators, cannulations in cardiac surgery, Priming fluids, Temperature management in cardiac surgery, hemofiltration.	25
	Total	45

BPERT.205: INTRODUCTION TO QUALITY AND PATIENT SAFETY CREDIT 03

Teaching Objective	<ul style="list-style-type: none"> • The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. • To understand the basics of emergency care and life support skills. • To Manage an emergency including moving a patient • To help prevent harm to workers, property, the environment and the general public. • To provide a broad understanding of the core subject areas of infection prevention and control. • To provide knowledge on the principles of on-site disaster management 	
Learning Outcomes	<ul style="list-style-type: none"> • Upon completion, Students should be able to apply healthcare quality improvement and patient safety principles, concepts, and methods at the micro-, meso-, and macro-system levels. 	
Unit	Content	Hours
UNIT-I	Quality assurance and management – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines	2
UNIT-II	Basics of emergency care and life support skills - Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR	8
UNIT-III	Bio medical waste management and environment safety -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals/Chemicals/Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices).	10
UNIT-IV	Infection prevention and control -Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand	10

	hygiene and use of Personal protective equipment (PPE)], Prevention & control of common healthcare associated infections. Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control	
UNIT-V	Antibiotic Resistance - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance	8
UNIT-VI	Disaster preparedness and management - Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.	7
	Total	45

COM.250: Computer Applications

Theory: 15 hours Practical's : 30 hours

Introduction to computer – I/O devices – memories – RAM and ROM – Different kinds of ROM – kilobytes, MB, GB their conversions – large computer – Medium, Micro, Mini computers - Different operating system – Networking – LAN, WAN, MAN (only basic ideas)

Typing text in MS word – Manipulating text – Formatting the text – using different font sizes, bold, italics – Bullets and numbering – Pictures, file insertion – Aligning the text and justify – choosing paper size – adjusting margins – Header and footer, inserting page No's in a document – Printing a file with options – Using spell check and grammar – Find and replace – Mail merge – inserting tables in a document.

Creating table in MS-Excel – Cell editing – Using formulas and functions – Manipulating data with excel – Using sort function to sort numbers and alphabets – Drawing graphs and charts using data in excel – Auto formatting – Inserting data from other worksheets.

Preparing new slides using MS-POWERPOINT – Inserting slides – slide transition and animation – Using templates – Different text and font sizes – slides with sounds – Inserting clip arts, pictures, tables and graphs – Presentation using wizards.

Introduction to Internet – Using search engine – Google search – Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – E- mail ID creation – Sending messages – Attaching files in E- mail.

Role of Computers in the Health care: - HIS, Medical Equipment, Pharmacy in inventory management, Patient record maintenance.

SEMESTER-III

BPRT-PAT.301: PATHOLOGY CREDIT 03

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

Unit	Content	Hours
UNIT-I	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.	8
UNIT-II	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.	13
UNIT-III	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.	10
UNIT-IV	Transfusion Medicine Selection of donor, blood grouping, Rh typing, cross matching, storage, transfusion transmitted diseases, transfusion reactions, components - types, indications	14
UNIT-V	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.	
	Total	45

PATHOLOGY PRACTICAL CREDIT.02

Content	60 Hours
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)	
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BPRT-306: INTRODUCTION OF PERFUSION TECHNOLOGY-II CREDIT 03

Unit	Content	Hours
UNIT-I	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	8
UNIT-II	Basic Principles of: Extracorporeal Circulation, Extracorporeal gas exchange Biocompatible Materials used in Perfusion Aseptic techniques and Sterility in perfusion Basic components used in CPB- Heart lung machine, Oxygenator, Heater cooler unit Blood cardioplegia device ACT Machine, Basics of general Anaesthesia., Types of anaesthesia 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)	13
UNIT-III	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	10
UNIT-IV	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 Respiratory System, Presentation, Diagnosis and Management, Chronic obstructive airway diseases, Bronchial asthma, Pneumonia, HINI, Pneumothorax, Haemothorax, Basics of PFT and its interpretation	14
UNIT-V	Congenital Heart Disease, presentation, diagnosis and management of, Atrial septal defect, VSD, PDA, TOF, TGA, TAPVC, Coarctation of aorta. Rheumatic Heart Disease-Causes, presentation, diagnosis and management of Mitral stenosis, Mitral regurgitation, Aortic regurgitation, Aortic stenosis, Tricuspid, regurgitation, Tricuspid stenosis	
	Total	45

Introduction to Perfusion Technology-Practical CREDIT 02

1. Chest X-ray 2. ECG 3. Echocardiography Coronary Angiography 4. ACT Machine 5. Laboratory investigations- arterial blood gas, Venous blood gas, Renal function test, liver function test, coagulation profile. 6. Assembling of Heart Lung Machine

BPERT.307: BASICS OF PUMPS, OXYGENATORS & BLOOD COMPONENTS CREDIT.03

Course outcome: This course is focus on basic components & equipment of extracorporeal circuit. After learning this course students are able to understand configuration, working, types and advantage disadvantage of different kind of oxygenator, pumps filter , tubing and blood products.

Unit	Content	Hours
UNIT-I	Oxygenators-History of Oxygenators, Types of Oxygenators, Disc and Screen Oxygenators, Bubble Oxygenators, Membrane Oxygenators, Design & function of various Oxygenators	8
UNIT-II	Pumps- History of Pumps, Characteristics of an Ideal Pump, Types of Pumps Roller pumps, Centrifugal pumps, Peristaltic pumps, Design & function of Roller pumps, Design & function of Centrifugal pumps.	13
UNIT-III	Filters-Arterial filters, Cardiotomy filters, Gas line filters, Leucocyte filters, Types of tubing's used in CPB, Heat Exchangers	10
UNIT-IV	Blood components-Blood grouping and Cross Matching, PRBC, Whole blood, Platelets, FFP, Cryoprecipitate Hemo-concentration, Conventional ultrafiltration CUF, Modified Ultra filtration MUF. Blood conservation techniques in Cardiac Surgery, Preoperative, Peri Operative, Post Operative, Cell Saver	14
UNIT-V	Coagulation system-Platelet Disorders- Thrombocytopenia, Thrombophilia, Coagulation pathway disorders - Von willibrands diseases Haemophilia, DIC-Disseminated intravascular coagulation, Fibrinolytic system and its disorders.	
	Total	45

BPERT.307: BASICS OF PUMPS, OXYGENATORS & BLOOD COMPONENTS PRACTICAL CREDIT.02

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| <ol style="list-style-type: none"> 1. Design & function of Roller pumps 2. Arterial filters Cardiotomy filters, Gas line filter , Leucocyte filters 3. Types of tubing's used in CPB & Heat Exchangers 4. Temperature controlling machine 5. Heart lung machine equipments |
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BPERT.308: 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.

Unit	Content	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.	8
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	13
UNIT-III	Fundamentals of Patient Care, Concept of health & Illness, Health Determinants, Concept of Patients & their types, Patient Centre Care & Fundamentals of Communications, Reporting & Recording of Patients, Rights of Patients, Concepts	10

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Revised March 2026

	of Disease & its types, General concept, care & Prevention of Accident, Trauma & Infections	
UNIT-IV	Patient Care, Associated Units & Departments Ambulatory Units, Critical Care Units, Pediatrics, Neonatal Intensive Care Unit (NICU), Emergency Department, Inpatient Units, Hematology/Oncology and Immunology Unit , Orthopedic 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, Tracheotomize Patients. Nutritional Support in ICU.	14
	Total	45

SEMESTER-IV session 2024
BPRT-PAT.302: APPLIED PATHOLOGY CREDIT.03

Unit	Content	Hours
UNIT-I	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	5
UNIT-II	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	5
UNIT-III	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	5
UNIT-IV	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	10
UNIT-V	Clinical manifestations of renal diseases, Glomerular lesions in systemic diseases- diabetes, amyloidosis and systemic lupus erythematosus, Pericardial and pleural effusions- causes and microscopy.	10
UNIT-VI	Atrial Septal Defect (ASD)– abnormal opening between the atria causing left-to-right shunt; hemodynamic effects & clinical features. Ventricular Septal Defect (VSD)-defect in the ventricular septum leading to shunt; size-dependent pathophysiology & complications. Tetralogy of Fallot– four components (VSD, pulmonary stenosis, overriding aorta, RV hypertrophy); pathophysiology of cyanotic heart disease. Functional Single Ventricle-physiology of hearts with one effective ventricle; management & hemodynamic consequences. Total Anomalous Pulmonary Venous Connection (TAPVC)– abnormal pulmonary venous return; circulatory effects & types. Transposition of Great Arteries (TGA)–ventriculo-arterial discordance; pathophysiology & circulatory patterns. Coronary Artery Disease (CAD)– atherosclerotic obstruction of coronary vessels; ischemic myocardial effects. Mechanical Complications of CAD– e.g., myocardial infarction sequelae like ventricular rupture or papillary muscle dysfunction. Interrupted Aortic Arch–congenital absence of aortic segment; hemodynamics & associated defects.	10
	Total	45

APPLIED PATHOLOGY-PRACTICAL CREDIT.01

1. Urine examination: physical, chemical, microscopy
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| <p>2. Blood grouping & Rh typing</p> <p>3. Hemoglobin estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR) Specimens: HEART & GREAT VESSELS SPECIMENS, LUNGS SPECIMENS, KIDNEY SPECIMEN, LIVER SPECIMENS</p> |
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BPRT-PHA.302: PHARMACOLOGY DRUGS

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

Unit	Content	Hours
UNIT-I	<p>CVS Drugs: Drugs affecting renin–angiotensin system and plasma kinins: Includes ACE inhibitors (e.g., enalapril), angiotensin receptor blockers (ARBs like losartan), renin inhibitors, and drugs influencing plasma kinin metabolism, used in hypertension & heart failure management. Cardiac glycosides and drugs for heart failure:</p> <p>Cardiac glycosides (e.g., digoxin) increase myocardial contractility. Other heart-failure drugs include β-blockers, ACE inhibitors, ARBs, diuretics, and vasodilators.</p> <p>Anti-arrhythmic drugs: Classified into four classes (I–IV) that modulate ion channels to stabilize cardiac rhythm (e.g., lidocaine, amiodarone, β-blockers, calcium channel blockers).</p> <p>Anti-anginal and other anti-ischemic drugs:</p> <p>Nitrates (nitroglycerin), β-blockers, calcium channel blockers, and newer agents that reduce myocardial oxygen demand or improve coronary blood flow.</p> <p>Anti-hypertensive drugs: Include diuretics, β-blockers, ACE inhibitors, ARBs, calcium channel blockers, and centrally acting agents to lower blood pressure.</p>	15
UNIT-II	Anticoagulant agents. Heparin warfarin, antiplatelet agents, antifibrinolytics, thrombolytics	5
UNIT-III	<p>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</p>	10
UNIT-IV	Drugs acting on Kidney: Diuretics and antidiuretics: Diuretics (thiazides, loop diuretics, potassium-sparing) promote Na^+ /water excretion. Antidiuretics (e.g., desmopressin) reduce urine output by enhancing water reabsorption in the collecting duct.	5
UNIT-V	<p>Drugs acting on CNS: General anaesthetics: Inhalational (e.g., isoflurane) and intravenous agents (e.g., propofol) that induce reversible loss of consciousness and analgesia for surgery.</p> <p>Sedative hypnotics: Benzodiazepines (e.g., diazepam) and non-benzodiazepine hypnotics (e.g., zolpidem) that produce</p>	10

	sedation and promote sleep. Opioid analgesics and antagonists: Opioids (e.g., morphine, fentanyl) provide analgesia by acting on μ -receptors. Antagonists like naloxone reverse opioid effects in overdose.	
	Total	45

BPERT.309: CONDUCTION OF CPB CREDIT.03 Semester-II

Unit	Content	Hours
UNIT-I	PRIMING SOLUTION: CRYSTALLOID & COLLOID SOLUTION 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	8
UNIT-II	Pre-bypass Checklist, Preparation of Patient, Cannulation Techniques, Arterial cannulation- Aortic, femoral, iliac, Venous cannulation SVC, IVC, RA, femoral vein, Cardioplegia cannulation- Antegrade, Retrograde, Osteal	13
UNIT-III	INITIATION OF BYPASS: PROTOCOLS 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 Cardiotomy Suction, Pre-CPB checklist, Pre weaning off, bypass checklist, Cardioplegia dosage and management, ABG and ACT management, Adequacy of Perfusion, Weaning From CPB	10
UNIT-IV	Equipment Of CPB: Oxygenators Size, Cannula Size & Tubing Size	14
UNIT-V	Blood Cardioplegia Device: Types of Cardioplegia Solution	
	Total	45

BPERT.309: CONDUCTION OF CPB CREDIT.03 Semester-IV (session 2024)

Unit	Content	Hours
UNIT-I	Pre-bypass Checklist, Preparation of Patient, Cannulation Techniques, Arterial cannulation- Aortic, femoral, iliac, Venous cannulation SVC, IVC, RA, femoral vein, Cardioplegia cannulation- Antegrade, Retrograde, Osteal	10
UNIT-II	INITIATION OF BYPASS: PROTOCOLS 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 Cardiotomy Suction, Pre-CPB checklist, Pre weaning off, bypass checklist, Cardioplegia dosage and management, ABG and ACT management, Adequacy of Perfusion, Weaning From CPB	20
UNIT-III	Blood Cardioplegia Device: Types of Cardioplegia Solution Intracellular vs. Extracellular Solutions, Common Formulations in Clinical Use. Delivery Techniques and Equipment: Modes of Delivery, Temperature Strategies	10
	Total	40

CONDUCTION OF CPB PRACTICAL CREDIT.02

1. Prime solutions

2. Protocol of Operation Theatre
3. Priming & assembling of CPB circuits
4. Assembling & priming of BCD
5. Measurement of ABG & ACT
6. Cannula & Catheter

BPRT. 310: Embryology of Cardio-Respiratory Systems

CREDIT.03

Unit	Content	Hours
UNIT-I	<p>Cardiovascular system Development:</p> <p>Arteries & their development: Anterior arch arteries & their fate, Formation of aortic arches (1st to 6th) and their transformation into adult arterial structures (e.g., carotid, pulmonary arteries).</p> <p>Development of other arteries: Differentiation of dorsal aorta derivatives like intersegmental arteries into systemic arteries.</p> <p>Veins & their development: Veins of the abdomen, Formation of hepatic portal system and renal veins from vitelline and umbilical veins.</p> <p>Somatic vs visceral veins: Differentiation of somatic (body wall) and visceral (organ-related) venous systems.</p> <p>Fetal circulation & changes at birth.</p> <p>Fetal circulation: Unique circulatory pathways (ductus arteriosus, foramen ovale, umbilical vessels) that bypass non-functional fetal lungs.</p> <p>Changes in circulation after birth: Closure of fetal shunts and transition to adult pulmonary circulation.</p> <p>Cardio vascular diseases</p> <ol style="list-style-type: none"> 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 	25
UNIT-II	<p>Respiratory system:</p> <p>Larynx: Development from the cranial part of the respiratory diverticulum.</p> <p>Trachea: Forms from the tracheoesophageal groove, separating from the esophagus.</p> <p>Extrapulmonary bronchi: Develop into primary bronchi that branch from the trachea.</p> <p>Intrapulmonary bronchi: Further branching into the lung tissue forming the bronchial tree.</p> <p>Embryological basis for clinical correlations: Abnormalities in these stages can lead to conditions like tracheoesophageal fistula or bronchial malformations.</p> <p>Respiratory diseases</p> <ol style="list-style-type: none"> 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 	20

	Respiratory care in ICU: airway care, tracheostomy care, endotracheal intubation, mechanical ventilation, care of ventilated patient, complications and weaning.	
		Total
		45

BPERT. 310: Embryology of Cardio-Respiratory Systems PRACTICAL CREDIT.02

Simulation Lab: ACLS "Mega-Code" scenarios for sudden cardiac arrest.
 Ventilator Workshop: Learning to "wean" a patient by switching from Assist Control (AC) to Pressure Support (PSV) mode.
 Imaging Review: Comparing a normal Chest X-ray with those showing Pneumonia, Pleural Effusion, and Pulmonary Edema (Kerley B lines).
 Blood Gas Analysis (ABG): Interpreting metabolic vs. respiratory acidosis in patients with COPD or Shock.

CRP.350: COMMUNITY REHABILITATION PRACTICE CREDIT.02
SYLLABUS FOR ALLIED & HEALTH PROFESSIONALS

TITLE OF THE COURSE: **Community Rehabilitation Practice**

CATEGORY: Compulsory Elective

AIM: To provide foundational knowledge and competencies in rehabilitation in practice, focusing on functioning, participation, equitable care across the life course.

COURSE STRUCTURE:

- Total duration -30 hours
- Credits: 2
- Teaching scheme: Theory learning:24 hours and Applied: 6 hours

CONTENT

Unit I: rehabilitation & health systems

- Concept and definition of rehabilitation (WHO)
- rehabilitation as an essential health service
- Overview of Rehabilitation
- Introduction to World Rehabilitation Alliance

Unit II: Functioning, Disability & ICF Framework

- Function versus disease -based models
- Components of ICF
- Activity, Participation, and contextual factors
- Application of ICF in basic case scenarios

Unit III: community-based rehabilitation

- Principles of CBR
- Early identification of disability
- Home-based rehabilitation
- Community participation and empowerment

Unit IV: Life-courses & Vulnerable Populations

- Women's health and caregiving burden
- Ageing and fall prevention
- Chronic diseases and disability
- Social determinants of health

Unit V: Primary Care & Interprofessional Practice

- Referral pathways

- Team-based rehabilitation
- Ethical and professional roles
- Communication in community settings

Unit VI: Applied Community Planning

- Designing a simple community rehabilitation plan
- Screening tools for functional limitations
- Documentation using ICF framework
- Case discussion

SEMESTER-V
BPERT.401: MYOCARDIAL PROTECTION AND DRUGS USED IN CPB
CREDIT.03

Course outcome: This course is focus on strategies to maintain integrity of myocardium during the cardiac surgery. After learning this course students are able to understand cardioplegia solutions and different drugs used during CPB.

Unit	Content	Hours
UNIT-I	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	8
UNIT-II	Drugs used in CPB: Vasodilators- Sodium Nitroprusside, Nitroglycerine, Vasoconstrictors Phenylephrine, Anti Arrhythmics- Amiodarone, Magnesium, Lignocaine Diuretic Frusemide, Mannitol. Anticoagulants- Heparin, Low molecular Weight heparin, Dabagatrin Argatroban, Protamine, Steroids- Dexamethasone Inhalation agents-Sevoflurane, Isoflurane, Analgesics- Fentanyl, Morphine, Sedatives Midazolam, Thiopentone, Antiplatelets- Aspirin, Clopidogrel, Ticlopidine, Prasugrel Sodium Bicarbonate, Potassium Chloride, Heparin and its alternatives- Bivalirudin, Argatroban, Lepirudin Inotropes-Adrenaline, Noradrenaline, Dopamine, Dobutamine, Milrinone, Vasopressin, Levosimendan.	13
UNIT-III	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.	10
UNIT-IV	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 Effect of CPB on Immune system, Effect of CPB on Endocrine system, Systemic Inflammatory Response Syndrome, Heparin Resistance, Heparin Induced Thrombocytopenia, Protamine Reactions	14
	Total	45

Myocardial Protection and drugs used in CPB Practical

CREDIT.02

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| <ol style="list-style-type: none"> 1. St Thomas solution, Del Nido solution, Custodiol HTK solution -Histidine-Tryptophan Ketoglutarate 2. MPS myocardial protection system, Cardioplegia reservoir, 3. Vasodilators- Sodium Nitroprusside, Nitroglycerine, 4. Vasoconstrictors- Phenylephrine, Anti Arrhythmics Amiodarone, Magnesium, Lignocaine Diuretic- Frusemide, Mannitol 5. Anticoagulants- Heparin, Low molecular Weight heparin Protamine 6. Steroids- Dexamethasone Sodium Bicarbonate, Potassium Chloride, 7. Heparin and its alternatives- Bivalirudin, Argatroban, Adrenaline, Noradrenaline, Dopamine, Dobutamine, Milrinone, Vasopressin, Levosimendan |
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BPERT.402: SPECIAL SITUATIONS IN PERFUSION TECHNOLOGY CREDITS.03

Course outcome: This course is focus on strategies of perfusion technology used in some special cases. After learning this course students are able to understand the perfusion strategies used in aortic. pregnancy and infants. Also understand about minimal invasive cardiac surgery and DHCA

Unit	Content	Hours
UNIT-I	Vascular Diseases-Classification, presentation, diagnosis and management of Aneurysms and dissections, Ascending aorta, Arch of aorta, Descending thoracic aorta.	8
UNIT-II	CPB special conditions, Foetal circulation, CPB in pregnancy, Reperfusion injury CPB CHECK LIST, Prebypass check list, Initiation of CPB, Maintenance of CPB, Weaning of CPB	13
UNIT-III	CPB in Infants & Children, Selection of circuit, Selection of cannulae Blood prime	10
UNIT-IV	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	14
UNIT-V	Minimal Invasive Cardiac Surgeries, CPB for Minimal Invasive Cardiac Surgeries, CPB for Non- Cardiac Surgeries, Recent advances in Perfusion Safety devices in CPB, Level detector, Bubble detector Pressure sensor, Pump slave, Hand cranks, Pulsatile, Perfusion	
	Total	45

Special Situations in Perfusion Technology-Practical

<ol style="list-style-type: none"> 1. Assembling of CPB circuit, Initiation of CPB, Maintenance of CPB, Weaning of CPB Conventional ultrafiltration CUF, Modified Ultra filtration MUF 2. Intra-Aortic Balloon Pump (IABP), Deep Hypothermic Circulatory Arrest (DHCA), 3. Antegrade & Retrograde Cerebral Perfusion, Setting up of DHCA circuit for ACP and RCP 4. Case scenarios of adult heart disease, congenital heart disease and thoracic vascular disease and lung diseases mentioned in the above units. 5. Practical, Identify and Discuss - CXR, CT thorax, angiogram, CT angiogram and PFT and ECHO findings of the above diseases

BPRT.403: MECHANICAL CIRCULATORY SUPPORT DEVICE CREDIT.03

Unit	Content	Hours
UNIT-I	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	8
UNIT-II	Introduction to ECMO, Components of ECMO circuits, Indications and contraindications to ECMO, Types of ECMO. Cardiac Support Devices, Extra Corporeal Life Support (ECMO / ECLS)	13
UNIT-III	Introduction to VAD, components of VAD, indication, contraindication and criteria to VAD. Types of VADs and advantage disadvantage of VADs Total artificial Heart	10
UNIT-IV	Minimal invasive cardiac surgery Deep hypothermic circulatory arrest, pH stat and alpha stat Antegrade and retrograde cerebral perfusion	14
	Recent advances in Perfusion technology	
	Total	45

Mechanical Circulatory Support Device-Practical CREDIT.02

1. Patient preparation, monitoring and handling of patients during insertion of IABP and continuous monitoring of IABP
2. Assembling, priming and monitoring and handling of ECMO
3. Monitoring of VADs
4. MICS
5. DHCA

Course Name: BPERT. 404: Medical Law and Ethics

Credit: 2= 30 hours

Course Rationale: Students are formulated to impart the basic concept of medical ethics, guidelines about human ethics, and animal ethics. Students will also learn about the Indian legal system, medico-legal cases and essential acts.

Learning Outcome: At the end of the course, students will be able to

- Comprehend knowledge of medical and bioethics
- Follow good laboratory practice and appropriate ethical guidelines while conducting research on animal and human samples.
- Understand the Indian Legal system, medico legal records, human rights act, disaster management, Human Organ Transplantation Act, mental Health act, professional indemnity insurance policy and IPR

Suggested reading:

- Bonnie F. Fremgen – *Medical Law and Ethics*, Pearson Education
- Jonathan Herring – *Medical Law and Ethics*, Oxford University Press
- ICMR – *Ethical Guidelines for Biomedical Research on Human Participants (2017)*
- John D. Angelo-*Ethics in Science (2012). Ethical Misconduct in Scientific Research.* CRC Press, Taylor & Francis Group
- Hazel Biggs-*Healthcare Research Ethics and Law. Regulation, Review & Responsibility. (2010).* Cavendish Biomedical Law & Ethics Library

SEMESTER-VI

BPERT.405: ADVANCED PERFUSION CRDIT.04+2 PRACTICALS

Teaching Objective	<ul style="list-style-type: none"> • Advancement in extra corporeal life support for cardiac and pulmonary patients • Different complications related to pediatric surgical intervention 	
Learning Outcomes	<ul style="list-style-type: none"> • Management of complications related to bypass and advanced extra corporeal life support • Team management of perfusion accidents and management 	
Unit	Content	Hours
UNIT-I	ECMO- special perfusion techniques for special cardiac surgeries and medical conditions (including thoracic aortic surgeries deep hypothermia and circulatory arrest). Perfusion for non- cardiac surgery, invasive cardiology and outside the operation suite. Peripheral bypass-femoral-femoral bypass, cannulations for peripheral bypass, vaccumm assisted venous drainage, kinetic augmented venous drainage, suction bypass	30
UNIT-II	Perfusion techniques for Pediatric cardiac surgery Complications and safety during cardiopulmonary bypass – bypass safety, organizational aspects, accidents, coagulopathies, mechanical and electrical failures, perfusion management, perfusion systems, safety for the perfusionist and surgical Team management of perfusion accidents.	30
Total		60

BPERT.407: RECENT ADVANCES IN CARDIOPULMONARY BYPASS & PERFUSION CREDIT.04+2 PRACTICALS

Teaching Objective	<ul style="list-style-type: none"> •To provide the critical information to students when beginning with uptake of the cardiopulmonary bypass •To provide an extension of techniques and methods described for diagnostic catheterization and specially related techniques. 	
Learning Outcomes	<ul style="list-style-type: none"> •The students will gain knowledge about chances of a successful procedure. •To enable students, understand about benefit/risk to the patient if the procedure is successful/ unsuccessful •The occurrence and management of various complications. 	
Sr. No.	Topics	Hrs.
1	Perfusion techniques for Pediatric cardiac surgery	6
2	ECMO- special perfusion techniques for special cardiac surgeries and medical conditions (including thoracic aortic surgeries deep hypothermia and circulatory arrest). Perfusion for non- cardiac surgery, invasive cardiology and outside the Operation suite.	10
3	Perfusion as a method of cardiopulmonary bypass	6

4	Complications and safety during cardiopulmonary bypass – bypass safety, organizational aspects, accidents, coagulopathies, mechanical and electrical failures, perfusion management, perfusion systems, safety for the perfusionist and surgical team management of perfusion accidents.	15
5	Minimally invasive surgery and the perfusionist	8
6	Recent advances in perfusion techniques	6
7	Experimental perfusion	5
Total		60

RMB.401: RESEARCH METHODOLOGY AND BIOSTATISTICS CREDIT.03

Teaching Objective	<ul style="list-style-type: none"> • To enable students to present, analyze and interpret data. • To enable students to use concepts of probability in business situations. • To enable students to make inferences from samples drawn from large datasets. • To enable students to apply univariate and multivariate statistical techniques. 	
Learning Outcomes	<ul style="list-style-type: none"> • To understand the importance & Methodology for research • To learn in detail about sampling, probability and sampling distribution, significance tests correlation and regression, sample size determination, study design and multivariate analysis. 	
Sr. No.	Topics	Hrs.
1	Introduction to research methods	5
2	Identifying research problem	5
3	Ethical issues in research	5
4	Research design	5
5	Basic Concepts of Biostatistics	5
6	Types of Data	5
7	Research tools and Data collection methods	5
8	Sampling methods	5
9	Developing a research proposal	5
Total		45

Text books:

- (1) Mausner & Bahn : Epidemiology-An Introductory text, 2nd Ed., W. B .Saunders Co.
- (2) Richard f. Morton & j. Richard Hebd : A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
- (3) Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

BPERT. 407: HOSPITAL MANAGEMENT CREDIT.03

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.

Unit	Content	Hours
UNIT-I	Introduction to hospital staffing- Hospital staffing, administration, PACS, HIS, RIS, DICOM. Medical records and documentation	2
UNIT-II	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)	13
UNIT-III	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 threading diseases like HIV, STD, HBsAG, etc.	10
UNIT-IV	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	15
UNIT-V	Anesthesia-Local anesthesia and general anesthesia, uses in hospital, Facilities regarding general Anesthesia in different department of hospital. Management of adverse.	5
	Total	45

INTERNSHIP

Guidelines:

1. The internship shall commence after the student has completed and passed all subjects up to VI semesters.
2. The internship is compulsory.
3. The duration of the internship shall be one year.
4. The degree of Bachelor in Allied Health Sciences shall be awarded after the satisfactory completion of the internship.

Evaluation of Internees:

Formative Evaluation:

Day to day assessment of the internees during their internship postings should be done by the Head of the Department/Faculty assigned. The objective is that all the interns must acquire necessary minimum skills required for carrying out day to day professional work competently. This can be achieved by maintaining Records /Log Book by all internees. This will not only provide a demonstrable evidence of the

processes
of training but more importantly of the internee's own acquisition of competence as related to performance.

Summative Evaluation:

It shall be based on the observation of the Sr. Technical staff / Faculty of the department concerned and Record / Log book maintained by the interns. Based on these two evaluations, the Head of the Department shall issue certificate of satisfactory completion of training, following which the university shall award the degree or declare him/her eligible for it.

To implement the project work uniformly for all the specialties in view of the curriculum and training to be acceptable internationally and the students to get opportunity for higher studies and employment.

Internship Programme:

05 days for
orientation
programme 300
days in CVTS
Department
30 days in Cardiac ICU
15 days for Record
Keeping/CSSD department
15 days for Casualty/Visit to
other hospital