Gopal Narayan Singh University

Jamuhar, Sasaram, Rohtas (Bihar)

Faculty of Medicine

ORDINANCES AND SYLLABUS GOVERNING TO

04 YEARS (03-YEARS + 01 YEAR INTERNSHIP)

B.SC. PERFUSION TECHNOLOGY

Gopal Narayan Singh University

Jamuhar, Sasaram, Rohtas (Bihar)

Faculty of Medicine

Ordinances and Syllabus Governing to

4-Year 8-Semester

B. Sc. Perfusion Technology

13/06/25

13/06/2025

Name of the Degree: B.Sc. Perfusion Technology

Duration of Study:

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

Eligibility Criteria:

- He/she has passed the Higher Secondary (10+2) with Science (PCB) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks in Physics, Chemistry, and Biology.
- Minimum percentage of marks: 45% aggregate.

Medium of Instruction:

English shall be the Medium of Instruction for all Subjects of study and for examinations.

Definitions of Key Words:

1. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year. Choice-Based Credit System (CBCS).
2. The CBCS provides a choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
3. **Course:** Usually referred to as "papers", is a component of a Programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/ laboratory work/ outreach activities/ project work/ viva/ seminars/ term papers/assignments/ presentations/ self-study, etc. or a combination of some of these.
4. **Credit:** A unit by which the coursework is interpreted. It functions as the number of hours of instruction required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
5. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the sum total of the credit points obtained by the student in various courses in all semesters and the sum of the total credits of all courses in all the semesters.
6. **Grade Point:** It is a numerical marking allotted to each letter grade on a 10-point scale.
7. **Letter Grade:** It is an appreciated point of the student's performance in a selected course. Grades are denoted by letters O, A+, A, B, C and RA x. Programme: An educational programme leading to award of a Degree certificate.

8. **Semester Grade Point Average (SGPA):** It is index of performance of all performance of work in a semester. Its total credit points obtained by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

9. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year. Choice-Based Credit System (CBCS).

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Semester System and Choice Based Credit System:

The semester system initiates the teaching-learning process and screws longitudinal and latitudinal mobility of students in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a sun shone" type approach in which the students can take choice of courses, learn and adopt an interdisciplinary approach of learning.

Credits: Credit defines the coefficient of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/ tutorial laboratory work and other forms of learning required, to complete the course contents in a 15-20 week schedule:

a. ***1 credit*** = 1 hour of lecture per week.

   ✓ Credits will be assigned on the basis of the lectures (L) / tutorials (T) / Clinical Training (CR) / laboratory work (P) / Research Project (RP) and other forms of learning in a 15-20 week schedule L - One credit for one hour lecture per week.

b. ***P/T*** - One credit for every two hours of laboratory or practical.
c. ***CR*** - One credit for every three hours of Clinical training/Clinical rotation/posting.
d. ***RP*** - One credit for every two hours of Research Project per week –
   Max Credit 20- 25.

	Lecture - L	**Tutorial - T**	**Practical - P**	**Clinical Training/ Rotation– CT/CR**	**Research Project– RP***
1 Credit	1 Hour	1 Hours	2 Hours	3 Hours	2 Hours
RP*	Maximum Credit 20 – 25 / Semester				

Types of Courses: Courses in a programme may be of three kinds:

- **Core Course**
- **Elective Course**

Core Course: A course, which should compulsorily be studied by a candidate as a basic requirement is termed as a Core course. There may be a Core Course in every semester. This is the course which is to be compulsorily studied by a student as a basic requirement to complete programme of respective study.

Elective Course: A course which can be chosen from a very specific or advanced the subject of study or which provides an extended scope or which enables an exposure to some other domain or expertise the candidates ability is called an Elective Course.

Discipline Specific Elective (DSE) Course: Elective courses offered by the main subject of study are referred to as Discipline Specific Elective. The University / Institute may also offer discipline related Elective courses of interdisciplinary nature. An elective may be "Discipline Specific Electives (DSE)" gazing on those courses which add intellectual efficiency to the students.

Dissertation / Project: An Elective/Core course designed to acquire special / advanced knowledge, such as supplement study / support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher / faculty member is called dissertation / project.

Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. P.S.: A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa and such electives may also be referred to as Generic Elective.

Assigning Credit Hours per Course: While there is flexibility for the departments in allocation of credits to various courses offered, the general formula would be:

- All electives should be restricted to a maximum of 3 credits.
- All core courses should be restricted to a maximum of 4 credits.
- All ability enhancement course should be restricted to a maximum of 2 credits.
- Projects should be restricted to a maximum of 20-25 credits.

Programme Outcome:

- To prepare competent entry-level Perfusionist in the cognitive (knowledge), psychomotor (skills), and affective (behaviour) learning domains.
- To provide a base knowledge of perfusion theory, the skill to implement that knowledge and proficiency in its application in accordance with the needs of healthcare providers and employers.

Programme Specific Outcome:

At the completion of course, students will be able to:

- Demonstrate clinical skills in cardiopulmonary bypass and mechanical circulatory devices.
- Demonstrate clinical skills in auto transfusion, blood conservation, and blood product management.
- Demonstrate clinical skills in laboratory analysis of blood gases, hematocrit, and coagulation.
- Integrate perfusion theory to clinical applications.
- Demonstrate acquired knowledge of various perfusion equipment and supplies used in the healthcare setting.

FIRST SEMESTER

Course Code	Course Title	Credit		Marks Distribution				Total Marks
		Theory (T)	Practical (P)	Theory		Practical		
				IA	UE	IA	UE	
BPFT101	Human Anatomy Part 1	4	2	20	80	20	80	**200**
BPFT102	Human Physiology Part 1	4	2	20	80	20	80	**200**
BPFT103	General Biochemistry & Nutrition	4	2	20	80	20	80	**200**
BPFT104	Introduction to National Health Care system	2	-	20	80	-	-	**100**
ACE001	Environmental Science	2	-	100	-	-	-	**100**
ACE002	Communication and Soft Skills	2	-	100	-	-	-	**100**
BPFT105	Community Orientation and Clinical Visit	2		-	-	-	-	-
	Total	**18**	**6**	**280**	**320**	**60**	**240**	**900**
	Total Credits	**26**						

SECOND SEMESTER

Course Code	Course Title	Credit		Marks Distribution				Total Marks
		Theory (T)	Practical (P)	Theory		Practical		
				IA	UE	IA	UE	
BPFT106	Human Anatomy Part II	4	2	20	80	20	80	**200**
BPFT107	Human Physiology Part II	4	2	20	80	20	80	**200**
BPFT108	General Microbiology	4	-	20	80	-	-	**100**
BPFT109	Basic Pathology and Hematology	4	-	20	80	-	-	**100**
BPFT110	Introduction to Quality and Patient Safety	2	-	20	80	-	-	**100**
SEC 001	Human Rights & Professional Values	2	-	100	-	-	-	**100**
BPFT111	Community Orientation & Clinical Visit	4		-	-	-	-	-
	Total	**16**	**4**	**200**	**400**	**40**	**160**	**800**
	Total Credits	**24**						

FOURTH SEMESTER

Course Code	Course Title	Credit		Marks Distribution				Total Marks
		Theory (T)	Practical (P)	Theory		Practical		
				IA	UE	IA	UE	
BPFT 205	Applied Physiology and Biochemistry	4	2	20	80	20	80	**200**
BPFT 206	Introduction of Perfusion Techniques	4	2	20	80	20	80	**200**
AEC 003	Computer and Applications	4	-	100	-	-	-	**100**
AEC 004	Biostats and Research Methodology	4	-	100	-	-	-	**100**
BPFT 207 CP	PFT Directed Clinical Education - IV	4		-	-	-	-	-
	Total	**16**	**4**	**240**	**160**	**40**	**160**	**600**
	Total Credits	**24**						

THIRD SEMESTER

Course Code	Course Title	Credit		Marks Distribution				Total Marks
		Theory (T)	Practical (P)	Theory		Practical		
				IA	UE	IA	UE	
BPFT 201	Applied Pharmacology	4	-	20	80	-	-	**100**
BPFT 202	Applied Anatomy and Physiology of Cardiovascular system related to PFT	4	2	20	80	20	80	**200**
BPFT 203	Basics of Perfusion Technology	4	2	20	80	20	80	**200**
BPFT 204 CP	PFT directed Clinical Education - III	8		-	-	-	-	-
	Total	**12**	**4**	**60**	**240**	**40**	**160**	**500**
	Total Credits	**24**						

FIFTH SEMESTER

Course Code	Course Title	Credit		Marks Distribution				Total Marks
		Theory (T)	Practical (P)	Theory		Practical		
				IA	UE	IA	UE	
BPFT 301	Perfusion Technology Clinical	4	2	20	80	20	80	**200**
BPFT 302	Perfusion Technology Applied	4	2	20	80	20	80	**200**
CEC 005	Basics of Clinical Skills Learning	4	-	100	-	-	-	**100**
CEC 006	Hospital Operation Management	4	-	100	-	-	-	**100**
BPFT 303 CP	PFT Directed Clinical Education - V	4		-	-	-	-	-
	Total	**16**	**4**	**240**	**160**	**40**	**160**	**600**
	Total Credits	**24**						

SIXTH SEMESTER

Course Code	Course Title	Credit		Marks Distribution				Total Marks
		Theory (T)	Practical (P)	Theory		Practical		
				IA	UE	IA	UE	
BPFT 304	Perfusion Technology Advanced	4	2	20	80	20	80	**200**
BPFT 305	Recent Advances in Cardiopulmonary bypass & Perfusion	4	2	20	80	20	80	**200**
BPFT306 CP	PFT Directed Clinical Education - VI	12		-	-	-	-	-
	Total	**8**	**4**	**40**	**160**	**40**	**160**	**400**
	Total Credits	**24**						

Eighth & Nineth Semester

Course Code	Course Title	Duration
BPFT 401	**BPFT Internship**	**1 Year**

FIRST YEAR

B.Sc. Perfusion Technology

Semester - I

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	Human Anatomy- Part I
Course Code	BPFT101 T

Teaching Objective	• To introduce the students to the concepts related to General anatomy, Muscular, Respiratory, Circulatory, Digestive and Excretory system
Learning Outcomes	• Comprehend the normal disposition, interrelationships, gross, functional and applied anatomy of various structures in the human body. • Demonstrate and understand the basic anatomy of Respiratory and Circulatory system • Demonstrate and understand the basic anatomy of Digestive and Excretory system

Sr.No.	Topics	No. of Hrs.
1	**Introduction to Anatomy, Terminology, Cell and Cell division, Tissues of body, Skin**	5
2	**Skeletal System** - Classification of Bones, Parts of Developing Long Bone and Its Blood Supply, Joints I – Classification of Joints, Joints II – Synovial Joint, Appendicular Skeleton I – Bones of Upper Limb, Appendicular Skeleton II – Bones of Lower Limb, Axial Skeleton I – Bones of Head and Trunk, Axial Skeleton II – Vertebral Column and Thoracic Cage.	8
3	**Muscular System** - Muscle Types, Muscle Groups and Movements, Muscles of the Upper Limb, Muscles of the Lower Limb, Muscles of the Neck, Muscles of the Back, Muscles of the Abdomen.	7
4	**Joints** – Shoulder, Hip, Knee, Movements and muscle groups producing movements at other joints	4
5	**Respiratory System** - Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea &Bronchopulmonary segments , Mediastinum	6
6	**Circulatory System** - Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of mediastinum , Blood vessels of Thorax	5
7	**Digestive System** - GIT I- Pharynx, Esophagus, GIT II-Stomach, GIT III- Small and Large Intestine, GIT IV-Liver &Gall Bladder, GIT V- Spleen, GIT VI-Pancreas , Salivary glands	7
8	**Excretory System** - Kidney, Ureter, Bladder, Urethra, Pelvis dynamic	3
	Total	**45hrs**

BPFT101 P - Human Anatomy Part I- (Demonstration)

Sr.No.	Topics	No of Hrs
1	**Introduction to Anatomy, Terminology, Cell and Cell division, Tissues of body, Skin**	60
2	**Skeletal System** - Classification of bones, Parts of developing long bone and its blood supply, JointsI- Classification of joints, Joints II- Synovial Joint, Appendicular skeleton I- Bones of upper Limb, Appendicular skeleton II- Bones of lower limb, Axial skeleton-I , Axial skeleton-II	
3	**Muscular System** - Muscle I-Types, Muscle II- Muscle groups and movements, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back , Muscles of abdomen	
4	**Joints** – Shoulder, Hip ,Knee , Movements and muscle groups producing , movements at other joints	
5	**Respiratory System** - Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea &Bronchopulmonary segments , Mediastinum	
6	**Circulatory System** - Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of mediastenum , Blood vessels of Thorax	
7	**Digestive System** - GIT I- Pharynx, Oesophagus, GIT II-Stomach, GIT III- Small and Large Intestine, GIT IV-Liver &Gall Bladder, GIT V- Spleen, GIT VI-Pancreas , Salivary glands	
8	**Excretory System** - Kidney, Ureter, Bladder, Urethra, Pelvis dynamic	
Total		**60 hrs**

TextBooks:

1. Manipal Manual of Anatomy for Allied Health Sciences courses: Madhyastha S.
2. G.J. Tortora & N.P Anagnostakos: Principles of Anatomy and Physiology.
3. B.D. Chaurasia: Handbook of General Anatomy.

Reference books:

1. B.D. Chaurasia : Volume I-Upper limb & Thorax,
   Volume II- Lower limb, Abdomen & Pelvis.
   Volume III- Head, Neck, Face.
   Volume IV- Brain- Neuroanatomy.
2. Vishram Singh: Textbook of Anatomy Upper limb & Thorax

Textbook of Anatomy Abdomen & Lower limb.
Textbook of Head neck and Brain.

3. Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.
4. T.S. Ranganathan : Text book of Human Anatomy.
5. Inderbirsingh, G P Pal: Human Embryology.
6. Textbook of Histology, A practical guide- J.P Gunasegaran.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Human Physiology Part I**
Course Code	**BPFT102 T**

Teaching objective	• To teach basic physiological concepts related to General physiology, Haematology, Nerve-Muscle physiology, Cardiovascular ,Digestive & Respiratory physiology
Learning outcomes	• To understand the basic physiological concepts of General physiology • To understand the basic physiological concepts of Hematology • To understand the basic physiological concepts of Nerve-Muscle physiology • To understand the basic physiological concepts of Respiratory physiology • To understand the basic physiological concepts of Cardiovascular physiology

Sr.No.	Topics	No. of Hrs.
1	**General Physiology-** Introduction to physiology, Homeostasis, Transport Across cell membrane	3
2	**Blood - Composition, properties and functions of Blood,** Hemopoiesis , Hemogram (RBC, WBC, Platelet count, Hb Concentrations), Blood Groups - ABO and RH grouping, Coagulations & Anticoagulants, Anemias: Causes, effects & treatment, Body Fluid: Compartments, Composition, Immunity – Lymphoid tissue	10
3	**Cardio vascular system -** Introduction, general organization, functions & importance of CVS , Structure of heart, properties of cardiac muscle, Junctional tissues of heart & their functions, Origin & spread of Cardiac Impulse, cardiac pacemaker, Cardiac cycle & E C G, Heart Rate & its regulation, Cardiac output, Blood Pressure definition & normal values, Physiological needs & variation, regulation of BP	10

4	**Digestive system** - General Introduction, organization, innervations & blood supply of Digestive system, Composition and functions of all Digestive juices, Movements of Digestive System (Intestine), Digestion & Absorption of Carbohydrate, Proteins & Fats	6
5	**Respiratory System** -Physiologic anatomy, functions of respiratory system, non respiratory functions of lung, Mechanism of respiration, Lung Volumes & capacities, Transport of Respiratory GasesO_2, Transport of Respiratory Gases CO_2, Regulation of Respiration.	10
6	**Muscle nerve physiology** - Structure of neuron & types, Structure of skeletal Muscle, sarcomere, Neuromuscular junction& Transmission. Excitation & contraction coupling (Mechanism of muscle contraction)	6
Total		**45 hrs**

BPFT102 P - Human Physiology Part I (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Study of Microscope and its use, Collection of Blood and study of Haemocytometer	60
2	Haemoglobinometry	
3	White Blood Cell count	
4	Red Blood Cell count	
5	Determination of Blood Groups	
6	Leishman's staining and Differential WBC Count	
7	Determination of Bleeding Time, Determination of Clotting Time	
8	Pulse & Blood Pressure Recording, Auscultation for Heart Sounds	
9	Artificial Respiration –Demonstration, Spirometry-Demonstration	
Total		**60hrs**

Textbooks

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – DevasisPramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.
4. Textbook of human Physiology for dental students-Indukhurana 2nd edition.
5. Essentials of medical Physiology for dental students –Sembulingum.

Reference books

1. Textbook of Medical Physiology, Guyton, 2nd South Asia Edition.
2. Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
3. Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**General Biochemistry & Nutrition**
Course Code	**BPFT103 T**

Teaching Objective	At the end of the course, the student demonstrates his knowledge and understanding on: • Structure, function and interrelationship of biomolecules and consequences of deviation from normal. • Integration of the various aspects of metabolism, and their regulatory pathways. • Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data. • to diagnose various nutritional deficiencies • Identify condition and plan for diet • Provide health education base on the client deficiencies
Learning Outcomes	• Define "biochemistry." • Identify the five classes of polymeric biomolecules and their monomeric building blocks. • Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action. • Explain how the metabolism of glucose leads ultimately to the generation of large quantities of ATP. • Describe how fats and amino acids are metabolized, and explain how they can be used for fuel. • Describe the structure of DNA, and explain how it carries genetic information in its base sequence. • Describe DNA replication. • Describe RNA and protein synthesis. • Explain how protein synthesis can be controlled at the level of transcription and translation. • Summarize what is currently known about the biochemical basis of cancer.

Sr. No.	Topics	No. of Hrs.
1	Introduction and scope of biochemistry	1
2	**Chemistry of carbohydrates, proteins, lipids and nucleic acid–** **Chemistry of Carbohydrates**: Definition, Functions, Properties, Outline of classification with eg.(Definition of Monosaccharides, Disaccharides, Polysaccharides and their examples). **Chemistry of Proteins:** Amino acids (total number of amino acids, essential and non-essential amino acids) .Definition, Classification of Proteins Structural organization of protein, Denaturation of Proteins. **Chemistry of Lipids:** Definition, functions, Classification (Simple Lipids, Compound Lipids, Derived Lipids.) Essential Fatty Acids. **Chemistry of Nucleic acid**: Nucleosides and Nucleotides, Watson and Crick model of DNA, **RNA-** it's type along with functions	12
3	**Elementary knowledge of enzymes -** Classification, mechanism of enzyme action, Factors affecting activity of enzymes, enzyme specificity, Enzyme inhibition, Isoenzymes and their diagnostic importance.	8
4	**Biological oxidation** - Brief concept of biological oxidation: Definition of Oxidative phosphorylation Electron transport chain. Inhibitors and Uncouplers briefly	5
5	**Metabolism of Carbohydrate**:Glycolysis, TCA cycle, Definition and significance of glycogenesis and glycogenolysis. Definition and significance of HMP shunt, definition and significance of gluconeogenesis. Regulation of blood Glucose level, Diabetes Mellitus, Glycosuria.Glucose Tolerance Test. **Metabolism of Proteins**: Transamination, Transmethylation reactions. Urea cycle, Functions of glycine, tyrosine, phenylalanine, tryptophan and Sulphur containing aminoacids. **Metabolism of Lipid:**Outline of beta oxidation with energetic, Ketone bodies (Enumerate) and its importance. Functions of cholesterol and its biomedical significance. Lipid profile and its diagnostic importance. Fatty liver, lipotropic factor, atherosclerosis. **Metabolism of Nucleic acid**: Purine catabolism (Formation of uric acid), Gout	14
6	**Vitamins and Minerals-** RDA, Sources, functions and deficiency manifestations of Fat soluble vitamins. RDA, sources, functions and deficiency manifestations of Water soluble vitamins. RDA, Sources, functions and deficiency manifestations of Calcium, Phosphorous, Iron, Iodine	5
7	**Principle and applications of :**Colorimeters, pH Meter	5

8	**Pre examination Skills -** Collection and preservation of samples (Anticoagulants), transportation & separation of biological specimens, Sample rejection criteria, Disposal of biological Waste materials.	5
9	**Nutrition:** History of Nutrition, Nutrition as a science, Food groups, RDA, Balanced diet, diet planning, Assessment of nutritional status, **Energy:** Units of energy, Measurements of energy and value of food, Energy expenditure, Total energy/calorie requirement for different age groups and diseases, Satiety value, Energy imbalance- obesity, starvation, Limitations of the daily food guide, Role of essential nutrients in the balanced diet	5
Total		**60hrs**

BPFT103 P – General Biochemistry (Demonstration)

Sr. No.	Topics	No. of Hrs
1	Introduction to Personnel protective equipments used in laboratory and their importance (LCD)	60
2	Handling of colorimeters – operation and maintenance (LCD)	
3	Serum electrolytes measurement (only demo)	
4	Demonstration of semi automated / fully automated blood analyser	
5	Demonstration of tests for carbohydrates (Monosacchrides, disaccharides and polysaccharides)	
6	Precipitation Reactions of protein (only demonstration)	
7	Test on bile salts (only demonstration)	
8	Tests on Normal constituents of Urin (only demo)	
9	Tests on Abnormal constituents of Urin (only demo)	
Total		**60 hrs**

Textbooks:

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

Kanai Mukharjee.

Reference books:

1. An Introduction to Chemistry, 8th Edition by Mark Bishop.
2. Clinical Chemistry made easy, 1stEidtion by Hughes.
3. Tietz Fundamentals of Clinical Chemistry, 7th Edition by Carl Burtis.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Introduction to National Health Care System (Multidisciplinary/Interdisciplinary)**
Course Code	**BPFT104 T**

Teaching Objective	• 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	• 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	No. of 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	10
2	**National Health Programme-** Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.	8
3	**Introduction to AYUSH system of medicine -** Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various system of medicine	8

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.	10
Total		**45 hrs**

Textbooks:

1. National Health Programs Of India National Policies and Legislations Related to Health: 1 J. Kishore (Author).
2. A Dictionary of Public Health Paperback by J Kishor.
3. Health System in India: Crisis & Alternatives , National Coordination Committee, Jan Swasthya Abhiyan.
4. In search In Search of the Perfect Health System.
5. Central Bureau of Health Intelligence (1998). Health Information of India, Ministry of Health and Family Welfare, New Delhi.
6. Goyal R. C. (1993). Handbook of Hospital Personal Management, Prentice Hall of India, New Delhi, 17–41. Ministry of Health and Family Welfare (1984). National Health Policy, Annual Report (1983–4), Government of India, New Delhi
7. Historical Development of Health Care in India, Dr. Syed Amin Tabish,
8. Cultural Competence in Health Care by Wen-Shing Tseng (Author), Jon Streltzer (Author)
9. Do We Care: India's Health System by K. Sujatha Rao (Author)

BPFT105 P - Community Orientation & Clinical Visit (including related practical's to the parent course) (Total -120 hrs.)

ABILITY ENHANCEMENT ELECTIVE COURSE

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**English and Communication Skills**
Course Code	**AEC 001 T**

Teaching Objective	• This course deals with essential functional English aspects of the of communication skills essential for the health care professionals. • To train the students in oral presentations, expository writing, logical organization and Structural support.
Learning Outcomes	• Able to express better. • Grow personally and professionally and Develop confidence in every field

Sr. No.	Topics	No. of Hrs.
1	**Basics of Grammar** - Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words	6
2	**Basics of Grammar – Part II** - Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms	6
3	**Writing Skills** - Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension	3
4	Writing and Reading, Summary writing, Creative writing, newspaper reading	3
5	Practical Exercise, Formal speech, Phonetics, semantics and pronunciation	5
6	**Introduction** to communication skills - Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals	6
7	**Speaking** - Importance of speaking efficiently, Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling Presentation skills, Individual feedback for each student, Conference/Interview technique	4
8	**Listening** - Importance of listening , Self-assessment, Action plan execution, Barriers in listening, Good and persuasive listening	4
9	**Reading** - What is efficient and fast reading , Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehension through systematic study	4

10	**Non Verbal Communication** - Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP), Communication in Optometry practice	4
Total		**45 hrs**

Text books:

1. Graham Lock, Functional English Grammar: Introduction to second Language Teachers.Cambridge University Press, New York, 1996.
2. Gwen Van Servellen. Communication for Health care professionals: Concepts,practice and evidence, Jones & Bartlett Publications, USA, 2009.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Environmental Sciences**
Course Code	**AEC 002 T**

Teaching Objective	• To understand and define terminology commonly used in environmental science • To teach students to list common and adverse human impacts on biotic communities, soil, water, and air Quality. • To understand the processes that govern the interactions of organisms with the biotic and abiotic. • Understand the relationship between people and the environment; Differentiate between key ecological terms and concepts
Learning Outcomes	• Current environmental issues and highlight the importance of adopting an interdisciplinary approach. • Sample an ecosystem to determine population density and distribution. • Create food webs and analyse possible disruption of feeding relationships.

Sr. No.	Topics	No. of Hrs.
1	**Components of Environment** – Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment;	4
2	**Ecosystem** : Basic concepts, components of ecosystem, Tropic levels, food chains and food webs, Ecological pyramids, ecosystem functions, Energy flow in ecological systems, Characteristics of terrestrial fresh water and marine ecosystems,	5
3	**Global Environmental Problems** – Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards.	4
4	**Environmental pollution and degradation** – Pollution of air, water and land with reference to their causes, nature of pollutions, impact and control strategies; perspectives of pollution in urban, industrial and rural areas. Habitat Pollution by Chlorinated Hydrocarbons (DDT, PCBs, Dioxin etc, Endocrine disrupting chemicals, Nutrient pollution.	8
5	**Environmental Management** – Concept of health and sanitation, environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases, health hazards due to pesticide and metal pollution, waste treatment, solid waste management, environmental standards and quality monitoring.	6
6	**Environmental Protection Act** – Environmental Laws, national movements, environmental ethics – holistic approach of environmental protection and conservation, IUCN – role in environmental protection. Concept with reference to UN – declaration, aim and objectives of human right policies with reference to India, recent north-south debate on the priorities of implementation, Environmental Protection Agency (EPA)	10
7	**Bioremediation** – Oil spills, Wastewater treatment, chemical degradation, heavy Metals.	8
Total		**45 hrs**

Text books:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.

FIRST YEAR

B.Sc. Perfusion Technology

Semester - II

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Human Anatomy- Part II**
Course Code	**BPFT106 T**

Teaching Objective	• To teach the students the basic anatomy of Reproductive , Lymphatic Endocrine ,Nervous system and Special senses
Learning Outcomes	• Demonstrate and understand the basic anatomy of Reproductive and Lymphatic system. • Demonstrate and understand the basic anatomy of Endocrine ,Nervous system • Demonstrate and understand the basic anatomy of Special senses

Sr. No.	Topics	No. of Hrs.
1	**Reproductive system -** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus	6
2	**Lymphatic system -** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal	5
3	**Endocrine system -** Thyroid, Parathyroid, Adrenal, Pitutary	4
4	**Nervous system -** Introduction to nervous system(Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain, Brain stem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles	12
5	**Sensory system -** Eye (Gross anatomy), Ear	3
Total		**30hrs**

BPFT106 P - Human Anatomy Part II (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	**Reproductive system -** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus	60
2	**Lymphatic system -** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal	
3	**Endocrine system -** Thyroid, Parathyroid, Adrenal, Pitutary	
4	**Nervous system -** Introduction to nervous system(Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain ,Brain stem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles	
5	**Sensory system -** Eye (Gross anatomy), Ear	
Total		**60 hrs**

Textbooks:

1. Manipal Manual of Anatomy for Allied Health Sciences courses:Madhyastha S.
2. G.J. Tortora& N.P Anagnostakos: Principles of Anatomy and Physiology.
3. B.D. Chaurasia: Handbook of General Anatomy.

Reference books:

1. B.D. Chaurasia : Volume I-Upper limb & Thorax,
   Volume II- Lower limb, Abdomen & Pelvis
   Volume III- Head, Neck, Face
   Volume IV- Brain-Neuroanatomy
2. Vishram Singh: Textbook of Anatomy Upper limb & Thorax
   Textbook of Anatomy Abdomen & Lower limb
   Textbook of Head neck and Brain
3. Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.
4. T.S. Ranganathan : Text book of Human Anatomy.
5. Inderbirsingh, G P Pal: Human Embryology.
6. Textbook of Histology, A practical guide: - J.P Gunasegaran.

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	Human Physiology Part II
Course Code	BPFT107 T

Teaching Objective	• To teach basic physiological concepts related to Renal physiology, Endocrinology& Reproductive physiology, CNS, Special senses
Learning Outcomes	• To understand the basic physiological concepts of Renal physiology • To understand the basic physiological concepts of Endocrinology & Reproductive physiology • To understand the basic physiological concepts of CNS, Special senses,

Sr. No.	Topics	No. of Hrs.
1	**Nervous system** -Functions of Nervous system , Neuron – Conduction of Impulses, factors affecting, Synapse- transmission, Receptors, Reflexes Ascending tracts, Descending tracts, Functions of various parts of the Brain.Cerebro-Spinal Fluid (CSF): Composition, functions & Circulation, Lumbar Puncture, Autonomic Nervous System (ANS): Functions.	10
2	**Special senses-** Vision: Structure of Eye, functions of different parts, Refractive errors of Eye and correction, Visual Pathway, Colour vision & tests for colour Blindness, Hearing: Structure and function of ear, Mechanism of Hearing, Tests for Hearing (Deafness)	6
3	**Skin -** Structure and function, Body temperature,Regulation of Temperature & fever.	4
4	**Endocrine System -** Short description of various endocrine glands and their functions	2
5	**Reproductive systems -** Structure & Functions of Reproductive system, Male Reproductive System: spermatogenesis, Testosterone, Female reproductive system:Ovulation, Menstrual cycle, Oogenesis, Tests for Ovulation, Oestrogen&Progesterone , Pregnancy test, Parturition. Contraceptives, Lactation: Composition of Milk, advantages of breast Feeding.	4
6	**Excretory System** General Introduction, structure & functions of kidney, Renal circulation, Glomerular filtration & tubular reabsorption, Nephron, Juxta Glomerular Apparatus,Mechanism of Urine formation, Micturition, Cystomatrogram.Diuretics, Artificial Kidney.	4
	Total	**30hrs**

BPFT107 P - Human Physiology Part II – (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Recording of body temperature	30
2	Examination of sensory system	
3	Examination of motor system	
4	Examination of Eye	
5	Examination of ear	
Total		**30 hrs**

Textbooks:

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – Devasis Pramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.
4. Textbook of human Physiology for dental students-Indukhurana 2nd edition.
5. Essentials of medical Physiology for dental students –Sembulingum.

Reference books:

1. Textbook of Medical Physiology, Guyton , 2nd South Asia Edition.
2. Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
3. Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**General Microbiology**
Course Code	**BPFT108 T**

Teaching Objective	• To introduce basic principles and then applies clinical relevance in four segments of the academic preparation for paramedical: immunology, bacteriology, mycology, and virology. This rigorous course includes many etiological agents responsible for global infectious diseases.
Learning Outcomes	• Upon completion, students should be able to demonstrate knowledge of microorganisms and the disease process as well as aseptic and sterile techniques. • Perform microbiological laboratory procedures according to appropriate safety standards

Sr. No.	Topics	No. of Hrs.
1	**Concepts and Principles of Microbiology** - Historical Perspective, Koch's Postulates, Importance of Microbiology, Microscopy, Classification of Microbes.	4
2	**General Characters of Microbes** - Morphology, staining methods, Bacterial growth & nutrition, Culture media and culture methods +ABS, Collection of specimen, transport and processing, Antimicrobial mechanism and action, Drug Resistance minimization.	6
3	**Sterilization and Disinfection** - Concept of sterilization, Disinfection asepsis,Physical methods of Sterilization, Chemical methods (Disinfection), OT Sterlization, Biological waste and Biosafety & Biohazard.	5
4	**Infection and Infection Control** - Infection, Sources, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Hospital acquired infections & Hospital Infection Control	3
5	**Immunity** - Types Classification, Antigen, Antibody – Definition and types, Ag-Ab reactions – Types and examples, Procedure of Investigation & Confidentiality, Immunoprophylaris – Types of vaccines, cold chain, Immunization Schedule.	6
6	**Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests)** – Introduction, Gram Positive Cocci & Gram Negative Cocci, Enterobacteraecea& Gram negative bacilli, Mycobacteria, Anaerobic bacteria &Spirochaetes, Zoonotic diseases, Common Bacterial infections of eye.	7
7	**Mycology** - Introduction, Classification, outline of lab diagnosis, List of Fungi causing: Common fungal infections of eyes, Superficial Mycoses, Deep mycoses & opportunistic , Fungi.	3
8	**Virology** - Common Viral infection of eye, Introduction, General Properties, outline of lab diagnosis& Classification, HIV Virus, Hepatitis -B Virus.	4
9	**Parasitology** – Morphology, Life Cycle & Outline of Lab Diagnosis & Classification, Common parasite infection of eye, Protozoa- E, histolytica,Malarial Parasite, General properties, classification, list of diseases caused by:Cestodes and Trematodes, Intestinal Nematodes& Tissue Nematodes, Vectors.	7
Total		**45 hrs**

BPFT108 P - General Microbiology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Concepts and Principles of Microbiology	
2	General Characters of Microbes	
3	Sterilization and Disinfection	

4	Infection and Infection Control	60
5	Immunity	
6	Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory test)	
7	Mycology	
8	Virology	
9	Parasitology	
Total		**60 hrs**

Text Book:

1. Text Book of Microbiology for Nursing Students, Anant Narayan Panikar.
2. Text Book of Ophthalmology, Khurana.

Reference Book:

1. Text Book of Microbiology, Baveja.

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	Basic Pathology & Hematology
Course Code	BPFT109 T

Teaching Objective	• Understand the importance of clinical information in supporting a timely, accurate pathological diagnosis. • Describe normal and disordered hematopoiesis • Develop implement and monitor a personal continuing education strategy and critically appraise sources of pathology related medical information. • Describe mechanisms of oncogenesis&demonstrate an understanding of genetics and cytogenetics pertaining to hematology
Learning Outcomes	• The student should submit the appropriate tissue sections per protocol to demonstrate the lesion and other clinically-relevant information needed for the final pathologic report • To aid hematology in the reference ranges for hemoglobin, hematocrit, erythrocytes, and leukocytes in infants, children and adult.

Sr. No.	Topics	No. of Hrs.
1	Introduction to Pathology	1
2	Working and maintenance of instruments	2
3	General principles of Haematologytechniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working	10
4	Generalprinciplesof Histopathologytechniques collection, fixation, processing & routine staining	3
5	General principles of Cytopathology techniques collection, fixation, processing & routine staining	5
6	General principles of Clinical Pathology techniques samplecollection, processing for routine test, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)	10
7	Generalprinciplesof Blood Bank techniques antigen, antibody, ABO & Rh system	5
8	General principles of Autopsy & Museum	4
9	**GeneralPathologyincludingintroductionto :** I) Cell Injury (Reversible, Irreversible cell injury) II) Inflammation(Acute inflammation, cells, Chronic inflammation, granuloma and examples III) Circulatorydisturbances(Thrombosis, Embolism ,Edema- ascetic, pleural, pericardial- effusions, Shock, Allergy, Anaphylaxis-Definition, Morphological features, And distinguishing features) IV) Neoplasia (Definition of Anaplasia, dysplasia, metaplasia and metastasis and difference between benign and malignant lesions)	8

10	**Systemicpathologybasis andmorphologyof common disorders like** I) Anemia(types-Iron deficiency, megaloblastic, Aplastic-Etiology, Pathogenesis Investigation) II) Leukemia (Acute and chronic, Peripheral smear), AIDS(Definition, Pathogenesis, Mode of transmission, Two Confirmatory test Tridot, Western blot), Hepatitis (Types, Etiology, Mode of spread) III) Malaria-(Mode of spread IV) Tuberculosis-(Primary and secondary tb, Granuloma formation, Mode of transmission, Organs involved	8
11	Maintenance and medicolegal importance of records and specimens, Lab information system(LIMS)	3
12	Biomedical Waste, Universal Safety Precaution(Protocol to be followed after - Needle injury, chemical injury	1
Total		**60hrs**

BPFT109 P – Basic Pathology & Hematology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Working and maintenance of instruments,	60
2	General principles of Haematologytechniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working	
3	Generalprinciplesof Histopathologytechniques collection, fixation, processing & routine staining	
4	General principles of Cytopathology techniques collection, fixation, processing & routine staining	
5	General principles of Clinical Pathology techniques samplecollection, processingforroutinetest, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)	
6	GeneralprinciplesofBloodBanktechniquesantigen, antibody, ABO & Rh system	
7	General principles of Autopsy & Museum	
Total		**60hrs**

Reference Books:

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

5. Medical Laboratory technology a procedure manual for routine diagnostic test -- vol – I, II, III. Kanai L. Mukharjee Tata Mc graw hill pub. New Delhi.
6. Practical Pathology P. Chakraborty Gargi Chakraborty New Central Book Agency, Kolkata.
7. Theory & Practice of Histological Techniques John D. Bancroft et.al. Churchill Livingstone Printed in China.
8. Histochemistry in Pathology M.I. Filipe et.al. Churchill Livingstone, London.
9. Hand Book of Histopathological & Histochemical Techniques C.F.A. Culling Butterworths Company Ltd. London.
10. A Handbook of Medical Laboratory (Lab) Technology. By V.H Talib.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Introduction to Quality and Patient safety**
Course Code	**BPFT110 T**

Teaching Objective	• 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	• 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.

Sr. No.	Topics	No. of Hrs.
1	**Quality assurance and management** – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines	7
2	**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	7

3	**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)	8
4	**Infection prevention and control** - Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand 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	8
5	**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
6	**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 hrs**

Reference Books:

1. Washington Manual of Patient Safety and Quality Improvement Paperback – 2016 by Fondahn (Author).
2. Understanding Patient Safety, Second Edition by Robert Wachter (Author).
3. Handbook of Healthcare Quality & Patient Safety Author : Girdhar J Gyani, Alexander Thomas.
4. Researching Patient Safety and Quality in Healthcare: A Nordic Perspective Karina Aase, LeneSchibevaag.
5. (Old) Handbook Of Healthcare Quality & Patient Safety by GyaniGirdhar J (Author)
6. Handbook of Healthcare Quality & Patient Safety by .Gyani G J/Thomas A
7. Quality Management in Hospitals by S. K. Jos

BPFT111 P - Community orientation & clinical visit (including related practicals to the parent course)(Total -120 hrs)

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Human Rights & Professional Values**
Course Code	**SEC 001 T**

Teaching Objective	• To understand interaction between society and educational institutions. • To sensitize the citizens so that the norms and values of human rights and duties of education programme are realized. • To encourage research activities. • To encourage research studies concerning the relationship between Human Rights and Duties Education.
Learning Outcomes	•This course will aim at making the learners acquire conceptual clarity and develop respect for norms and values of freedom, equality, fraternity and justice. • It will include awareness of civil society organizations and movements promoting human rights. • This will make the students realize the difference between the values of human rights and their duties

Sr. No.	Topics	No. of Hrs.
1	**Background -** Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights	6
2	**Human rights at various level-** Human Rights at Global Level UNO, **Instruments**: U.N. Commission for Human Rights, European Convention on Human Rights.	6
3	**Human rights in India -** Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman	7
4	**Human Rights Violations -**Human Rights Violations against Women, Children, Violations against Minorities SC/ST and Trans-genders, Preventive Measures.	6
5	**Professional values-** Integrity, Objectivity, Professional competence and due care, Confidentiality	6
6	**Personal values-** ethical or moral values, Attitude and behavior- professional behavior, treating people equally	6
7	**Code of conduct-** professional accountability and responsibility, misconduct, Cultural issues in the healthcare environment	8
Total		**45hrs**

Reference Books:

1. JagannathMohanty Teaching of Human sRights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009.
2. Ram Ahuja: Violence Against Women Rawat Publications Jewahar Nager Jaipur.1998.
3. SivagamiParmasivam Human Rights Salem 2008

SECOND YEAR

B.Sc. Perfusion Technology

Semester - III

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Applied Pharmacology**
Course Code	**BPFT 201 T**

Teaching Objective	To understand Indication and Contraindications, Uses and Adverse effects of drugs, Mechanism of Action
Learning Outcomes	Students will be proficient in Pharmacology with proficient knowledge about the different drugs / medicines to be given in various cardiovascular diseases, dose calculation and mode of administration. Also recent advances in pharmacology will play a key role in research aspect of the students.

Sr. No.	Topics	No. of Hrs.
1.	**GENERAL PHARMACOLOGY:** Sources of drugs, Route of drug administration, Pharmacokinetics, Pharmacodynamics, First pass metabolism, Adverse drug reactions	5
2.	**DRUGS USED IN CARDIOVASCULAR SYSTEM (with its MOA, ADRs, Indications and complications):** Anti-Hypertensives, Anti- Anginal Agents, Anti-Failure Agents, Anti-Arrhythmic Agents, Antithrombotic Agents	10
3.	**DRUGS USED IN NERVOUS SYSTEM (with its MOA, ADRs, Indications and complications):** Anticholinergics & Adrenergic, Narcotics, Sedatives & Hypnotics	10
4.	**PHARMACOTHERAPY OF RESPIRATORY DISORDERS:** Introduction –Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone, Pharmacotherapy of bronchial asthma, Mucokinetic and mucolytic agents	5
5.	**ANAESTHETIC AGENTS**: Definition of general and local anaesthetics. Classification of general anaesthetics, Pharmacokinetics and Pharmacodynamics of inhaled anaesthetic agents, Intravenous general anaesthetic agents, Local anaesthetics – classification mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration	10
6.	**ANALGESIC:** Definition and classification, Routes of administration, dose, frequency of administration, Side effects and management of non opioid and opiod analgesics.	5
7.	**ANTIHISTAMINES AND ANTIEMETICS**: Classification, Mechanism of action, adverse effects, Preparations, dose and routes and administration.	5

8.	**CNS STIMULANTS AND DEPRESSANTS**: Alcohol, Sedatives, hypnotics and narcotics, CNS stimulants , Neuromuscular blocking agents and muscle relaxants.	5
9.	**MISCELLANEOUS:** IV Fluids, Neuromuscular blockers, Electrolyte supplements, Antihistamines, Protamine, Emergency drugs- Atropine, Adrenaline, Steroids, Sodium bicarbonate	5
Total		**60 hrs**

Reference Learning Resources:

Text Books:

1. Pharmacology for Physiotherapy by Padmaja Udaykumar.
2. Drugs for the Heart, South Asia edition by Lionel H. Opie and Bernard J. Gersh.
3. R. S. Satoskar, S.D. Bhandarkar, S. S. Ainapure, Pharmacology and Pharmacotherapeutics, 18th Edition.
4. K.D. Tripathi, Essentials of Medical Pharmacology, V. Edition, M/s. Jaypee Brothers, Post Box, 7193, G-16, EMCA House, 23/23, Bansari Road, Daryaganj, New Delhi.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Applied Anatomy & Physiology of Cardiovascular System related to PFT**
Course Code	**BPFT 202 T**

Teaching Objective	Students will be aware of entire anatomy and physiology related to the cardiovascular system and other systems
Learning Outcomes	Students will be able to identify normal anatomy and vasculature and also be familiar with the pathologically diseased conditioned organs and changes in hemodynamics

Sr. No.	Topics	No. of Hrs.
1	**ANATOMY OF CARDIOVASCULAR SYSTEM:** Anatomy of Arteries and arterioles, Anatomy of Aorta, Capillaries and sinusoids, Anastomoses, Veins and venules, Anatomy of Coronary arteries: Left and Right	15
2	**PHYSIOLOGY OF CARDIOVASCULAR SYSTEM:** Physiology of Aorta, Physiology of Carotid Bifurcation, Systemic, Pulmonary, Coronary and Portal circulation, Nerve supply of the heart, Major Arteries and Veins supplying Head, Neck and Thorax, Major Arteries and Veins of Upper limb, Major Arteries and Veins of Pelvis and Lower Limb.	20
3	**ANATOMY OF HEART:** Surface anatomy of heart, Structure of the heart, Surface and Borders, Pericardium, Myocardium and Endocardium, Chambers: Right Atrium (Venous Area, Septum, Atrial Appendage), Right ventricle: (Inflow, Atrial Sinus, Outflow), Left Atrium (Venous, Ventricular Septum, Appendage, MV), Left Ventricle (Inflow, Body, Outflow), Anatomy of SA node and AV node, Anatomy of Cardiac Valves: Eustachian, Thebesian, A-V Valves, Semilunar Valves, Valve Apparatus, Major Arteries and their branches Major veins and their tributaries	20
4	**BLOOD VESSELS AND HEMODYNAMICS:** Regulation of Blood pressure: Hormonal and Neural regulation, Pulse and sites for pulse assessment, Shock and Homeostasis, Innovation: Sympathetic and parasympathetic sensory	5
Total		**60hrs**

Recommended Learning Resources:

Text Books:

1. Textbook of Pathology, Harsh Mohan
2. Pathology illustrated, Robin Reid
3. B. D Chaurasia (volume 2)

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Applied Anatomy and Physiology of Cardiovascular System related to PT**
Course Code	**BPFT 202 P**

Teaching Objective	Students will be aware of entire anatomy and physiology related to the cardiovascular system and other systems
Learning Outcomes	Students will be able to identify normal anatomy and vasculature and also be familiar with the pathologically diseased conditioned organs and changes in hemodynamics

Sr. No	Topics	No. of Hours
1	**Heart :** Internal features of heart , External features ,Interior of the Right atrium , Interior of the left Atrium , interior of left and right ventricles , Nodal system **Vascular :** Blood supply of the heart , Anatomy of the coronary circulation **Great vessels** : Aorta and its branches , superior and inferior vena cavae , pulmonary vessels	15
2	**Lungs :** Interior and exterior features of the lungs , Pathological changes related to lungs and the heart (pnuemothorax , hydrothorax , hemothorax , cardiomegally , COPD, tumors , etc	15
3	**Hematology :** anemia , atherosclerosis , arteriosclerosis , plaque formations in the vasculature, Gross : pathological changes in congestive heart failure , myocardial infarction , hypertension	15
4	**Kidneys :** acute and chronic renal failure , liver cirrhosis and pancreatic dysfunctions related to pathology	15
TOTAL		**60 hrs**

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Basics of Perfusion Technology**
Course Code	**BPFT 203 T**

Teaching Objective	Students will be taught the overall physiology of CPB and investigations used to diagnose cardiac related disorders
Learning Outcomes	Students will understand the use of equipments in CPB and also hand on training with the equipments and materials used Students will be able to understand the principles and use of all the equipments and its making

Sr. No.	Topics	No. of Hrs.
1	**INVESTIGATIONS OF CARDIAC RELATED DISORDERS:** Chest X-rays (cardiomegaly, pneumothorax, pleural effusions) ECG (normal waves, changes in waveforms like atrial and ventricular arrhythmias, heart blocks, MI, myocardial ischemia) Echocardiography (principles, TTE,TEE and intra-oprative ECHO)	15
2	**CLINICAL PATHOLOGY:** Coronary Artery Disease (CAD), Congestive Heart Failure (CHF), and Atherosclerosis, Shock and Hemorrhage, Syncope, Hypertension. Congenital Disease, IHD, RHD, Valvular diseases, Myocardial Disease , Respiratory System (Normal structure, COPD, Pulmonary Infections, Tumors of the lungs, Diseases of pleura) Renal system (RFT, Renal Failure, Patho-physiology of Renal Failure	10
4	**EQUIPMENTS USED IN CPB AND HISTORY** **a.** History of Cardiac Surgery and **b.** History of Perfusion Technology **c.** Heart-Lung Machine: introduction, clinical use, practical and its theory **d.** Aseptic techniques (principles, definition, concept, technical aspect and clinical use) **e.** Theory and clinical use of Blood pumps (roller pumps, centrifugal pumps and other historical pumps) **f.** Oxygenators (introduction, theory, types, and its evolution) **g.** Various devices used in CPB: Arterial filters, bubble traps, Heat Exchangers, hemo- concentrators	20
	Total	**45hrs**

Recommended Learning Resources:

Text Books:

1. Manual of Clinical Perfusion, Byrian Lichh.
2. Cardio-pulmonary bypass: Surgical and Clinical orientation.
3. Handbook of Extra Corporeal Circulation.
4. Handbook of IV fluids and administration, S. Pandya.
5. The ABC's of Heart Diseases, William Herring.
6. Guide to Good Practise in Clinical Perfusion.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Basics of Perfusion Technology**
Course Code	**BPFT 203 P**

Teaching Objective	Students will be taught the overall physiology of CPB and investigations used to diagnose cardiac related disorders
Learning Outcomes	Students will understand the use of equipments in CPB and also hand on training with the equipments and materials used Students will be able to understand the principles and use of all the equipments and its making

Sr. No.	Topics	No. of Hrs.
1.	**Cardiopulmonary bypass protocols** - Pre-bypass checklist , circuit selection , circuit assembling , occlusion setting , circuit priming	20
2.	**Administration of drugs** – buffering agent, correction of hyperkalemia, hypokalemia, acidosis and alkalosis, metabolic dearrangements, drugs related to coagulation and anti- coagulation	20
3.	**Use of Equipments** – heart lung machine , heat cooler unit Use of devices – arterial filter , bubble trap , heat exchangers , hemo-concentrators	20
Total		**60 hrs**

Course code- BPFT 204 CP: PFT Directed Clinical Education – I

Students will gain additional skills in medical equipment and radiation safety techniques. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate technical skills.

(Total-360 hrs)

SECOND YEAR

B.Sc. Perfusion Technology

Semester - IV

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Applied Physiology and Biochemistry**
Course Code	**BPFT 205 T**

Teaching Objective	In this semester students will be guided about the investigations and tests performed to diagnose the patient and pre-operative assessment.
Learning Outcomes	At the end of this semester students will be able to evaluate, diagnose and help in treating the patients and differentiate patients eligible for taking for surgery or to be given meditational treatment.

Sr. No.	Topics	No. of Hrs.
1	**PHYSIOLOGY OF CVS:** mechanism of cardiac contraction, cardiac cycle, stroke volume & cardiac output, Regulatory mechanism of CO, Normal pressures in all chambers of heart & great vessels, methods of measurement, description of wave forces of pressure tracings. Physiology of coronary circulation and its auto-regulation. CVS responses to exercise, posture and valsalva maneuver, conduction system of heart	10
2	**PHYSIOLOGY OF RESPIRATORY SYSTEM:** upper respiratory tract, mechanism of breathing, alveolar gas exchange, regulation of respiration, PFT and their interpretation, Arterial blood gas analysis, brief concepts of artificial ventilation	8
3	**HEMATOLOGY**: Blood components, normal value and their functions, Blood groups, Physiology of coagulation	3
4	**RENAL SYSTEM:** Introduction to renal physiology, renal circulation and glomerular filtration, tubular function	5
5	**NERVOUS SYSTEM:** physiological basis of consciousness and sleep, ANS, auto regulation of cerebral circulation, functions of brain and spinal cord	4
6	**BIOCHEMISTRY RELATED INVESTIGATIONS** and its theory : Principles and Estimation blood gas analysis and pH , principles and estimation of Electrolytes collection of samples for lab investigations (blood , urine , and other body fluids)	10

7	Cardiac Profile – Biochemical markers , basic principles and evaluation	5
8	Blood Lipid Profile and its Interpretation Blood Sugar Profile and its Interpretation	
Total		**45 hrs**

REFERENCES:

1. Textbook of physiology , A K Jain
2. Textbook of physiology , Sembulingam
3. Textbook of medical physiology , Guyton and Hall
4. Textbook of biochemistry, Pankaja Naik
5. Textbook of biochemistry, Ranjana Chawla

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Applied Physiology and Biochemistry**
Course Code	**BPFT 205 P**

Teaching Objective	In this semester students will be guided about the investigations and tests performed to diagnose the patient and pre-operative assessment
Learning Outcomes	At the end of this semester students will be able to evaluate, diagnose and help in treating the patients and differentiate patients eligible for taking for surgery or to be given meditational treatment

Sr. No	TOPIC	No. of Hours
1	**COMPONENTS OF BLOOD** - their normal values and function **BLOOD GROUPS** and briefly procedures involved in blood transfusion , blood grouping and cross matching , Bleeding time, clotting time, Erythrocyte sedimentation rate	25

2	**PULMONARY FUNCTION TEST** (including the use of spirometer) Brief Coagulation factors and Coagulation cascade Renal Physiology Renal function tests **PHYSICS OF VENTILATION -** principles of elasticity compliance and airway resistance.	10
3	**ROUTINE BIOCHEMICAL INVESTIGATIONS :** **CARDIAC PROFILES** – Biochemical Markers of myocardial infarction, basic principles, evaluation and application **BLOOD GAS ANALYSIS** : Principles and Estimation and pH Basic principles and estimation of electrolytes and their normal values Liver function test , Renal function tests, Thyroid Profile	25
	Total	**60 hrs**

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Introduction of Perfusion Techniques**
Course Code	**BPFT 206 T**

Teaching Objective	Students will be taught to access the patients pre-operatively and understand the significance of pre existing factors which modify the changes with the selection of equipments and medicines used during cardiopulmonary bypass
Learning Outcomes	Students will be able to collect the data before and at the time of surgery for equipment evaluation

Sr. No.	Topics	No. of Hrs.

1	**PHYSICS OF CARDIOPULMONARY BYPASS:** a. Hemodynamics of (arterial flow, venous drainage, cardioplegia delivery, suction effect and venting b. Connection of the vascular system with extra corporeal circulation (ECC) : Cannulation techniques (selection of cannulae sizes, oxygenator selection), Calculation of BSA, BFR and other advanced formula c. Hazards of ECC: Oxygenator leakage, electricity cut off, Etc and its management during ECC	10
2	**MONITORING DURING CARDIOPULMONARY BYPASS**: Hemodynamic and hemostatic monitoring during CPB	10
3	**CONDUCTON AND TERMINATION OF CARDIOPULMONARY BYPASS**: Principles and Methodology **MYOCARDIAL PRESERVATION**: Hypothermia, Deep Hypothermic Circulatory Arrest, cardioplegia	10
4	Drugs used during CPB, Handling of Blood and Blood Products, Physiology of ECC Pulsatile and Non-pulsatile pumps, Physics of medical gases (oxygen, carbon dioxide)	15
Total		**45 hrs**

Recommended Learning Resources:

Text Books:

1. Manual of Clinical Perfusion, Byrian Lichh.
2. Cardio-pulmonary bypass: Surgical and Clinical orientation.
3. Handbook of Extra Corporeal Circulation.
4. Handbook of IV fluids and administration, S. Pandya.
5. The ABC's of Heart Diseases, William Herring.
6. Guide to Good Practise in Clinical Perfusion.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Introduction of Perfusion Techniques**
Course Code	**BPFT 206 P**

Teaching Objective	Teaching diagnosis and corrective methods of biochemistry investigations To know about blood transfusion and transfusion related problems Selection of equipment related of cardiopulmonary bypass
Learning Outcomes	Students will be aware of the hematologic derangements and the pharmacological application respectively Selection of the equipment and instrumentation related to cardiopulmonary bypass

Sr. No.	Topics	No. of Hrs.
1.	**Blood Gas Management** (pH , partial pressures of oxygen and carbon dioxide, base excess , sodium and chloride, potassium , meta – hemoglobin , alpha- hemoglobin, saturation, bicarbonate – intracellular and extracellular , total hemoglobin,) Glucose management	20
2.	**Blood transfusion** (blood grouping, cross-matching, blood grouping system, components of blood transfusion conditionally) Transfusion related problems	20
3.	**Calculation of** – Body Surface Area , blood volume calculation , priming volume , Circulating Haematocrit and haemoglobin on bypass Selection of cannula and other equipment related to the surgery , normal values	20
	Total	**60 hrs**

Reference Books:

Text Books:

1. Manual of Clinical Perfusion
2. Cardiopulmonary bypass, Glenn Gravlee

Course code- BPFT 207 CP: PFT Directed Clinical Education – IV

Students will gain additional skills in medical equipment and radiation safety techniques. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist.

Students are tested on intermediate technical skills.

(Total- 450hrs)

ABILITY ENHANCEMENT ELECTIVE COURSE

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Computers and Applications**
Course Code	**AEC 003 T**

Teaching Objective	Learn IT applications in medicine and allied health care field. Introduction to health informatics. Understand the theories and practices adopted in Hospital Information Systems in the light of medical standards, medical data formats and recent trends in Hospital Information Systems.
Learning Outcomes	Discuss about health informatics and different IT applications in allied health care. Explain the function of Hospital Information Systems Analyze medical standards.

Sr. No.	Topics	No. of Hrs.
1	**Introduction to computer**: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.	1
2	Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).	3
3	Processor and memory: The Central Processing Unit (CPU), main memory.	4
4	Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.	3
5	Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).	5
6	Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.	5
7	Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.	5
8	Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.	5

9	Introduction of Operating System: introduction, operating system concepts, types of operating system.	4
10	Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network	5
11	Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.	4
12	Application of Computers in clinical settings.	1
Total		**45 hrs**

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.

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	Biostatistics and Research Methodology
Course Code	AEC 004 T

Teaching Objective	• 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	• 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	No. of 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 hrs**

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

THIRD YEAR

B.Sc. Perfusion Technology

Semester - V

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	**Perfusion Technology: Clinical**
Course Code	BPFT 301 T

Teaching Objective	• To understand the use of various drugs and intravenous fluids used during cardiopulmonary bypass • Understanding hematologic effects and physics of cardiopulmonary bypass
Learning Outcomes	• To learn the pharmacokinetics and pharmacodynamics during cardiopulmonary bypass • Dealing with conduction and termination of cardiopulmonary bypass and problems associated with it

Sr. No.	Topics	No. of Hrs.
1	**CPB**: Conduct and monitoring of Cardiopulmonary bypass	10
2	**Adequacy of perfusion** – General considerations, specific aspects of perfusion, Monitoring, other concomitants which may affect its adequacy	6
3	**Pulsatile perfusion** – Introduction, theory & physiology of pulsatile flow, Hemodynamic, metabolic effects, Clinical use, hematological effects	6
4	Hemodynamic, metabolic effects, Clinical use, hematological effects, Cannulation techniques during cardiopulmonary bypass	7
5	**Termination of cardiopulmonary bypass** – principles and methodology	8
6	**Myocardial protection and cardioplegia-** pretreatment of the Myocardium, cardioplegia, hypothermia, controlled reperfusion, myocardial protection for specific clinical problems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass	8
7	**Oxygenation** – general consideration, bubble & membrane (including assessment and comparison of oxygenator function)	6
8	**Heat exchangers**-principles function of heat exchangers & their assessment. Complications related to heat exchange and their management	4
9	Priming fluids and hemodilution	5
Total		**60 hrs**

Recommended Text Books:

1. Manual of Clinical Perfusion, Byrian Lichh
2. Cardio-pulmonary bypass: Surgical and Clinical orientation
3. Handbook of Extra Corporeal Circulation
4. Handbook of IV fluids and administration, S. Pandya
5. The ABC's of Heart Diseases, William Herring
6. Guide to Good Practise in Clinical

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Perfusion Technology: Clinical**
Course Code	**BPFT 301 P**

Teaching Objective	To understand the use of various drugs and intravenous fluids used during cardiopulmonary bypass Understanding hematologic effects of cardiopulmonary bypass
Learning Outcomes	To learn the pharmacokinetics and pharmacokinetics during cardiopulmonary bypass Dealing with conduction and termination of cardiopulmonary bypass Selection of appropriate equipments and instruments

Sr. No.	Topics	No. of Hrs.
1	**Oxygenators** – selection of oxygenators, difference between oxygenators, adult and pediatric and neonatal setup, oxygenator accidents, change of oxygenator in the ongoing surgery **Custom tubing pack** – selection with regards to oxygenator, quality determination demonstration, difference between disposable and reusable equipments and its clinical use	20
2	**Use of hemotherm** (heater cooler unit) and its connection with the extra corporeal circulation **Hypothermia methods** in case of failure of the hemotherm	20
3	**Myocardial Preservation techniques** – pre treatment of the myocardium Cardioplegia delivery techniques and hypothermia techniques Complications during delivery of cardioplegia and management of the same	20
Total		**60 hrs**

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	**Perfusion Technology: Applied**
Course Code	BPFT 302 T

Teaching Objective	• To know the intracellular and extracellular effects during cardiopulmonary bypass and cardiac surgery • To understand the effects of the surgical procedure and also the drawbacks of the inflammatory response
Learning Outcomes	• Techniques that can minimise the ill effects of the machinery and to improve patient outcome and the activated systemic inflammatory response system

Sr. No.	Topics	No. of Hrs.
1	**Blood cell trauma** – analysis of forces of fluid motion, effects of physical forces on Blood cell, clinical effect. Complications of blood transfusion	10
2	**Anticoagulation on bypass**, its monitoring, its reversal and complications. Heparin less Bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to Cardiopulmonary bypass and its management.	6
3	**Inflammatory response to cardiopulmonary bypass & its clinical effects.** Methods to minimize the same. Immune response, neuroendocrine, renal, metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass	6
4	**Blood conservation hemofiltration & dialysis** during cardiopulmonary bypass including modified ultrafiltration , reverse autologous priming and other methods	6
5	**Micro emboli**- gaseous and particulate, filters used in cardiopulmonary bypass circuit	6
6	Micro pore filtration during cardiopulmonary bypass	6
7	Counter pulsation techniques and assist devices	5
Total		**45 hrs**

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	**Perfusion Technology: Applied**
Course Code	BPFT 302 P

Teaching Objective	To know the intracellular and extracellular effects during cardiopulmonary bypass and cardiac surgery To understand the effects of the surgical procedure and also the drawbacks of the inflammatory response
Learning Outcomes	Techniques that can minimise the ill effects of the machinery and to improve patient outcome and the activated systemic inflammatory response system

Sr. No.	Topics	No. of Hrs.
1	• anti-coagulation during cardiopulmonary bypass and its reversal • Management of coagulopathies, platelet aggregation and platelet dysfunction	20
2	• Use of the Intra Aortic Balloon Pump (IABP) – normal, complications of IABP, Management • Demonstration of the use of centrifugal pumps, right ventricular assist devices, left ventricular assist devices and biventricular assist devices. • Use of equipments in organ transplantation and drugs	20
3	• Blood conservation techniques – use of equipment , hemo concentrators, leukocyte filters, other blood filters, miniaturized circuit, banked-blood filters, screen filters, depth filters, • cell salvaging machine • Modified ultrafiltration , conventional ultrafiltration, zero-balanced ultrafiltration, pre bypass ultrafiltration	20
Total		**60 hrs**

Reference

Text Books:

1. Cardiopulmonary bypass, Glenn Gravlee

2. Handbook of clinical perfusion, ISECT CON BOOK – 2017 & latest editions
3. Manual of Clinical Perfusion, Byrian Lichh
4. Cardio-pulmonary bypass: Surgical and Clinical orientation
5. Handbook of Extra Corporeal Circulation
6. Handbook of IV fluids and administration, S. Pandya
7. The ABC's of Heart Diseases, William Herring
8. Guide to Good Practise in Clinical Perfusion

Course code- BPFT 303 CP: PFT Directed Clinical Education – V

Students will gain additional skills in interventional procedures, cardiac pharmacology and recent advancements. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate pharmacological and invasive techniques.

(Total- 450 hrs)

CORE ELECTIVE COURSES

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Basics of Clinical Skill Learning**
Course Code	**CEC 005 T**

Teaching Objective	•To Understand the basic ideas on how to check for Vital Signs of the Patient • This course the Student will learn how to handle the patients and their positioning •They will also learn on the Basics of Nasal-Gastric Tube •The Students will learn on Administration of IV, IV and Medication •Also they will know about Cleanliness in the Asepsis
Learning Outcomes	•After successful accomplishment of the course, the students would be able to Measure Vital Signs, do basic physical Examination of the patients, NG tube basics, Administration of Medicines •The students will learn about Asepsis, and the Cleanliness related to asepsis and on mobility of the patients

Sr. No.	Topics	No. of Hrs.
1	**MEASURING VITAL SIGNS:** Temperature: Axillaries Temperature, Pulse: Sites of pulse, Measurement, Respiratory, Blood Pressure, Pain: Pain Scale	5
2	**PHYSICAL EXAMINATION:** Observation, Auscultation (Chest), Palpation, Percussion, History Taking	10
3	**FEEDING: ENTRAL FEEDING, NG TUBE:** Measurement, Procedure, Care, Removal of Nasal-Gastric Tube, Nasal-Gastric Tube Feeding, and Parenteral Nutrition.	10
4	**ADMINISTRATIONS:** Oral, Intravenous, Intramuscular, Subcutaneous, Recapping of Syringe, Loading of Drugs, Calculation of Drugs, Venipuncture, IV Infusion, Cannula, Attachment of IV infusion Set, Fluid Collection, Heparin Lock, Maintenance of IV set, Performing Nebulizer Therapy, Inhaler, Oxygen Therapy (Nasal, prongs, nasal Catheter, Venturi Mask, face mask)	10
5	**ASEPSIS:** Hand wash Techniques, (Medical, Surgical) Universal Precaution, Protecting Equipment's: Using Sterile Gloves, Opening a Sterile package and Establishing a Sterile Field, Sterile Dressing Changes, Surgical Attire, Wound Dressing, Suture Removal, Cleaning and Application of Sterile Dressing, Wearing and Removal of personal protective Equipment	5
6	**MOBILITY AND SUPPORT:** Moving and Positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints	5
Total		**45 hrs**

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Hospital Operation Management**
Course Code	**CEC 006 T**

Teaching Objective	•To promote scientific management of hospital and advancement of health care systems so as to make it rational, responsive and cost efficient •To promote the development of high quality of hospital care in the community and the country. •It has to provide a satisfactory environment to the patient and also to the doctors for clinical research.

Learning Outcomes	•Understand and apply resource management concepts (personnel, finance, and material resources) and the processes and strategies needed in specific hospital sectors •Communicate effectively and develop their leadership and teambuilding abilities •Apply modern change management and innovation management concepts to optimize structures •Analyze existing hospital service policies and enhance their alignment within the local and national context

Sr. No.	Topics	No. of Hrs.
1	**MEDICO-LEGAL CASES:** Introduction: Laws associated with Medico-Legal Cases, Three Core Contents in Medico-legal cases w.r.t Doctors, Patient & Profession,	5
2	**CONSIDERATIONS OF ETHICS:** Consent, Confidentiality, Mental Health, End of life and Organ Transportation, Research & Clinical Trials	10
3	**HOSPITAL INFORMATION SYSTEM(HIS):** Hospital Information System Management, software applications in registration, billing, investigations, reporting, medical records management, Security and ethical challenges	10
4	**EQUIPMENT OPERATIONS MANAGEMENT:** Hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, AMCS	10
5	**ROLE OF MEDICAL RECORDS IN HEALTH CARE MANAGEMENT:** Computers for Medical records, Developments of computerized medical record information processing system (EMR's), Computer stored (Vs) Manual hand written record, Advantages of EMR (Vs) Manual	10
Total		**45hrs**

THIRD YEAR

B.Sc. Perfusion Technology

Semester - VI

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	Perfusion Technology: Advanced
Course Code	BPFT 304 P

Teaching Objective	• Advancement in extra corporeal life support for cardiac and pulmonary patients • Different complications related to pediatric surgical intervention
Learning Outcomes	• Management of complications related to bypass and advanced extra corporeal life support • Team management of perfusion accidents and management

Sr. No.	Topics	No. of Hrs.
1	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
2	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 hrs**

Name of the Programme	B.Sc. Perfusion Technology
Name of the Course	Recent advances in Cardiopulmonary bypass & Perfusion
Course Code	BPFT 305 T
Teaching Objective	•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.

Name of the Programme	**B.Sc. Perfusion Technology**
Name of the Course	**Perfusion Technology : Advanced**
Course Code	**BPFT 304 T**

Teaching Objective	• Knowledge of the use of various equipments in cardiac surgery operations • Advancement in extra corporeal life support for cardiac and pulmonary patients • Different complications related to pediatric surgical intervention
Learning Outcomes	• Use of machinery and amenities during emergency cases and conditions • Management of complications related to bypass and advanced extra corporeal life support • Team management of perfusion accidents and management

Sr. No.	Topics	No. of Hrs.
1	Cannulations techniques during cardiac surgery – arterial cannulation , venous cannulations , root venting and the cardiac chamber venting cannulations, selection of cannulae , position and securing of the cannula	15
2	Conduction of cardiopulmonary bypass and its monitoring – preparation for conduction , ABG and VBG analysis , ACT analysis , theory and clinically done test for anti-coagulation (ApTT, PT, INR, heparin monitoring, Etc)	10
3	Heat exchangers – principle , function and its assessment Complications related to heat exchangers and its management	10
4	Termination of cardiopulmonary bypass – principle and methodology including the beginning of the pulmonary ventilation and anaesthesia , inotrophic and dronotrophic support, Analysis of blood parameters	15
5	Blood conservation , hemofiltration and dialysis during CPB including the concept of modified ultrafiltration , conventional ultrafiltration, zero balanced ultrafiltration Reverse autologous priming and other new methods Filters used during CPB – arterial filters , bubble traps , gas filter , screen filter , depth filter , combination filter, banked blood filters , ultrafilters, cardiotomy filters and others Micro –emboli and gaseous particulate	10
Total		**60 hrs**

Learning Outcomes	•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	No. of 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.	6
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.	8
5	Minimally invasive surgery and the perfusionist	8
6	Recent advances in perfusion techniques	6
7	Experimental perfusion	5
Total		**45 hrs**

Recommended Text Books:

1. Manual of Clinical Perfusion, Byrian Lichh
2. Cardio-pulmonary bypass: Surgical and Clinical orientation
3. Handbook of Extra Corporeal Circulation
4. Handbook of IV fluids and administration, S. Pandya
5. The ABC's of Heart Diseases, William Herring
6. Guide to Good Practise in Clinical Perfusion

Course code- BPFT 306 CP: PFT Directed Clinical Education – VI

Students will gain additional skills in diagnosis in pediatric cases and pediatric interventional procedures. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate clinical diagnostic and therapeutic skills.

(Total – 450 hrs)

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

15 days for CSSD department

Checklist - I

Continuous Evaluation of Directed Clinical Education (Clinical Posting) by Faculty in charge

Name of the student: _____ **Date:**_____

Semester: _____ **Name of the faculty/Observer:** _____

Core Competencies	Grade
Students will begin to develop critical thinking abilities utilizing the allied health personnel roles of communicator and caregiver. Students will learn principles of professional allied health personnel practice and provide direct care to individuals within a medical surgical setting while recognizing the diverse uniqueness of individuals with health alterations.	Write a grade 1-4 in the boxes below
I. Clinical Teaching	
a. Demonstrate beginning competency in technical skills.	
II. Independent Work by Student guided by faculty	
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	
b. Identify relevant data for communication in pre and post conferences	
c. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	
d. Identify need for help when appropriate to situation. Delegates level specific skills to appropriate team member.	
III. Hands on practical work by students	
a. Navigate and document clear and concise responses to care in the electronic health record for patient, where appropriate for clinical setting	
b. Protect confidentiality of electronic health records data, information, and knowledge of technology in an ethical manner	
IV. Independent work by student	
a. Maintain a positive attitude and interact with inter-professional team members, faculty, and fellow students in a positive, professional manner. Accept constructive feedback and develop plan of action for improvement.	
b. Demonstrate expected behaviours and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behaviour and appearance.	
c. Accept individual responsibility and accountability for nursing interventions, outcomes, and other actions. Engage in self evaluation & assumes responsibility for learning.	

***Clinical evaluation tool guidelines for full descriptions of grades 1-4.**

4-exceeds expectations (range of marks –40-50 marks)
3-meets expectations (range of marks –30-40 marks)
2-below expectations (range of marks –25-30 marks)
1-does not meet expectations (range of marks –no marks)

Resolution No. 4.5.1 of BOM-53/2018:

It was accepted to keep 50% as the passing marks for the entire elective and core subjects for UG courses.

Resolution No. 4.13 of BOM-55/2018: Resolved as follows:-

1. Slow learners must be re-designated as potential learners.
2. Students scoring less than 35% marks in a particular subjects/course in the 1st formative exam are to be listed as potential learners. These learners must be constantly encouraged to perform better with the help of various remedial measures.
3. Students scoring more than 75% marks in a particular subjects/course in the 1st formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

Resolution No. 3.1.4.2 of BOM-57/2019:

i. Resolved to include "Gender Sensitization" into UG (from new batch 2019-2020) and PG (from existing batches) curricula. **[Annexure-21]**

ii. Resolved to align the module of "Gender Sensitization" with MCI CBME pattern for MBBS students.

iii. Resolved that Dr. Swati Shiradkar, Prof., Dept. of OBGY., MGM Medical College, Aurangabad will coordinate this activity at both campuses.

Annexure - 21

Gender sensitization for UG (2nd, 3rd, 8th semesters)

INCLUSION OF " GENDER SENSATIZATION" IN CURRICULUM

Introduction :

The health care provider should have a healthy gender attitude, so that discrimination, stigmatization, bias while providing health care will be avoided. The health care provider should also be aware of certain medico legal issues related with sex & gender.

Society particularly youth & adolescents need medically accurate, culturally & age-wise appropriate knowledge about sex, gender & sexuality. So we can train the trainers for the same. It is need of the hour to prevent sexual harassment & abuse.

To fulfill these objectives, some suggestions are there for approval of BOS.

Outline

1. For undergraduates :- Three sessions of two hours each, one in 2nd term, one in 3rd term & one in 8th term.
2. For Faculties and postgraduates: - One session of two hrs.
3. For those want to be trainers or interested for their own self, value added course, which is optional about sex, gender, sexuality & related issues.

Responsibility

ICC of MGM, MCHA, with necessary support from IQAC & respective departments.

Details of undergraduate sessions

1. 1st Session in 2nd Term

Aim – To make Students aware about the concept of sexuality & gender.

To check accuracy of knowledge they have,

To make them comfortable with their own gender identify & related issues.

To make them aware about ICC & it is functioning.

Mode – Brain storming, Interactive power point presentation experience sharing.

Duration – Around two hours

Evaluation – Feedback from participants.

2. 2nd Session in 3rd/4th Term

Aim – To ensure healthy gender attitude in these students as now they start interacting with patients.

To ensure that the maintain dignity privacy while interacting with patients and relatives, particularly gender related.

To make them aware about importance of confidentiality related with gender issues.

To encourage them to note gender related issues affecting health care & seek solutions.

Mode – focused group discussions on case studies, Role plays & discussion.

Duration – Around two hours.

Evaluation – Feedback from participants.

Third session in 8th term.

Aim – To understand effect of gender attitudes on health care in various subjects.

To develop healthy gender attitude while dealing with these issues.

Mode – Suggested PBL by departments individually. (In collaboration with ICC till faculty sensitization is complete)

Evaluation – Feedback