Course Structure for the Diploma in Catheterization Laboratory Technology (code- DCLT.1.5)
Session 2025

Course No.	Course Title	Course Type	L+T+P	Credits/ week	Weightage IA+UE
Semester-I					
DCLT-ANT.201	Anatomy-I	Foundation	3+0+2	5	10+40=50T 10+40=50P
DCLT-PHY.201	Physiology-I	Foundation	3+0+2	5	10+40=50T 10+40=50P
DCLT-BIC.201	Biochemistry	Foundation	3+0+0	3	30+70=100T
DCLT.201	Medical Electronics	Core	3+0+2	5	30+70=100T 10+40=50P
ECO.250	English/Communication skills	Elective	2+0+0	2	NC
		Total Credits	**14+0+6**	**20**	**450**
Semester-II (revised)					
DCLT-ANT.202	Anatomy-II	Foundation	3+0+0	3	30+70=100T
DCLT-PHY.202	Physiology-II	Foundation	3+0+0	3	30+70=100T
DCLT-PHA.201	Pharmacology	Foundation	2+0+2	4	30+70=100T 30+70=100P
DCLT.202	Biophysics	Core	2+1+2	5	30+70=100T 30+70=100P
COM.250	Computer Applications	Elective	1+0+1	2	NC
DCLT.205	Introduction to Quality and patient safety	Elective	2+0+0	2	NC
		Total Credits	**13+1+5**	**19**	**600**
Semester-III					
DCLT-PAT.301	Pathology	Foundation	2+0+3	5	30+70=100T 30+70=100P
DCLT.301	Basic Electrocardiography	Core course	3+0+2	5	30+70=100T 30+70=100P
DCLT.302	Basic Echocardiography	Core course	3+0+2	5	30+70=100T 30+70=100P
DCLT.303	Medical Emergencies and Patient care	Elective	2+1+0	3	NC
		Total Credits	**10+1+7**	**18**	**600**
Semester-IV					
DCLT-MIC.201	Microbiology	Foundation	2+0+1	3	30+70=100T 30+70=100P
DCLT.304	Basic Cardiac catheterization	Core	3+0+3	6	30+70=100T 30+70=100P
DCLT.305	Treadmill exercise stress testing	Core	2+0+2	4	30+70=100T 30+70=100P
DCLT.306	Clinical Medicine & Management	Elective	2+1+0	3	NC
CRP.350	Community Rehabilitation practice	Elective	2+0+0	2	NC
		Total Credits	**11+1+6**	**18**	**600**
Internship= six month minimum 840 hours (calculated based on 6 hours per day for six month of internship)					

Course Structure for the Diploma in Catheterization Laboratory Technology (code- BCLT.1.5)
Session 2024

Course No.	Course Title	Course Type	L+T+P	Credits/ week	Weightage
Semester-I					

DCLT-ANT.201	Anatomy-I	Foundation	3+0+2	5	25+25=50T 50P
DCLT-PHY.201	Physiology-I	Foundation	3+0+2	5	25+25=50T 50P
DCLT-BIC.201	Biochemistry	Foundation	3+0+0	3	50+50=100T
DCLT.201	Medical Electronics	Core	3+0+0	3	50+50=100T
ECO.250	English/Communication skills	Elective	2+0+0	2	NC
DCLT.201	Practical in Catheterization	Core	0+0+2	2	50P
		Total Credits	**14+0+6**	**20**	**450**
Semester-II					
DCLT-ANT.201	Anatomy-II	Foundation	3+0+1	4	25+25=50T 50P
DCLT-PHY.201	Physiology-II	Foundation	3+0+1	4	25+25=50T 50P
DCLT-MIC.201	Microbiology	Foundation	2+1+1	4	50+50=100T 50P
DCLT.204	Biophysics	Core	2+1+0	3	50+50=100T
COM.250	Computer Applications	Elective	2+0+0	2	NC
DCLT.204	Practical in Catheterization	Core	0+0+3	3	50P
		Total Credits	**12+2+6**	**20**	**500**
Semester-III					
DCLT-PHA.201	Pharmacology	Foundation	3+0+2	5	50+50=100T 50P
DCLT.301	Basic Electrocardiography	Core course	3+1+3	6	50+50=100T 50P
DCLT.302	Basic Echocardiography	Core course	3+1+3	6	50+50=100T 50P
HVE.350	Human Values & Ethics	Elective	3+0+0	3	NC
		Total Credits	**12+2+8**	**20**	**450**
Semester-IV (new)					
DCLT-PAT.301	Pathology	Foundation	2+0+2	4	30+70=100T 10+40=50P
DCLT.304	Basic Cardiac catheterization	Core	3+1+3	7	30+70=100T 10+40=50P
DCLT.305	Treadmill exercise stress testing	Core	2+0+2	4	30+70=100T 10+40=50P
DCLT.306	Clinical Medicine & Management	Elective	2+1+0	3	NC
CRP.350	Community Rehabilitation Practice	Elective	2+0+0	2	NC
		Total Credits	**11+2+7**	**20**	**450**

SEMESTER-I	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Human Anatomy-I**
Course Code	**DCLT-ANT.201**
Credit hours	**03**
Teaching Objective	To introduce the students to the concepts related to General anatomy, Muscular, Cardiovascular, Lymphatic system, Gastro-intestinal system.
Learning Outcomes	i. Comprehend the normal disposition, interrelationships, gross, functionaland applied anatomy of various structures in the human body. ii. Demonstrate and understand the basic anatomy of Muscular, and Cardiovascular. iii. Demonstrate and understand the basic anatomy of Lymphatic system, Gastro-intestinal system.

Unit No.	Content	Lecture
1.	**Introduction:** Definition of anatomy and its divisions, Terms of location, positions and planes, Cell and its organelles, Tissues & its classification, Glands.	**8**
2.	**Musculoskeletal system:** Structure of Bone & its types, Joints- Classification of joints with examples; details of synovial joint, Bones & joints of upper limb, lower limb and their movements, Axial skeleton & appendicular skeleton, Skull, spine & its movements, intervertebral disc, Muscles & its types, Muscles of the upper limb, lower limb, trunk and neck.	**11**
3.	**Cardiovascular System:** Arteries & veins, Capillaries & arterioles, Heart-size, location, chambers, blood supply of heart, pericardium, Systemic & pulmonary circulation, Major blood vessels of Heart- Aorta, pulmonary artery, common carotid artery, subclavian artery, axillary artery, brachial artery, common iliac artery, femoral artery, Inferior vena cava, portal circulation, great saphenous vein.	**10**
4.	**Lymphatic System:** Lymph & Lymph vessels, Structure of lymph node, names of regional lymphatics, axillary and inguinal lymph nodes.	**8**
5.	**Gastro-intestinal System:** Parts of GIT, structure of tongue, pharynx, salivary glands, Location & Gross structure of Oesophagus, stomach, intestine (small and large), liver, gall bladder, pancreas, spleen.	**8**
	Total	**45**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
1.	Ross and Wilson, Anatomy and Physiology, Churchill Livingstone.
2.	Companion Pocketbook for quick review B.D. Chaurasia's Human Anatomy:-Vol. (1,2,3)
3.	B.D. Chaurasia's Human Anatomy -Vol. (1,2,3)
4.	B.D. Chaurasia'sHandbook of General Anatomy
5.	Textbook of Anatomy & Physiology for Nurses- Nachiket Shankar/ Mario Vaz Anatomy for B.Sc. Nursing – Dr Renu Chauhan

SEMESTER-I	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Practical in Anatomy**
Course Code	**DCLT-ANT.201**
Credit hours	**01 (2hrs)**
Teaching Objective	To introduce the students to the concepts related to General anatomy, Muscular, Cardiovascular, Lymphatic system, Gastro-intestinal system.
Learning Outcomes	i. Comprehend the normal disposition, interrelationships, gross, functionaland applied anatomy of various structures in the human body. ii. Demonstrate and understand the basic anatomy of Muscular, and Cardiovascular. iii. Demonstrate and understand the basic anatomy of Lymphatic system, Gastro-intestinal system.

Unit No.	**Content**	**HOURS**
1.	**Demonstration** of all bones of the human body. Bones of Upper Limb, Lower limb, thorax, Abdomen & Pelvic Bones of Head & Neck	15
2.	**Demonstration** of all organs of the human body. Viscera of Thorax, Abdomen, pelvis, Head & Neck	15
	Total	**30**

Suggested Books:

Sr. No.	**Authors/ Name of Books/Publisher**
1.	Ross and Wilson, Anatomy and Physiology, Churchill Livingstone.
2.	Companion Pocketbook for quick review B.D. Chaurasia's Human Anatomy:-Vol. (1,2,3)
3.	B.D. Chaurasia's Human Anatomy -Vol. (1,2,3)
4.	B.D. Chaurasia'sHandbook of General Anatomy
5.	Textbook of Anatomy & Physiology for Nurses- Nachiket Shankar/ Mario Vaz Anatomy for B.Sc. Nursing – Dr Renu Chauhan

SEMESTER-I	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Human Physiology- I**
Course Code	**DCLT-PHY.201**
Credit hours	**03**
Teaching Objective	To teach basic physiological concepts related to General Physiology, Haematology, Nerve-Muscle Physiology, Cardiovascular and Gastro-intestinal physiology
Learning Outcomes	i. To understand the basic physiological concepts of General Physiology ii. To understand the basic physiological concepts of Hematology iii. To understand the basic physiological concepts of Cardiovascular physiology and Gastrointestinal physiology. iv. To understand the basic physiological concepts of Nerve-Muscle physiology

Unit No.	Content	Lecture
1.	**Blood:** Red Blood Cells- Functions, count, Physiological variations, Erythropoisis-stages, Hemoglobin-Functions, Physiological variations. White Blood cells-Functions, count, morphology, Platelets-count, morphology, functions. Hemostasis-Definition, Mechanism, clotting factors, Blood groups-ABO system, Rh system, Blood transfusion- Indication, transfusion reactions, Anaemias-classification, morphological and Etiological, effects of anaemia on body.	15
2.	**Cardiovascular System:** Heart-Physiological Anatomy, Nerve supply, Properties of cardiac muscle, Cardiac Cycle-Events –systole, diastole, Cardiac Output-Definition and factors affecting it, Heart sounds-normal heart sounds, its causes, areas of auscultations. Blood Pressure-Definition, normal value, Physiological variations, its measurement, ECG- normal waves, Shock-Definition, Types	**10**
3.	**Gastrointestinal System:** Physiological Anatomy, functions of GIT, Salivary Gland-functions of saliva, Stomach- structure and functions, Gastric secretions-composition, functions, Mechanism, Pancreas- structure, functions, composition of Pancreatic juice, Liver-Functions of liver, Bile-Composition, functions, Jaundice-Types and its causes, Gall Bladder- Functions, Intestine- Movements of small and large intestine, Digestion and Absorption of Carbohydrates, Proteins, Fats, Hormones of GIT- Functions of Gastrin, Secretin, CCK-Pz.	15
4.	**Nerve Muscle Physiology:** Classification of Muscle, structure of skeletal muscle, Neuromuscular Junction, Excitation Contraction Coupling	**5**
	Total	**45**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
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 2ndedition.
5.	Essentials of medical Physiology for dental students –Sembulingum.

SEMESTER-I	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Practical in Physiology**
Course Code	**DCLT-PHY.201**
Credit hours	**01**

Practicals: - Estimation of Hemoglobin Concentration - Determination of Bleeding Time and Clotting Time - Determination of Blood Groups - Recording of normal Blood Pressure - Clinical Examination of Arterial Pulse - Determination of Vital Capacity	30 hrs

SEMESTER-I	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Biochemistry**
Course Code	**DCLT-BIC.201**
Credit hours	**02**
Teaching Objective	At the end of the course, the student demonstrates the 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.
Learning Outcomes	i. Students learns about polymeric biomolecules and their monomeric building blocks. ii. To understand the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action and metabolism of glucose. iii. To understand the structure of DNA, and geneticinformation in its base sequence, DNA replication, RNA and protein synthesis.

Unit No.	Content	Lecture
1.	**Biomolecules and the cell:** Major complex biomolecules of cell and cell organelles Prokaryotic and eukaryotic cell	**3**
2.	**Carbohydrates**: Chemical structure, function and Classification: Monosaccharides, Disaccharides, Polysaccharides, Homopolysaccahrides, Heteropolysaccharudes, Glycoproteins	**5**
3.	**Proteins:** Amino acids, Classification, Structure of proteins, Determination of protein structure, Properties of proteins, Denaturation, Classification of proteins, Antigen Antibody Types, Plasma proteins, Blood clotting.	**5**
4.	**Lipids:**	**3**

	Chemical structure, functions and Classification, fatty acids, Triacylglycerols, Phospholipids, glycoproteins, Lipoproteins, Steroids, Amphipathic lipids.	
5.	**Nucleic acids:** Purines and pyrimidine, Structure of DNA, Watson & Crick model of DNA , Structure of RNA, Types of RNA	**3**
6.	**Enzymes:** Definition, Nomenclature, Classification, Factors affecting enzyme activity, Active site, Coenzyme, Enzyme Inhibition, Mechanism of enzyme action, Units of enzyme, Isoeznzymes, Enzyme pattern in diseases.	**5**
7.	**Vitamins & Minerals:** Fat soluble vitamins(A,D,E,K), Water soluble vitamins, B-complex vitamins, principal elements(Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and sulphur), Trace elements, Calorific value of foods, Basal metabolic rate(BMR), respiratory quotient(RQ), Specific dynamic action(SDA), Balanced diet, Marasmus, Kwasoirkar	**5**
8.	**Hormones:** Classification, Mechanism of action, Hypothalamic hormones, Pitutary– Anterior, posterior; Thyroid – Adrenal cortex, Adrenal medulla; Gonadal hormones, Menstrual cycle, GI hormones	**3**
9.	**Acids and bases:** Definition, pH, Henderson Hasselbach equation, Buffers, Indicators, Normality, Molarity, Molality	**3**
	Total	**35**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
1.	Essentials of Biochemistry, Second Edition, Dr.(Prof) Satyanarayan
2.	Essentials of Biochemistry, 2nd Edition, Dr. PankajaNaik
3.	Principles and Techniques of Biochemistry and MolecularBiology, 5Th Edition, Wilson &Walker
4.	An Introduction to Chemistry, 8th Edition by Mark Bishop
5.	Clinical Chemistry made easy, 1stEidtion by Hughes
6.	Tietz Fundamentals of Clinical Chemistry, 7th Edition by Carl Burtis

SEMESTER-I	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Practical in Biochemistry**
Course Code	**DCLT-BIC.201**
Credit hours	**01**
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 andinterpretation 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	Students will be trained in the different diagnostics test and interpretation of results involves in the Biochemistry Laboratory	
Unit No.	**Content**	**HOURS**
1.	Qualitative tests of monosaccharide (glucose and fructose) a. Molisch's test b. Fehling's test c. Benedict's test d. Seliwanoff's test	10
2.	Qualitative tests of lipids a. Solubility tests b. Emulsification tests c. Saponification tests	10
3.	Qualitative tests of proteins a. Isoelectric precipitation tests b. Heat coagulation tests	10
	Total	**30**
SEMESTER-I		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Medical Electronics**	
Course Code	**DCL.201**	
Credit hours	**02+1**	
Teaching Objective	To understand the working principle of circuit diagram of the medical instrumentations. To Understand the working principle and components of physiological; monitors, pulse oximetry. To understand the Concept of Reflection, Refraction, Diffraction in CT-Scan.	
Learning Outcomes	Able to learn the concept of Reflection, Refraction, Diffraction and Working Principle of Medical Ultrasound, Working Principle of Colour Doppler.	
Unit No.	**Content**	**Lecture**
1.	**Pressure transducers:** Concept of Resistance, Capacitance and Inductance, Concept of Analog to Digital and Digital to Analog Conversion, Concept of Potentiometer, Variable Capacitance, Strain Gauage and Differential Transformer	**5**
2.	**Defibrillators:** Working Principle of DC Defibrillators, Circuit Diagram and Applications	**5**
3.	**Cathode ray tubes and physiological monitors:** Components of CRT, Working of CRT, Scanning, Convergence and Purity in Color CRT, Degaussing of CRT, Application as Voltmeter, Frequency Measurement, Voltage and Time period	**8**

4.	**Impedence plethysmography:** Working Principle of Imedence plethysmography, Advantages and Applications	**5**
5.	**Pulse oximetry:** Concept of Wavelength, Frequency and Tim period, Working of Photo detector, Types of Waveforms in Pulse Oximeter	**5**
6.	**Medical ultrasound and Doppler** Concept of Reflection, Refraction, Diffraction, Concept of Attenuation and Scattering, Working of Piezzoelectric devices, Concept of Echo and Absorption , Working Principle of Medical Ultrasound, Working Principle of Colour Doppler	**10**
	Total	**35**

SEMESTER-I	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**English & Communication Skills**
Course Code	**ECO.250**
Credit hours	**02**
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	i. Able to express better. ii. Grow personally and professionally and Develop confidence in every Field

Unit No.	**Content**	**Lecture**
1.	**Basics of Grammar-I** Vocabulary, Synonyms, Antonyms, Prefix and Suffix,Homonyms, Analogies and Portmanteau words	**5**
2.	**Basics of Grammar –II** Active, Passive, Direct and Indirect speech,Prepositions, Conjunctions and Euphemisms	**5**
3.	**Writing Skills:** Letter Writing, Email, Essay, Articles, Memos, one word substitutes,note making and Comprehension	**5**
4.	Writing and Reading, Summary writing, Creative writing, news paper reading	**2**
5.	Practical Exercise, Formal speech, Phonetics, semantics and pronunciation	**2**
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	**5**
7.	**Listening:** Importance of listening , Self assessment, Action plan execution,Barriersin	**2**

	listening, Good and persuasive listening	
8.	**Reading:** What is efficient and fast reading, Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehensionthrough systematic study	**4**
9.	**Non Verbal Communication:** Basics of non-verbal communication, Rapport buildingskills using neuro-linguistic programming (NLP), Communication in Cath Lab Technology practice	**2**
	Total	**32**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
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: oncepts,practice andevidence, Jones & Bartlett Publications, USA, 2009

BCLT.202: INTRODUCTION TO NATIONAL HEALTHCARE SYSTEM CREDIT 02

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	Hrs.
1	**Introduction to healthcare delivery system** - Healthcare delivery system in India at primary, secondary and tertiary car; Community participation in healthcare delivery system; Health system in developed countries; Private / Govt Sector; National Health Mission; National Health Policy; Issues in Health Care Delivery System in India	5
2	**National Health Programme-** Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.	5
3	**Introduction to AYUSH system of medicine -** Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various system of Medicine	6
4	**Health scenario of India-** past, present and future	4
5	**Demography & Vital Statistics-** Demography – its concept; Census & its impact on health policy	5

6	**Epidemiology -** Principles of Epidemiology; Natural History of disease; Methods of Epidemiological studies; Epidemiology of communicable & non-communicable diseases, disease, transmission, host defense immunizing agents, cold chain, immunization, disease, monitoring and surveillance.	5
Total		**30 hrs**

DCLT.203: MEDICAL TERMINOLOGIES AND RECORD KEEPING CREDIT 02

This course introduces the elements of medical terminology.
Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes.
Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests.
Topics to be covered under the subject are as follows:
1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic medical terms.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical orders/reports.
9. Data entry and management on electronic health record system.

SEMESTER-II	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Human Anatomy-II**
Course Code	**DCLT-ANT.201**
Credit hours	**03**
Teaching Objective	To introduce the students to the concepts related to Respiratory, Urinary, reproductive systems.
Learning Outcomes	i. Comprehend the normal disposition, interrelationships, gross, functionaland applied anatomy of various structures in the human body. ii. Demonstrate and understand the basic anatomy of Respiration, Urinary, reproductive systems. iii. Demonstrate and understand the basic anatomy of Endocrine glands and Nervous system.

Unit No.	Content	Lecture
1.	**Respiratory system:** Parts of Respiratory system; Structure of nose, nasal cavity, larynx, trachea, lungs, pleura, bronchopulmonary segments.	**10**
2.	**Urinary System:** Parts of Urinary system, location and gross structure of kidney, ureter, urinary bladder, urethra.	**7**
3.	**Reproductive system:** Parts of male reproductive system, gross structure of testis, vas deferens, epididymis, prostate, Parts of female reproductive system, gross structure of uterus, ovary, fallopian tube, mammary gland.	**10**
4.	**Endocrine glands:** Name of all endocrine glands, gross structure & functions of pituitary gland, adrenal gland, thyroid gland and parathyroid gland.	**8**
5.	**Nervous system:** Neuron, classification of NS, Meninges, ventricles, CSF, Gross features of cerebrum, midbrain, pons, medulla oblongata, cerebellum, name of basal nuclei, Blood supply of brain, cranial nerves, Spinal cord and spinal nerves, Autonomic nervous system, Visual & auditory pathways	**10**
	Total	**45**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
1.	Ross and Wilson, Anatomy and Physiology, Churchill Livingstone.
2.	Companion Pocketbook for quick review B.D. Chaurasia's Human Anatomy: -Vol. (1,2,3)
3.	B.D. Chaurasia's Human Anatomy -Vol. (1,2,3)
4.	B.D. Chaurasia'sHandbook of General Anatomy
5.	Textbook of Anatomy & Physiology for Nurses- Nachiket Shankar/ Mario Vaz Anatomy for B.Sc. Nursing – Dr Renu Chauhan

SEMESTER- II		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Human Physiology- II**	
Course Code	**DCLT-PHY.201**	
Credit hours	**03**	
Teaching Objective	To teach basic physiological concepts related to Respiratory system, Endocrine and Central Nervous System, Excretory and Reproductive system.	
Learning Outcomes	i. To understand the basic physiological concepts of Respiratory system ii. To understand the basic physiological concepts of Endocrine and Central Nervous System iii. To understand the basic physiological concepts of Excretory and Reproductive system.	

Unit No.	Content	Lecture
1.	**Respiratory System:** Physiological Anatomy, Functions of the respiratory system, Types of respiration, respiratory membrane, Lung volumes and capacities, vital capacity and factors affecting it, Transport of Oxygen-Forms of transportation, Oxy-hemoglobin dissociation curve and factors affecting it, Transport of Carbon-Dioxide- Forms of transportation, Hypoxia-Definition, types, effects of hypoxia,Cyanosis-Definition and types, Artificial Respiration- CPR	**10**
2.	**Endocrine System:** Classification of Endocrine glands and their hormones, Thyroid Gland-Physiological Anatomy, hormones secreted, functions, disordersHypo and hyper secretion of hormone, Adrenal Gland-Adrenal Cortex-Physiological Anatomy, its hormones and functions, Adrenal Medulla-Hormones, functions, Pituitary Gland-Anterior and posterior pituitary hormones and their functions, disorders, Pancreas-Hormones and their functions, Diabetes Mellitus-types, pathophysiology, signs and symptoms, Parathyroid Gland- Hormones and their functions.	**10**
3.	**Central Nervous System:** Structure of neuron, functions of nervous system, Classification and properties of nerve fibres, Synapse- structure and types, Receptors-Definition, classification, properties, Reflex Arc, Ascending and Descending tracts- names and functions, Functions of Hypothalamus, Functions of Cerebellum and Basal Ganglia, Functions of Cerebral Cortex, **Autonomic Nervous System-** Actions of sympathetic and parasympathetic system and their comparison, **Special Senses-**Eye-structure, functions of different parts,Visual acuity, Refrective errors**,** Ear-structure, functions, General mechanism of hearing	**10**
4.	**Excretory System:** Kidneys-structure of nephron, functions of kidney, Glomerular filtration Rate(GFR) and factors affecting it, Counter Current Mechanism, Bladder-its innervation, micturition reflex	**8**
5.	**Reproductive System:** Male Reproductive System-Stages of spermatogenesis, function of Testosterone, Female Reproductive System-Ovulation, menstrual cycle, functions of Estrogen and progesterone	**7**
	Total	**45**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher

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 2ndedition.
5.	Essentials of medical Physiology for dental students –Sembulingum.

SEMESTER-II		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Pharmacology**	
Course Code	**DCLT-PHA.201**	
Credit hours	**03**	
Teaching Objective	Discuss the factors which impact the cardiac output and identify those factors impacted by physical activity and environmental factors To understand Indication and Contraindications, Uses and Adverse effectsof drugs, Mechanism of Action.	
Learning Outcomes	Students will be proficient in Pharmacology with proficient knowledge about the different drugs or medicines to be given in various cardiovascular diseases, dose calculation and mode of administration.	
Unit No.	**Content**	**Lecture**
1.	**Anti-anginal agents: Beta blockers**: propranolol, atenolol, metoprolol, bisoprolol carvedilol, esmolol; Nitrates-nitroglycerine, isosorbide dinitrate, isosorbide mononitrate, transdermal nitrate patches; Calcium channel blockers- nifedipine, verapamil, dilteazem, amlodipine	5
2.	**Anti-failure agents: Diuretics**: furosemide, torsamide, thiazide diuretics, metolazone, spironolactone, combination diuretics; Angiotensin convertying enzyme (ACE) inhibitors – captopril Enalapril, ramipril, lisinopril, ACE inhibitors for diabetics and hypertensive renal disease; Digitalis and acute ionotropes – digoxin, doubutamine, dopamine, adrenaline, noradrenaline, isoprenaline	10
3.	**Anti-hypertensive drugs**: Diuretics, beta-blockers, ACE inhibitors, calcium antagonists, direct Vasodilators, centrally acting and peripherally acting vasodilators	5
4.	**Anti-arrhythmic agents**: Amiodarone, adenosine, verapamil, diltiazem, lidocaine, mexiletine, Phenytoin, flecainide, bretylium, atropine	5
5.	**Antithrombotic agents: Platelet inhibitors**: aspirin, clopidogrel; Anticoagulants: heparin, low molecular weight heparin, warfarin;Fibrinolytics: streptokinase, urokinase ; Glycoprotein 2b3a antagonists: abciximab, tirofiban, eptifibatide	7
6.	**Lipid lowering and anti-atherosclerotic drugs**: statins, exetimibe, niacin, fenofibrate	6
7.	**Miscellaneous drugs:** Narcotics: morphine, pethidine, fentanyl Sedatives: diazepam, midazolam Steroids: hydrocortisone, prednisolone, Antihistamines: diphenhydramine Antibiotics: pecicillins, cephalosporins, aminoglycosides Anesthetic agents: local, general Antacids and proton pump inhibitors, Protamin	10
	Total	**48**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
1.	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
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

SEMESTER-II		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Practical in Pharmacology**	
Course Code	**PHA.301T**	
Credit hours	**03**	
Teaching Objective	To understand Indication and Contraindications, Uses and Adverse effectsof 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.	
Unit No.	**Content**	**Lecture**
1.	Different drugs and medicines to be given in various cardiovascular diseases, dose calculation and mode of administration.	10
2.	Sources of drugs	5
3.	Route of drug administration,	5
4.	Pharmacokinetics and Pharmacodynamics	5
5.	Adverse drug reactions	5
6.	Anti-Hypertensives, Anti- Anginal Agents,	6
7.	Anti-Failure Agents, Anti-Arrhythmic Agents, Antithrombotic Agents	6
8.	Anticholinergics & Adrenergic, Narcotics, Sedatives & Hypnotics	6
	Total	**48**

Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Biophysics**	
Course Code	**DCLT.204**	
Credit hours	**02+1**	
Teaching Objective	To understand the working concept of medical instrumentations. To Understand the radiation physics, monitoring radiation exposure and reduction.	
Learning Outcomes	Able to learn the concept of medical physics and ttechniques of monitoring radiation exposure and measure to reduce radiation exposure.	
Unit No.	**Content**	**Lecture**

1.	Introduction to medical physics Medical Physics & its application in field of medicine, Concept of CT scan, Concept of MRI imaging, Concept of PET scan, Concept of SPECT SCAN	**5**
2.	**Radiation physics:** Structure of Atom, Electromagnetic radiation, Production of X-rays, The interaction of X-ray & gamming with matter, Characteristic X-rays, Bremsstratilung X-rays, Coherent scattering, Compton scattering, Photoelectric effect.	**5**
3.	**Techniques of monitoring radiation exposure** Radiation dosimetry, Radiation dose ND UINTS. Tld Badge, Ionization chamber & it's working	**8**
4.	**Measures to reduce radiation exposure:** Ionizing radiation interaction with tissue, Effects of Radiation, Principles of radiation protection Practical aspects of Radiation protection	**5**
5.	**Ionic currents and Electrocardiography:** Excitable cells, with Nerve/ Newon Cell, Composition ICF & ECF, Ionic basis of Resting Memb Potential Action Potential & Its ionic basis, Cardiac Muscle, Properties of Cardiac Muscle with Excitability, Autorhythmicity, Pace maker Potential, Conductivity	**5**
	Total	**35**

SEMESTER-II		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Practical in Biophysics**	
Course Code	**DCLT.204**	
Credit hours	**02**	
Unit No.	**Content**	**HOURS**
1.	ECG Machine	5
2.	Stress Test Machine	5
3.	Patient monitor	5
4.	Central Monitoring System	5
5.	Sphygmomanometer	5
6.	Pulse Oximeter	5
7.	Stethoscope	5
8.	Defibrillators	5
9.	Pressure transducers	5
10.	Techniques of monitoring radiation exposure	5
	Total	**50**

Suggested Books:

Sr. No.	**Authors/ Name of Books/Publisher**
1.	R. S. Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw HillPublishingCo Ltd.,2003.
2.	Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II edition, Pearson Education, 2002 / PHI

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

COM.250: Computer Applications
Theory: 15 hours Practical's : 30 hours

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

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

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

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

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

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

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

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.

Unit	Content	Hours
UNIT-I	Quality assurance and management – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines	2
UNIT-II	Basics of emergency care and life support skills - Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR	8
UNIT-III	Bio medical waste management and environment safety -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals/Chemicals/Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices).	10
UNIT-IV	Infection prevention and control-Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand 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	10
UNIT-V	Antibiotic Resistance - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance	8
UNIT-VI	Disaster preparedness and management - Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.	7
	Total	45

SEMESTER IV 2024 and SEMESTER-III 2025		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Pathology**	
Course Code	**DCLT-PAT.301**	
Credit hours	**02**	
Teaching Objective	Understand the importance of clinical information in supporting a timely, accurate pathological diagnosis, Describe mechanisms of Congenital heart disease, Pathophysiology of Coronary artery disease, Myocardial and Pericardial diseases	
Learning Outcomes	Students will learn heart diseases, Pulmonary hypertension, Peripheral Vascular Disease and Congenital heart disease	

Unit No.	**Content**	**Lecture**
1.	**Valvular heart disease**: Etiology, Acquired valvular heart disease, Rheumatic fever and rheumatic heart disease, Aortic stenosis, Aortic regurgitation, **Mitral valve disease**, Mitral stenosis, Mitral regulation, **Tricuspid valve disease,** Infective endocarditis, Valvuloplasty and valve surgery	5
2.	**Coronary artery disease:** Pathophysiology and clinical recognition, Angina Pectoris, Symptomatic and asymptomatic myocardial ischemia, Types and locations of myocardial infarction, Thrombolytic therapy, Medical treatment, Percutaneous interventions, Surgical treatment, Cardiac rehabilitation	4
3.	**Systemic hypertension:** Essential and seconodary hypertension	3
4.	**Heart failure:** Surgical and medical treatment	3
5.	**Myocardial diseases:** Dilated cardiomyopathy, Hypertrophic cardiomyopathy, Myocarditis, Restrictive cardiomyopathy.	3
6.	**Pericardial Diseases:** Pericardial effusion, Constrictive pericarditis, Cardiac tamponade	3
7.	**Electrical disturbances of the heart**: Sinus node dysfunction, Arrhythmias and conduction disturbances, Treatment of arrhythmias, pharmacological, radiofrequency ablation and surgery	3
8.	**Pulmonary hypertension:** Primary pulmonary hypertension, Pulmonary thrombo-embolism	3
9.	**Peripheral Vascular Disease:** Atherosclerotic peripheral vascular disease, Aortic aneurysms, Aortic dissection, Takayasu arteritis	3
10.	**Congenital heart disease:** Acyanotic heart disease, Atrial septal defect, Ventricular septal defect, Patent ductus arteriosus, Congenital valvular disease, Coarctation of aorta (b) Cyanotic vongenital heart disease, Tetralogy of Fallot, Double outlet right ventricle Pulmonary atresia, Transposition of great arteries, Truncus arteriousus, Total anomalous pulmonary venous connection.	5
	Total	**35**

Suggested Books:

Sr. No.	**Authors/ Name of Books/Publisher**

1.	A *Handbook of Medical* Laboratory (Lab) Technology: *Editor*) *Second Edition*. *V.H. Talib* (Ed.). Textbook of Medical Laboratory Technology- PrafulB. Godkar, Darshan P. Godkar Medical Laboratory Technology. Methods and Interpretations – RamnikSood (volume 1&2) Medical Laboratory technology a procedure manual for routine diagnostic test – vol – I, II, III.Kanai L. Mukharjee Tata Mc graw hill pub. New Delhi. Practical Pathology P. Chakraborty Gargi Chakraborty New CentralBook Agency, Kolkata. Theory & Practice of Histological Techniques John D. Bancroft et.al. Churchill LivingstonePrinted in China. Histochemistry in Pathology M.I. Filipe et.al. Churchill Livingstone, London Hand Book of Histopathological & Histochemical Techniques C.F.A. Culling ButterworthsCompany Ltd. London. A Handbook of Medical Laboratory (Lab) Technology. By V.H Talib

SEMESTER-III		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Practical in Pathology**	
Course Code	**DCLT-PAT.301**	
Credit hours	**01 (30 hrs)**	
Teaching Objective	To enable students to understand procedures and techniques in the Pathology. To understand the different diagnostic tests of body fluids and special diagnostics in Pathology.	
Learning Outcomes	To train students to different diagnostics tests and examination of fluids for identification of diseases.	
Unit No.	**Content**	**hrs**
1.	Working and maintenance of instruments,	**3**
2.	General principles of Haematologytechniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear	**3**
3.	(CBC report), platelet counts, cell counter working	**3**
4.	General principles of Histopathology techniques collection, fixation, processing	**2**
5.	& routine staining	**3**
6.	General principles of Cytopathology techniques collection, fixation, processing & routine staining	**3**
7.	General principles of Clinical Pathology techniques sample collection, processing for routine test, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)	**3**
9.	General principles of Blood Bank techniques antigen, antibody, ABO & Rh system	**3**
10.	General principles of Autopsy & Museum	**3**

11.	Working and maintenance of instruments,	**2**
	Total	**30**

SEMESTER-III	
Name of the Programme	**Catheterization Laboratory Technology**
Name of the Course	**Basic Electrocardiography**
Course Code	DCLT.301
Credit hours	**03**
Teaching Objective	i. To enable students, understand the correct placement of all electrodes ii. To demonstrate patient positioning and preparation iii. To teach students about maintenance of the ECG machine, wires and electrodes.
Learning Outcomes	i. To develop understanding regarding Electrocardiography and its procedure. ii. Describe the proper hook-up procedure for a 12-Lead ECG iii. Identify basic normal ECG waveform morphology and common interpretation. iv. Enumerate the measures to be taken before, after and during ECG procedure.

Unit No.	**Content**	**Lecture**
1.	Electrocardiography	3
2.	Electrocardiographic processing and display system	3
3.	Fundamental principles of electrocardiography: Cardiac electrical field generation during activation, Cardiac wave fronts	3
4.	Cardiac electrical field generation during ventricular recovery	3
5.	Electrocardiographic lead systems: Standard limb leads, Precordial leads and the Wisdom central termina, Augmented limb leads	4
6.	The hex axial reference frame and electrical axis	4
7.	Recording adult and pediatric ECGs	4
8.	The normal electrocardiogram, Atrial activation	4
9.	The normal P wave Atrial repolarization	4
10.	Atrioventricular node conduction and the PR segment Ventricular activation and the QRS complex	5
11.	Ventricular recovery and ST-T wave, U wave Normal variants	5
12.	Rate and rhythm	4
	Total	**45**

Suggested Books:

Sr. No.	**Authors/ Name of Books/Publisher**
1.	ECG Made Easy –AtulLuthra Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test
2.	An Introduction to Electrocardiography:Schamroth Colin Clinical Electrocardiography: Goldberger. A

SEMESTER-III		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Practical in Basic Electrocardiography**	
Course Code	**DCLT.301**	
Credit hours	**03 (80 hrs)**	
Teaching Objective	i. To enable students, understand the correct placement of all electrodes ii. To teach students about maintenance of the ECG machine, wires and electrodes.	
Learning Outcomes	i. To develop understanding regarding Electrocardiography and its procedure. ii. Identify basic normal ECG waveform morphology and common interpretation. iii. Enumerate the measures to be taken before, after and during ECG procedure.	
Unit No.	**Content**	**hrs**
1.	Steps to perform an ECG	15
2.	Patient positioning according to various conditions.	15
3.	Proper communication with patient to find out the history	15
4.	ECG machine operating and maintenance	15
5.	Maintain ECG catalogue for self-assessment	10
6.	Common errors in ECG recording	10
	Total	**80**

SEMESTER-III		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Basic Echocardiography**	
Course Code	DCLT.302	
Credit hours	**03**	
Teaching Objective	i. To provide a brief introduction to Echocardiography, its techniques and types of Echocardiography. ii. To provide practically and clinically useful application of Echocardiography. iii. To explain echo techniques available and to put echo into a clinical perspective.	
Learning Outcomes	i. To develop an understanding regarding Echocardiography. ii. To train students to perform Echocardiography examinations by explaining the position of transducers. iii. To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.	
Unit No.	**Content**	**Lecture**

1.	**M- Mode and 2D transthoracic echocardiography**, Views used in transthoracic echocardiography,	5
2.	Doppler echocardiography: pulsed, continuous wave and colour,	5
3.	**Measurement of cardiac dimensions**, Evaluation of systolic and diastolic left ventricular function, Regional wall motion abnormalities, Stroke volume and cardiac output assessment, Transvalvular gradients, Orifice area, Continuity equation,	10
4.	**Echocardiography in Valvular heart disease**: Mitral stenosis, Mitral regurgitation, Mitral valve prolapsed, Aortic stenosis, Aortic regurgitation, Infective endocarditis Prosthetic valve assessment,	10
5.	**Echocardiography in Cardiomyopathies**: Dilated, Hypertrophic, Restrictive, Constrictive pericarditis, pericardial effusion and cardiac tamponade,	10
6.	**Echocardiographic detection of congentital heart desease**: Atrial septal defect, Ventricular septal defect, Patent ductus arteriosus, Pulmonary stenosis, Tetralogy of Fallot, Coarctation of aorta, Left atrial thrombus, Left atroal myxoma, Transoesophageal echocardiography	5
	Total	**45**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
1.	Echo Made Easy: Sam Kaddoura Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
2.	Feigen Baum's Echocardiography Tajik Jamil for Echocardiography.

SEMESTER-III		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Practical in Basic Echocardiography**	
Course Code	**DCL.302**	
Credit hours	**03 (80 hrs)**	
Teaching Objective	To provide a brief practical knowledge of Echocardiography, its techniques and types of Echocardiography. To provide practically and clinically useful application of Echocardiography.	
Learning Outcomes	To train students to perform Echocardiography examinations by explaining the position of transducers.	
Unit No.	**Content**	**Lecture**
1.	Learn about Probe and Scanner settings.	10
2.	Learn about Structural and Functional assessment of the heart.	10
3.	Learn about various windows and views used in Echocardiography.	10
4.	Learn about qualitative reporting system along with various software's associated with Echo reporting.	10
5.	M- Mode and 2D transthoracic echocardiography, Views used in transthoracic echocardiography.	40
	Total	**80**

BCLT.303	Medical Emergencies and Patient care credit.02+1	
Course outcome: This course is focus on pathophysiology of complex patient conditions requiring intensive care, as well as assessment, monitoring and advance therapeutics. After learning this course students are able to understand general ICU care & monitoring, infection control care, systemic disease & trauma care.		
Unit	**Content**	**Hours**
UNIT-I	Introduction to Emergency Services Organization of Emergency Department, Guidelines in Emergency, Clinical Monitoring, Fluid Therapy and Blood Transfusion, Airway Management, Cardiopulmonary Resuscitation, Principal of Mechanical Ventilation, Injection – An Infusion Method, Acid Base and Electrolyte Imbalance.	8
UNIT-II	Handling of Different Emergencies Cardiogenic Shock, Congestive Cardiac Failure, Myocardial Infarction, Head Injuries, Vasovagal Syncope, Seizer, Epilepsy, Conjunctival and Corneal Foreign Body, Foreign Body in Nose & in Ear, Epistaxis, Asthma, COPD, Haemoptysis, Rib Fracture, Tear Gas Exposure, Food Poisoning, Diarrhea, Urine Retention, Blunt Scrotal Trauma, Hypo & Hyperthermia	13
UNIT-III	Fundamentals of Patient Care, Concept of health & Illness, Health Determinants, Concept of Patients & their types, Patient Centre Care & Fundamentals of Communications, Reporting & Recording of Patients, Rights of Patients, Concepts of Disease & its types, General concept, care & Prevention of Accident, Trauma & Infections	10
UNIT-IV	Patient Care, Associated Units & Departments Ambulatory Units, Critical Care Units, Pediatrics, Neonatal Intensive Care Unit (NICU), Emergency Department, Inpatient Units, Hematology/Oncology and Immunology Unit , Orthopedic Unit, Psychiatry Unit ,Neurology and Neurosurgical Unit, Renal, Dialysis Unit, Gastroenterology/Endocrinology Unit, Life Flight Critical Care Transport Program, Radiology Department, Surgical Units, Cardiac Catheterization Lab, Operating Room, Post Anaesthesia Care Unit, Managing patients with disabilities, Geriatric Care, Care of Critically Ill Patients, Tracheotomize Patients. Nutritional Support in ICU.	14
	Total	45

SEMESTER- IV		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Microbiology**	
Course Code	DCLT-MIC.301	
Credit hours	**02**	
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	i. Upon completion, students should be able to demonstrate knowledgeof microorganisms and the disease process as well as aseptic and sterile techniques. ii. Perform microbiological laboratory procedures according to appropriate safety standards	
Unit No.	**Content**	**Lecture**
1.	Introduction to Microbiology	**2**

2.	Medically important Gram Positive & Gram Negative Cocci.	**4**
3.	Medically important Gram Negative Bacilli.	**3**
4.	Classification of fungus, Yeast & Yeast like.	**3**
5.	Dry heat sterilization.	**2**
6.	Moist heat sterilization	**2**
7.	Chemical disinfectants.	**2**
8.	Hospital acquired infection.	**2**
9.	Blood stream infectious.	**4**
10.	Subacute Bacterial endocarditis (SABE).	**3**
11.	Rheumatic fever & its lab diagnosis.	**3**
12.	Biochemical waste management.	**2**
	Total	**32**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
1.	Textbook on Microbiology for DMLT & Paramedical courses.
2.	Textbook on Microbiology Dr C P Baveja
3.	Essentials of Practical Microbiology

MICROBIOLOGY-PRACTICAL

Unit	Content	30 Hours
	Practical: 1. Introduction to Microbiology & Aseptic techniques. 2. Safety measures in Microbiology Lab. 3. Study of compound microscope. 4. Principal & working of an Autoclave. 5. Principal & working of Hot air oven. 6. Culture media (Liquid). 7. Culture media (Solid). 8. Biomedical test for identification of Bacteria. 9. Antimicrobial sensitivity testing. 10. Smear preparation & staining techniques (Gram staining & ZN staining). 11. Mantoux test. 12. KOH preparation & SDA	

SEMESTER-IV		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Basic Cardiac Catheterization**	
Course Code	**DCLT.304**	
Credit hours	**03**	
Teaching Objective	i. To provide the critical information to students when beginning withI nterventional cardiology. ii. To provide an extension of techniques and methods described for diagnostic catheterization and specially related techniques.	
Learning Outcomes	i. The students will gain knowledge about chances of a successful procedure. ii. To enable students, understand about benefit/risk to the patient if theprocedure is successful/ unsuccessful iii. The occurrence and management of various complications.	

Unit No.	**Content**	**Lecture**
1.	Types of catheters, catheter cleaning and packing, Techniques of sterilization; advantages and disadvantages of each, setting up the cardiac catheterization laboratory for a diagnostic study, Table movement, Image intensifier movement, Image play back	10
2.	Intra cardiac pressures, Pressure recording systems, Fluid filled catheters versus catheter tipped manometers, Artifacts, damping, ventricularization, Pressure gradient recording pullback, peak-to peak	10
3.	Cardiac output determination, Thermo dilution method, Oxygen dilution method, Principles of oximetry, Shunt detection and calculations	10
4.	Coronary angiography, Coronary angiographic catheters, Use of the manifold, Angiographic views in coronary angiography, Laboratory preparation for coronary angiography,	10
5.	Left Ventriculography – catheters, views, use of the injector, Right heart catheterization and angiography	5
	Total	**45**

Suggested Books:

Sr. No.	**Authors/ Name of Books/Publisher**
1.	Echo Made Easy: Sam Kaddoura Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
2.	The Interventional Cardiac Catheterization Handbook, 3rd Edition By Mortonj. Kern

Practical in Basic Cardiac Catheterization

Basic Principles: The Electrocardiographic paper, The Electrograph, The electrical field of Heart,The leads, standard limb lead, Pericardial lead, 'V' lead & 'AV' lead Basic ECG deflections. Normal ECG The 'P' wave The 'QRS' complex T wave, the S-T segment, P-R segment The 'U' wave Rate & rhythm Rotation of the heart, The Q-T interval.

The Electrical axis

Precardial pattern of ECG

Chamber enlargement-atrial enlargement, LV hypertrophy & RV hypertrophy

Bundle branch block General principles Right Bundle branch block Left Bundle branch block The Hemi blocks (Fasicular blocks)

Exercise stress Testing a. Exercise b. Exercise protocols c. Electrocardiographic measurements d. Exercise testing-Indication and techniques.

ECG in myocardial infarction –ECG in anterior wall, Inferior wall, true posterior wall and sub endocardial infarction and RV infarction

ECG in rheumatic heart disease–ECG in mitral stenosis, mitral incompetence, aortic stenosis and aortic incompetence.

ECG in hypertension

SEMESTER-IV		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Treadmill exercise stress testing**	
Course Code	**DCL.304**	
Credit hours	**03**	
Teaching Objective	To teach students about basics of stress test and physiology	
Learning Outcomes	To develop understanding regarding principles, mechanism of stress test and ECG.	
Unit No.	**Content**	**Lecture**
1.	**Basics of stress test:** Protocols, lead placement, instruction to the patient, rhythm analysis, Exercise physiology, protocols, Lead systems, Patient preparation.	10
2.	**ST segment displacement** – types and measurement, Non electrocardiographic observations Exercise test indications, contra-indications and precautions	10
3.	Cardiac arrhythmias and conduction disturbances during stress testing, Emergencies in the stress testing laboratory.	10
4.	Principles of Holter Recording, Connections of the Holter recorder, Holter Analysis	10
5.	Guidelines for ambulatory electrocardiography	5
	Total	**45**

Suggested Books:

Sr. No.	Authors/ Name of Books/Publisher
1.	Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.

SEMESTER-IV		
Name of the Programme	**Catheterization Laboratory Technology**	
Name of the Course	**Practical in Basic Cardiac catheterization and Treadmill exercise stress testing**	
Course Code	**DCLT.304**	
Credit hours	**03**	
Teaching Objective	Hands on training regarding practicals of stress test and physiology	
Learning Outcomes	i. To develop understanding regarding principles, mechanism of stress test and ECG. ii. Describe the proper hook-up procedure for a 12-Lead ECG iii. Identify basic normal ECG waveform morphology and common interpretation. iv. Enumerate the measures to be taken before, after and during ECG procedure	

Unit No.	**Content**	**Lecture**
1.		**10**
2.	Cardiac Monitoring- definition, purpose of cardiac monitoring, how to Recognise various arrhythmias how to set up a intensive coronary care unit and usefulness of ICCU	**10**
3.	Interpretation of TMT report-criteria for TMT positive test contraindication for TMT conditions where TMT is not useful, complications that may occur in TMT room and its management	**10**
4.	Use of defibrillator – indications, how to use the defibrillator, complications during the procedure and its management	**10**
5.	Management of cardiac arrest – definition, causes external cardiac massage, artificial respiration and other drugs and procedures used in the management of Cardiac Arrest (ACLC, BLS) myocardial perfusion scan-procedures and usefulness of myocardial perfusion scan	**10**
6.	Cardiac arrhythmias- bradyarrhythmia and tachy arrhythmias and ECG diagnosis of all rhythm disturbances.	**10**
7.	Electrolyte disturbances- ECG in hypokalemia, hyperkalemia etc.	**10**
8.	Holter monitoring- procedure and usefulness	**10**
	Total	**80**
	Recommended Books: **Grossmann text book of heart disease** **Braunward text book of heart disease**	

DCLT.306: Clinical Medicine & Management

Learning Objectives	Practical topics for students in the field of respiratory and cardiovascular system include hands- on training in examinations and investigations, such as ECG interpretation and pulmonary function tests, as well as simulations for managing emergencies like cardiac arrest. They should also learn about specific conditions like ischemic heart disease, asthma, and pneumonia through case discussions and observation of relevant procedures. Additionally, practical sessions on airway management, chest tube insertion, and the use of diagnostic tools in diagnosing and managing lung diseases like tuberculosis and lung cancer are essential
	Clinical Medicine & Related Management 1. Respiratory & cardiovascular system- 2. Examination and Investigations relevant to cardiovascular system 3. Ischemic heart disease 4. Valvular heart diseases 5. Common arrhythmias encountered in clinical practice 6. Hypertension 7. Heart failure 8. Cardiomyopathies 9. Examination and Investigations relevant to respiratory system 10. Asthma and COPD 11. Pneumonia 12. Pulmonary tuberculosis 13. Bronchiectasis 14. Lung abscess 15. Pneumothorax 16. Pleural effusion 17. Respiratory failure-types, causes and management **18.** Carcinoma lung

CRP.350: Community Rehabilitation practice
SYLLABUS FOR ALLIED &HEALTH PROFESSIONALS
TITLE OF THE COURSE: **Community Rehabilitation Practice**
CATEGORY: Compulsory Elective
AIM: To provide foundational knowledge and competencies in rehabilitation in practice, focusing on functioning, participation, equitable care across the life course.
COURSE STRUCTURE:

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

CONTENT
Unit I: rehabilitation & health systems

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

Unit II: Functioning, Disability &ICF Framework

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

Unit III: community-based rehabilitation

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

Unit IV: Life-courses & Vulnerable Populations

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

Unit V: Primary Care & Interprofessional Practice

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

Unit VI: Applied Community Planning

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

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 Six month.
4. The Diploma 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 120 days in Cardiology Department

30 days in Cardiac ICU

15 days for Record Keeping/CSSD department

15 days for Casualty/Visit to other hospital