

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

Total Credits:25

Semester 1 ST		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext		
BCCTS1-101	Human Anatomy Part I	3	0	0	40	60	100	3
BCCTS1-102	Human Physiology Part I	3	0	0	40	60	100	3
BCCTS1-103	General Biochemistry & Nutrition	3	1	0	40	60	100	4
BCCTS1-104	Introduction to National HealthCare System (Multidisciplinary/ Interdisciplinary)	3	0	0	40	60	100	3
BCCTS1-105	Human Anatomy Part I- Practical	0	0	4	60	40	100	2
BCCTS1-106	Human Physiology Part I- Practical	0	0	4	60	40	100	2
BCCTS1-107	General Biochemistry - Practical	0	0	4	60	40	100	2
BCCTS1-108	English & Communication	3	0	0	40	60	100	3
BCCTS1-109	Drug abuse: problem, management and prevention	3	0	0	40	60	100	3
Total		-	-	-	420	480	900	25

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Total Credit: 26

Semester 2 nd		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext		
BCCTS1-201	Human Anatomy Part II	2	0	0	40	60	100	2
BCCTS1-202	Human Physiology Part II	2	0	0	40	60	100	2
BCCTS1-203	General Microbiology	3	0	0	40	60	100	3
BCCTS1-204	Basic Pathology & Hematology	3	1	0	40	60	100	4
BCCTS1-205	Introduction to Quality and Patient safety (Multidisciplinary/ Interdisciplinary)	3	0	0	40	60	100	3
BCCTS1-206	Human Anatomy Part II- Practical	0	0	4	60	40	100	2
BCCTS1-207	Human Physiology Part II- Practical	0	0	2	60	40	100	1
BCCTS1-208	General Microbiology- Practical	0	0	4	60	40	100	2
BCCTS1-209	Basic Pathology & Hematology- Practical	0	0	4	60	40	100	2
BCCTS1-210	Environmental Science	3	0	0	40	60	100	3
BCCTS1-211	Computer Fundamentals - Theory	2	0	0	40	60	100	2
Total		-	-	-	520	580	1100	26

Students shall undergo 4 weeks CCT Directed Clinical training after 2nd semester during summer vacation in hospitals, Lab, etc. as per the requirements of the program.

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HUMAN ANATOMY- PART I

Subject Code: BCCTS1-101

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

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

Unit-1

(13 hrs.)

- **Introduction to Anatomy , Terminology, Cell and Cell division, Tissues of body, Skin**
- **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, Axial skeleton-II.

Unit 2

(11 hrs.)

- **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.
- **Joints:**Shoulder, Hip, Knee, Movements and muscle groups producing movements at other joints.

Unit 3

(11 hrs.)

- **Respiratory System:**Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura, Trachea & Bronchopulmonary segments, Mediastinum.
- **Circulatory System:**Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of Media stenum, Blood vessels of Thorax.

Unit 4

(10 hrs.)

- **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.
- **Excretory System:**Kidney, Ureter, Bladder, Urethra, Pelvis dynamic

HUMAN ANATOMY PART I- PRACTICAL

Subject Code: BCCTS1-105

**L T P C
0 0 4 2**

Duration: 4 Hrs./ Week

EXPERIMENTS

- **Introduction to Anatomy, Terminology, Cell and Cell division, Tissues of body, Skin**
- **Skeletal System:**Classification of bones, Parts of developing long bone and its blood supply, Joints- 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.
- **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.
- **Joints:**Shoulder, Hip, Knee, Movements and muscle groups producing movements at other joints.
- **Respiratory System:**Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea & Bronchopulmonary segments , Mediastinum
- **Circulatory System:**Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of media stenum , Blood vessels of Thorax
- **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
- **Excretory System:**Kidney, Ureter, Bladder, Urethra, Pelvis dynamic

TextBooks:

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

Reference books:

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

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- Textbook of Histology, A practical guide:- J.P Gunasegaran

HUMAN PHYSIOLOGY PART I

Subject Code: BCCTS1-102

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Teaching objective:

- To teach basic physiological concepts related to General physiology, Hematology, 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

Unit 1

(13 hrs.)

- **General Physiology:** Introduction to physiology, Homeostasis, Transport Across cell membrane.
- **Blood:** Composition, properties and functions of Blood, Haemopoiesis, Haemogram (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.

Unit 2

(10 hrs.)

- **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 & ECG, Heart Rate & its regulation, Cardiac output, Blood Pressure definition & normal values, Physiological needs & variation, regulation of BP.

Unit 3

(7 hrs.)

- **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

Unit 4

(15 hrs.)

- **Respiratory System:** Physiologic anatomy, functions of respiratory system, non-respiratory functions of lung, Mechanism of respiration, Lung Volumes & capacities, Transport of Respiratory Gases O₂, Transport of Respiratory Gases CO₂, Regulation of Respiration.
- **Muscle nerve physiology:** Structure of neuron & types, Structure of skeletal Muscle,

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Sarcomere, Neuromuscular junction & Transmission. Excitation & contraction coupling (Mechanism of muscle contraction).

HUMAN PHYSIOLOGY PART I – PRACTICAL

Subject Code: BCCTS1-106

**L T P C
0 0 4 2**

Duration: 4 Hrs./ Week

EXPERIMENTS

- Study of Microscope and its use, Collection of Blood and study of Haemocytometer
- Haemoglobinometry
- White Blood Cell count
- Red Blood Cell count
- Determination of Blood Groups
- Leishman's staining and Differential WBC Count
- Determination of Bleeding Time, Determination of Clotting Time
- Pulse & Blood Pressure Recording, Auscultation for Heart Sounds
- Artificial Respiration – Demonstration, Spirometry-Demonstration

Textbooks

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

Reference books

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

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GENERAL BIOCHEMISTRY & NUTRITION

Subject Code: BCCTS1-103

**L T P C
3 1 0 4**

Duration: 60(Hrs.)

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, 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.

Unit 1

(15hrs)

- Introduction and scope of biochemistry.
- **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

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Lipids, Derived Lipids). Essential Fatty Acids.

- **Chemistry of Nucleic acid:** Nucleosides and Nucleotides, Watson and Crick model of DNA, RNA- its type along with functions.

Unit 2 **(10 hrs)**

- **Elementary knowledge of enzymes:**
- Classification, mechanism of enzyme action, Factors Affecting Activity of enzymes, enzyme specificity, Enzyme inhibition, Isoenzymes and their diagnostic importance.
- **Biological oxidation:**
- Brief concept of biological oxidation: Definition of Oxidative phosphorylation Electron transport chain. Inhibitors and Uncouples briefly

Unit 3 **(15 hrs)**

- **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, Trans methylation reactions. Urea cycle, Functions of glycine, tyrosine, phenylalanine, tryptophan and Sulphur containing amino acids.
- **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.

Unit 4 **(20 hrs)**

- **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.
- **Principle and applications of:**
- Colorimeters, pH Meter
- **Pre examination Skills:**
- Collection and preservation of samples (Anticoagulants), transportation & Separation of biological specimens, Sample rejection criteria, Disposal of Biological Waste materials.
- **Nutrition:**

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- 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.

Textbooks

- Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by Praful Ghodkar
- Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by Praful Ghodkar
- Medical Laboratory Technology (Volume 1): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Essentials of Biochemistry, Second Edition, Dr. (Prof) Satyanarayan

Reference books

- An Introduction to Chemistry, 8th Edition by Mark Bishop
- Clinical Chemistry made easy, 1st Edition by Hughes
- Tietz Fundamentals of Clinical Chemistry, 7th Edition by Carl Burtis

GENERAL BIOCHEMISTRY - PRACTICAL

Subject Code BCCTS1-107

L T P C
0 0 4 2

Duration: 4 Hrs./ Week

EXPERIMENTS

- Introduction to Personnel protective equipment used in laboratory and their importance (LCD)
- Handling of colorimeters – operation and maintenance (LCD)
- Serum electrolytes measurement (only demo)
- Demonstration of semi-automated / fully automated blood analyzer
- Demonstration of tests for carbohydrates (Monosaccharides, disaccharides and polysaccharides)
- Precipitation Reactions of protein (only demonstration)
- Test on bile salts (only demonstration)
- Tests on Normal constituents of Urine (only demo)

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- Tests on Abnormal constituents of Urine (only demo)

Textbooks:

- Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by Praful Ghodkar
- Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by Praful Ghodkar
- Medical Laboratory Technology (Volume 1): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Essentials of Biochemistry, Second Edition, Dr. (Prof) Satyanarayana
- Essentials of Biochemistry, 2nd Edition, Dr. Pankaja Naik
- Principles and Techniques of Biochemistry and Molecular Biology, 5th Edition, Wilson & Walker

Reference books:

- An Introduction to Chemistry, 8th Edition by Mark Bishop
- Clinical Chemistry made easy, 1st Edition by Hughes
- Tietz Fundamentals of Clinical Chemistry, 7th Edition by Carl Burtis

**INTRODUCTION TO NATIONAL HEALTH CARE SYSTEM (MULTIDISCIPLINARY/
INTERDISCIPLINARY)**

Subject Code: BCCTS1-104

L T P C
3 0 0 3

Duration: 45 (Hrs.)

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 the National Health Programme- Background objectives, action plan, targets, operations, in various National Health 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.

Unit 1

(18 hrs)

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- **Introduction to healthcare delivery system:**Healthcare delivery system in India at primary, secondary and tertiary care; 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.
- **National Health Programme:**Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.

Unit 2 **(12 hrs)**

- **Introduction to AYUSH system of medicine:**Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various system of Medicine

Unit 3 **(7 hrs)**

- **Health scenario of India:**Past, present and future
- **Demography & Vital Statistics:**Demography – its concept; Census & its impact on health policy

Unit 4 **(8 hrs)**

- **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

Books:

- National Health Programs Of India National Policies and Legislations Related to Health: 1 J. Kishore (Author)
- A Dictionary of Public Health Paperback by J Kishor
- Health System in India: Crisis & Alternatives , National Coordination Committee, Jan SwasthyaAbhiyan
- In search In Search of the Perfect Health System
- Central Bureau of Health Intelligence (1998). Health Information of India, Ministry of Health and Family Welfare, New Delhi.
- 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
- Historical Development of Health Care in India, Dr. Syed Amin Tabish,
- cultural Competence in Health Care by Wen-Shing Tseng (Author),Jon Streltzer(Author)
- Do We Care: India's Health System by K. Sujatha Rao (Author)

ABILITY ENHANCEMENT ELECTIVE COURSE

ENGLISH AND COMMUNICATION SKILLS

Subject Code: BCCTS1-108

L T P C
3 0 0 3

Duration: 45 (Hrs.)

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

Unit 1

(15 hrs)

- **Basics of Grammar:** Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words
- **Basics of Grammar** –Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms
- **Writing Skills:** Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension

Unit 2

(08 hrs)

- Writing and Reading, Summary writing, Creative writing, newspaper reading
- Practical Exercise, Formal speech, Phonetics, semantics and pronunciation

Unit 3

(10 hrs)

- **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.
- **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.

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Unit 4

(12 hrs)

- **Listening:** Importance of listening, Self-assessment, Action plan execution, Barriers in listening, Good and persuasive listening.
- **Reading:** What is efficient and fast reading, Awareness of existing reading habits, tested techniques for improving speed, Improving concentration and comprehension through systematic study.
- **Non Verbal Communication:** Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP), Communication in Optometry practice.

Text books:

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

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DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BCCTS1-109

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Course Objectives:

- To make students understand the concept of drug abuse and their impact on public health.
- To make students understand the types of drugs.
- To make them aware of the impact of drugs addiction on families and peers.
- To make students understand the management and prevention of drug abuse.

Course Outcomes:

- Students gain knowledge about detrimental impacts of drug on health and relations.
- Students become aware about the physiological and sociological causes of drug abuse.
- Students acquire knowledge about types of drugs.
- Students acquire knowledge about management and prevention of drug abuse.

Unit-1

(13 hrs)

- **Problem of Drug Abuse:** Concept and Overview; Types of Drug Often Abused
- **Concept and Overview:** What are drugs and what constitutes Drug Abuse?, Prevalence of menace of Drug Abuse, How drug Abuse is different from Drug Dependence and Drug Addiction?, Physical and psychological dependence- concepts of drug tolerance
- **Introduction to drugs of abuse:** Short Term, Long term effects & withdrawal symptoms
- **Stimulants:** Amphetamines, Cocaine, Nicotine
- **Depressants:** Alcohol, Barbiturates- Nembutal, Seconal, Phenobarbital Benzodiazepines Diazepam, Alprazolam, Flunitrazepam
- **Narcotics:** Opium, morphine, heroin
- **Hallucinogens:** Cannabis & derivatives (marijuana, hashish, hash oil), Steroids and inhalants.

Unit-2

(11 hrs)

- **Nature of the Problem:** Vulnerable Age Groups
- Signs and symptoms of Drug Abuse: Physical indicators, Academic indicators, Behavioral and Psychological indicators

Unit-3

(11 hrs)

- **Causes and Consequences of Drug Abuse**
- **Causes:** Physiological, Psychological & Sociological

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- **Consequences of Drug Abuse:** For individuals, For families & For society & Nation

Unit 4

(10 hrs)

- **Management & Prevention of Drug Abuse:** Management of Drug Abuse, Prevention of Drug Abuse & Role of Family, School, Media, Legislation & Deaddiction Centers

Recommended Text Books / Reference Books:

- Kapoor. T., Drug Epidemic among Indian Youth, Mittal Pub, New Delhi, 1985.
- Modi, Ishwar and Modi, Shalini, Drugs: Addiction and Prevention, Rawat Publication, Jaipur, 1997.
- Ahuja, Ram, Social Problems in India, Rawat Publications, Jaipur, 2003.
- National Household Survey of Alcohol and Drug Abuse. New Delhi, Clinical Epidemiological Unit
- All India Institute of Medical Sciences, 2004.
- World Drug Report , United Nations Office of Drug and Crime, 2011
- World Drug Report, United nations Office of Drug and Crime, 2010.
- Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004

MRSPTU

2nd Semester

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HUMAN ANATOMY- PART II

Subject Code: BCCTS1-201

**L T P C
2 0 0 2**

Duration: 30 (Hrs.)

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.

Unit 1

(5 hrs)

- **Reproductive system:** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus

Unit 2

(10 hrs)

- **Lymphatic system:** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal
- **Endocrine system:** Thyroid, Parathyroid, Adrenal, Pituitary

Unit 3

(10 hrs)

- **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.

Unit 4

(5 hrs)

- **Sensory system:** Eye (Gross anatomy), Ear

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HUMAN PHYSIOLOGY PART II

Subject Code: BCCTS1-202

**L T P C
2 0 0 2**

Duration: 30 (Hrs.)

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

Unit 1

(16 hrs)

- **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.
- **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).

Unit 2

(6 hrs)

- **Skin:** Structure and function, Body temperature, Regulation of Temperature & fever.
- **Endocrine System:** Short description of various endocrine glands and their functions.

Unit 3

(4 hrs)

- **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

Unit 4

(4 hrs)

- **Excretory System-** General Introduction, structure & functions of kidney, Renal circulation, Glomerular filtration & tubular reabsorption, Nephron, Juxta Glomerular Apparatus, Mechanism of Urine formation, Micturition, Cystomatogram. Diuretics, Artificial Kidney.

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
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GENERAL MICROBIOLOGY

Subject Code: BCCTS1-203

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

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

Unit 1

(15 hrs)

- **Concepts and Principles of Microbiology:** Historical Perspective, Koch's Postulates, Importance of Microbiology, Microscopy, Classification of Microbes.
- **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.
- **Sterilization and Disinfection:** Concept of sterilization, Disinfection aseptis, Physical methods of Sterilization, Chemical methods (Disinfection), OT Sterilization, Biological waste and Biosafety & Biohazard.

Unit 2

(15 hrs)

- **Infection and Infection Control:** Infection, Sources, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Hospital acquired infections & Hospital Infection Control.
- **Immunity:** Types Classification, Antigen, Antibody – Definition and types, Ag-Ab reactions –Types and examples, Procedure of Investigation & Confidentiality, Immunoprophylaxis – Types of vaccines, cold chain, Immunization Schedule.
- **Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests)** Introduction, Gram Positive Cocci & Gram Negative Cocci, Enterobacteraceae & Gram negative bacilli, Mycobacteria, Anaerobic bacteria & Spirochaetes, Zoonotic diseases, Common Bacterial infections of eye

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Unit 3 **(10 hrs)**

- **Mycology:** Introduction, Classification, outline of lab diagnosis, List of Fungi
- **Causing:** Common fungal infections of eyes, Superficial Mycoses, Deep mycoses & opportunistic, Fungi.
- **Virology:** Common Viral infection of eye, Introduction, General Properties, outline of lab diagnosis & Classification, HIV Virus, Hepatitis -B Virus.

Unit 4 **(5 hrs)**

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.

BASIC PATHOLOGY & HEMATOLOGY

Subject Code: BCCTS1-204

L T P C
3 1 0 4

Duration: 60 (Hrs.)

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 on cogenesis & 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.

Unit 1 **(13 hrs)**

- Introduction to Pathology
- Working and maintenance of instruments
- General principles of Haematology techniques, blood collection, anticoagulants, fixation,

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processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working.

Unit 2 (18 hrs)

- General principles of Histopathology techniques collection, fixation, processing & routine staining.
- General principles of Cytopathology techniques collection, fixation, processing & routine staining.
- 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)

Unit 3 (09 hrs)

- General principles of Blood Bank techniques antigen, antibody, ABO & Rh system
- General principles of Autopsy & Museum.

Unit 4 (16 hrs)

- **General Pathology including introduction to :**Cell Injury (Reversible, Irreversible cell injury) Inflammation (Acute inflammation, cells, chronic inflammation, granuloma and examples Circulatory disturbances (Thrombosis, Embolism, Edema- ascetic, pleural, pericardial- effusions, Shock, Allergy, Anaphylaxis-Definition, Morphological features and distinguishing features) Neoplasia (Definition of Anaplasia, dysplasia, metaplasia and metastasis and difference between benign and malignant lesions).

Unit 5 (04 hrs)

- Maintenance and medico legal importance of records and specimens, Lab information system (LIMS).
- Biomedical Waste, Universal Safety Precaution (Protocol to be followed after-Needle injury, chemical Injury).

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INTRODUCTION TO QUALITY AND PATIENT SAFETY

Subject Code: BCCTS1-205

L T P C
3 0 0 3

Duration: 45 (Hrs.)

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 1

(14 hrs)

- **Quality assurance and management:** Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines
- **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.

Unit 2

(16 hrs)

- **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).
- **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.

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Unit 3 **(10 hrs)**

- **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

Unit 4 **(5 hrs)**

- **Disaster preparedness and management:** Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.

Reference Books:

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

HUMAN ANATOMY PART II (DEMONSTRATION)

Subject Code: BCCTS1-206

**L T P C
0 0 4 2**

Duration: 4 Hrs./week

Experiments

- **Reproductive system:** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus
- **Lymphatic system:** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal
- **Endocrine system:** Thyroid, Parathyroid, Adrenal, Pituitary
- **Nervous system:** Introduction to nervous system (Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain, Brainstem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles
- **Sensory system:** Eye (Gross anatomy), Ear

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Textbooks:

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

Reference books:

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

HUMAN PHYSIOLOGY PART II – (DEMONSTRATION)

Subject Code: BCCTS1-207

L T P C
0 0 2 1

Duration: 4 Hrs./week

Experiments

- Recording of body temperature
- Examination of sensory system
- Examination of motor system
- Examination of Eye
- Examination of ear

Textbooks:

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

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Reference books:

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

GENERAL MICROBIOLOGY (DEMONSTRATION)

Subject Code: BCCTS1-208

**L T P C
0 0 4 2**

Duration: 4 Hrs./week

Experiments

- Concepts and Principles of Microbiology
- General Characters of Microbes
- Sterilization and Disinfection
- Infection and Infection Control
- Immunity
- Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory test)
- Mycology
- Virology
- Parasitology

Text Book:

- Text Book of Microbiology for Nursing Students, Anant Narayan Panikar
- Text Book of Ophthalmology, Khurana

Reference Book:

- Text Book of Microbiology, Baveja.

BASIC PATHOLOGY & HEMATOLOGY (DEMONSTRATION)

Subject Code: BCCTS1-209

**L T P C
0 0 4 2**

Duration: 4 Hrs./week

Experiments

- Working and maintenance of instruments.
- General principles of Haematology techniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report),

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- platelet counts, cell counter working.
- General principles of Histopathology techniques collection, fixation, processing & routine staining.
 - General principles of Cytopathology techniques collection, fixation, processing & routine staining
 - 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).
 - General principles of Blood Bank techniques antigen, antibody, ABO & Rh system.
 - General principles of Autopsy & Museum.

Reference Books:

- *A Handbook of Medical Laboratory (Lab) Technology: Editor) Second Edition. V.H. Talib(Ed.).*
- Comprehensive Textbook of Pathology for Nursing: Pathology Clinical Pathology Genetics. AkMandalShramana Choudhury, Published by Avichal Publishing Compnay | Language English
- 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 Central Book Agency, Kolkata.
- Theory & Practice of Histological Techniques John D. Bancroft^{et.al}. Churchill Livingstone Printed in China.
- Histochemistry in Pathology M.I. Filipe^{et.al}. Churchill Livingstone, London
- Hand Book of Histopathological & Histochemical Techniques C.F.A. Culling Butterworths Company Ltd. London.
- A Handbook of Medical Laboratory (Lab) Technology. By V.H Talib

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

ENVIRONMENTAL SCIENCES

Subject Code: BCCTS1-210

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

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 analyze possible disruption of feeding relationships.

Unit 1

(13 hrs)

- **Components of Environment:** Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment;
- **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
- **Global Environmental Problems:** Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards.

Unit 2

(14 hrs)

- **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.
- **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.

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Unit 3

(18 hrs)

- **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)
- **Bioremediation:** Oil spills, Wastewater treatment, chemical degradation, heavy Metals.

Books

- Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
- Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
- Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from Indidum, E.P., Odum, , I.L., Gerba, C.
- Rao, M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
- Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
- Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
- Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
- Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
- Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
- Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
- Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
- Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
- World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

COMPUTER FUNDAMENTAL

Subject Code: BCCTS1-211

**L T P C
2 0 0 2**

Duration: 60 (Hrs.)

Course Objectives:

- Upon completion of the course the student shall be able to know the various types of application of computers in pharmacy
- know the various types of databases
- Know the various applications of databases in pharmacy.

Course Outcomes:

- This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Unit -1

(5 hrs)

- **Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement ,Two's complement method, binary multiplication, binary division.**
- **Concept of Information Systems and Software:** Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the products.

Unit-2

(5 hrs)

- **Web technologies:** Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products.
- **Introduction to databases:** MYSQL, MS ACCESS, Pharmacy Drug Database

Unit 3

(7.5 hrs)

- **Computer networks: Introduction-** Types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
- **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.

Unit-4

(12.5 hrs)

- **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

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document, spell checking, printing the document file, creating and editing of table, mail merge.

Introduction to Excel: Introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

- **Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
- **Introduction of Operating System:** Introduction, operating system concepts, types of Operating system.
- **Computers as data analysis in Preclinical development.** Chromatographic data analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS).

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
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Total Credits: 22

Semester 3 rd		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCCTS1-301	Applied Anatomy, Physiology, Pharmacology in Cardiac Care	4	0	0	40	60	100	4
BCCTS1-302	Basic Electrocardiography	3	0	0	40	60	100	3
BCCTS1-303	Basic Echocardiography	2	0	0	40	60	100	2
BCCTS1-304	Community Orientation & Clinical Visit (Including related practical to the parent course) - Practical	0	0	8	60	40	100	4
BCCTS1-305	Basic Electrocardiography-Practical	0	0	2	60	40	100	1
BCCTS1-306	Basic Echocardiography-Practical	0	0	4	60	40	100	2
BCCTS1-307	Medical Bioethics & IPR	3	0	0	40	60	100	3
BCCTS1-308	Organizational Behavior	3	0	0	40	60	100	3
Total		-	-	-	380	420	800	22

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

Total Credits: 25

Semester 4th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCCTS1-401	Development of Cardiovascular system: Fetal & Neonatal	3	1	0	40	60	100	4
BCCTS1-402	Cardiovascular diseases pertinent to Cardiac care Technology	3	0	0	40	60	100	3
BCCTS1-403	Medical Instrumentation relevant to Cardiac care	2	0	0	40	60	100	2
BCCTS1-404	CCT Directed Clinical Education-II (One month in vacation)	0	0	0	50	0	50	8
BCCTS1-405	Medical Instrumentation relevant to Cardiac care-Practical	0	0	4	60	40	100	2
BCCTS1-406	Human Rights & Professional Values/ Pursuit of Inner Self Excellence (POIS)	3	0	0	40	60	100	3
BCCTS1-407	Biostatistics and Research Methodology	3	0	0	40	60	100	3
Total		-	-	-	310	340	650	25

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
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Total Credit: 21

Semester 5 th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCCTS1-501	Advanced Electrocardiography	2	0	0	40	60	100	2
BCCTS1-502	Advanced Echocardiography	2	0	0	40	60	100	2
BCCTS1-503	Invasive Cardiology	3	0	0	40	60	100	3
BCCTS1-504	Community Orientation & Clinical Visit (Including related practical's to the parent course) - Practical	0	0	8	60	40	100	4
BCCTS1-505	Advanced Electrocardiography- Practical	0	0	4	60	40	100	2
BCCTS1-506	Advanced Echocardiography- Practical	0	0	4	60	40	100	2
BCCTS1-507	Basics of Clinical Skills Learning	3	0	0	40	60	100	3
BCCTS1-508	Hospital Operation Management	3	0	0	40	60	100	3
Total		-	-	-	380	420	800	21

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Total credit: 16

Semester 6 th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCCTS1-601	Cardiac Catheterization	2	0	0	40	60	100	2
BCCTS1-602	Pediatric Interventions	2	0	0	40	60	100	2
BCCTS1-603	CCT Directed Clinical Education-IV (240 hours)	0	0	0	50	0	50	8
BCCTS1-604	Cardiac Catheterization-Practical	0	0	4	60	40	100	2
BCCTS1-605	Pediatric Interventions - Practical	0	0	4	60	40	100	2
Total		-	-	-	250	200	450	16

Semester 7 th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int	Ext		
BCCTS1-701	Project	0	0	30	0	500	500	15
Total							500	15

The candidates will be supervised by the concerned faculty & the project report will be submitted following competitions. The Viva-Voce examination shall be conducted by external expert.

Report/Thesis- 200

Daily Evaluation – 100

Viva-Voce - 200

Semester 8 th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int	Ext		
BCCTS1-801	Internship	0	0	30	0	500	500	15
Total							500	15

The candidate shall undergo internship of Six months in Cardiac care department. The internship report shall be submitted to the principal & Viva-Voce examination shall be conducted by external expert.

Report/Thesis- 200

Daily Evaluation – 100

Viva-Voce - 200

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Semester	Credit
1 st	25
2 nd	26
3 rd	22
4 th	25
5 th	21
6 th	16
7 th	15
8 th	15
Total	165

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

APPLIED ANATOMY, PHYSIOLOGY, PHARMACOLOGY IN CARDIAC CARE

Subject Code: BCCTS1-301

**L T P C
4 0 0 4**

Duration: 60(Hrs.)

Course Objective:

- Describe the structure and function of the heart including the electrical activity involved in the normal and abnormal cardiac cycle.
- Describe the structure and function of the myocytes & function of the peripheral and coronary circulatory systems at rest and during physical activity
- Discuss Anatomy of Coronaries of Heart
- 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 effects of drugs, Mechanism of Action

Course Outcomes:

- To understand Coronary Anatomy
- To enable students, differentiate between normal heart sounds and murmurs.
- To enable students, a preliminary understanding of the circulatory system from a physiological and
- Functional perspective, as well as related terminologies.
- 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.

Unit 1

(15 hrs)

- **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
- **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.

Unit 2

(15 hrs.)

- **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,

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ventricular septum, appendage, mv), left ventricle (inflow, body, outflow), anatomy of sa node and av node, anatomy of cardiac valves: eustachian, the besian, a-v valves, semilunar valves, valve apparatus

- **Blood vessels and hemodynamics:** regulation of blood pressure: hormonal and neural regulation, pulse and sites for pulse assessment, shock and homeostasis
- **Clinical pathologies in physiology of cvs:** coronary artery disease (cad), congestive heart failure (chf), and atherosclerosis, shock and hemorrhage, syncope, hypertension.
- **Drugs used in cardiovascular system (with its moa, adrs, indications and complications):** anti-hypertensives, anti- anginal agents, anti- failure agents, antiarrhythmic agents, antithrombotic agents

Unit 3 **(15 hrs.)**

- **General pharmacology:** sources of drugs, route of drug administration, pharmacokinetics, pharmacodynamics, first pass metabolism, **adverse drug reactions.**
- **Drugs used in nervous system (with its moa, adrs, indications and complications):** anticholinergics & adrenergic, narcotics, sedatives & hypnotics.

Unit 4 **(15 hrs.)**

- **Miscellaneous:** Iv fluids, neuromuscular blockers, electrolyte supplements, antihistamines, protamine, emergency drugs- atropine, adrenaline, steroids, sodium bicarbonate.

Reference books

- Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and Allison Grant
- Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora & Bryan Derrickson
- Textbook of Physiology (Vol.1,2) Dr. A.K. Jain
- Essentials of Medical Physiology, Sixth Edition by K Sembulingam and Prema Sembulingam
- Physical Examination of the Heart and Circulation, Fourth Edition by Joseph K. Perloff
- Pharmacology for Physiotherapy by Padmaja Uday kumar.
- Drugs for the Heart, South Asia edition by Lionel H. Opie and Bernard J. Gersh
- R. S. Satoskar, S.D. Bhandarkar, S. S. Ainapure, Pharmacology and Pharmacotherapeutics, 18th Edition
- 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.

BASIC ELECTROCARDIOGRAPHY

Subject Code: BCCTS1-302

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Course Objective:

- To enable students, understand the correct placement of all electrodes.
- To demonstrate patient positioning and preparation.
- To teach students about maintenance of the ECG machine, wires and electrodes.

Course Outcomes:

- To develop understanding regarding Electrocardiography and its procedure.
- Describe the proper hook-up procedure for a 12-Lead ECG.
- Identify basic normal ECG waveform morphology and common interpretation.
- Enumerate the measures to be taken before, after and during ECG procedure.

Unit 1

(10 hrs.)

- **Basic electrophysiology:** Heart: An electrical field, Electrical and Mechanical properties of the heart, Cardiac electrical field generation during activation, Cardiac wave fronts - Action potential: Repolarization and Depolarization, Cardiac electrical field generation during ventricular recovery, Conduction system of the heart: In detail
- **Basics of electrode placement and lead selection and axis deviation:** Basics of Electrodes and Leads, ECG deflections: Isoelectric, Upright, Negative and Biphasic, Types of ECG leads- Standard limb leads, Precordial leads and the Wisdom central, Augmented limb leads, Unipolar V/S Bipolar leads, Placement of leads with universal color code, Hexa-axial reference frame and Electrical axis, X axis – time presentation, Y axis – voltage presentation, Right & Left axis in Normal ECG, Einthoven's Triangle, Deviation of Axis.
- **BASICS OF STRESS TEST:** Protocols, lead placement, instruction to the patient, rhythm analysis.

Unit 2

(15 hrs.)

- **ECG COMPONENTS-WAVES AND INTERVALS:** ECG waveforms: Rate, Rhythm and Normal time intervals-The Normal Electrocardiogram, the Normal P wave & atrial repolar-ization, Atrioventricular node conduction and the PR segment, Ventricular activation and the QRS Complex, Genesis of QRS complex, Ventricular recovery and ST-T wave, Normal variants and Rotation of the heart, ECG PAPER, Rate measurement: Six second method, large box method, Small box method
- **Sinus rhythms & atrioventricular blocks (Description, Possible causes, ECG Criteria, Plan of assessment, Potential treatments):** Normal Sinus Rhythm, Sinus Bradycardia, Sinus Tachycardia, 1st Degree AV block, 2nd Degree AV block: Type-I or Mobitz-I, 2nd Degree AV

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block: Type-II or Mobitz-II, 3rd Degree AV block/ CHB.

Unit 3 **(05 hrs.)**

- **Basics of ecg interpretation:** basic steps for interpretation- Rate, Rhythm, P-wave Examination, P to R interval, QRS width, Rhythm interpretation.

Unit 4 **(15 hrs.)**

- **Atrial & ventricular arrhythmias (Description, Possible causes, ECG criteria, Plan of assessment, Potential treatments):** Premature Atrial Contractions (PACs), Atrial Flutter (AF), Atrial Fibrillation (A. Fib), Paroxysmal Atrial Tachycardia, Premature Ventricular Contractions (PVCs), Ventricular Tachycardia (V. Tach), Supraventricular Tachycardia (SVT), Ventricular Fibrillation (V. Fib), Asystole.

Reference books

- ECG Made Easy – Atul Luthra
- Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test
- An Introduction to Electrocardiography: Schamroth Colin
- Clinical Electrocardiography: Goldberger. A

BASIC ELECTROCARDIOGRAPHY PRACTICAL

Subject Code-BCCTS1-305

**L T P C
0 0 2 1**

Duration: 30 (Hrs.)

Course Objective:

- To enable students, understand the correct placement of all electrodes.
- To demonstrate patient positioning and preparation.
- To teach students about maintenance of the ECG machine, wires and electrodes.

Course Outcomes:

- To develop understanding regarding Electrocardiography and its procedure.
- Describe the proper hook-up procedure for a 12-Lead ECG.
- Identify basic normal ECG waveform morphology and common interpretation.
- Enumerate the measures to be taken before, after and during ECG procedure.

Experiments

- Steps to perform an ECG
- Patient positioning according to various conditions.
- Proper communication with patient to find out the history
- ECG machine operating and maintenance
- Maintain ECG catalog for self-assessment
- Common errors in ECG recording

Reference books

- ECG Made Easy – Atul Luthra
- Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test
- An Introduction to Electrocardiography: Schamroth Colin
- Clinical Electrocardiography: Goldberger. A

BASIC ECHOCARDIOGRAPHY

Subject Code: BCCTS1-303

**L T P C
2 0 0 2**

Duration: 30 (Hrs.)

Course Objective:

- To provide a brief introduction to Echocardiography, its techniques and types of Echocardiography.
- To provide practically and clinically useful application of Echocardiography.
- To explain echo techniques available and to put echo into a clinical perspective

Course Outcomes:

- To develop an understanding regarding Echocardiography.
- To train students to perform Echocardiography examinations by explaining the position of transducers.
- To make students aware of recent advances in Echocardiography.
- To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Unit 1

(10 hrs.)

- **Introduction to echocardiography:** basics of ultrasound waves, characteristics of: sound wave, frequency and attenuation, basic principle of echocardiography, indications of echocardiography, types of echocardiography, importance of gel in echocardiography.
- **Murmurs:** types of murmurs heard in echocardiography- systolic and diastolic murmurs, possible causes of murmurs, conditions associated with murmurs, features of murmurs suggesting echocardiography.
- **Echocardiography techniques:** basic principles, indications and uses of: 2d transthoracic echocardiography, m-mode, echo windows and views used in transthoracic echocardiography, doppler echocardiography in detail: pulsed, continuous wave and color flow mapping.
- **Knobology and instrumentation:** transducer: basic principle and working, types of transducers, piezoelectric crystals and its effect, various knobs used on echo machine with its description and application.
- **Cardiac assessment:** measurement of cardiac dimensions, basics of: evaluation of systolic and diastolic left ventricular function, ejection fraction, fractional shortening, and regional wall motion abnormalities: classification, stroke volume and cardiac output assessment, transvalvular gradients and orifice area.

Unit 2

(10 hrs.)

- **Doppler effect:** basics of doppler, applications of doppler, types of doppler, continuity equation
- **Echocardiography assessment in valvular heart disease:** Role Of Echo In Assessment Of

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Valvular Heart Diseases, 2D Findings, Doppler Calculations, M-Mode Findings And Views Seen In: Mitral Regurgitation, Mitral Stenosis With Different Types Of M-Mode Pattern, Mitral Valve Prolapse, Aortic Regurgitation, Aortic Stenosis: Types Of AS, Infective Endocarditis, Tricuspid Regurgitation, Tricuspid Stenosis, Pulmonary Regurgitation, Pulmonary Stenosis.

Unit 3

(5 Hrs.)

- **Basics of toe, stress echo & contrast echo:** advantages & disadvantages, applications, indications & contraindications, complications, patient positioning and medications used.
- **Echo in special hospital settings:** clinical uses of echocardiography in: preoperative cases, intraoperative cases, intensive care unit (icu), coronary care unit (ccu), cardiac catheterization laboratory (ccl), accident & emergency (a&e) department, portable (hand-held) echo.
- **Echo assessment in cad:** assessment of ischemia, assessment of myocardial infarction, complications Of MI Detection By Echo, Myocardial Hibernation.

Unit 4

(05 Hrs.)

- **Artificial (prosthetic) valves:** Basics Of Artificial Valves, Types Of Artificial Valves, Echo Examination Of Prosthetic Valve, Basics Of Prosthetic Valve Malfunction, Echo Assessment Of: Endocarditis, Thrombus, Dehiscence, Regurgitation, Variance, Degeneration.
- **Hypertension and lvh:** Indications For Echo In Hypertension, Echo Findings In Hypertension, Left Ventricular Hypertrophy: Echo Findings.
- **Screening and follow-up echo:** Good Indications For Screening Echo, Less Clear-Cut Indications For Screening Echo, Follow-Up Echo.

Reference Books

- Echo made easy: sam kaddoura
- Reference by pgdcc – ignou handbooks for ecg, echo and stress test.
- Feigen baum's echocardiography
Tajik jamil for echocardiography

BASIC ECHOCARDIOGRAPHY PRACTICAL

Subject Code: BCCTS1-306

**L T P C
0 0 4 2**

Duration: 60 (Hrs.)

Course Objective:

- To provide a brief introduction to Echocardiography, its techniques and types of Echocardiography.
- To provide practically and clinically useful application of Echocardiography.
- To explain echo techniques available and to put echo into a clinical perspective

Course Outcomes:

- To develop an understanding regarding Echocardiography.
- To train students to perform Echocardiography examinations by explaining the position of transducers.
- To make students aware of recent advances in Echocardiography.
- To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Experiments

- Learn about Probe and Scanner settings.
- Learn about Structural and Functional assessment of the heart.
- Learn about various windows and views used in Echocardiography
- Learn about qualitative reporting systems along with various software's associated with Echo reporting.

Reference Books

- Echo made easy: sam kaddoura
- Reference by pgdcc – ignou handbooks for ecg, echo and stress test.
- Feigen baum's echocardiography
- Tajik jamil for echocardiography.

**COMMUNITY ORIENTATION & CLINICAL VISIT (INCLUDING RELATED
PRACTICAL TO THE PARENT COURSE) PRACTICAL**

Subject Code: BCCTS1-304

**L T P C
0 0 8 4**

Duration: 240 (Hrs.)

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.

MEDICAL BIOETHICS & IPR

Subject Code: BCCTS1-307

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Course Objective:

- To introduce the wide range of ethical issues in healthcare.
- To provide basic skills in: A) Approaching ethical issues. B) Analysis and statement of issues. C) Understanding the relevant ethical principles invoked.
- Imparting knowledge and skills that will enable students to develop ethical answers to these issues
- To acquire specialized knowledge of law and IPR.
- The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.

Course Outcomes:

- Upon successful completion of the course, students will be able to: Recognize what constitutes an ethical concern in health care.
- Understanding ethical issues in health care.
- Understand better the complexity and multi-dimensionality of medical ethical concerns and uniqueness of each problem.
- Capacity to rationally justify your decision.
- Develop the ability to reason through difficult medical/clinical ethical issues both orally, in the context of a group of their peers, and through written.
- The students get awareness of acquiring the patent and copyright for their innovative works.
- They also get the knowledge of plagiarism in their innovations which can be questioned legally.

Unit 1

(05 hrs.)

- Introduction to Bioethics.
- Bioethical issues related to Healthcare & Medicine.

Unit 2

(15hrs.)

- **Anatomy** - Cadaver ethics, Human dignity, PNDT, Disposal of cadaver, Genetic Counseling.
- **Physiology** - Animal ethics, Health policy privacy.

Unit 3

(15 hrs.)

- **Biochemistry & Pathology** - Prudence of investigation confidentiality, Patients bill of rights, Disposal of investigative material, Integrity, Blood transfusion
- **Pharmacology** - Rational drug prescribing, Clinical trials, Risk minimization, Animal ethics

Unit 4

(10 hrs.)

- **Medico legal aspects of medical records**
- **Introduction to Intellectual Property:** Concept of Intellectual Property Kinds of Intellectual Property Patents, Copyrights Designs, Trademarks, Geographical Indication, Infringement of IPR, Its protection and Remedies Licensing and its types

Reference Books:

- Contemporary issues in bioethics – Beauchamp & Walters (B&W) 4th edition.
- Classic philosophical questions by Gloud (8th Edition)
- Case book series and booklets by UNESCO Bioethics Core curriculum 2008
- Encyclopedia of Bioethics 5 vol set, (2003) ISBN-10: 0028657748
- Intellectual property rights- Ganguli-Tat McGrawhill. (2001) ISBN-10: 0074638602,
- Intellectual Property Right- Wattal- Oxford Publication House. (1997) ISBN: 0195905024

ORGANIZATIONAL BEHAVIOR

Subject Code: BCCTS1-308

**L T P C
3 0 0 3**

Duration: 45(Hrs.)

Course Objective:

- To understand the initial insights into underlying principles and fundamental theories of organizational behavior.
- The Student should develop a sense of what falls under the domain of organizational behavior.
- He should develop an understanding of academic views on the behavior and motivations of people in organizations and the purposes of organizations.
- This course clearly takes an academic and scientific lens with the aim of understanding human behavior in organizations.

Course Outcomes:

- Describe and apply motivation theories to team and organizational scenarios in order achieve a team's or an organization's goals and objectives.
- Explain the effect of personality, attitudes, perceptions and attributions on their own and other's behaviors in team and organizational settings.
- Explain types of teams and apply team development, team effectiveness, and group decision making models and techniques.
- Analyze and apply leadership theories and better understand their own leadership style.

Unit 1

(5 hrs.)

- **Organizational Behavior** - Definition - Importance - Historical Background – Fundamental concepts of OB- 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive

Unit 2

(15 hrs.)

- **Organization Structure and Design** - Authority and Responsibility Relationships – Delegation of Authority and Decentralization - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organizational design - Mechanistic vs Adoptive Structures – Formal and Informal Organization

Unit 3

(5 hrs.)

- **Perception Process** - Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception - Impression Management

Unit 4

(20 hrs.)

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- **Learning** - Process of Learning - Principles of Learning - Organizational Reward Systems – Behavioral Management
- **Motivation - Motives** - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity – Morale Indicators
- **Leadership** - Definition - Importance - Leadership Styles - Models and Theories of Leadership Styles
- **Conflict Management** - Traditional vis-a-vis Modern view of conflict - Constructive and Destructive
- **Conflict** – Conflict Process - Strategies for encouraging constructive conflict - Strategies for resolving destructive conflict.

Reference Books:

- Organizational Behavior, 9th Ed. - Stephen Robbins.
- Human Behavior at work - Davis and Newstrom
- Organizational Behavior - Uma Sekaran
- Organizational Behavior - Fred Luthans
- Organizational Behavior - K.Aswathappa
- Human Behavior at Work - Keith Davis
- Organizational Behavior - Jit S.Chandran
- Human Relations & Organizational Behavior - R.S.Dwivedi
- Organizational Behavior - McShane

4th
Semester

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

DEVELOPMENT OF CARDIOVASCULAR SYSTEM: FETAL & NEONATAL

Subject Code: BCCTS1-401

L T P C

Duration: 60(Hrs.)

3 1 0 4

Course Objective:

- To understand the description of fate of certain fetal structures once postnatal circulation is established.
- To provide an outline of Cardiovascular Anatomy to improve the student's understanding of the technical and diagnostic procedures used with special emphasis on applied aspects in Cardiology

Course Outcomes:

- This course will provide overall information of the structural development of the cardiovascular system.
- To encourage students to apply this knowledge to understand developmental anomalies in the Cardiovascular System.

Unit1 (15 hrs.)

- **Early development of embryo:** Early development of embryo, Early blood vessel formation, Intra-embryonic blood vessel, Extra-embryonic blood vessel.
- **Development of the heart:** Formation and position of the heart tube, Formation and position of the heart loop, Mechanism of cardiac looping, Formation of the embryonic ventricle, Development of the sinus venous, Formation of the cardiac septa, Atrial septation, the atrio-ventricular canal, the Muscular interventricular septum, the septum in truncus arteriosus and the cord is conus.

Unit 2 (15 hrs.)

- **Formation of the cardiac valves:** Formation of the cardiac valves, The Atrioventricular Valve, The semilunar valve.
- **Formation of the great systemic veins:** The cardiac veins, The vitelline veins, The Umbilical veins, the vena cava.

Unit 3 (15 hrs.)

- **Fetal & neonatal circulation:** Blood flow pattern, oxygenation & venous return to the Heart, Cardiac output and its distribution, Intra - cardiac vascular pressure, Myocardial function & its Energy metabolism
- **Characteristics of fetal circulation and changes occur at birth:** Postnatal Circulation In Detail

Unit 4 (15 hrs.)

- **Etiology of cardiovascular malformation:** Congenital anomalies in detail
- **Adult circulation:** Systemic Circulation, Pulmonary Circulation.

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Reference Books:

- Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waughand Allison Grant
- Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora & Bryan Derrickson
- Human Embryology; Inderbir Singh

CARDIOVASCULAR DISEASES PERTINENT TO CARDIAC CARE TECHNOLOGY

Subject Code: BCCTS1-402

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Course Objective:

- To know the Definition and Pathophysiology of Cardiovascular diseases Classification, Etiology, Clinical features, Diagnosis & Management of Diseases

Course Outcomes:

- This course will cover common Cardiovascular Diseases, their related pathology and microbiology.
- Along with outline of clinical presentation and management of these conditions it also includes Medical and Surgical interventions

Unit 1

(10 hrs.)

- **Valvular heart disease:** Acquired Valvular heart disease, Rheumatic fever and Rheumatic heart disease: Aortic stenosis, Aortic regurgitation, Mitral valve disease, Mitral stenosis, Mitral Regulation, Combined valvular heart disease, Tricuspid valve disease, Infective Endocarditis.
- **Coronary artery disease:** Pathophysiology and clinical recognition of Angina Pectoris, Pathophysiology of Coronary Artery Disease, Myocardial Infarction, Treatment for Coronary Artery Disease.

Unit 2

(15 hrs.)

- **Hypertension:** Etiology of Hypertension, Systemic hypertension, Essential and secondary Hypertension, Treatment for hypertension, DASH diet, Pulmonary Hypertension, Pulmonary thrombo-embolism
- **Heart failure:** Types of Heart failure- Left, Right, Biventricular, Acute Decompensated Heart Failure, Pathophysiology of Heart failure, Causes, Signs and symptoms, Medical management, surgical treatment.
- **Myocardial diseases:** Dilated cardiomyopathy, Hypertrophic cardiomyopathy, Restrictive cardiomyopathy, Myocarditis.

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Unit 3

(15 hrs.)

- **Congenital heart diseases:** Acyanotic heart disease -Atrial septal defect (ASD),Ventricular septal defect (VSD), Patent ductus arteriosus (PDA), Coarctation of Aorta (coa),Cyanotic congenital heart disease - Tetralogy of Fallot (TOF), Double Outlet Right Ventricle(DORV), Pulmonary Atresia, Transposition of Great Arteries (TGA), Total Anomalous Pulmonary, Venous Connection (TAPVC).
- **Pericardial diseases:** Pericardial effusion, Constrictive pericarditis, Cardiac tamponade, Pericardiocentesis.

Unit 4

(05 hrs.)

- **Peripheral vascular disease:** Atherosclerotic peripheral vascular disease, Aortic aneurysms, Aortic dissection, Takayasu's arteritis
- **Cardiac arrest:** Classification, 6 H's and 6 T's, Signs and Symptoms, Diagnosis, Treatment
- **COPD:** Causes, Stages of COPD (Stage 1-4),Signs and Symptoms, Diagnosis, Treatment: Medication, Dietary changes, Lifestyle changes.

Reference book

- Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and Allison Grant
- Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora& Bryan Derrickson
- Essentials of Medical Physiology, Sixth Edition by K Sembulingam and Prema Sembulingam
- Physical Examination of the Heart and Circulation, Fourth Edition by Joseph K. Perloff

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BATCH 2021 ONWARDS (4 YEARS COURSE)**

MEDICAL INSTRUMENTATION RELEVANT TO CARDIAC CARE

Subject Code: BCCTS1-403

**L T P C
2 0 0 2**

Duration: 30 (Hrs.)

Course Objective:

- To introduce Biomedical applications of different transducers used.
- To introduce the student to the various sensing and measurement devices of electrical origin.
- To provide awareness of electrical safety of medical equipment.
- To provide the latest ideas on devices of non-electrical devices.
- To bring out the important and modern methods of imaging techniques.
- To provide latest knowledge of medical assistance / techniques and therapeutic equipment.

Course Outcomes:

- The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance.
- The fundamental principles of equipment that are actually in use at the present day are introduced.
- The healthcare industry or they will be the best helping hand for biomedical engineers.

Unit 1

(05 hrs.)

- **Introduction to medical physics:** Basics, Indications, Outcome, Machines related to Medical Physics.

Unit 2

(10 hrs.)

- **Electro-physiological measurements:** Electrodes – Limb electrodes, floating electrodes, pregelled disposable electrodes, Microneedle and surface electrodes, ECG: Lead systems and recording methods, Typical waveforms, Electrical safety in medical environment: shock hazards, leakage current, Instruments for checking safety parameters of biomedical equipment, Transducers: selection criteria, Piezoelectric ultrasonic transducers.

Unit 3

(10 hrs.)

- **Non-electrical parameter measurements:** Measurement of blood pressure, Cardiac output, Stethoscope: Heart rate, Heart sound, ACT, Pulmonary function measurements – Spirometer, Photoplethysmography, Body Plethysmography, Blood Gas analyzers: ph of blood, measurement of blood pco₂, po₂, finger-tip oximeter - ESR, GSR measurements.

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Unit 4

(05 hrs.)

- **Assisting and therapeutic equipments:** Types of Pacemakers, Types of Defibrillators, Ventilators- Types of Ventilators
- **Medical imaging:** C-Arm, Coronary Computer tomography & MRI, TLD, Radiographic and fluoroscopic techniques: Echocardiography: TTE, TEE, Stress Echo, Coronary Angiography, PTCA

Reference books

- R. S. Khandpur, 'handBook Of Biomedical Instrumentation', Tata Mcgraw Hill Publishing Co Ltd.,2003.
- Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'bio-Medical Instrumentation And Measurements', Ii Edition, Pearson Education, 2002
- M. Arumugam, 'Biomedical Instrumentation', Anuradha Agencies, 2003.
- L.A. Geddes and L.E. Baker, 'Principles of Applied Biomedical Instrumentation', John Wiley & Sons, 1975.
- J. Webster, 'Medical Instrumentation', John Wiley & Sons, 1995.
- C. Raja Rao and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities press (India) Ltd, Orient Longman ltd, 2000.

CCT DIRECTED CLINICAL EDUCATION – II (ONE MONTH IN VACATION)

Subject Code: BCCTS1-404

Duration: 240 (Hrs.)

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.

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MEDICAL INSTRUMENTATION RELEVANT TO CARDIAC CARE PRACTICAL

Subject Code: BCCTS1-405

**L T P C
0 0 4 2**

Duration: 60 (Hrs.)

Course Objective:

- To introduce Biomedical applications of different transducers used.
- To introduce the student to the various sensing and measurement devices of electrical origin.
- To provide awareness of electrical safety of medical equipment.
- To provide the latest ideas on devices of non-electrical devices.
- To bring out the important and modern methods of imaging techniques.
- To provide latest knowledge of medical assistance / techniques and therapeutic equipment.

Course Outcomes:

- The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance.
- The fundamental principles of equipment that are actually in use at the present day are introduced.
- The healthcare industry or they will be the best helping hand for biomedical engineers.

Experiments

1. ECG Machine
2. Stress Test Machine
3. Patient monitor
4. Central Monitoring System
5. Sphygmomanometer
6. Pulse Oximeter
7. Stethoscope
8. Defibrillators
9. Pressure transducers
10. Techniques of monitoring radiation exposure

Reference books

- R. S. Khandpur, 'handBook Of Biomedical Instrumentation', Tata Mcgraw Hill Publishing Co Ltd.,2003.
- Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'bio-Medical Instrumentation And

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Measurements', Ii Edition, Pearson Education, 2002

- M. Arumugam, 'Biomedical Instrumentation', Anuradha Agencies, 2003.
- L.A. Geddes and L.E. Baker, 'Principles of Applied Biomedical Instrumentation', John Wiley & Sons, 1975.
- J. Webster, 'Medical Instrumentation', John Wiley & Sons, 1995.
- C. Raja Rao and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities press (India) Ltd, Orient Longman ltd, 2000.

**HUMAN RIGHTS & PROFESSIONAL VALUES/ PURSUIT OF INNER SELF
EXCELLENCE (POIS)**

Subject Code: BCCTS1-406

L T P C
3 0 0 3

Duration: 45 (Hrs.)

Course 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 programmes are realized.
- To encourage research activities.
- To encourage research studies concerning the relationship between Human Rights and Duties Education.

Course 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

Unit 1

(05 hrs.)

- **Background** - Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights

Unit 2

(15 hrs.)

- **Human rights at various level-** Human Rights at Global Level UNO
- **Instruments:** U.N. Commission for Human Rights, European Convention on Human Rights.
- **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

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BATCH 2021 ONWARDS (4 YEARS COURSE)**

Unit 3 **(15 hrs.)**

- **Human Rights Violations** -Human Rights Violations against Women, Children, Violations against Minorities SC/ST and Trans-genders, Preventive Measures.
- **Professional values**- Integrity, Objectivity, Professional competence and due care, Confidentiality
- **Personal values**- ethical or moral values, Attitude and behavior- professional behavior, treating people Equally

Unit 4 **(10hrs.)**

- **Code of conduct**- professional accountability and responsibility, misconduct, Cultural issues in the Healthcare environment

Reference Books:

- Jagannath Mohanty Teaching of Humans Rights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009
- Ram Ahuja: Violence Against Women Rawat Publications Jewahar Nager Jaipur.1998.
- Sivagami Paramasivam Human Rights Salem 2008
- Hingorani R.C.: Human Rights in India: Oxford and IBH New Delhi.

BIOSTATISTICS AND RESEARCH METHODOLOGY

Subject Code: BCCTS1-407

L T P C
3 0 0 3

Duration: 45 (Hrs.)

Course 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.

Course Outcomes:

- To understand the importance & Methodology for research.
- To learn in detail about sampling, probability and sampling distribution, significance tests correlation an regression, sample size determination, study design and multivariate analysis.

Unit 1 **(15 hrs.)**

- **Introduction:** Statistics, Biostatistics, Frequency distribution Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples
- **Measures of dispersion:** Dispersion, Range, standard deviation
- **Correlation:** Definition, Karl Pearson's coefficient of correlation, Multiple correlation

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Unit 2

(15 hrs.)

- **Regression:** Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression–
- **Probability:** Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples Parametric test: t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

Unit 3

(05 hrs.)

- **Non Parametric tests:** Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test
- **Introduction to Research:** Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Unit 4

(10 hrs.)

- **Graphs:** Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph
- **Designing the methodology:** Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Reference Books:

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

5th
Semester

ADVANCED ELECTROCARDIOGRAPHY

Subject Code: BCCTS1-501

**L T P C
2 0 0 2**

Duration: 30 (Hrs.)

Course Objective:

- To enable students, understand various arrhythmias.
- To demonstrate patient positioning and preparation.
- To teach students about maintenance of the ECG machine, wires and electrodes.

Course Outcome

- To develop an understanding regarding Echocardiography.
- To train students to perform Echocardiography examinations by explaining the position of transducers.
- To make students aware of recent advances in Echocardiography.
- To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Unit 1

(05 hrs.)

- **Anatomy of the conduction system & basics of electrophysiology:** SA node, AV node, Inter nodal and Inter-atrial conduction, Bundle branches, History, Equipment used, Procedure, Resting interval measurements, Management of Arrhythmias by EP study.

Unit 2

(10 hrs.)

- **Genesis of cardiac arrhythmias and management:** Various Mechanisms of Arrhythmogenesis & disorders of impulse formation: Artifacts, Electrical interference, Somatic tremor, Wandering baseline, Antiarrhythmic agents class I, class II, class III, class IV, Implantable electric devices for treatment of cardiac arrhythmias, Ablation theory for cardiac arrhythmias: Basic
- **ECG in ischemic heart disease:** Coronary events and ECG, ECG changes in IHD and Myocardial Infarction, Investigations: Stress test- Indications, Contraindications, Pre-test probability, Exercise Protocols, Interpretation of reports.

Unit 3

(10 hrs.)

- **Disorders of impulse conduction:** Reentry mechanism, Tachycardia caused by reentry, Electrical remodeling of atria, Sinus reentry, Atrial reentry, AV node reentry, Pre-excitation syndrome, Ventricular tachycardia caused by reentry, **PACEMAKERS:** Types of Pacemakers, Components of Pacemaker, Single and Double Timing cycles, Pacemaker Troubleshooting

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Unit 4

(05 hrs.)

- **Cardiac pacing & radiofrequency ablation therapy:** Indications, Temporary and Permanent Pacing, NBG codes, Types of Pacing, Complications, Common sites of Ablation, Management of A. Flutter, V. Tach, A. Fib, AVNRT

Reference books

- ECG Made Easy –Atul Luthra
- Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
- Hampton J. 2003, The ECG made Easy (6th ed.) Churchill Livingstone, Edinburgh
- An Introduction to Electrocardiography: Schamroth Colin
- Clinical Electrocardiography: Goldberger. A
- Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.

ADVANCED ELECTROCARDIOGRAPHY-PRACTICAL

Subject Code: BCCTS1-505

**L T P C
0 0 4 2**

Duration: 60 (Hrs.)

Course Objective:

- To enable students, understand various arrhythmias.
- To demonstrate patient positioning and preparation.
- To teach students about maintenance of the ECG machine, wires and electrodes.

Course Outcome

- To develop an understanding regarding Echocardiography.
- To train students to perform Echocardiography examinations by explaining the position of transducers.
- To make students aware of recent advances in Echocardiography.
- To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Experiments

- Learn about 12-lead ECG
- Learn about various software's associated with ECG.
- Learn various conditions indicated for Electrocardiography

Reference books

- ECG Made Easy –Atul Luthra
- Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
- Hampton J. 2003, The ECG made Easy (6th ed.) Churchill Livingstone, Edinburgh
- An Introduction to Electrocardiography: Schamroth Colin
- Clinical Electrocardiography: Goldberger. A

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- Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.

ADVANCED ECHOCARDIOGRAPHY

Subject Code: BCCTS1-502

L T P C
2 0 0 2

Duration: 30 (Hrs.)

Course Objective:

- To provide a brief introduction to Echocardiography, its techniques and types of Echocardiography.
- To provide practically and clinically useful application of Echocardiography.
- To explain echo techniques available and to put echo into a clinical perspective.

Course Outcomes:

- To develop an understanding regarding Echocardiography.
- To train students to perform Echocardiography examinations by explaining the position of transducers.
- To make students aware of recent advances in Echocardiography.
- To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Unit 1 (5 hrs.)

- **Heart failure, myocardium and pericardium:** heart failure, assessment of lv systolic function, coronary artery disease, cardiomyopathies and myocarditis, diastolic function, right heart and lungs, long-axis function, pericardial disease, device therapy for heart failure – cardiac resynchronization therapy.

Unit 2 (10 hrs.)

- **Transesophageal echocardiography:** standard views used in toe, indications for toe, advantages and disadvantages of toe, patient preparation and care during toe, uses of toe, contraindications to toe, complications of toe,
- **Cardiac masses, infection and congenital abnormalities:** cardiac masses - tumors (primary or secondary), thrombus, infected material (vegetation or abscess), congenital abnormalities- shunts: asd, vsd, pfo, coarctation of the aorta, congenital valvular abnormalities- ebstein’s anomaly, pulmonary stenosis, bicuspid aortic valve.

Unit 3 (10 hrs.)

- **Special situations and conditions:** Pregnancy, Rhythm disturbances: A.Fib, V. Fib, Syncope, Palpitations, LVH, Stroke, TIA and Thromboembolism, Breathlessness and Peripheral edema.
- **Echo abnormalities in some systemic diseases and conditions:** HIV infection and AIDS, Chagas’ disease, Lyme disease, Rheumatic heart disease, Obesity.

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Unit 4

(05 hrs.)

- **Recent advances in echocardiography:** 3D Echo, 4D Echo, Tissue Doppler Imaging.

Reference Book:

- Echo Made Easy: Sam Kaddoura Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
- Feigen Baum's Echocardiography, Tajik Jamil for Echocardiography.

ADVANCED ECHOCARDIOGRAPHY PRACTICAL

Subject Code: BCCTS1-506

**L T P C
0 0 4 2**

Duration: 60 (Hrs.)

Course Objective:

- To provide a brief introduction to Echocardiography, its techniques and types of Echocardiography.
- To provide practically and clinically useful application of Echocardiography.
- To explain echo techniques available and to put echo into a clinical perspective.

Course Outcomes:

- To develop an understanding regarding Echocardiography.
- To train students to perform Echocardiography examinations by explaining the position of transducers.
- To make students aware of recent advances in Echocardiography.
- To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing **individually**.

Experiments

1. Learn about advanced Echo settings.
2. Learn about qualitative reporting systems along with various software's associated with Echo reporting.
3. Learn various conditions indicated for Echocardiography

Recommended Text Books:

- Echo Made Easy: Sam Kaddoura Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
- Feigen Baum's Echocardiography, Tajik Jamil for Echocardiography.

INVASIVE CARDIOLOGY

Subject Code: BCCTS1-503

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Course Objective:

- To enable students, understand new techniques for procedures in and around the heart emerge that again Need expert knowledge and manual dexterity.
- To understand such interventions which include diagnostic and therapeutic electrophysiology; implantation Or exchange of complex pacemaker systems or percutaneous cardioverter-defibrillator-pacers; Percutaneous valve repairs or replacements etc.

Course Outcomes: To enable students to not only be a helping hand to those just starting out in the specialty but also to serve as a reference for those who have been working in Invasive field for some time

Unit 1

(15 hrs.)

- **Contrast media:** basics, definition of hydrophilicity, osmolarity, and viscosity, contrast agents used in the ccl, uses, complications, contrast medium reactions: mild, moderate, severe, allergies: anaphylactic and anaphylactoid reaction, contrast-induced nephropathy (cin)
- **Hemodynamics:** introduction to hemodynamics, pressure measurement system, sources of error and artifacts: fluid artifacts, electronic and electrical artifacts, human error: leveling and balancing, slope calibration, hemodynamic waveforms, gradient, valve area calculations, cardiac output formulas- fick, ejection fraction.

Unit 2

(05 hrs.)

- **Ivus:** history, angiography vs. Ivus, ivus systems, diagnostic applications of ivus, complications of ivus, optical coherence tomography (oct)
- **Functional assessment of coronary disease:** intravascular pressure measurement: coronary pressures and fractional flow reserve

Unit 3

(15 hrs.)

- **Ptca:** history, indications, materials used, types of angioplasty balloons (otw, soe, fixed-wire
- Balloons, perfusion balloons, compliant and non-compliant balloons, stent implantation, contraindications, complications.
- **Ic hardwares: stents:** composition, types, guidewires: composition, types, catheters:

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diagnostic

- And guiding.
- **Iabp and other cardiac assist devices:** iabp- physiologic principles of counter pulsation, indications, contraindications, insertion, timing: timing errors, troubleshooting, weaning and balloon removal, complications.
- **Basics of percutaneous ventricular assist devices:** tandem heart, impella, percutaneous coronary bypass

Unit 4

(10 hrs.)

- **Peripheral carotid angiography:** introduction, cerebrovascular anatomy and pathology, diagnosis and patient selection, patient preparation, diagnostic procedure, post procedure care.
- **Cardiac pharmacology:** local anesthetics, analgesics and sedatives: opioids, morphine, fentanyl, diazepam, midazolam, lorazepam, vasodilators: nitroglycerine, sodium nitroprusside, beta receptor blockers: metoprolol, propranolol, esmolol, labetalol, calcium channel blockers: diltiazem, verapamil, nicardipine, anticoagulation agents: platelet aggregation inhibitors, aspirin, clopidogrel, glycoprotein iib/iiia inhibitors, tirofiban, heparin, warfarin, thrombolytics: streptokinase, urokinase, anistreplase, rtpa, reteplase, tenecteplase.

Reference books

- The Interventional Cardiac Catheterization Handbook, 3rd Edition By Morton J. Kern
- Invasive Cardiology, 3rd Edition by Sandy Watson

**COMMUNITY ORIENTATION & CLINICAL VISIT (INCLUDING RELATED
PRACTICAL'S TO THE PARENT COURSE) PRACTICAL**

Subject Code: BCCTS1-504

**L T P C
0 0 8 4**

Duration: 120 (Hrs.)

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.

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BASICS OF CLINICAL SKILL LEARNING

Subject Code: BCCTS1-507

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Course 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

Course 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

Unit 1 (15 hrs.)

- **Measuring vital signs:** temperature: axillaries temperature, pulse: sites of pulse, measurement, respiratory, blood pressure, pain: pain scale
- **Physical examination:** observation, auscultation(chest), palpation, percussion, history taking

Unit 2 (10 hrs.)

- **Feeding: enteral feeding, ng tube:** measurement, procedure, care, and removal of nasal-gastric tube, nasal-gastric tube feeding, and parenteral nutrition.

Unit 3 (10 hrs.)

- **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).

Unit 4 (10 hrs.)

- **Asepsis:** hand wash techniques,(medical, surgical) universal precaution, protecting equipments: 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.
- **Mobility and support:** moving and positioning, range of motion exercises (active & passive) assisting for transfer, application of restraints.

Reference Book:

- Jansen van Vuuren, M. V. (2005). A framework for a skills laboratory curriculum in an undergraduate medical programme in South Africa (Doctoral dissertation, University of the

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Free State).

HOSPITAL OPERATION MANAGEMENT

Subject Code: BCCTS1-508

**L T P C
3 0 0 3**

Duration: 45 (Hrs.)

Course Objective:

- To promote scientific management of hospitals and advancement of health care systems so as to make it rational, responsive and cost efficient.
- To promote the development of high quality 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.

Course 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

Unit 1

(15 hrs.)

- **Medico-legal cases:** introduction, laws associated with medico-legal cases, three core contents in medico-legal cases w.r.t doctors, patient & profession,
- **Considerations of ethics:** consent, confidentiality, mental health, end of life and organ transportation, research & clinical trials

Unit 2

(10 hrs.)

- **Hospital information system (his):** hospital information system management, software applications in registration, billing, investigations, reporting, medical records management, security and ethical challenges.

Unit 3

(10 hrs.)

- **Equipment operations management:** hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, amcs.

Unit 4

(10 hrs.)

- **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

Reference Book

- Hospital Operations: Principles of High Efficiency Health Care [William S. Lovejoy](#)
Handbook of Healthcare Operations Management Brian T. Denton

MRSPTU

6th Semester

**MRSPTU B. SC. (CARDIAC CARE TECHNOLOGY) SYLLABUS
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CARDIAC CATHETERIZATION

Subject Code: BCCTS1-601

L T P C
2 0 0 2

Duration: 30 (Hrs.)

Course Objective:

- To provide the critical information to students when beginning with interventional cardiology.
- To provide an extension of techniques and methods described for diagnostic catheterization and specially related techniques.

Course 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.

Unit 1 **(10 hrs.)**

- Asepsis in the cardiovascular catheterization laboratory
- Diagnostic catheterization

Unit 2 **(10 hrs.)**

- **Atherectomy and thrombectomy:** atherectomy devices- directional coronary atherectomy, rotational atherectomy, components, procedure, complications, thrombectomy devices- angiojet, manual aspiration devices
- **Renal artery intervention**

Unit 3 **(05 hrs.)**

- **Foreign body retrieval:** various instruments- amplatz goose neck snare, curry
- Intravascular retriever, dotter intravascular retriever, vascular retrieval forceps, walter retrieval loop, biopsy forceps

Unit 4 **(05 hrs.)**

- **Emergencies in the cardiac catheterization laboratory:** complications encountered in ccl, acs and bts algorithm

Reference books or related websites:

- The Interventional Cardiac Catheterization Handbook, 3rd Edition By Morton J. Kern

CARDIAC CATHETERIZATION PRACTICAL

Subject Code: BCCTS1-604

**L T P C
0 0 4 2**

Duration: 60 (Hrs.)

Course Objective:

- To provide the critical information to students when beginning with interventional cardiology.
- To provide an extension of techniques and methods described for diagnostic catheterization and specially related techniques.

Course 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.

Experiments

1. Sterilization techniques
2. Hardwares used in Cardiac Catheterization
3. Procedures involved in Cardiac Catheterization

Reference books

- The Interventional Cardiac Catheterization Handbook, 3rd Edition By Morton J. Kern

PEDIATRIC INTERVENTIONS

Subject Code: BCCTS1-602

**L T P C
2 0 0 2**

Duration: 30 (Hrs.)

Course Objective:

- To provide the critical information to students when beginning with Pediatric cardiology interventions.
- To approach the diagnostic problem presented by an infant or child with a cardiac finding.

Course Outcomes:

- The students will gain knowledge through proper assessment and integration of the history, physical examination, electrocardiogram, and chest X-ray, the type of problem can be diagnosed correctly in many patients, and the severity and hemodynamics correctly estimated.
- The occurrence and management of various complications in Pediatric cardiology interventions.

Unit 1

(10 hrs.)

- **Tools to diagnose cardiac conditions in children:** history- general principles of the cardiovascular history, chief complaint and/or presenting sign, physical examination- vital signs, cardiac examination, laboratory examinations

Unit 2

(05 hrs.)

- **Cardiac defect closure device:** device closure procedures in patent foramen ovale (pfo), atrial septal defect (asd), ventricular septal defect (vsd), patent ductus arteriosus (pda), left atrial appendage (laa).

Unit 3

(10 hrs.)

- **Percutaneous valve commissurotomy, repair, and replacement:** cardiac valves from the left to the right: mitral, aortic, pulmonic & tricuspid valves, their pathologies: ms, mr, as, ps, ts and treatment.
- **Pediatric interventional cardiology:** introduction, general anesthesia versus sedation and analgesia, diagnostic procedures, interventional procedures, device placement.

Unit 4

(05 hrs.)

- Chamber localization & cardiac malposition
- Recent advances in pediatric interventions

Reference books

- Invasive Cardiology, 3rd Edition by Sandy Watson.
- Pediatric Cardiology the Essential Pocket Guide, 3rd Edition by Walter H. Johnson, Jr., MD
- The Interventional Cardiac Catheterization Handbook, 3rd Edition By Morton J. Kern

PEDIATRIC INTERVENTIONS PRACTICAL

Subject Code: BCCTS1-605

**L T P C
0 0 4 2**

Duration: 60 (Hrs.)

Course Objective:

- To provide the critical information to students when beginning with Pediatric cardiology interventions.
- To approach the diagnostic problem presented by an infant or child with a cardiac finding.

Course Outcomes:

- The students will gain knowledge through proper assessment and integration of the history, physical examination, electrocardiogram, and chest X-ray, the type of problem can be diagnosed correctly in many patients, and the severity and hemodynamics correctly estimated.
- The occurrence and management of various complications in Pediatric cardiology interventions

Experiments

1. Diagnosis of Cardiac conditions in children
2. Cardiac Defect Closure Devices
3. Valve repair and replacement procedures
4. Drugs used in Pediatric Interventions

Reference books

- Invasive Cardiology, 3rd Edition by Sandy Watson.
- Pediatric Cardiology the Essential Pocket Guide, 3rd Edition by Walter H. Johnson, Jr., MD
- The Interventional Cardiac Catheterization Handbook, 3rd Edition By Morton J. Kern

CCT DIRECTED CLINICAL EDUCATION – IV

Subject Code: BCCTS1-603

Duration: 240 (Hrs.)

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:

- The internship shall commence after the student has completed and passed all subjects up to VI semesters.
- The internship is compulsory.
- The duration of the internship shall be one year.
- 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 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 a 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 Cardiology Department 30 days in Cardiac ICU/General ICUs 15 days for Record Keeping/CSSD department 15 days for Casualty/Visit to other hospitals

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.

I Clinical Teaching: Demonstrate beginning competency in technical skills.

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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.
- c. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.
- d. Identify the need for help when appropriate to the situation. Delegates level specific skills to Appropriate team members.

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 interprofessional team members,

Faculty, and fellow students in a positive, professional manner. Accept constructive feedback and develop a plan of action for improvement.

- b. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive at Clinical experiences at assigned times. Maintain professional behavior and appearance.

- c. Accept individual responsibility and accountability for nursing interventions,

outcomes, and other actions. Engage in self-evaluation & assume 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)