



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A⁺⁺' Accredited by NAAC

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CHOICE BASED CREDIT SYSTEM

(CBCS)

(with effect from 2023-24 Batches)

Curriculum for
B.Sc. Medical Radiology and Imaging
Technology

Approved as per AC-46/2023, Dated 28/04/2023

Amended History

1. Approved as per AC-46/2023 [Resolution No.6.3], Dated 28/04/2023.
2. Amended as per AC-46/2023 [Resolution No.6.7], Dated 28/04/2023.



MGM SCHOOL OF BIOMEDICAL SCIENCES
(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

(Deemed to be University u/s 3 of UGC Act 1956)

Grade “A⁺⁺” Accredited by NAAC

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CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2023 - 24)

Curriculum for

B.Sc. Allied Health Sciences

B.Sc. Medical Radiology and Imaging Technology

Semester I & II

Resolution No. 6.3 of Academic Council (AC-46/2023): Resolved to approve the major revision in the syllabus for all B.Sc. Allied program (1st and 2nd Semester) which is common for B.Sc. AT & OT, B.Sc. CCT, B.Sc. MDT, B.Sc. PT, B.Sc. MLT, B.Sc. MRIT, B. Optometry & B.Sc. PA, with effective from batch admitted in Academic Year 2023-24 onwards [ANNEXURE-47A, 47B, 47C, 47D, 47E, 47F, 47G, 47H].

OUTLINE OF COURSE CURRICULUM														
B.Sc. Medical Radiology & Imaging Technology														
Semester I														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Theory														
BMRIT 101 L	Human Anatomy Part I	2	-	-	-	2	30	-	-	-	30	10	40	50
BMRIT 102 L	Human Physiology Part I	2	-	-	-	2	30	-	-	-	30	10	40	50
BMRIT 103 L	General Biochemistry & Nutrition	3	-	-	-	3	45	-	-	-	45	10	40	50
BMRIT 104 L	Introduction to National Health Care System	2	-	-	-	2	30	-	-	-	30	10	40	50
BMRIT 101 P	Human Anatomy Part I	-	-	1	-	-	-	-	15	-	15	-	-	-
BMRIT 102 P	Human Physiology Part I	-	-	1	-	-	-	-	15	-	15	-	-	-
BMRIT 103 P	General Biochemistry Nutrition	-	-	1	-	-	-	-	15	-	15	-	-	-
BMRIT 105 P	Community Engagement & Clinical Visit (Including related practicals to the Parent course)	-	-	-	24	8	-	-	-	360	360	-	50	50
Ability Enhancement Course														
AEC 001 L	English & Communication skills	4	-	-	-	4	60	-	-	-	60	10	40	50
Multidisciplinary Course														
MD 001 L	Environmental Sciences	4	-	-	-	4	60	-	-	-	60	10	40	50
Total		17	0	3	24	25	255	0	45	360	660	60	290	350

OUTLINE OF COURSE CURRICULUM														
B.Sc. Medical Radiology & Imaging Technology														
Semester II														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Theory														
BMRIT 106 L	Human Anatomy Part II	2	-	-	-	2	30	-	-	-	30	10	40	50
BMRIT 107 L	Human Physiology Part II	2	-	-	-	2	30	-	-	-	30	10	40	50
BMRIT 108 L	General Microbiology	3	-	-	-	3	45	-	-	-	45	10	40	50
BMRIT 109 L	Basic Pathology & Hematology	4	-	-	-	4	60	-	-	-	60	10	40	50
BMRIT 110 L	Introduction to Quality and Patient safety (Multidisciplinary/Interdisciplinary)	3	-	-	-	3	45	-	-	-	45	10	40	50
Practical														
BMRIT 106 P	Human Anatomy Part II	-	-	1	-	-	-	-	15	-	15	-	-	-
BMRIT 107 P	Human Physiology Part II	-	-	1	-	-	-	-	15	-	15	-	-	-
BMRIT 108 P	General Microbiology	-	-	1	-	-	-	-	15	-	15	-	-	-
BMRIT 109 P	Basic Pathology & Hematology	-	-	1	-	-	-	-	15	-	15	-	-	-
BMRIT 111 P	Community Engagement & Clinical Visit (Including related practicals to the Parent course)	-	-	-	24	8	-	-	-	360	360	-	50	50
Skill Enhancement Elective Course														
SEC 001 L	Medical Bioethics & IPR	3	-	-	-	3	45	-	-	-	45	10	40	50
SEC 002 L	Human Rights & Professional Values													
Total		17	0	4	24	25	255	0	60	360	675	60	290	350

FIRST YEAR

B.Sc. Medical Radiology and Imaging Technology SEMESTER-I

Code No.	Core Subjects
Theory	
BMRIT 101 L	Human Anatomy Part I
BMRIT 102 L	Human Physiology Part I
BMRIT 103 L	General Biochemistry & Nutrition
BMRIT 104 L	Introduction to National Health Care System (Multidisciplinary/ Interdisciplinary)
Practical	
BMRIT 101 P	Human Anatomy Part I
BMRIT 102 P	Human Physiology Part I
BMRIT 103 P	General Biochemistry
BMRIT 105 P	Community Engagement & Clinical Visit (Including related practicals to the Parent course)
Ability Enhancement Course	
AEC 001 L	English & Communication Skills
Multidisciplinary Course	
MD 001 L	Environmental Sciences

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Human Anatomy- Part I
Course Code	BMRIT 101 L

Teaching Objective	<ul style="list-style-type: none"> To introduce the students to the concepts related to General anatomy, Muscular, Respiratory, Circulatory, Digestive and Excretory system
Learning Outcomes	<ul style="list-style-type: none"> Comprehend and describe the normal disposition, inter -relationships, gross, functional and applied anatomy of various structures in the human body. Describe the basic anatomy of Respiratory and Circulatory system Describe the basic anatomy of Digestive and Excretory system

Sr. No.	Topic	Learning objectives	Subtopic	No. of Hours
1	Introduction to anatomy	<ul style="list-style-type: none"> To specify the various terms of anatomy To define cell To describe Cell Division To define tissue and enumerate its types To enumerate layers of skin and function 	Definition and various terms of anatomy Define cell with diagram, Cell Division – Definition and steps of mitosis and meiosis Tissue and enumerate the types of tissues with location and function Skin - Layers and function of skin	3
2	Skeletal System	<ul style="list-style-type: none"> To define bone and classify To list the names and number of bones in skeleton To define joint To classify joints To describe synovial joint To describe Shoulder, Hip & Knee joint 	Bone – Definition, functions, classification by - shape, region, development and structure List the names and number of bones in appendicular and axial skeleton Appendicular skeleton I - Bones of upper Limb, Appendicular skeleton II - Bones of lower limb Axial skeleton I -skull mandible, Axial skeleton II - vertebrae sacrum and pelvis	6

			<p>Joint-Definition of joint with structural classification and examples</p> <p>Definition and features of Synovial Jointclassification of Synovial Joint with examples</p> <p>Shoulder, Hip, Knee joint – for each joint type, bones forming joint, list of ligaments, Movements and muscle groups producing movements at these joints, applied anatomy</p>	
3	Muscular System	<ul style="list-style-type: none"> To define muscle To classify muscles To enumerate the muscles of upper limb To describe deltoid and biceps brachii To enumerate the muscles of lower limb, mastication & abdomen To describe Gluteus maximus, hamstrings, sternocleidomastoid & trapezius 	<p>Define Muscle and describe the types with features</p> <p>Enumerate the muscles of upper limb – group wise Describe deltoid and biceps brachii in detail</p> <p>Enumerate the muscles of lower limb – group wise Describe Gluteus maximus and hamstrings in detail Describe sternocleidomastoid in detail</p> <p>Enumerate the muscles of mastication</p> <p>Back - Describe trapezius in detail</p> <p>Enumerate the Muscles of abdomen</p>	5
4	Respiratory System	<ul style="list-style-type: none"> To specify parts of respiratory System To describe Larynx To enumerate list of bones and cartilages of Thoracic cage, To enumerate the movements. To describe diaphragm To describe Lung To list layers of pleura 	<p>Respiratory System - Introduction to Respiratory system and Parts</p> <p>Larynx-List of cartilages with type, Describe interior, nerve supply (names), function & applied anatomy</p> <p>Thoracic cage - list of bones and cartilages forming cage, enumerate the movements.</p> <p>Diaphragm- Describe origin, insertion, major</p>	4

		<ul style="list-style-type: none"> To describe Trachea & bronchopulmonary segments To define Mediastinum To list boundaries & divisions 	<p>openings, movements and applied anatomy</p> <p>Lung- external features, mediastinal surface, applied anatomy</p> <p>Pleura- name the layers</p> <p>Trachea- external features and function</p> <p>Bronchopulmonary segments- definition, list the segments, features of segments, applied anatomy</p> <p>Mediastinum- definition, boundaries, divisions</p>	
5	Circulatory System	<ul style="list-style-type: none"> To classify blood vessels To describe Heart To list layers of Pericardium To describe Coronary Circulation To enumerate Blood vessels of Thorax 	<p>Types of blood vessels- classification with example</p> <p>Heart- external & internal features</p> <p>Pericardium- layers</p> <p>Coronary Circulation- name vessels, for each vessel origin and distribution, list veins of the heart, applied anatomy</p> <p>Blood vessels of Thorax- list of vessels, branches of arch of aorta</p>	4
6	Digestive System	<ul style="list-style-type: none"> To describe Pharynx, Oesophagus, Stomach To enumerate Parts, functions and differences of Small and Large Intestine To describe liver, Spleen, Pancreas To enumerate salivary glands and their functions 	<p>Pharynx - Extent, parts, list internal features, list of muscles and nerve supply of pharynx</p> <p>Oesophagus - extent, function, applied anatomy</p> <p>Stomach -Gross anatomy, shape, capacity, location, parts, blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes), relation, functions, applied anatomy</p> <p>Small and Large Intestine – Parts, function and differences</p> <p>Liver - External features, location, functions, applied anatomy</p> <p>Spleen -External features,</p>	6

			location, functions, applied anatomy	
			Pancreas- External features, location, ducts, functions, applied anatomy	
			Salivary glands -Enumerate salivary gland and functions	
7	Excretory System	<ul style="list-style-type: none"> To describe Kidney and Urinary Bladder 	Kidney - External features, blood supply (Names of vessels) and function, applied anatomy Urinary Bladder- External features, capacity, list of ligaments and location, blood supply (Names of vessels), applied anatomy Urethra- male and female urethra difference	2
Total				30 hrs

BMRIT 101 P - Human Anatomy Part I- (Demonstration)

Sr No.	Topic	Learning objectives	Subtopic	No. of Hours
1	Introduction to anatomy	<ul style="list-style-type: none"> To understand Terminology of anatomy 	Terminology	1
2	Skeletal System	<ul style="list-style-type: none"> To identify types of Bones, Joints, To understand Shoulder, Hip, Knee joint – movements 	Bone- Classification of bones Joint- classification and examples Shoulder, Hip, Knee joint – movements at these joints	1
3	Muscular System	<ul style="list-style-type: none"> To identify Muscles of upper limb, lower limb, Sternocleidomastoid, muscles of Mastication, Trapezius 	Muscles of upper limb Muscles of lower limb Neck – Sternocleidomastoid muscles of Mastication Muscles of back - Trapezius	3
4	Respiratory System	<ul style="list-style-type: none"> To identify features of Larynx To identify bones and cartilages of Thoracic cage To identify Lung external features 	Larynx- cartilages, interior	1
			Thoracic cage- bones and cartilages	
			Lung- external features, mediastinal surface,	1
			Trachea- external features Mediastinum- definition, boundaries, divisions	
5	Circulatory System	<ul style="list-style-type: none"> To identify external & internal features of Heart 	Heart- external& internal features	1
			Right and left Coronary artery	
			Blood vessels of Thorax- list of vessels, branches of arch of aorta	
6	Digestive System	<ul style="list-style-type: none"> To identify features of Pharynx, Stomach, Small and Large Intestine, Liver, Spleen & pancreas 	Pharynx - parts, internal features	5
			Oesophagus- extent,	
			Stomach- Gross anatomy, shape, parts, interior	
			Small and Large Intestine – Parts, features	
			Liver- External features	
Spleen- External features				

			Pancreas- External features	
7	Excretory System	<ul style="list-style-type: none"> To identify features of kidney & urinary bladder 	Kidney – External and internal features Urinary Bladder- External and internal features	2
Total				15 hrs

Text Books :

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

Reference books:

1. B.D. Chaurasia :
 - Volume I-Upper limb & Thorax,
 - Volume II- Lower limb, Abdomen & Pelvis
 - Volume III- Head, Neck, Face
 - Volume IV- Brain-Neuroanatomy
2. Vishram Singh:
 - Textbook of Anatomy Upper limb & Thorax
 - Textbook of Anatomy Abdomen & Lower limb
 - Textbook of Head neck and Brain
3. Students Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Human Physiology Part I
Course Code	BMRIT 102 L

Teaching objective	To teach basic physiological concepts related to : General physiology, Hematology, Cardiovascular, Digestive, Respiratory physiology, Nerve-Muscle physiology
Learning outcomes	<p>At the end of the semester, the student shall be able to</p> <ul style="list-style-type: none"> • To demonstrate knowledge of Homeostasis, transport mechanism, composition & functions of blood and blood components, blood groups coagulation process, Immunity • To demonstrate knowledge of basics of functioning of heart, Cardiac cycle, normal count & Variation in heart rate, cardiac output, Blood pressure. Normal ECG • To demonstrate knowledge of Composition and functions of all Digestive juices, Movements of gut, Digestion & Absorption of food • To demonstrate knowledge of Mechanism of respiration, Transport of Respiratory Gases-O₂ & CO₂, respiratory centers and their function • To demonstrate knowledge of Structure & types of neuron, muscles, , Neuromuscular junction& Transmission

Sr. No.	Topics	Learning Objectives	No. of Hours
1	General Physiology- a. Introduction to physiology, b. Homeostasis-Definition , Positive & negative feedback mechanism c. Transport Across cell membrane- Types, diffusion, osmosis, active transport	At the end of the session, the student shall be able to <ul style="list-style-type: none"> • Define physiology and its significance • Define Homeostasis, Define& describe Positive & negative feedback mechanism with examples, • classify transport mechanism, Explain diffusion, osmosis, active transport 	2
2	Blood – a. Composition and functions of Blood, b. RBC-structure, Normal count, and Physiological variation of the RBC, stages of erythropoiesis, factors required for erythropoiesis c.Hb Concentrations- normal value & variation , function	At the end of the session, the student shall be able to <ul style="list-style-type: none"> • Describe composition & functions of blood • Describe structure &function RBC, Normal count, and Physiological variation of the RBC, 	8

	<p>d. Anemia: Causes, effects on body e .WBC- Types and functions, Normal count, and Physiological variation, f. Blood Groups - ABO and RH grouping, g. Platelet - Normal count, and Physiological variation and functions h. Coagulations - & Anticoagulants, i. Immunity – definition &types, j. Body Fluid: Compartments, Composition,</p>	<ul style="list-style-type: none"> • Enumerate stages of Erythropoiesis, & factors required for Erythropoiesis • Mention normal value & variation & function of hemoglobin • Define Anemia, enumerate its causes, mention its effects on body • Classify WBC, mention Normal count, and Physiological variation, • Describe structure &function each WBC, • Enumerate functions of platelets & variation in platelets count • Explain ABO & Rh blood groups and their importance • Describe coagulation process and enumerate invivo and invitro Anticoagulants • Define & classify immunity • Classify body fluid compartments & mention their composition 	
3	<p>Cardio vascular system - a. general organization, functions & importance of CVS , b. Structure of heart, properties of cardiac muscle, c. Origin & spread of Cardiac Impulse, cardiac pacemaker, d. Cardiac cycle – arterial & ventricular Events ,heart sounds- normal heart sounds, causes e. E C G-Normal waves & significance, Uses of ECG f. Heart Rate- normal count & Variation. factors affecting g. Cardiac output _ normal values ,factors affecting h. Blood Pressure definition & normal values, Physiological needs & variation, g. concept of CVS regulatory mechanisms</p>	<p>At the end of the session, the student shall be able to</p> <ul style="list-style-type: none"> • Describe general organization, functions importance of CVS , • Describe Structure of heart & Enumerate properties of cardiac muscle, • Describe Origin & spread of Cardiac Impulse& mention cardiac pacemaker, • Describe arterial & ventricular events in Cardiac cycle • Enumerate normal heart sounds & its causes • Draw & Identify Normal E C G waves & Mention their significance, • Enumerate uses of ECG , • Mention normal Heart Rate & define Tachycardia ,Bradycardia • Enumerate factors affecting 	8

		<p>HR</p> <ul style="list-style-type: none"> • Define Cardiac output ,mention normal value • Enumerate factors affecting CO • Define Blood Pressure ,mention normal BP values & variation, • Classify regulatory mechanisms, Enumerate function of VMC • Enumerate effects of sympathetic and parasympathetic stimulation on heart, HR,CO,BP 	
4	<p>Digestive system –</p> <p>a. organization of Digestive system,</p> <p>b. Composition and functions of all Digestive juices- Saliva, gastric juice , Pancreatic juice, Bile, Intestinal juice,</p> <p>c. Deglutition-Stages, Peristalsis</p> <p>d. Digestion & Absorption of Carbohydrate, Proteins & Fats in short</p>	<p>At the end of the session, the student shall be able to</p> <ul style="list-style-type: none"> • Describe organization of Digestive system, • Enumerate Composition and functions of Saliva, gastric juice , Pancreatic juice, Bile, Intestinal juice, • Enumerate Stages of Deglutition describe Peristalsis • Describe Digestion & Absorption of Carbohydrate, Proteins & Fats in short 	4
5	<p>Respiratory System –</p> <p>a. Physiologic anatomy, functions of respiratory system,</p> <p>b. Mechanism of respiration-Inspiration& Expiration, Muscles of Respiration</p> <p>c. Lung Volumes & capacities-Definition & normal values</p> <p>d. Transport of Respiratory Gases-O₂ & CO₂- pressure gradient, forms of transport</p> <p>e. Regulation of Respiration- respiratory centers and their function</p>	<p>At the end of the session, the student shall be able to</p> <ul style="list-style-type: none"> • Mention parts of and functions of respiratory system, • Describe Mechanism of Inspiration& Expiration, • Enumerate Muscles of Respiration • Define Lung Volumes & capacities & mention their normal values • Describe Transport of O₂ by blood, Draw a labeled oxygen –Hb dissociation curve. Enumerate factors shifting the curve to left and right • Describe various forms in 	5

		<ul style="list-style-type: none"> • which CO₂ transported • Enumerate respiratory centers and their function 	
6	Muscle nerve physiology – a. Structure of neuron & types, b. Types of muscles, c. Structure of skeletal Muscle, Sarcomere, Neuromuscular junction & Transmission.	At the end of the session, the student shall be able to <ul style="list-style-type: none"> • Draw a labeled Structure of neuron • Classify neurons • Classify muscles, • Draw a labeled Structure of Sarcomere, • Draw a labeled Structure Neuromuscular junction • Describe the steps in Neuromuscular Transmission. 	3
Total			30 hrs

BMRIT 102 P - Human Physiology Part I (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Study of Microscope and its use, Collection of Blood and study of Haemocytometer	15
2	Haemoglobinometry	
3	White Blood Cell count	
4	Red Blood Cell count	
5	Determination of Blood Groups	
6	Leishman's staining and Differential WBC Count	
7	Determination of Bleeding Time, Determination of Clotting Time	
8	Pulse & Blood Pressure Recording, Auscultation for Heart Sounds	
9	Artificial Respiration –Demonstration, Spirometry-Demonstration	
Total		15 hrs

Textbooks:

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – DevasisPramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.

Reference books:

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

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	General Biochemistry & Nutrition
Course Code	BMRIT 103 L

Teaching Objective	<p>At the end of the course, the student demonstrates his knowledge and understanding on:</p> <ul style="list-style-type: none"> • Structure, function and interrelationship of biomolecules and consequences of deviation from normal. • Action mechanism and importance of enzymes and isoenzymes in biological system. • Generation of Energy at cellular level. • Understand aspects of Nutrition and it's deficiencies. • Clinical significance of vitamins and minerals in health and diseases. • Universal Safety precautions in health care.
Learning Outcomes	<ul style="list-style-type: none"> • Define "biochemistry". • Classify carbohydrates and give their biological significance. • Classify proteins and give their biological significance. • Classify lipids and give their biological significance. • Describe structure, types and functions of DNA and RNA. • Explain the types and mechanism of enzyme (biochemical catalysts)

	<p>action. Understand the diagnostic importance of enzymes and isoenzymes.</p> <ul style="list-style-type: none"> • Explain the ultimate generation of large quantities of ATP from the fate of various biomolecules. • Explain the functions and clinical importance of vitamins and minerals. • Describe the structure, types and functions of DNA and RNA. • Explain the functions and clinical importance of vitamins and minerals. • Basic Knowledge of clinical laboratory samples, First-Aid and universal safety precautions. • Describe the importance of balanced diet, nutrition and its related deficiencies.
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Sr. No.	Topics	No. of Hrs.
1	Introduction and scope of biochemistry	1
2	1) Chemistry of Carbohydrates: <ul style="list-style-type: none"> • Definition and classification of carbohydrates with examples (Definition and Functions of Monosaccharides, Disaccharides and Polysaccharides) 	3
	2) Chemistry of Proteins: <ul style="list-style-type: none"> • Amino acids (total number of amino acids, essential and non essential amino acids) • Definition and Classification of Proteins • Structural organization of proteins • Denaturation of Proteins. 	3
	3) Chemistry of Lipids: <ul style="list-style-type: none"> • Definition, functions, Classification of Lipids (Simple, Compound and Derived Lipids) • Essential Fatty Acids. 	2
	4) Chemistry of Nucleic acid: <ul style="list-style-type: none"> • Nucleosides and Nucleotides • Watson and Crick model of DNA • RNA- it's type along with functions 	2
3	Elementary knowledge of enzymes – <ul style="list-style-type: none"> • Classification of enzymes • Mechanism of enzyme action • Factors affecting enzyme activity • Diagnostic importance of enzymes and isoenzymes. 	7
4	Biological oxidation <ul style="list-style-type: none"> • Outline of Electron transport chain. • Definition of Oxidative phosphorylation. 	3

5	Vitamins and Minerals <ul style="list-style-type: none"> • 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. 	12
6	Pre examination Skills – <ul style="list-style-type: none"> • Collection, preservation and transport of blood and urine samples • Anticoagulants used in Biochemistry • Disposal of biological Waste materials used in Biochemical laboratory • Universal precautions and Safety measures • First-Aid 	6
7	Nutrition: <ul style="list-style-type: none"> • Specific Dynamic Action • BMR and its significance • Balanced Diet • Protein Energy Malnutrition (Kwashiorkor and Marasmus) • Nitrogen Balance • Glycemic Index 	6
Total		45 hrs

BMRIT 103 P – General Biochemistry (Demonstration)

Sr. No.	Topics	No. of Hrs
1	Introduction to Personnel protective equipments used in laboratory and their importance (LCD)	15
2	Principle and applications of colorimeter (LCD)	
3	Demonstration of tests for carbohydrates (Monosaccharides, disaccharides and polysaccharides)	
4	Test on bile salts and bile pigments (only demonstration)	
5	Tests on Normal constituents of Urine (only demo) <ul style="list-style-type: none"> • Urea • Creatinine • Uric acid • Ammonia 	
6	Tests on Abnormal constituents of Urine (only demo) <ul style="list-style-type: none"> • Sugar • Protein • Blood • Ketone bodies 	
Total		15 hrs

Textbooks:

1. Essentials of Biochemistry, 2nd Edition, Dr. Pankaja Naik
2. Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by Praful Ghodkar
3. Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by Praful Ghodkar
4. Essentials of Biochemistry, Third Edition, Dr. (Prof) Satyanarayana.

Reference books:

1. Textbook of Biochemistry for Medical Student, 6th Edition, DM Vasudevan
2. Principles and Techniques of Biochemistry and Molecular Biology, 5th Edition, Wilson & Walker

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Introduction to National Health Care System (Multidisciplinary/Interdisciplinary)
Course Code	BMRIT 104 L

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

Sr. No	Topic Name	Learning objectives	Topics	Hrs
1	Introduction to healthcare delivery system	The student should be aware about healthcare delivery system in India and should be able to describe the healthcare delivery system functioning at various levels	<ul style="list-style-type: none"> • Healthcare delivery system in India • Three tier healthcare delivery system in India • Village level health workers (ASHA, 	6

			<p>AWW)</p> <ul style="list-style-type: none"> Working and functions of Sub centre, PHC, CHC Role of Medical Officer, Health worker male/female Role of Health assistant-male/female National Health mission-key points and salient features Health system in developed nations-UK, Canada, USA, developing countries general idea Issues in healthcare delivery system in India 	
2	Introduction to AYUSH system of medicine	The students should have a general idea about AYUSH system of medicine and should be able to describe the rationale behind need for integration of various system of medicine	<ul style="list-style-type: none"> Describe following: Ayurveda, Homeopathy, Unani, Siddha Naturopathy and Yoga under following head- a) Principle b) Characteristic features c) Merits d) Demerits Need for integration of various systems of medicine 	2
3	Health scenario of India	Students should be able to link and give an overview of the evolution of Health scenario of India-past, present and future	The evolution of health scenario in India from various Health planning committees (only overview with emphasis on Bhorecommittee) to recent national Health Policy to Sustainable development goals.	2
4	Demography and vital statistics	<p>Student should be</p> <ul style="list-style-type: none"> able to describe concept of demography, able to enumerate demographic indicators aware of various sources of epidemiological data Understand the relationship between demography and its effect on public health 	<ul style="list-style-type: none"> Definition of Demography Demography cycle Demographic indicators Population pyramids Dependency Ratio Indicators of Fertility(enumeration) Sex Ratio Population explosion Factors Responsible for High Fertility in India Population Census Vital statistics and its Registration Registration of Birth and Deaths Act National Family Health Survey(overview) 	5
5	Epidemiology- General principles	<ul style="list-style-type: none"> Define epidemiology, describe its concept, principles and uses Enumerate, define and discuss epidemiological study methods Define, calculate and interpret 	<ul style="list-style-type: none"> Define epidemiology Concept of epidemiology Uses of epidemiology Basic measurements in epidemiology Types of epidemiological studies 	5

		epidemiological data	<ul style="list-style-type: none"> • Concept of Screening • Monitoring and surveillance(overview) 	
6	Epidemiology of Communicable diseases with Infectious Disease epidemiology	Student should know epidemiology of disease, lab diagnosis, prevention and control measures	<ul style="list-style-type: none"> • Natural history of disease • Iceberg phenomenon • Carriers • Modes of transmission • IP and GT • Secondary Attack Rate • Basic concepts in Immunization including UIP • Cold Chain • Disinfection • Notification of Disease <p>Epidemiology of</p> <ol style="list-style-type: none"> 1. Measles 2. HIV 3. TB 4. Covid19 5. Polio 6. Acute diarrhoeal diseases 7. Acute Respiratory diseases 8. Vector borne diseases (Malaria, dengue) 9. Typhoid 10. Hepatitis 	5
	Epidemiology of non-communicable diseases	Student should know epidemiology of disease, lab diagnosis, prevention and control measures	<ul style="list-style-type: none"> • Cancer • Blindness • Cardiovascular disease • DM • HTN • Accidents and Injuries 	2
8.	National Health Programmes	Student should be aware about various National programmes running in the country and should be able to give a basic idea about them	<p>Heads to be focussed under National Health Programme:</p> <ol style="list-style-type: none"> 1. Introduction 2. Goals/targets/objectives 3. Initiatives taken/Services provided under the programme, broadly. <ul style="list-style-type: none"> • ICDS • RMNCH+A • NVBDCP • NBCP • NACP • NTEP • NPCDCS • Ayushman Bharat 	3
Total				30 hrs

Books:

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

BMRIT 105 P - Community Engagement & Clinical Visit (Including related practicals to the Parent course) (Total -360 hrs)

ABILITY ENHANCEMENT COURSE

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	English and Communication Skills
Course Code	AEC 001 L

Teaching Objective	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Able to express better. • Grow personally and professionally and Develop confidence in every field

Sr. No.	Topics	No. of Hrs.
1	Basics of Grammar - Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words	10
2	Basics of Grammar – Part II - Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms	10
3	Writing Skills - Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension	5
4	Writing and Reading, Summary writing, Creative writing, news paper reading	5

5	Practical Exercise, Formal speech, Phonetics, semantics and pronunciation	5
6	Introduction to communication skills - Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals	6
7	Speaking - Importance of speaking efficiently, Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling , Presentation skills, Individual feedback for each student, Conference/Interview technique	5
8	Listening - Importance of listening , Self assessment, Action plan execution, Barriers in listening, Good and persuasive listening	5
9	Reading - What is efficient and fast reading , Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehension through systematic study	5
10	Non Verbal Communication - Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP), Communication in Optometry practice	4
Total		60 hrs

Text books:

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

Multidisciplinary Course

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Environmental Sciences
Course Code	MD 001 L

Teaching Objective	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Current environmental issues and highlight the importance of adopting an interdisciplinary approach. • Sample an ecosystem to determine population density and distribution. • Create food webs and analyse possible disruption of feeding relationships.

Sr. No.	Topics	No. of Hrs.
1	Concept Of Environment, Land : A Natural Resource, Natural Resource : Forest, The Story Of Water, Treasure Of Earth	2
2	Global Food Position : Challenges And Solutions, Renewable Energy Resources :	8

	Energy And Environment, Energy & Environment, Part-1, Dams : Boon Or Curse, Fresh Water Ecology, Reservoir Ecosystem, Part-1	
3	Reservoir Ecosystem, Part-2, The Concept Of Ecosystem, Energy Flow In Ecosystem, Eco-Friendly Agriculture, Desert Ecosystem, Forest Ecosystem, Ecological Succession, Food Webs & Ecological Pyramids, Grass Land Ecosystem	6
4	Bio-Geographical Classification Of India, Natural Dye, Biodiversity : An Introduction ,Biodiversity And Its Conservation, Biodiversity At Global National And Local-Level,Threats To Biodiversity, Value Of Biodiversity, Endangered Common Plant And Animal Species	8
5	India As - A Megadiversity Nation, Types Of Noise Pollution, Air Pollution, Soil Pollution, Effects Of Noise Pollution, Role Of An Individual In Prevention Of Pollution, Land Slides	8
6	Cyclone, Flood, Earth Quakes And Disaster Management, The Changing Nature Of Earth	4
7	Basics Of Municipal Solid Waste, Management Of Municipal Solid Waste, Agony Of Seas, The Price Of Panacea - Biomedical Waste, Effects And Controls Of Water Pollution	4
8	Nuclear Hazards, Industries & Waste, Dealing With Industrial Waste, Environmental Rights, Environmental Threats, Public Environmental Awareness, Ethics Of Environmental Education, Environmental Values	4
9	Indian Legislative Steps To Protect Our Environment, Water Management Practices, Sustainable Development, Urban Problems Related To Energy, Resettlement And Rehabilitation	4
10	Environment And Climate Change, Sex Ratio, Population Explosion, Impact Of Human Population On Environment, Infectious Diseases And Waterborne Diseases	2
11	Hiv/Aids, Cancer & The Environment, Environment And Human Health, Chemicals In Food, Typha : A Bio-Remedial Plant, Castor Bean, Pinus	5
12	Malaria, Machla : A Serene Village, The Secret Of Taste – Chilli, Common Avenue – Trees, Common Village Trees, Flower - The Beautiful Gift Of Nature, Silk Cotton Tree : Kapok, Cotton Yarn	5
Total		60 hrs

Books:

- 1-Bharucha, Erach (2005):"Text Book of Environmental Studies for Undergraduate Courses", Universities Press (India) pvt ltd, Hyderabad, India.
- 2-IGNOU – 1991 – AHE-1/5 – Human Environment Management of Environment - Indira Gandhi open university, New Delhi
- 3-IGNOU 1995 – FST-1/4 Foundation course in Science and Technology “Environment and Resource” - Indira Gandhi open university, New Delhi
- 4-Kothari Dr. Milind – 2005 – Environmental Education – Universal Publication, Agra.

FIRST YEAR

B.Sc. Medical Radiology and Imaging Technology

SEMESTER- II

Code No.	Core Subjects
Theory	
BMRIT 106 L	Human Anatomy Part II
BMRIT 107 L	Human Physiology Part II
BMRIT 108 L	General Microbiology
BMRIT 109 L	Basic Pathology & Hematology
BMRIT 110 L	Introduction to Quality and Patient safety
	(Multidisciplinary/Interdisciplinary)
Practical	
BMRIT 106 P	Human Anatomy Part II
BMRIT 107 P	Human Physiology Part II
BMRIT 108 P	General Microbiology
BMRIT 109 P	Basic Pathology & Hematology
BMRIT 111 P	Community Engagement & Clinical Visit (Including related practicals to the Parent course)
Skill Enhancement Elective Course	
SEC 001 L	Medical Bioethics & IPR
SEC 002 L	Human Rights & Professional Values

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Human Anatomy- Part II
Course Code	BMRIT 106 L

Teaching Objective	To teach students the basic anatomy of Reproductive, Lymphatic, Endocrine, Nervous systems and special senses
Learning Outcomes	<ul style="list-style-type: none"> • Describe the basic anatomy of Reproductive system. • Describe the basic anatomy of Lymphatic system. • Describe the basic anatomy of Endocrine system • Describe the basic anatomy of Nervous system • Describe the basic anatomy of Special senses

Sr. No.	Topics	Learning Objectives	Subtopics	No.of Hrs.
1	Reproductive system	<ul style="list-style-type: none"> • To describe testis • To list parts of epididymis • To list of coverings and contents of spermatic cord • To describe ovaries, Fallopian Tube & Uterus • To classify supports of uterus with examples 	Testis - coverings, features (external & internal), blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes) & any 2 applied aspects	6
			Epididymis – parts	
			Spermatic cord – List of coverings and contents	
			Ovaries – Position, features (external), ligaments, blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes) & applied anatomy	
			Fallopian Tube - Position, features (external), blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes) & applied anatomy	
			Uterus - Position, features (external & internal), supports (Classification with examples), blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes), applied anatomy	
2	Lymphatic system	<ul style="list-style-type: none"> • To list parts and 	Lymphoid system – Lymph, Functions, Parts, Primary &	5

		<p>functions of lymphoid system</p> <ul style="list-style-type: none"> To classify lymphoid tissue with examples To describe microscopic features of lymph node, thymus, spleen, & tonsil To describe of cervical, axillary & inguinal lymph nodes 	<p>secondary lymphoid tissue, Microscopic features, Functions Lymph node</p> <p>Thymus - Microscopic features, Functions</p> <p>Spleen- Microscopic features, Functions</p> <p>MALT – definition and examples Tonsil - Microscopic features, Functions</p> <p>Cervical, Axillary, Inguinal - Lymph node groups – Location, Number, Drainage area, applied aspect 1 each</p>	
3	Endocrine system	<ul style="list-style-type: none"> To describe pituitary, thyroid, parathyroid and adrenal glands 	<p>Pituitary gland - Coverings, Position, features (external), Secretions, blood supply (Names of vessels) & applied anatomy</p> <p>Thyroid gland - Coverings, Position, features (external), Secretions, blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes) & applied anatomy</p> <p>Adrenal gland - Coverings, Position, features (external), Secretions, blood supply (Names of vessels), & applied anatomy</p> <p>Parathyroid gland - Position, features (external), Secretions, blood supply (Names of vessels), & applied anatomy</p>	4
4	Nervous system	<ul style="list-style-type: none"> To describe structure of neuron To classify neurons & neuroglia with examples To list divisions of nervous system To list meninges, dural folds To define & classify dural 	<p>Introduction to nervous system – Neuron - Structure, Axon & dendrite differences, Classification with examples Neuroglia – Classification, Functions Divisions of Nervous system</p> <p>Meninges – Names, Names of dural folds, Dural venous sinuses – Definition, Classification & List</p> <p>Cavernous sinus - Position, features (external & internal),</p>	13

		<p>venous sinuses</p> <ul style="list-style-type: none"> • To describe cavernous sinus • To describe features & functional areas of cerebrum • To describe blood supply of brain • To describe cerebellum • To list parts of brain stem • To describe medulla, pons & midbrain including their internal structure at inferior olivary nucleus, facial colliculus and superior colliculus • To describe spinal cord including its internal structure • To list cranial nerves • To describe origin & distribution of III, VII & XII nerves • To describe circulation of C.S.F • To name ventricles of brain with their connections 	<p>Connections, Tributaries & applied anatomy</p> <p>Cerebrum – Features, Sulci, gyri, Functional areas – Names & Numbers (Broadman), Location & Function.</p> <p>Blood supply of brain – Names of arteries and their area of distribution with applied anatomy. Circle of Willi’s – Location, Formation, Branches and Applied</p> <p>Cerebellum – Location, Features, Divisions, Deep nuclei (names), Connections – Names of 3 peduncles with main tracts passing through, Blood supply – Names of arteries, Cerebellar syndrome</p> <p>Brainstem - Parts</p> <p>Medulla - Location, features (external), List of cranial nerves emerging from it, Internal features – T.S at inferior olivary nucleus, Applied aspect</p> <p>Pons - Location, features (external), List of cranial nerves emerging from it, Internal features – T.S at facial colliculus, Applied aspect</p> <p>Midbrain - Location, features (external), List of cranial nerves emerging from it, Internal features – T.S at superior colliculus, Applied aspect</p> <p>Spinal cord - Extent, size, features (external), number of spinal nerves, Internal features – T.S showing tracts, List of ascending and descending tracts with their function, Applied aspects any 2</p> <p>List of cranial nerves with function</p> <p>Oculomotor, Facial,</p>	
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			Hypoglossal nerve – Origin and distribution	
			CSF – Path of circulation and applied aspect	
			Ventricles – Names and connections	
5	Sensory system	<ul style="list-style-type: none"> To specify parts of eye and ear with their functions To list contents of middle ear 	Eye – Parts of eye and their functions Ear – Parts of ear and their functions, List of middle ear contents	2
Total				30 hrs

BMRIT 106 P - Human Anatomy Part II (Demonstration)

Sr.No.	Topics	Learning Objectives	Subtopics	No.of Hrs.
1	Reproductive system	To identify features of organs of male and female reproductive system	Testis - coverings, features (external & internal) Epididymis – parts	1
			Spermatic cord – coverings and contents	
			Ovaries – features (external), Ligaments	1
			Fallopian Tube - Parts, features (external)	
			Uterus - Position, Parts, features, broad ligament, Structures at cornu	
2	Lymphatic system	To identify location of Cervical, Axillary, Inguinal Lymph node groups	Cervical, Axillary, Inguinal - Lymph node groups – Location	1
3	Endocrine system	To identify features of thyroid, parathyroid & adrenal glands	Thyroid gland - Position, features (external)	1
			Adrenal gland - Position, features (external)	
			Parathyroid gland - Position	
4	Nervous system	<ul style="list-style-type: none"> To identify features of cerebrum, cerebellum, brain stem, spinal cord To identify formation of circle of Willis' To identify features of ventricles of brain 	Cerebrum – Features, Sulci, gyri, Functional areas – Names & Numbers (Broadman), Location	4
			Circle of Willi's – Location, Formation	
			Cerebellum – Location, features, Divisions, 3 peduncles	6
			Brainstem - Parts	
			Medulla - features (external), cranial nerves attachment	
			Pons - features (external), cranial nerves attachment	
			Midbrain - features (external), cranial nerves attachment	
			Spinal cord - Extent, size, features (external)	
			Ventricles – Identification	
5	Sensory system	To understand parts of eye and ear	Eye – Parts of eye	1
			Ear – Parts of ear	
Total				15 hrs

Textbooks:

1. Manipal Manual of Anatomy for Allied Health Sciences courses: Madhyastha S.
2. G.J.Tortora &N.P Anagnostakos: Principles of Anatomy and Physiology
3. Text book of Histology, Apracticalguide :-J.P Gunasegaran

Reference Books:

1. B. D. Chaurasia:
 - Volume I - Upper limb & Thorax,
 - Volume II - Lower limb, Abdomen & Pelvis
 - Volume III - Head,Neck,Face
 - Volume IV- Brain - Neuroanatomy
2. Vishram Singh:
 - Textbook of Anatomy Upper limb &Thorax
 - Textbook of Anatomy Abdomen & Lower limb
 - Text book of Head neck and Brain ,
3. Students Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Human Physiology Part II
Course Code	BMRIT 107 L

Teaching Objective	<p>To teach students the basic physiological concepts related to:</p> <ul style="list-style-type: none"> • Renal system, Endocrinology & Reproductive system, CNS, Special senses
Learning Outcomes	<p>At the end of the semester, the student shall be able to</p> <ul style="list-style-type: none"> • To demonstrate knowledge of Parts and Functions of Nervous system, Synapse, Receptors, Reflex, spinal cord, Ascending tracts, Descending tracts, Cerebral cortex, Cerebellum, Basal ganglia Hypothalamus • To demonstrate knowledge of Structure of Eye, functions of different parts of eye, Refractive errors of Eye, functions of ear, Tests for Hearing • To demonstrate knowledge of Structure and function of skin, body temperature, cause of fever • To demonstrate knowledge of endocrine glands of the body and hormone secreted by each gland & their main functions • To demonstrate knowledge of Parts of Male Reproductive System, stages of spermatogenesis, functions of Testosterone, parts of Female reproductive system, Menstrual cycle, functions of Oestrogen & Progesterone, urine pregnancy test Contraceptives methods • To demonstrate knowledge of functions of kidney, steps of Glomerular filtration, functions of PCT, DCT, Loop of Henle, CT of Nephron, Micturition reflex

Sr. No.	Topics	Learning Objectives	No. of Hours
1	<p>Nervous system –</p> <p>a. Parts and Functions of Nervous system</p> <p>b. Synapse-transmission, Receptors-Types & examples,</p> <p>c. Reflexes –definition & Classification</p> <p>d. Spinal cord- structure and function</p> <p>e. Ascending tracts-Names & functions,</p> <p>f. Descending tracts- Names & functions,,</p> <p>g. Functions of various parts of the Brain- Cerebral cortex, Cerebellum, Basal ganglia Hypothalamus.</p> <p>h. Cerebro-Spinal Fluid (CSF): Composition, functions & Circulation, Lumbar Puncture,</p> <p>i. Autonomic Nervous System (ANS): Functions.</p>	<p>At the end of the session, the student shall be able to</p> <ul style="list-style-type: none"> • Enumerate Parts and Functions of Nervous system , • Draw labeled diagram of Synapse • Describe steps of synaptic transmission, • Classify Receptors with examples, • Define Reflex , Classify reflexes with example • Explain structure (parts) of spinal cord and function • Enumerate Ascending tracts & their functions, • Enumerate Descending tracts & their functions, • Enumerate Functions of various parts of the Brain- Cerebral cortex, Cerebellum, Basal ganglia Hypothalamus. • Describe Composition, functions & Circulation Cerebro-Spinal Fluid (CSF), Explain significance of Lumbar Puncture • Explain Functions of Autonomic Nervous System (ANS) 	10
2	<p>Special senses-</p> <p>a. Vision: Structure of Eye, functions of different parts, Refractive errors of Eye and correction,</p> <p>b. Hearing: Structure and function of ear, Tests for Hearing (Deafness)</p>	<p>At the end of the session, the student shall be able to</p> <ul style="list-style-type: none"> • Draw Structure of Eye • Enumerate functions of different parts of eye, • Classify and Define different Refractive errors of Eye and 	6

		correction, <ul style="list-style-type: none"> Enumerate function of ear, Describe Tests for Hearing (Deafness) 	
3	Skin – Structure and function, Body temperature- Normal value & variation, heat gain and heat lost mechanisms, fever.	At the end of the session, the student shall be able to <ul style="list-style-type: none"> Describe Structure and function of skin Mention Normal value & variation of body temperature Enumerate heat gain and heat lost mechanisms, Define fever & Enumerate cause of fever 	4
4	Endocrine System - Names of endocrine glands, Names of hormone secreted by each gland and their main function	At the end of the session, the student shall be able to <ul style="list-style-type: none"> Enumerate endocrine glands of the body and hormone secreted by each gland Enumerate the main functions of Growth hormone, thyroid hormone, parathyroid, Insulin, Aldosterone, cortisone 	2
5	Reproductive systems – a. Male Reproductive System: spermatogenesis, functions of Testosterone, b. Female reproductive system: Ovulation, Menstrual cycle, functions of Oestrogen & Progesterone, Pregnancy test, Contraceptives, Lactation: Composition of Milk, advantages of breast Feeding.	At the end of the session, the student shall be able to <ul style="list-style-type: none"> Enumerate Parts of Male Reproductive System Enumerate stages of spermatogenesis, Enumerate functions of Testosterone, Enumerate parts of Female reproductive system Define Ovulation, Enumerate uterine changes in Menstrual cycle, Enumerate functions of Oestrogen & Progesterone , Explain Physiological basis of urine pregnancy test, Enumerate different Contraceptives methods, Composition of Milk, Enumerate advantages of breast 	4

		Feeding.	
6	Excretory System - structure & functions of kidney, Glomerular filtration & tubular functions of Nephron, Juxta Glomerular Apparatus, Micturition, Artificial Kidney.	At the end of the session, the student shall be able to <ul style="list-style-type: none"> • Enumerate functions of kidney, • Draw labeled structure of Nephron • Enumerate steps and pressure gradient of Glomerular filtration • Enumerate functions of PCT, DCT, Loop of Henle, CT of Nephron. • Draw labeled structure of Juxta Glomerular Apparatus and enumerate functions • Describe nerve supply of urinary bladder Explain Micturition reflex • Artificial Kidney 	4
Total			30 hrs

BMRIT 107 P - Human Physiology Part II –(Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Recording of body temperature	15
2	Examination of sensory system- somatic sensations	
3	Examination of motor system-, movements, reflexes	
4	Examination of Eye- Distance and Near vision, Color vision, Visual reflexes	
5	Examination of ear-tests for hearing	
Total		15 hrs

Textbooks:

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – Devasis Pramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.

Reference books:

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

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	General Microbiology
Course Code	BMRIT 108 L

Teaching Objective	<ul style="list-style-type: none"> • To teach the students general principles of immunology, bacteriology, mycology, and virology. Understand the importance of clinical information in supporting a timely, accurate Microbiological diagnosis. • To provide students with essential medical knowledge and a broad understanding of human infection. • To demonstrate clinical skills essential in providing basic diagnostic services such as proper collection, transportation, receiving, acceptance or rejection and storage of blood sample, urine, stool, body fluids. • To inculcate knowledge regarding rationale and principles of technical procedures of the microbiological diagnostic lab tests and interpretation of test results.
Learning Outcomes	<p>The student should be able to</p> <ul style="list-style-type: none"> • Describe the working pattern of different Sections. (Bacteriology, Immunology/serology, mycology, parasitology, and virology) • Apply methods of sterilization and disinfection to control hospital and community acquired infections • Demonstrate knowledge of microorganisms and the disease process as well as aseptic and sterile techniques for their isolation and identification • Perform Microbiological laboratory procedures according to appropriate safety standards Perform beside tests for detection of infectious diseases and to correlate the clinical manifestations with the etiological agents

Sr. No.	Topics	Objectives	No.of Hrs.
1	Concepts and Principles of Microbiology- Introduction to Bacteriology, Historical Perspective, Koch's Postulates, Importance of Microbiology, Microscopy	<ul style="list-style-type: none"> • To understand the principles of Microbiology • To understand the history of Microbiology • To understand the principle and types of Microscopy 	4

2	<p>General Characters of Microbes- Morphology, staining methods, Bacterial growth & Nutrition</p> <p>1) Morphology of Bacteria, 2) Staining Method : Gram stain & AFB stain 3) Routine: Basic culture media, Blood Agar, Mac conkey Agar, Nutrient Agar 4) Antibiotic Sensitivity Test</p>	<ul style="list-style-type: none"> To be able to perform the various staining procedures-Gram staining, ZN staining To understand the morphology and physiology of microorganisms To be able to understand bacteriological medias and biochemicals To be able to understand antibiotic susceptibility test methods 	6
3	<p>Sterilization and Disinfection-Concept of sterilization, Disinfection asepsis, Physical methods of Sterilization, Chemical methods (Disinfection), OT Sterilization, Biomedical Waste Management.</p>	<ul style="list-style-type: none"> To apply methods of sterilization and disinfection to control hospital and community acquired infections 	5
4	<p>Infection and Infection Control-Infection, Sources, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Hospital acquired infections & Hospital Infection Control</p>	<ul style="list-style-type: none"> To know about Infection control practices. To be able to demonstrate Universal safety precautions (Standard Precautions) 	3
5	<p>Immunity–Types Classification, Antigen, Antibody–Definition and types, Ag-Ab Reactions (Serological)–Types and examples,</p>	<ul style="list-style-type: none"> To understand types of immunity To Know about antigen and types of antibodies To be able to understand the principle & procedure of common serological tests 	6
6	<p>Systemic Bacteriology (Morphology, diseases caused)–Introduction,</p> <p>1.Gram positive cocci (GPC)- Staphylococcus aureus, Streptococcus Str.pyogenes, S.pneumoniae)</p> <p>2. Gram positive bacilli (GPB) – Corynebacterium diphtheriae (CD)</p> <p>3. Gram negative Cocci (GNC) – Neisseria meningitidis, Neisseria gonorrhoeae.</p> <p>5. Gram negative bacilli</p> <p>a) Enterobacteriaceae– E.coli, Klebsiella, Proteus, Salmonella, Shigella</p> <p>b) Pseudomonas, Vibrio Cholera</p> <p>6. Mycobacteria – M. tuberculosis, M.leprae</p> <p>7. Anaerobic bacteria – Clostridium tetani,</p>	<ul style="list-style-type: none"> List of gram-positive bacteria and diseases caused by them List of gram-negative bacteria and diseases caused by them List of anerobic bacteria and diseases caused by them Mycobacterium tuberculosis- diagnosis and diseases caused by them 	7

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7	<p>Mycology-Introduction, Classification, Enumerate common fungi & disease caused</p> <p>Candida</p> <p>Aspergillus</p> <p>Cryptococcus</p> <p>Mucor</p>	<p>To be able to classify fungi on morphological basis & enumerate list of common fungi and diseases caused by them</p> <ul style="list-style-type: none"> • Candida • Aspergillus • Cryptococcus • Mucor 	3
8	<p>Virology–</p> <ul style="list-style-type: none"> • Introduction, General Properties of viruses • Difference between Virus & Bacteria • Enumerate DNA & RNA Virus <p>1) HIV (Route of transmission, Disease caused & Lab diagnosis).</p> <p>2) Hep B virus (Route of transmission, Disease caused & Lab diagnosis).</p>	<p>To be able to describe</p> <ul style="list-style-type: none"> • General Properties of Virus • Difference between Virus & Bacteria • Enumerate DNA & RNA Virus <p>To describe Route of transmission, Disease caused & Lab diagnosis of</p> <p>1) Human immunodeficiency Virus- HIV</p> <p>2) Hepatitis B virus - HBV</p>	4
9	<p>Parasitology –</p> <p>Introduction to Parasitology – Classification & general characteristics</p> <p>List of common parasite ((Enumerate & disease caused) E. histolytica, Plasmodium spp, Taeniaspp, Roundworm, Hookworm, W. bancrofti – Filaria.</p> <p>Life cycle & Lab diagnosis of Malaria & Roundworm.</p>	<ul style="list-style-type: none"> • To be able to classify and mention general characteristics of parasites • To enumerate list of common parasites and mention diseases caused by parasites- E. histolytica, Plasmodium spp, Taeniaspp, Roundworm, Hookworm, W. bancrofti – Filaria. • To be able to perform stool examination for ova, cysts and trophozoites of parasites 	7
Total			45hrs

BMRIT 108 P - General Microbiology (Demonstration)

Sr No	Topics	No of hrs
1	Microscopy	15
2	Collection & transport of specimen	
3	Gram stain	
4	ZN stain	
5	Morphology of bacteria – Gram positive & negative cocci, Gram positive & negative bacilli	
6	Sterilization	
7	Disinfection	
8	Infection control – Biomedical waste (BMW) hand hygiene	
9	Uninoculated culture media and culture methods	
10	Antibiotic sensitivity testing	
11	Serological reactions	
12	Virology	
13	Parasitology- stool examination	
14	Mycology	
15	Vaccines & immunization schedule	
	TOTAL	15 hrs

Text Book:

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

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Basic Pathology & Hematology
Course Code	BMRIT 109 L

<p>Teaching Objective</p>	<ul style="list-style-type: none"> • To teach the students general principles of hematology, histopathology, cytopathology, clinical pathology and blood bank techniques • Understand the importance of clinical information in supporting a timely, accurate pathological diagnosis. • Describe normal and disordered hematopoiesis. • To provide students with essential medical knowledge and a broad understanding of human disease. • To demonstrate clinical skills essential in providing basic diagnostic services such as proper collection, transportation, receiving, acceptance or rejection and storage of blood sample, urine, body fluids and tissue samples.
<p>Learning Outcomes</p>	<ul style="list-style-type: none"> • The student should be able to describe the working pattern of different laboratories (Hematology, Histopathology & Cytology) and blood bank. • The student should be able to provide technical help for selected sophisticated hematological techniques with adequate knowledge of various principles. • To aid hematology in the reference ranges for hemoglobin, hematocrit, erythrocytes, and leukocytes in infants, children and adult • The student should be able to describe the practice of collection, handling and transportation of medical laboratory specimens. • The student should be able to explain quality assurance in medical laboratories.

Sr. No	Topic	Objectives	No. of hours
1.	Introduction to Pathology	Role of pathologist in diagnosis of disease, Definition and its various branches.	1
2.	Working and maintenance of laboratory instruments.	Principle, operational steps and uses of the following instruments: 1. Automated hematology analyzer 2. Cyto-centrifuge 3. Histokinette	2
3.	General principles of Hematology techniques: <ul style="list-style-type: none"> • Laboratory requisition form • Introduction/overview to hematology : hematopoiesis • Normal constituents of Blood, their structure and functions • Various anticoagulants used in Hematology • Blood collection: Basic steps for blood collection by venipuncture, order of draw and complications of venipuncture. • Processing of blood sample • Preparation, fixation, routine staining of peripheral blood smear. • Peripheral smear (CBC report) • Hemoglobin estimation, different methods and normal values • Total leucocyte count 	<ul style="list-style-type: none"> • Laboratory requisition form • Enlist the functions of blood. • Stages of hematopoiesis with morphology of cells. • Draw and label the different cells of blood. • Anticoagulant: Definition • Preference of anticoagulant for different hematological studies. • Mechanism of action of each anticoagulant. • Differences between plasma and serum. • Enlist the steps in preparation of peripheral blood smear. • Enlist the different stains used for Peripheral smear staining. • Enumerate the characteristic features of an ideal peripheral blood smear. • Thick and thin smear and their uses. Enlist names of parasites identified on peripheral smear. • Interpretation of normal CBC report. • Structure of hemoglobin and enumerate the various methods of hemoglobin estimation.(Cyanmethemoglobin method, Acid hematin method and cell counter) • Normal values of hemoglobin in Male and Female. • Enlist the causes of increased and decreased hemoglobin. • Advantages of Cyanmethemoglobin method over Acid hematin method. 	10

	<p>(TLC)</p> <ul style="list-style-type: none"> • Differential Leucocyte Count (DLC) • Platelet count 	<ul style="list-style-type: none"> • Normal values of total WBC count, platelet count. • Define leukocytosis and enumerate the causes. • Uses of WBC pipette and contents of WBC diluting fluid. • Define leucopenia and enumerate the causes. • Define thrombocytosis and enumerate the causes. • Define thrombocytopenia and enumerate the causes. 	
4.	<p>General principles of histopathology techniques</p> <ul style="list-style-type: none"> • Collection • Fixation of tissue • Tissue processing • Routine staining (H&E staining) 	<p>Collection:</p> <ul style="list-style-type: none"> • What is a histopathology specimen? • Importance of specimen collection to the laboratory. • Steps in specimen collection. • Enumerate the types of histopathological specimens. • Enlist criteria of specimen rejection. <p>Fixation:</p> <ul style="list-style-type: none"> • Define fixation. • Aim of fixation. Mention advantages and disadvantages of fixation. • Enumerate the common fixatives used for tissue fixation. • Define decalcification and name common decalcifying agents. <p>Tissue processing:</p> <ul style="list-style-type: none"> • Steps in tissue processing. • Define dehydration. • Commonly used dehydrating agents. • Microtome and its application. • Enumerate types of microtome. <p>Staining:</p> <ul style="list-style-type: none"> • Principle and uses of H&E stain. • Enumerate the steps of H&E staining. • Interpretation of H&E staining. • Enlist the various mounting agents. 	6

5.	<p>General principles of cytopathology techniques</p> <ul style="list-style-type: none"> • Collection, preservation, transportation and processing of cytological specimens. • Routine cytology staining (Pap) 	<p>Collection:</p> <ul style="list-style-type: none"> • What is a cytology specimen? • Enumerate the types of cytology specimens. • Steps in transportation of cytology sample. • Enlist criteria of specimen rejection. • Steps in cervical cytology specimen collection (Pap smear). <p>Fixation:</p> <ul style="list-style-type: none"> • Enumerate the common fixatives used for cytology samples. <p>Processing:</p> <ul style="list-style-type: none"> • Enumerate steps in processing of cytology sample. <p>Staining:</p> <ul style="list-style-type: none"> • Principle and uses of Pap stain. • Enumerate the steps of Pap staining. 	5
6.	<p>General principles of clinical pathology techniques</p> <ul style="list-style-type: none"> • Collection, transport, preservation and processing of various clinical specimens. • Urine examination - collection and preservation, Physical, chemical and microscopic examination for abnormal constituents by urine strip method • Introduction to body fluids (Distinguish between Transudate and exudate) 	<p>Collection & transport:</p> <ul style="list-style-type: none"> • Steps in clinical pathology sample collection. • Common clinical pathology tests. • Importance of clinical pathology. • Steps in transportation of clinical pathology sample? • Enlist criteria of specimen rejection. <p>Preservation:</p> <ul style="list-style-type: none"> • Preservation of clinical pathology samples. <p>Processing:</p> <ul style="list-style-type: none"> • Enumerate steps in processing of clinical pathology sample. <p>Staining:</p> <ul style="list-style-type: none"> • Enumerate the stains used for clinical pathology sample. <p>Urine examination:</p> <ul style="list-style-type: none"> • Methods of urine collection • Enlist the gross and microscopic features of abnormal urine/ example of abnormal urine 	5

7.	<p>General principles of Blood Bank techniques</p> <ul style="list-style-type: none"> • Introduction/Review of blood banking • Blood group system • Collection and processing of blood for transfusion • Compatibility testing • Blood transfusion reactions 	<ul style="list-style-type: none"> • ABO and Rh system of blood grouping. • Enlist the different methods of blood group estimation. • Enlist donor selection criteria. • Enumerate transfusion reactions and enlist the investigations carried out in transfusion reactions. • Enlist the different blood components for transfusion. • In brief: storage of whole blood and its components. 	5
8	<p>General and systemic pathology:</p> <p>I) Cell Injury</p> <ul style="list-style-type: none"> • Reversible cell injury • Irreversible cell injury • Cellular adaptations – Hypertrophy, hyperplasia, atrophy and metaplasia. 	<ul style="list-style-type: none"> • Enlist the causes of reversible and irreversible cell injury. • Enlist differences between reversible and irreversible cell injury. • Definition of different types of cellular adaptations. 	20
	<p>II) Inflammation:</p> <ul style="list-style-type: none"> • Acute inflammation: cellular and vascular changes and inflammatory cells • Chronic inflammation: general features, granulomatous inflammation with examples 	<ul style="list-style-type: none"> • Definition of acute and chronic inflammation. • Enlist the causes of Acute and chronic inflammation. • Types of Tuberculosis, enlist the organs affected and lab investigations • Types of Hepatitis and enlist the investigations 	
	<p>III) Circulatory disturbances:</p> <ul style="list-style-type: none"> • Edema • Thrombosis • Embolism • Shock • Infarction 	<ul style="list-style-type: none"> • Definition and enlist the types of circulatory disturbances. • Define edema and enlist the causes. • Define thrombosis and mention the types and 	

		<ul style="list-style-type: none"> causes. Define Embolism and enlist types and causes. Define shock. Enumerate the types Define infraction and enlist the causes and organs affected 	
	IV) Hypersensitivity reaction	<ul style="list-style-type: none"> Mention the types of hypersensitivity reactions Anaphylaxis: Definition, morphological features and distinguishing features 	
	V) Neoplasia	<ul style="list-style-type: none"> Definition of anaplasia, dysplasia and metaplasia Difference between benign and malignant lesions 	
	VI) AIDS, Malaria, Dengue	<ul style="list-style-type: none"> AIDS- Enlist the modes of spread and investigations Malaria- Clinical features, Mode of spread and enlist the Lab investigations. Dengue- Clinical features, Mode of spread and enlist the Lab investigations 	
9.	Hematology: <ul style="list-style-type: none"> Anemia Leukemia 	<ul style="list-style-type: none"> Define anemia and enumerate the types of anemia Enlist the investigations for anemia Define leukemia Enlist the types of leukemia Enumerate clinical features and lab investigations in leukemia. 	5
10	Introduction to concepts of NABL and NABH	<ul style="list-style-type: none"> Define NABL and NABH Enlist the importance of NABL and NABH 	1
Total			60 hrs

BMRIT 109 P – Basic Pathology & Hematology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1.	<ul style="list-style-type: none"> • Methods of blood collection: Basic steps for blood collection by venepuncture, order of draw and complications of venepuncture. • Anticoagulants used in Hematology and Vacutainer. 	2
2.	<ul style="list-style-type: none"> • Processing of blood sample : Automated hematology analyzer 	1
3.	<ul style="list-style-type: none"> • Preparation, fixation, routine staining of peripheral blood smear. • Peripheral smear (CBC report) • Peripheral smear for malaria, anemia and leukemia. 	2
4.	<ul style="list-style-type: none"> • Hemoglobin estimation, different methods and normal values. • Total leucocyte count (TLC) • Differential leucocyte count (DLC) 	1
5.	Histopathology: <ul style="list-style-type: none"> • Collection • Fixation of tissue • Tissue processing including histokinette and microtome • Routine staining (H&E staining) 	3
6.	Cytopathology: <ul style="list-style-type: none"> • Collection, preservation, transportation and processing of cytological specimens. • Routine staining (PAP staining) 	2
7.	Clinical pathology: <ul style="list-style-type: none"> • Collection, transport, preservation and processing of various clinical specimens including cyto-centrifuge. • Urine examination - collection and preservation, microscopic examination for abnormal constituents. 	2
8.	Blood Bank techniques: <ul style="list-style-type: none"> • Visit to blood Bank • Collection and processing of blood for transfusion • Blood group estimation, Rh typing and cross- matching. 	2
Total		15 hrs

Reference Books:

1. A Handbook of Medical Laboratory (Lab) Technology: Second Edition. V.H. Talib(Author)
2. Comprehensive Textbook of Pathology for Nursing (Pathology, Clinical Pathology, Genetics) (English, Paperback, Dr. A.K. Mandal, Dr. Shramana Choudhury)
3. Textbook of Medical Laboratory Technology- Praful B. Godkar, Darshan P. Godkar.
4. Medical Laboratory Technology. Methods and Interpretations – RamnikSood, 6th Edition (Volume 1&2)
5. Medical Laboratory technology a procedure manual for routine diagnostic test including phlebotomy/ venipuncture procedure – 4th Edition, Volume- I, II, III. Kanai L. Mukharjee(Author)
6. Practical Pathology P. Chakraborty, Gargi Chakraborty New Central Book Agency, Kolkata.
7. Theory & Practice of Histological Techniques John D. Bancroft et.al. Churchill Livingstone Printed in China.
8. Hand Book of Histopathological & Histochemical Techniques C.F.A. Culling ButterworthsCompany Ltd. London.
9. Essentials of Hematology by Shirish M Kawthalkar, 3rd Edition.
10. Textbook of Pathology for *Allied Health Sciences* by RamadasNayak, Edition: 1st Publisher:Jaypee Brothers Medical Publishers.
11. The ABC of CBC: interpretation of complete blood count & histograms. D P Lokwani and SunitLokwani(Author). Jaypee Brothers Medical Publishers.

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Introduction to Quality and Patient safety
Course Code	BMRIT 110 L

Teaching Objective	<ul style="list-style-type: none"> • The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. • To understand the basics of emergency care and life support skills. • To Manage an emergency including moving a patient • To help prevent harm to workers, property, the environment and the general public. • To provide a broad understanding of the core subject areas of infection prevention and control. • To provide knowledge on the principles of on-site disaster management
Learning Outcomes	<ul style="list-style-type: none"> • Upon completion, Students should be able to apply healthcare quality improvement and patient safety principles, concepts, and methods at the micro-, meso-, and macro-system levels.

Sr. No.	Topics	No. of Hrs.
1	Quality assurance and management – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines	7
2	Basics of emergency care and life support skills - Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR	7
3	Bio medical waste management and environment safety -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals/ Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices)	8
4	Infection prevention and control - Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)], Prevention & control of common healthcare associated infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control	8
5	Antibiotic Resistance - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance	8
6	Disaster preparedness and management - Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.	7
Total		45 hrs

Reference Books:

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

BMRIT 111 P - Community Engagement & Clinical Visit (Including related practicals to the Parent course) (Total - 360 hrs)

SKILL ENHANCEMENT ELECTIVE COURSE

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Medical Bioethics & IPR
Course Code	SEC 001 L

Teaching Objective	<ul style="list-style-type: none"> • To introduce the wide range of ethical issues in health care. • 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.
Learning Outcomes	<ul style="list-style-type: none"> • 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.

Sr. No.	Topics	No. of Hrs.
1	Introduction to Bioethics- Bioethical issues related to Healthcare & medicine .	5
2	Anatomy - Cadaver ethics, Human dignity, PNDT, Disposal of cadaver, Genetic Counselling	7
3	Physiology - Animal ethics, Health policy privacy	7
4	Biochemistry & Pathology - Prudence of investigation confidentiality, Patients bill of rights, Disposal of investigative material, Integrity, Blood transfusion	5
5	Pharmacology - Rational drug prescribing, Clinical trials, Risk minimization, Animal ethics	5
6	Microbiology - Hand wash, Drug resistance minimization, Prudence of investigation confidentiality, Sterilization procedure, Biosafety and bio hazard	5
7	Medicolegal aspects of medical records	3
8	Introduction to Intellectual Property: Concept of Intellectual Property Kinds of Intellectual Property Patents,	8

Copyrights Designs, Trademarks, Geographical Indication, Infringement of IPR, Its protection and Remedies Licensing and its types	
Total	45 hrs

Reference Books:

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

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Human Rights & Professional Values
Course Code	SEC 002 L

Teaching Objective	<ul style="list-style-type: none"> • To understand interaction between society and educational institutions. • To sensitize the citizens so that the norms and values of human rights and duties of education programme are realized. • To encourage research activities. • To encourage research studies concerning the relationship between Human Rights and Duties Education.
Learning Outcomes	<ul style="list-style-type: none"> • This course will aim at making the learners acquire conceptual clarity and develop respect for norms and values of freedom, equality, fraternity and justice. • It will include awareness of civil society organizations and movements promoting human rights. • This will make the students realize the difference between the values of human rights and their duties

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

Reference Books:

1. Jagannath Mohanty Teaching of Human Rights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi 2009
2. Ram Ahuja: Violence Against Women Rawat Publications Jewahar Nager Jaipur. 1998.
3. Sivagami Parmasivam Human Rights Salem 2008
4. Hingorani R.C.: Human Rights in India: Oxford and IBA New Delhi.

B.Sc. Allied Courses Scheme of Examination Pattern

B.Sc. First Year (Semester I & II)
w.e.f.(Academic Year 2023-24 onwards)

Internal Examination Pattern (Theory)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Short answers	5	4	4 x 3 marks each	12 marks
CIA	1. Seminar / poster (4 marks) 2. Assignments/open book test (4 marks)			8 marks
Total				20 marks

Note –20 marks to be converted to 10 marks weightage for submission to the university.

University Examination Pattern (Theory)

Question Type	No. of Questions	Questions to be Answered	Question X marks	Total marks
Section A				
Structured LAQ	3	2	2X8	16 Marks
Short notes	8	6	6X4	24 Marks
Total				40 Marks

Note: The exam pattern for Course “Community Engagement & Clinical Visit (Including Related Practicals To The Parent Course)” is as per Annexure No-1.

EVALUATION FORM FOR
COMMUNITY ENGAGEMENT & CLINICAL VISIT
(INCLUDING RELATED PRACTICALS TO THE PARENT COURSE)

Name of the Student:**Program/Course:****Semester:****Name of the Internal Faculty/Observer:****Name of the External Faculty/Observer:**

Sr. No.	Core Competencies	Marks Allotted	Marks Obtained
1.	Community Engagement/Educational Tour/Field work/Hospital visits/NSS (Report)	15	
2.	Demonstrated understanding of responsibilities	10	
3.	Managed time effectively to meet deadlines		
4.	Communicated well with others (Staff members, Teacher, Patients, Community Members, etc)		
5.	Demonstrated knowledge required to meet objectives		
6.	Completed required tasks as assigned by Teacher/Co-ordinator		
7.	Model making / Quiz/ Poster/Conference/ Seminar/ Presentation/Innovative Ideas Competition	15	
8.	Attendance	10	
Total Marks		50	

Internal Faculty/Observer Signature:**Date:****External Faculty/Observer Signature:**

Resolution No.6.7 of Academic Council (AC-46/2023): Resolved to incorporate credits in internship as per NEP 2020 & National Credit Framework for UG programme (B.Sc. Medical Laboratory Technology, B.Sc. Medical Radiology & Imaging Technology, B.Sc. Operation Theatre & Anaesthesia Technology, B.Sc. Cardiac Care Technology, B.Sc. Perfusion Technology, B. Optometry, B.Sc. Medical Dialysis Technology, B.Sc. Physician Assistant In Emergency & Trauma Care) from Batch admitted in Academic Year 2020-21 (Sem VII & VIII) onwards [ANNEXURE-49A, 49B, 49C, 49D, 49E, 49F, 49G, 49H].

Annexure-49E of AC-46/2023

**OUTLINE OF COURSE CURRICULUM
B.Sc. Medical Radiology and Imaging Technology**

Semester VII & VIII														
Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
BMRIT 128	B.Sc. MRIT Internship (Semester VII)	-	-	1	16	17	-	-	42	1008	1050	20	80	100
BMRIT 129	B.Sc. MRIT Internship (Semester VIII)	-	-	1	16	17	-	-	42	1008	1050	20	80	100

Internship is for 12 months (July-December; January-June) after deducting for national holidays/Sick Holidays/ sundays + Examination), (6 days/week;8 Hours/day). Minimum of 21 weeks/semester. Students are encouraged to involve in community outreach activities as part of their clinical postings without absenting himself/herself for the other regular classes.

Internal Assessment Exam Pattern (IA) for Semester VII & VIII (Internship Program)	
Internal exam pattern: Total 20 marks with following breakup	
Description	Marks
Internal exam (at department)	10 marks
Viva	5 marks
Log Book	5 marks
Total = 20 Marks	

Scheme of University Semester End Examination (SEE) for Semester VII & VIII (Internship Program)		
Practical exam pattern: Total 80 marks with following breakup		
Exercise	Description	Marks
Q No 1	Case Study	2 x 15=30 M
Q No 2	Station exercise	3 x 5=15
Q No 3	VIVA	15 M
QNo 4	Log Book	10 M
QNo 5	Attendance	10 M
Total = 80 Marks		

Attendance (10 marks) of the student. It was decided that weightage be given to attendance as per following scheme	
Attendance Percentage	Marks
< 75	Zero
75	5
76-80	6
81-85	7
86-90	8
91-95	9
96-100	10



MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)

Grade 'A⁺⁺' Accredited by NAAC

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