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 2024-2025 Batch onwards)

Curriculum for

B.Sc. Medical Radiology and Imaging Technology

Approved as per AC-51/2025, Dated 29/04/2025

Amended History

1. Approved as per AC-48/2023, [Resolution No. 6.2] Dated 12/12/2023.
2. Amended as per AC-48/2023, [Resolution No. 6.6], [Resolution No. 6. 7] Dated 12/12/2023.
3. Approved as per AC-50/2024, [Resolution No. 3.1], [Resolution No. 3.10];Dated 25/11/2024.
4. Amended as per AC-51/2025, [Resolution No. 3.3 (Annexure - 5B)], [Resolution No. 3.24]; Dated 29/04/2025.

Resolution No. 3.3 of Academic Council (AC-51/2025):

Resolved to approve the Learning Objectives for all 08 undergraduate programs–B.Sc. Medical Laboratory Technology, **B.Sc. Medical Radiology & Imaging Technology**, B.Sc. Operation Theatre & Anesthesia Technology, B.Sc. Cardiac Care Technology, B.Sc. Perfusion Technology, B. Optometry, B.Sc. Medical Dialysis Technology, and B.Sc. Physician Assistant in Emergency & Trauma Care offered under MGMSBS. These Learning Objectives will be applicable to all existing and forthcoming batches from the Academic Year 2025-26 onwards [**ANNEXURE**-5A, **5B**, 5C, 5D, 5E, 5F, 5G & 5H].

MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI

(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

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B.Sc. Medical Radiology & Imaging Technology Learning Objectives

At the end of completion of Internship in 4th year student shall achieve following skills:

X RAY:

- Shall be trained in performing all routine x-rays – mobile and steady, medicolegal x-rays, poly-trauma x-rays.
- Shall assist all conventional procedures like IVP, MCU, Barium procedures, HSG, etc.

Master Patient Positioning:

- Demonstrate proper patient positioning for various common radiographic examinations (e.g., chest, abdomen, spine, extremities).
- Ensure correct alignment of anatomical structures to achieve optimal image quality and diagnostic value.

Optimize Exposure Factors:

- Adjust kilovoltage (kV), milliamperage (mA), and exposure time according to the patient's body type, size, and clinical indication.
- Understand how exposure factors affect image quality, including contrast, brightness, and resolution.

Ensure Radiation Protection:

- Apply radiation safety principles such as shielding, collimation, and the ALARA (As Low as Reasonably Achievable) principle during radiographic procedures.
- Minimize radiation exposure to patients, staff, and others while maintaining diagnostic image quality.

Handle Contrast Media Appropriately:

- Understand the use of contrast agents in enhancing radiographic images for specific procedures (e.g., gastrointestinal, angiography).
- Ensure safe and effective administration of contrast agents, including understanding contraindications and adverse reactions.

Demonstrate Effective Communication with Patients:

- Communicate clearly with patients about the radiographic procedure, ensuring they understand the process and are comfortable during the examination.

- Address patient concerns and ensure their safety and well-being throughout the imaging process.

Adapt Techniques for Special Populations:

- Adjust radiographic techniques for pediatric, geriatric, or obese patients to ensure appropriate imaging while minimizing discomfort and radiation exposure.
- Learn techniques for patients with specific needs (e.g., immobilization for trauma patients, managing claustrophobic patients).

Computed Tomography

CT Equipment and Components

- CT Scanner Components: Identify and describe the key components of a CT scanner, including the X-ray tube, detectors, gantry, computer system, and display monitor.
- Types of CT Scanners: Learn the differences between various CT scanners, such as single-slice, multi-slice, and spiral (helical) CT, and their clinical applications.

CT Imaging Techniques

- **Imaging Protocols**: Understand how to select appropriate imaging protocols based on the clinical indication, patient factors, and area of the body being imaged (e.g., head, chest, abdomen, and pelvis).
- **Slice Thickness and Reconstruction**: Learn how to adjust slice thickness, reconstruction algorithms, and image resolution to optimize image quality while minimizing radiation dose.
- **Contrast Enhancement**: Understand the role of intravenous contrast agents in CT imaging, including the indications, administration techniques, and timing of contrast injection.
- **Scan Timing**: Learn the importance of scan timing in relation to patient physiology (e.g., respiratory phases, contrast phases) to optimize imaging outcomes, especially in dynamic studies like CT angiography.

Clinical Applications of CT Imaging

- **Neurological Imaging:** Understand the role of CT in diagnosing and evaluating conditions like strokes, brain tumors, hemorrhages, and trauma.
- **Chest Imaging**: Learn how to use CT to assess the lungs, heart, and chest wall, particularly in conditions like pulmonary embolism, pneumonia, lung cancer, and coronary artery disease.
- **Abdominal and Pelvic Imaging**: Understand the use of CT for imaging the abdominal organs (e.g., liver, pancreas, kidneys) and diagnosing conditions like abdominal trauma, tumors, and infections.
- **Musculoskeletal Imaging**: Learn how CT is used for evaluating bone fractures, joint abnormalities, and soft tissue pathology in musculoskeletal imaging.
- **Cardiac Imaging**: Understand the role of CT in assessing coronary artery disease (CT coronary angiography), cardiac anatomy, and evaluation of congenital heart defects.
- **Trauma Imaging**: Learn how to perform CT imaging in trauma patients to quickly assess injuries to the head, chest, abdomen, and extremities.

Radiation Safety and Dose Optimization

- **Principles of Radiation Safety**: Understand the principles of radiation safety, including minimizing exposure to patients and healthcare workers, using ALARA (As Low As Reasonably Achievable) principles.
- **Dose Reduction Techniques**: Learn techniques to reduce radiation exposure during CT scans, such as adjusting parameters (e.g., milliampere-seconds [mAs], kilovolt [kV]), using automatic exposure control, and limiting the scan area.
- **Pediatric CT Imaging**: Understand the special considerations for pediatric CT imaging, including dose reduction strategies and the need for modified protocols in children.
- **Pregnancy Considerations**: Recognize when CT should be avoided in pregnant patients and understand the protocols for managing pregnant patients if CT imaging is necessary.

Image Interpretation and Diagnosis

- **Normal Anatomy vs. Pathology**: Learn to distinguish between normal anatomy and pathological conditions on CT images, including tumors, fractures, hemorrhages, infections, and vascular abnormalities.
- **Multiplanar Reformation (MPR) and 3D Imaging**: Understand how to use multiplanar reformation (MPR) and 3D imaging techniques to enhance the diagnostic value of CT scans, especially in complex cases.

Contrast Media in CT

- **Indications for Contrast**: Understand the indications for using intravenous contrast agents in CT, including enhancing the visibility of blood vessels, tumors, and certain tissues.
- **Administration and Timing**: Learn the techniques for administering contrast agents (e.g., intravenous injection, bolus timing) and optimizing imaging to capture peak enhancement of structures.
- **Contrast Reactions**: Recognize the signs of adverse reactions to contrast agents, including allergic reactions, nephrotoxicity, and anaphylaxis, and how to manage them.
- **Post-Contrast Imaging**: Understand how to interpret CT images taken before and after contrast administration and the importance of timing in obtaining optimal images.

Clinical Workflow and Collaboration

- **CT Workflow**: Understand the steps involved in CT imaging, including patient preparation, scanning, and post-scan care. Ensure proper patient scheduling and communication within the multidisciplinary team.
- **Collaboration with Radiologists and Clinicians**: Learn how to communicate effectively with radiologists and referring clinicians, ensuring that the CT scan is appropriate for the clinical question and that findings are reported promptly.
- **Emergency Imaging**: Understand the workflow in emergency settings, such as trauma or stroke, where rapid CT imaging is required to make critical decisions.

Ethical, Legal, and Professional Considerations

- **Patient Consent**: Ensure informed consent is obtained from patients, especially when contrast agents are used or when CT is used for high-risk procedures.
- **Confidentiality and Documentation**: Maintain patient confidentiality and accurately document CT imaging findings as part of the medical record.
- **Legal and Ethical Issues**: Be aware of legal and ethical considerations in CT imaging, particularly regarding radiation exposure, consent, and patient rights.
- **Quality Assurance**: Understand the importance of quality control and assurance protocols for CT equipment and image quality.

MRI

Patient Preparation and Screening

- Patient Assessment: Understand the importance of thorough patient history-taking and screening for contraindications (e.g., metal implants, pacemakers, pregnancy).
- Preparation Procedures: Learn how to prepare the patient for the MRI scan, including removing jewelry, clothing, and any objects that may interfere with the MRI.
- Patient Comfort and Positioning: Ensure patient comfort during the procedure and properly position the patient for optimal imaging results.

MRI Safety and Protocols

- Safety Guidelines: Understand and follow safety protocols, including the safe use of MRI equipment in the presence of a strong magnetic field.
- Magnetic Field Awareness: Recognize the risks of the magnetic field (e.g., projectile hazards, effects on implants, and other medical devices).
- Precautionary Measures: Identify patient factors that may pose a risk, such as claustrophobia, and know the methods for addressing these concerns.
- Monitoring During Scans: Ensure patient monitoring during the procedure for any adverse reactions or discomfort.

MRI Imaging Techniques and Sequences

- Basic MRI Sequences: Understand the different MRI sequences used in clinical practice, such as T1-weighted, T2-weighted, FLAIR, and post-contrast sequences.
- Sequence Selection: Select the appropriate MRI sequences based on clinical indications (e.g., neurological, musculoskeletal, or abdominal imaging).
- Parameter Optimization: Learn how to adjust MRI parameters like slice thickness, repetition time (TR), echo time (TE), and flip angle to optimize image quality.

Image Quality and Troubleshooting

- Image Quality Evaluation: Learn to assess image quality for common artifacts, such as motion artifacts, susceptibility artifacts, and distortion.
- Troubleshooting: Understand how to address technical issues during imaging, including equipment calibration, optimizing sequences, and managing artifacts.
- Adjusting for Patient Factors: Adjust scanning parameters or sequences based on patient-specific factors such as age, body size, or movement.

Clinical Applications of MRI

- Clinical Indications: Understand the clinical indications for MRI across various specialties, including neurology, musculoskeletal imaging, cardiology, oncology, and abdominal imaging.
- Pathology Recognition: Learn to recognize common pathological findings on MRI scans, such as tumors, lesions, strokes, multiple sclerosis plaques, and joint abnormalities.
- Post-Processing: Understand how to apply post-processing techniques (e.g., contrast enhancement, 3D reconstruction, and multiplanar reconstructions) for advanced clinical applications.

MRI Contrast Agents

- Contrast Administration: Learn about the different contrast agents used in MRI (e.g., gadolinium-based agents), their indications, and the methods of administration (e.g., intravenous injection).
- Contraindications and Reactions: Understand the potential risks and contraindications for contrast agents, including allergic reactions and nephrogenic systemic fibrosis (NSF).
- Pre- and Post-Contrast Imaging: Gain knowledge of how to handle and interpret pre- and post-contrast MRI images.

Clinical Decision-Making and Workflow

- Image Interpretation Support: Understand the role of MRI in clinical decision-making, including how images contribute to diagnosis, treatment planning, and monitoring of disease progression.
- Collaborating with Healthcare Providers: Communicate effectively with radiologists, referring physicians, and other healthcare providers to ensure the appropriate use and interpretation of MRI.
- Workflow Management: Learn the workflow for MRI procedures, from scheduling and patient preparation to scan execution and image processing.

Ethical and Legal Considerations

- Patient Consent: Understand the importance of obtaining informed consent for MRI procedures, especially when using contrast agents or performing invasive procedures.
- Confidentiality and Privacy: Ensure patient confidentiality and data protection in line with legal and institutional guidelines (e.g., HIPAA).
- Patient Advocacy: Act as an advocate for the patient's comfort and safety throughout the imaging process.

Post-Procedure Care and Follow-Up

- Post-Scan Instructions: Provide appropriate post-scan instructions to the patient, especially regarding post-contrast care and any potential side effects from contrast agents.
- Monitoring for Complications: Monitor patients for delayed allergic reactions or other complications after the MRI scan, particularly when contrast agents are used.

Ultrasound and Doplar

Understanding the Principles of Ultrasound

- Physics of Ultrasound: Understand the basic principles of ultrasound, including the production and transmission of high-frequency sound waves and how they interact with tissues to form images.
- Impedance and Reflection: Learn how different tissues (e.g., muscle, fat, bone, organs) reflect ultrasound waves differently based on their acoustic impedance.
- Image Formation: Understand how ultrasound images are formed through the reflection (echoes) of sound waves, and how the time it takes for these echoes to return to the transducer is used to create an image.

Ultrasound Equipment and Techniques

- **Ultrasound Components**: Identify and describe the function of key ultrasound machine components (e.g., transducer, display screen, gel, controls).
- **Transducer Selection**: Learn about different types of ultrasound transducers (e.g., linear, curvilinear, phased array) and how to select the appropriate one based on the clinical application and patient characteristics.
- **Image Optimization**: Understand how to adjust key imaging parameters (e.g., gain, depth, focus, frequency) to optimize image quality.
- **Probe Handling and Patient Positioning**: Develop the skills to correctly position the probe on the patient's body and maintain it for optimal visualization of the area of interest

Clinical Applications of Ultrasound

- **Abdominal Ultrasound**: Understand the indications and techniques for performing abdominal ultrasound, including the evaluation of organs like the liver, kidneys, gallbladder, pancreas, and spleen.
- **Obstetric and Gynecological Ultrasound**: Learn to perform obstetric scans (e.g., fetal development, gestational age, amniotic fluid levels) and gynecological scans (e.g., assessing ovaries, uterus, and pathology).
- **Musculoskeletal Ultrasound**: Understand how to evaluate muscles, tendons, ligaments, and joints using ultrasound for conditions like tears, inflammation, and cysts.
- **Cardiac Ultrasound (Echocardiography)**: Learn the basics of echocardiography, including assessing the heart's function, chamber sizes, and detecting abnormalities like valve defects and pericardial effusions.
- **Thyroid Ultrasound**: Understand the procedure for evaluating the thyroid gland, identifying cysts, nodules, and other pathologies.
- **Pediatric Ultrasound**: Learn the nuances of performing ultrasound in pediatric patients, considering factors such as body habitus and imaging challenges.

Clinical Applications of Doppler Ultrasound

- **Vascular Doppler Studies**: Understand the use of Doppler to assess peripheral vascular conditions, including the evaluation of deep vein thrombosis (DVT), arterial occlusions, and carotid artery disease.

- **Obstetric Doppler**: Learn how Doppler is used to assess fetal well-being by evaluating uteroplacental blood flow and detecting abnormalities such as intrauterine growth restriction (IUGR).
- **Renal Doppler**: Understand how Doppler ultrasound is used in renal imaging to assess renal artery stenosis, hypertension, and other kidney-related conditions.
- **Cerebral Doppler**: Learn the role of Doppler ultrasound in assessing cerebral blood flow, especially in conditions like stroke, intracranial hypertension, and vasospasm.

Safety and Patient Care

- **Safety in Ultrasound**: Understand the safety considerations for ultrasound procedures, including avoiding excessive exposure to high-frequency sound waves.
- **Patient Comfort and Communication**: Develop effective communication skills to explain the ultrasound or Doppler procedure to the patient, ensuring they are comfortable and informed throughout the process.
- **Contingency Planning**: Learn how to address challenges that may arise during imaging, such as obesity, body positioning difficulties, or poor patient cooperation.
- **Post-Procedure Care**: Provide patients with appropriate post-procedure instructions if necessary, particularly following Doppler studies where specific monitoring may be required.

Ethical and Legal Considerations

- **Patient Privacy and Consent**: Ensure that appropriate informed consent is obtained before performing ultrasound and Doppler studies, particularly in sensitive cases like obstetric scans or Doppler studies involving pregnant patients.
- In case of gynae usg scan PCPNDT from should be filled by patient.
- **Confidentiality**: Maintain patient confidentiality and comply with relevant healthcare regulations (e.g., HIPAA).
- **Documentation**: Ensure accurate documentation of ultrasound and Doppler study findings for clinical records and future patient care.

SCHOOL OF BIO-MEDICAL SCIENCES KAMOTHE NAVI MUMBAI

HOD

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Annexure-46F of AC-48/2023

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CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2024 - 25)

Curriculum for

B.Sc. Allied Health Sciences

B.Sc. Medical Radiology and Imaging Technology

Resolution No. 6.2 of Academic Council (AC-48/2023):

(i) Resolved to approve the syllabus realigning the curriculum notational hours, credit as per NEP-2020 and NCrF, for Semester I & II of B.Sc. AT & OT, B.Sc. CCT, B.Sc. MDT, B.Sc. PT, B.Sc. MLT, B.Sc. MRIT, B. Optometry & B.Sc. PA **[Annexure-46A, 46B, 46C, 46D, 46E, 46F, 46G & 46H].**

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 Assesment (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 (Multidisciplinary/ Interdisciplinary)	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**
AEC 002 L	Envioronmental 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 Assesment (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	
BMRIT101L	Human Anatomy Part I
BMRIT102 L	Human Physiology Part I
BMRIT103 L	General Biochemistry &Nutrition
BMRIT104 L	Introduction to National HealthCare System (Multidisciplinary/ Interdisciplinary)
Practical	
BMRIT101 P	Human Anatomy Part I
BMRIT102 P	Human Physiology Part I
BMRIT103 P	General Biochemistry
BMRIT105 P	Community Engagement & Clinical Visit (Including related practicals to the Parent course)
Ability Enhancement Course	
AEC 001L	English &Communication Skills
AEC 002 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	• To introduce the students to the concepts related to General anatomy, Muscular, Respiratory, Circulatory, Digestive and Excretory system
Learning Outcomes	• 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**	• 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	3
			Tissue and enumerate the types of **tissues** with location and function	
			Skin- Layers and function of skin	
2	**Skeletal System**	• 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 appendicularand axial skeleton** **Appendicular skeleton I**- Bones of upper Limb, **Appendicular skeleton II**- Bones of lower limb **Axial skeleton I**-skull mandible,	6

			Axial skeleton II- vertebrae sacrum and pelvis	
			Joint-Definition of **joint** with structural classification and examples	
			Definition and features of **Synovial Joint**classification of **Synovia**l Joint with examples	
			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	
3	**Muscular System**	• 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	**Define Muscle** and **describe the types** with features	5
			Enumerate the muscles of **upper limb** – group wise Describe **deltoid** and **biceps brachii** in detail	
			Enumerate the muscles of **lower limb** – group wise Describe **Gluteus maximus** and **hamstrings** in detail Describe **sternocleidomastoid** in detail Enumerate the muscles of **mastication** **Back** - Describe **trapezius** in detail Enumerate the Muscles of **abdomen**	
4	**Respiratory System**	• 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	**Respiratory System -** Introduction to Respiratory system and Parts **Larynx-**List of cartilages with type, Describe interior, nerve supply (names), function & applied anatomy	4
			Thoracic cage - list of bones and cartilages forming cage, enumerate the movements.	

		• To describe Lung • To list layers of pleura • To describe Trachea & bronchopulmonary segments • To define Mediastinum • To list boundaries &divisions	**Diaphragm**- Describe origin, insertion, major openings, movements and applied anatomy **Lung**- external features, mediastinal surface, applied anatomy Pleura- name the layers **Trachea**- external features and function Bronchopulmonary segments- definition, list the segments, features of segments, applied anatomy **Mediastinum-** definition, boundaries, divisions	
5	**Circulatory System**	• To classify blood vessels • To describe Heart • To list layers of Pericardium • To describe Coronary Circulation • To enumerate Blood vessels of Thorax	**Types of blood vessels-** classification with example **Hear**t- external& internal features **Pericardium**- layers **Coronary Circulation-** name vessels, for each vessel origin and distribution, list veins of the heart, applied anatomy **Blood vessels of Thorax-** list of vessels, branches of arch of aorta	4
6	**Digestive System**	• 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	**Pharynx -** Extent, parts, list internal features, list of muscles and nerve supply of pharynx **Oesophagus -** extent, function, applied anatomy **Stomach -**Gross anatomy, shape, capacity, location, parts, blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes), relation, functions, applied anatomy **Small and Large Intestine** – Parts, function and differences **Liver -** External features, location, functions, applied	6

			anatomy	
			Spleen -External features, location, functions, applied anatomy	
			Pancreas- External features, location, ducts, functions, applied anatomy	
			Salivary glands -Enumerate salivary gland and functions	
7	**Excretory System**	• To describe Kidney and Urinary Bladder	**Kidney** - External features, blood supply (Names of vessels) and function, applied anatomy	2
			Urinary Bladder- External features, capacity, list of ligaments and location, blood supply (Names of vessels), applied anatomy **Urethra-** male and female urethra difference	
Total				**30 hrs**

BMRIT101 P - Human Anatomy Part I- (Demonstration)

Sr No.	Topic	Learning objectives	Subtopic	No. of Hours
1	**Introduction to anatomy**	• To understand Terminology of anatomy	Terminology	1
2	**Skeletal System**	• 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**	• 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**	• 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**	• 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**	• 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**	• To identify featuresof kidney & urinary bladder	Kidney – External and internal features	2
			Urinary Bladder- External and internal features	
			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	**BMRIT102 L**

Teaching objective	**To teach basic physiological concepts related to:** General physiology, Hematology, Cardiovascular, Digestive, Respiratory physiology, Nerve-Muscle physiology
Learning outcomes	**At the end of the semester, the student shall be able to** • 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 • 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 d. Anemia: Causes, effects on body e .WBC- Types and functions, Normal count, and Physiological variation,	At the end of the session, the student shall be able to • Describe composition & functions of blood • Describe structure &function RBC, Normal count, and Physiological variation of the RBC, • Enumerate stages of Erythropoiesis, & factors required for Erythropoiesis	8

	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,	• 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	**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	At the end of the session, the student shall be able to • 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 HR • Define Cardiac output ,mention normal value	8

		• 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	**Digestive system –** a. organization of Digestive system, b. Composition and functions of all Digestive juices-Saliva, gastric juice , Pancreatic juice, Bile, Intestinal juice, c. Deglutition-Stages, Peristalsis d. Digestion & Absorption of Carbohydrate, Proteins & Fats in short	At the end of the session, the student shall be able to • 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	**Respiratory System** – a. Physiologic anatomy, functions of respiratory system, b. Mechanism of respiration-Inspiration& Expiration, Muscles of Respiration c. Lung Volumes & capacities-Definition & normal values d. Transport of Respiratory Gases-O2 & CO2- pressure gradient, forms of transport e. Regulation of Respiration- respiratory centers and their function	At the end of the session, the student shall be able to • 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 which CO2 transported • Enumerate respiratory	5

		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 • 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			**30hrs**

BMRIT102 P - Human Physiology Part I (Demonstration)

Sr.No.	Topics	No.of Hrs.
1	StudyofMicroscopeanditsuse,CollectionofBloodandstudy ofHaemocytometer	15
2	Haemoglobinometry	
3	WhiteBloodCellcount	
4	RedBloodCellcount	
5	DeterminationofBloodGroups	
6	Leishman'sstainingandDifferentialWBCCount	
7	DeterminationofBleedingTime,DeterminationofClottingTime	
8	Pulse&BloodPressureRecording,AuscultationforHeartSounds	
9	ArtificialRespiration–Demonstration,Spirometry-Demonstration	
Total		**15hrs**

Textbooks:

1. BasicsofmedicalPhysiology–DVenkateshandH.HSudhakar,3rdedition.
2. PrinciplesofPhysiology –DevasisPramanik,5thedition.
3. HumanPhysiologyforBDS–DrA.K.Jain,5thedition.

Referencebooks:

1. TextbookofMedicalPhysiology,Guyton,2ndSouthAsiaEdition.
2. Textbook ofPhysiologyVolumeI&II(forMBBS)–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	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. • 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 heath care.
Learning Outcomes	• Define "biochemistry". • Classifycarbohydrates and give their biological significance. • Classifyproteins and give their biological significance. • Classifylipids and give their biological significance. • Describe structure, types and functions of DNA and RNA. • Explain the types and mechanism of enzyme (biochemical catalysts)action. Understand the diagnostic importance of enzymes and isoenzymes. • 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.

Sr. No.	Topics	No. of Hrs.
1	Introduction and scope of biochemistry	1
2	**1) Chemistry of Carbohydrates**: • Definition and classification of carbohydrates with examples (Definition and Functions of Monosaccharides, Disaccharides and Polysaccharides) **2) Chemistry of Proteins:** • 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) **Chemistry of Lipids:** • Definition, functions, Classification of Lipids (Simple, Compound and Derived Lipids) • Essential Fatty Acids. 4) **Chemistry of Nucleic acid**: • Nucleosides and Nucleotides • Watson and Crick model of DNA • RNA- it's type along with functions	3 3 2 2
3	**Elementary knowledge of enzymes –** • Classification of enzymes • Mechanism of enzyme action • Factors affecting enzyme activity • Diagnostic importance of enzymes and isoenzymes.	7
4	**Biological oxidation** • Outline of Electron transport chain. • Definition of Oxidative phosphorylation.	3
5	**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.	12
6	**Pre examination Skills –** • 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:** • 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 (Monosacchrides, disaccharides and polysaccharides)	
4	Test on bile saltsand bile pigments (only demonstration)	
5	Tests on Normal constituents of Urine (only demo) • Urea • Creatinine • Uric acid • Ammonia	
6	Tests on Abnormal constituents of Urine (only demo) • Sugar • Protein • Blood • Ketone bodies	
Total		**15 hrs**

Textbooks:

1. Essentials of Biochemistry, 2nd Edition, Dr. PankajaNaik
2. Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by PrafulGhodkar
3. Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by PrafulGhodkar
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	• To teach the measures of the health services and high-quality health care • To understand whether the health care delivery system is providing high-quality health care and whether quality is changing over time. • To provide to National Health Programme- Background objectives, action plan, targets, operations,in various National Heath Programme. • To introduce the AYUSH System of medicines.
Learning Outcomes	• The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Sr. No	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	• Healthcare delivery system in India • Three tier healthcare delivery system in India • Village level health workers (ASHA, AWW) • 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	6
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	• Describe following: Ayurveda, Homeopathy, Unani, Siddha Naturopathy and Yoga under following head- a) Principle	2

			b) Characteristic features c) Merits d) Demerits • Need for integration of various systems of medicine	
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) torecent national Health Policy to Sustainable development goals.	2
4	Demography and vital statistics	Student should be • 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	• 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	• Define epidemiology, describe its concept, principles and uses • Enumerate, define and discuss epidemiological study methods • Define, calculate and interpret epidemiological data	• Define epidemiology • Concept of epidemiology • Uses of epidemiology • Basic measurements in epidemiology • Types of epidemiological studies • Concept of Screening • Monitoring and surveillance(overview)	5
6	Epidemiology of Communicable diseases with Infectious Disease epidemiology	Student should know epidemiology of disease, lab diagnosis, prevention and control measures	• 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 Epidemiology of 1. Measles 2. HIV 3. TB 4. Covid19 5. Polio 6. Acute diarrhoeal diseases	5

			7. Acute Respiratory diseases 8. Vector borne diseases (Malaria, dengue) 9. Typhoid 10. Hepatitis	
	Epidemiology of non-communicable diseases	Student should know epidemiology of disease, lab diagnosis, prevention and control measures	• 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	Heads to be focussed under National Health Programme: 1. Introduction 2. Goals/targets/objectives 3. Initiatives taken/Services provided under the programme, broadly. • 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)

BMRIT105 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	• 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 Developconfidence 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

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Name of the Course	Environmental Sciences
Course Code	AEC 002 L

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

Sr. No.	Topics	No. of Hrs.
1	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 : Energy And Environment, Energy & Environment, Part-1, Dams : Boon Or Curse, Fresh Water Ecology, Reservoir Ecosystem, Part-1	8
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 Awarness, Ehtic's Of Environmental Education, Environmental Values	4
9	Indian Legislative Steps To Protect Our, Nvironment, Water Management Practices,	4

	Sustainable Development, Urban Problems Related To Energy, Resettlement And Rehabilitation	
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 Enviromental 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	
BMRIT106 L	Human Anatomy Part II
BMRIT107 L	Human Physiology Part II
BMRIT108 L	General Microbiology
BMRIT109 L	Basic Pathology & Hematology
BMRIT110 L	Introduction to Quality and Patient safety (Multidisciplinary/Interdisciplinary)
Practical	
BMRIT106 P	Human Anatomy Part II
BMRIT107 P	Human Physiology Part II
BMRIT108 P	General Microbiology
BMRIT109 P	Basic Pathology & Hematology
BMRIT111 P	Community Engagement & Clinical Visit (Including related practicals to the Parent course)
Skill Enhancement Elective Course	
SEC 001L	Medical Bioethics & IPR
SEC 002L	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	**BMRIT106 L**

Teaching Objective	To teach students the basic anatomy of Reproductive,Lymphatic, Endocrine, Nervous systems and special senses
Learning Outcomes	• 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	**Reproductivesystem**	• 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 **Epididymis** – parts	6
			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**	• To list parts and	**Lymphoid system** – Lymph, Functions, Parts, Primary	5

		functions of lymphoid system • To classify lymphoid tissue with examples • To describe microscopic features of lymph node, thymus, spleen, & tonsil • To describe of cervical, axillary & inguinal lymph nodes	&secondary lymphoid tissue, Microscopic features, Functions Lymph node	
			Thymus - Microscopic features, Functions	
			Spleen- Microscopic features, Functions	
			MALT – definition and examples Tonsil - Microscopic features, Functions	
			Cervical,Axillary,Inguinal - Lymphnodegroups – Location, Number, Drainage area, applied aspect 1 each	
3	**Endocrine system**	• To describe pituitary, thyroid, parathyroid and adrenal glands	**Pituitary gland -** Coverings, Position, features (external), Secretions, blood supply (Names of vessels) & applied anatomy	4
			Thyroid gland - Coverings, Position, features (external), Secretions, blood supply (Names of vessels), lymphatic drainage (Names of groups of nodes) & applied anatomy	
			Adrenal gland - Coverings, Position, features (external), Secretions, blood supply (Names of vessels), & applied anatomy	
			Parathyroid gland - Position, features (external), Secretions, blood supply (Names of vessels), & applied anatomy	
4	**Nervous system**	• 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	**Introduction to nervous system** – Neuron - Structure, Axon & dendrite differences, Classification with examples Neuroglia – Classification, Functions Divisions of Nervous system	13
			Meninges – Names, Names of dural folds, Dural venous sinuses – Definition, Classification&List	
			Cavernous sinus - Position, features (external & internal),	

		venous sinuses • 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	Connections, Tributaries & applied anatomy **Cerebrum** – Features, Sulci, gyri, Functional areas – Names & Numbers (Broadman), Location & Function. **Blood supply of brain** – Names of arteries and their area of distribution with applied anatomy. Circle of Willi's – Location, Formation, Branches and Applied **Cerebellum** – Location, Features, Divisions, Deep nuclei (names), Connections – Names of 3 peduncles with main tracts passing through, Blood supply – Names of arteries, Cerebellar syndrome **Brainstem** - Parts **Medulla -** Location, features (external), List of cranial nerves emerging from it, Internal features – T.S at inferior olivary nucleus, Applied aspect **Pons -** Location, features (external), List of cranial nerves emerging from it, Internal features – T.S at facial colliculus, Applied aspect **Midbrain -** Location, features (external), List of cranial nerves emerging from it, Internal features – T.S at superior colliculus, Applied aspect **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 List of cranial nerves with function **Oculomotor, Facial,**	

			Hypoglossal nerve – Origin and distribution	
			CSF – Path of circulation and applied aspect	
			Ventricles – Names and connections	
5	**Sensorysystem**	• Tospecify parts of eye and ear with their functions • Tolist contents of middle ear	**Eye –** Parts of eye and their functions	2
			Ear – Parts of ear and their functions, List of middle ear contents	
			Total	**30 hrs**

BMRIT 106 P - Human Anatomy Part II (Demonstration)

Sr.No.	Topics	LearningObjectives	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 Lymphnodegroups	**Cervical, Axillary, Inguinal** - Lymphnodegroups – 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**	• 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. ManipalManualofAnatomyforAlliedHealthSciencescourses:MadhyasthaS.
2. G.J.Tortora &N.PAnagnostakos:PrinciplesofAnatomyandPhysiology
3. TextbookofHistology,Apracticalguide:-J.PGunasegaran

Reference Books:

1. B.D.Chaurasia:
   - VolumeI-Upperlimb& Thorax,
   - VolumeII-Lowerlimb,Abdomen&Pelvis
   - VolumeIII-Head,Neck,Face
   - VolumeIV-Brain-Neuroanatomy
2. VishramSingh:
   - TextbookofAnatomyUpperlimb&Thorax
   - Textbookof AnatomyAbdomen&Lowerlimb
   - TextbookofHeadneckandBrain ,
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	BMRIT107 L

Teaching Objective	**To teach students the basic physiological concepts related to:** • Renal system, Endocrinology& Reproductive system, CNS, Special senses
Learning Outcomes	**At the end of the semester, the student shall be able to** • 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	**Nervous system –** a. Parts and Functions of Nervous system b. Synapse-transmission, Receptors-Types & examples, c. Reflexes –definition & Classification d. Spinal cord- structure and function e. Ascending tracts-Names & functions, f. Descending tracts- Names & functions,, g. Functions of various parts of the Brain-Cerebral cortex, Cerebellum, Basal ganglia Hypothalamus. h. Cerebro-Spinal Fluid (CSF): Composition, functions & Circulation, Lumbar Puncture, i. Autonomic Nervous System (ANS): Functions.	At the end of the session, the student shall be able to • 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	**Special senses-** a. Vision: Structure of Eye, functions of different parts, Refractive errors of Eye and correction, b. Hearing: Structure and function of ear, Tests for Hearing (Deafness)	At the end of the session, the student shall be able to • Draw Structure of Eye • Enumerate functions of different parts of eye, • Classify and Define different Refractive errors of Eye and	6

		correction, • 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 • 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 • 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 • 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 ofNephron, Juxta Glomerular Apparatus, Micturition, Artificial Kidney.	At the end of the session, the student shall be able to • 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. ofHrs.
1	Recordingofbodytemperature	15
2	Examinationofsensorysystem- somatic sensations	
3	Examinationofmotorsystem-, movements, reflexes	
4	ExaminationofEye- Distance and Near vision, Color vision, Visual reflexes	
5	Examinationofear-tests for hearing	
Total		**15hrs**

Textbooks:

1. BasicsofmedicalPhysiology–DVenkateshandH.HSudhakar,3rdedition.
2. PrinciplesofPhysiology –Devasis Pramanik,5thedition.
3. HumanPhysiologyforBDS–DrA.K.Jain,5thedition.

Referencebooks:

1. TextbookofMedicalPhysiology,Guyton,2ndSouthAsiaEdition.
2. Textbook ofPhysiologyVolumeI&II(forMBBS)–Dr.A.K.Jain.

Name of the Programme	**B.Sc. Medical Radiology and Imaging Technology**
Name of the Course	**General Microbiology**
Course Code	**BMRIT108 L**

Teaching Objective	• 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	The student should be able to • 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	**ConceptsandPrinciplesofMicrobiology-** Introduction to Bacteriology, HistoricalPerspective,Koch'sPostulates, ImportanceofMicrobiology,Microscopy	• To understand the principles of Microbiology • To understand the history of Microbiology • To understand the principle and types of Microscopy	4

2	**GeneralCharactersofMicrobes-** Morphology,stainingmethods,Bacterialgrowth &Nutrition1) 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	• To be able to perform the various staining procedures-Gram staining, ZN staining • To understand the morphology and physiology of microorganisims • To be able to understand bacteriological medias and biochemicals • To be able to understandantibiotic susceptibility test methods	6
3	**SterilizationandDisinfection-** Conceptofsterilization,Disinfectionasepsis, PhysicalmethodsofSterilization,Chemicalmethods(Disinfection),OTSterilization,Biomedical Waste Management.	• To apply methods of sterilization and disinfection to control hospital and community acquired infections	5
4	**InfectionandInfectionControl-** Infection,Sources,portalofentryandexit, Standard(Universal)safetyPrecautions&handhygiene,Hospitalacquiredinfections&HospitalInfectionControl	• To know about Infection control practices. • To be able to demonstrate Universal safety precautions (Standard Precautions)	3
5	**Immunity–** TypesClassification,Antigen,Antibody–Definitionandtypes,Ag-Ab Reactions (Serological)–Typesandexamples,	• 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	**Systemic Bacteriology (Morphology, diseases caused)–**Introduction, **1.Gram positive cocci (GPC)**- Staphylococcus aureus, Streptococcus Str.pyogenes, S.pneumoniae) **2. Gram positive bacilli (GPB)** – Corynebacterium diphtheriae (CD) **3. Gram negative Cocci (GNC)** – Neisseria meningitidis, Neisseria gonorrhoeae. **5. Gram negative bacilli** a) Enterobacteriaceae– E.coli, Klebsiella, Proteus, Salmonella, Shigella b) Pseudomonas, Vibrio Cholera **6. Mycobacteria** – M. tuberculosis, M.leprae **7. Anaerobic bacteria** – Clostridium tetani,	• 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

	welchi		
7	**Mycology-**Introduction,Classification, Enumerate common fungi & disease caused Candida Aspergillus Cryptococcus Mucor	To be able to classify fungi on morphological basis & enumerate list of common fungi and diseases caused by them • Candida • Aspergillus • Cryptococcus • Mucor	3
8	**Virology**– • Introduction,GeneralProperties of viruses • Difference between Virus & Bacteria • Enumerate DNA & RNA Virus 1) HIV(Route of transmission, Disease caused & Lab diagnosis). 2) Hep B virus (Route of transmission, Disease caused & Lab diagnosis).	To be able to describe • GeneralProperties of Virus • Difference between Virus & Bacteria • Enumerate DNA & RNA Virus To describe Route of transmission, Disease caused & Lab diagnosis of 1) Human immunodeficiency Virus- HIV 2) Hepatitis B virus - HBV	4
9	**Parasitology** – Introduction to Parasitology – Classification & general characteristics List of common parasite ((Enumerate & disease caused) E. histolytica, Plasmodium spp, Taeniaspp, Roundworm, Hookworm, W. bancrofti – Filaria. Life cycle & Lab diagnosis of Malaria & Roundworm.	• 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	BMRIT109 L

Teaching Objective	• 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.
Learning Outcomes	• 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: • 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	• 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

	(TLC) • Differential Leucocyte Count (DLC) • Platelet count	• 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.	General principles of histopathology techniques • Collection • Fixation of tissue • Tissue processing • Routine staining (H&E staining)	**Collection:** • 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. **Fixation:** • 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. **Tissue processing:** • Steps in tissue processing. • Define dehydration. • Commonly used dehydrating agents. • Microtome and its application. • Enumerate types of microtome. **Staining:** • 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.	General principles of cytopathology techniques • Collection, preservation, transportation and processing of cytological specimens. • Routine cytologystaining (Pap)	**Collection:** • 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). **Fixation:** • Enumerate the common fixatives used for cytology samples. **Processing:** • Enumerate steps in processing of cytology sample. **Staining:** • Principle and uses of Pap stain. • Enumerate the steps of Pap staining.	5
6.	General principles of clinical pathology techniques • 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)	**Collection & transport:** • 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. **Preservation:** • Preservation of clinical pathology samples. **Processing:** • Enumerate steps in processing of clinical pathology sample. **Staining:** • Enumerate the stains used for clinical pathology sample. **Urine examination:** • Methods of urine collection • Enlist the gross and microscopic features of abnormal urine/ example of abnormal urine	5

7.	General principles of Blood Bank techniques • Introduction/Review of blood banking • Blood group system • Collection and processing of blood for transfusion • Compatibility testing • Blood transfusion reactions	• 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	General and systemic pathology: I) Cell Injury • Reversible cell injury • Irreversible cell injury • Cellular adaptations – Hypertrophy, hyperplasia, atrophy and metaplasia.	• 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
	II) Inflammation: • Acute inflammation: cellular and vascular changes and inflammatory cells • Chronic inflammation: general features, granulomatous inflammation with examples	• 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	
	III) Circulatory disturbances: • Edema • Thrombosis • Embolism • Shock • Infarction	• Definition and enlist the types of circulatory disturbances. • Define edema and enlist the causes. • Define thrombosis and mention the types and	

		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	• Mention the types of hypersensitivity reactions • Anaphylaxis: Definition, morphological features and distinguishing features	
	V) Neoplasia	• Definition of anaplasia, dysplasia and metaplasia • Difference between benign and malignant lesions	
	VI)AIDS, Malaria, Dengue	• 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: • Anemia • Leukemia	• 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	• Define NABL and NABH • Enlist the importance of NABL and NABH	1
Total			**60 hrs**

BMRIT109 P – Basic Pathology & Hematology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1.	• 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.	• Processing of blood sample : Automated hematology analyzer	1
3.	• Preparation, fixation, routine staining of peripheral blood smear. • Peripheral smear (CBC report) • Peripheral smear for malaria, anemia and leukemia.	2
4.	• Hemoglobin estimation, different methods and normal values. • Total leucocyte count (TLC) • Differential leucocyte count (DLC)	1
5.	**Histopathology:** • Collection • Fixation of tissue • Tissue processing including histokinette and microtome • Routine staining (H&E staining)	3
6.	**Cytopathology:** • Collection, preservation, transportation and processing of cytological specimens. • Routine staining (PAP staining)	2
7.	**Clinical pathology:** • 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:** • 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	• The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. • To understand the basics of emergency care and life support skills. • To Manage an emergency including moving a patient • To help prevent harm to workers, property, the environment and the general public. • To provide a broad understanding of the core subject areas of infection prevention and control.•To provide knowledge on the principles of on-site disaster management
Learning Outcomes	• Upon completion, Students should be able to apply healthcare quality improvement and patient safety principles, concepts, and methods at the micro-, meso-, and macro-system levels.

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

Reference Books:

1. Washington Manual of Patient Safety and Quality Improvement Paperback – 2016 by Fondahn (Author)
2. Understanding Patient Safety, Second Edition by Robert Wachter (Author)
3. Handbook of Healthcare Quality & Patient Safety Author : Girdhar J Gyani, Alexander Thomas
4. Researching Patient Safety and Quality in Healthcare: A Nordic Perspective Karina Aase, 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 001L

Teaching Objective	• 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 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	• 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, CopyrightsDesigns, Trademarks,Geographical Indication, Infringement of IPR, Its protection and Remedies Licensing and its types	8
Total		**45 hrs**

Reference Books:

1. Contemporary issues in bioethics – Beauchamp & walters (B&W) 4th edition.
2. Classic philosophical questions by Gloud (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 Publicatiopn 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 002L

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

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

Reference Books:

1. Jagannath Mohanty Teaching of Human Rights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009
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. 6.2 of Academic Council (AC-48/2023):

Resolved to approve the reframed index from Semester III to VIII of all the above CBCS programs as per NCrF guidelines, to be effective from batch admitted in Academic Year 2024-25 onwards **[Annexure-46I, 46J, 46K, 46L, 46M, 46N, 46O & 46P].**

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester III

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 112 L	Basics of Radiation Physics	3	-	-	-	3	45	-	-	-	45	20	80	100
BMRIT 113 L	Radiographic Techniques - I	2	-	-	-	2	30	-	-	-	30	20	80	100
BMRIT 114 L	Dark Room Techniques	2	-	-	-	2	30	-	-	-	30	20	80	100
BMRIT 115 CP	MRIT Directed Clinical Education - I	-	-	-	27	9	-	-		405	405	-	50	50
Practical														
BMRIT 113 P	Radiographic Techniques - I	-	-	2	-	1	-	-	30	-	30	10	40	50
BMRIT 114 P	Dark Room Techniques	-	-	2	-	1	-	-	30	-	30	10	40	50
Generic Elective Course														
GEC 001 L	Pursuit of Inner Self Excellence (POIS)	3	-	-	-	3	45	-	-	-	45	10	40	50
GEC 002 L	Organisational Behaviour													
Total		10	0	4	27	21	150	0	60	405	615	90	410	500

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester IV

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 116 L	Physics for Medical Imaging	4	-	-	-	4	60	-	-	-	60	20	80	100
BMRIT 117 L	Radiographic Techniques - II	2	-	-	-	2	30	-	-	-	30	20	80	100
BMRIT 118 L	Patient Care & Radiation Protection	3	-	-	-	3	45	-	-	-	45	20	80	100
BMRIT 119 CP	MRIT Directed Clinical Education - II	-	-	-	24	8	-	-	-	360	360	-	50	50
Practical														
BMRIT 116 P	Physics for Medical Imaging	-	-	2	-	1	-	-	30	-	30	10	40	50
BMRIT 117 P	Radiographic Techniques - II	-	-	2	-	1	-	-	30	-	30	10	40	50
Ability Enhancement Elective Course														
AEC 003 L	Computer and Applications	3	-	-	-	3	45	-	-	-	45	10	40	50
AEC 004 L	Research and Innovation													
Total		12	0	4	24	22	180	0	60	360	600	90	410	500

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester V

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 120 L	Quality Assuarance in Medical Imaging	3	-	-	-	3	45	-	-	-	45	20	80	100
BMRIT 121 L	Equipment for Medical Imaging	4	-	-	-	4	60	-	-	-	60	20	80	100
BMRIT 122 L	Special Procedures in Medical Imaging	3	-	-	-	3	45	-	-	-	45	20	80	100
BMRIT 123 CP	MRIT Directed Clinical Education - III	-	-	-	27	9	-	-	-	405	405	-	50	50
Practical														
BMRIT 122 P	Special Procedures in Medical Imaging	-	-	2	-	1	-	-	30	-	30	10	40	50
Discipline Specific Elective														
DSE 001 L	Basics of Clinical Skill Learning	3	-	-	-	3	45	-	-	-	45	10	40	50
DSE 002 L	Hospital Operation Management													
Total		13	0	2	27	23	195	0	30	405	630	80	370	450

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester VI

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 124 L	Basics of Radio Therapy and Nuclear Medicine	3	-	-	-	3	45	-	-	-	45	20	80	100
BMRIT 125 L	Modern Technologies in Imaging	4	-	-	-	4	60	-	-	-	60	20	80	100
BMRIT 126 L	Advanced Radiographic Techniques	3	-	-	-	3	45	-	-	-	45	20	80	100
BMRIT 127 CP	MRIT Directed Clinical Education - IV	-	-	-	24	8	-	-	-	360	360	-	50	50
Practical														
BMRIT 125 P	Modern Technologies in Imaging	-	-	4	-	2	-	-	120	-	120	10	40	50
Total		10	0	4	24	20	150	0	120	360	630	70	330	400

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester VII & VIII

Code No.	Core Course	Credits		Marks		
		Clinical Posing/ Rotation (CP)	Total Credits (C)	Internal Assement (IA)	Semester End Exam (SEE)	Total
BMRIT 128	B.Sc. MRIT Internship (Semester VII)	20	20	20	80	100
BMRIT 129	B.Sc. MRIT Internship (Semester VIII)	20	20	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. During Internship a candidate must have 100% attendance before the award of the degree. NOC from the Dean/Director, MGMSBS to be made mandatory while applying for Convocation Degree.

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 x15=30 M
Q No 2	Station exercise	3 x 5=15 M
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

Resolution No. 6.6 of Academic Council (AC-48/2023): Resolved to grant to the revised Post-facto approval for amending the AT & KT rules for batch Academic Year 2020-21 onwards

MGM
Mahatma Gandhi Mission

Vice Chancellor <vc@mgmuhs.com>

Annexure-49 of AC-48/2023

Revised Post facto approval for amending the ATKT rules.

1 message

SBS Navi Mumbai <sbsnm@mgmuhs.com> Wed, Jul 19, 2023 at 10:20 AM
To: Vice Chancellor <vc@mgmuhs.com>
Cc: Registrar MGMIHS <registrar@mgmuhs.com>, Controller of Exam MGMIHS <coe@mgmuhs.com>

Respected Sir,

Please find attached herewith the request letter for Post facto approval for amending the ATKT rules.
Kindly do the needful.

Thanking you,

Director
MGM School of Biomedical Sciences
(Deemed University u/s 3 of UGC Act, 1956) Grade 'A++' Accredited by NAAC
MGMIHS, Kamothe
Navi Mumbai
022 27437631 / 32

Letter to VC Post facto approval for amending the atkt rules 19.07.2023.pdf
4143K

(1) As based on the NEP Policy · BSc. III Yr + 1 Yr of Internship become 4 year of Progr so now we have made it upto I to VIII Sem. So request to approved post facto approval for ATKT Rule for sem VII & VIII. So that candidate will be allowed for VII, VIII sem exam and not allowed to appear in the final Semexamination (sem VIII) unless the candidate has cleared all the previous sem examinations (I to VII

19/7/23.

Approved

19/7/23.

MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI

(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

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

Grade "A" Accredited by NAAC

Sector 1, Kamothe, Navi Mumbai-410209, Tel.No.022-27437631, 27432890

Email: sbsnm@mgmuhs.com Website: www.mgmsbsnm.edu.in

Ref: MGMSBS/23/07/1709 Date:18-07-2023

To,
Hon'ble Vice Chancellor
MGMIHS,
Kamothe, Navi Mumbai

Through – proper channel

Sub: Post facto approval for amending the ATKT rules.

Respected Sir,

As per National Education Policy (NEP) 2020, we have accordingly changed our credit & semester pattern where students will have to appear for VII & VIII Semester exams as approved vide resolution no. 6.7 of AC - 46/2023 for batch AY 2020-21 onwards.

We request post-facto approval to amend our ATKT rules (Resolution No. 3.2.1.d of BOM 57/2019 dated 26.04.2019) for batch AY 2020-21 onwards as per below:

Carryover Pattern (ATKT Rules):

- A student will be allowed to keep term for Semester II irrespective of number of heads of failure in the Semester I.
- A student will be allowed to keep term for Semester III if he/she passes each Semester I & II **OR** fails in not more than two courses each in Semester I & II.
- Student will be allowed to keep term for Semester IV irrespective of number of heads of failure in Semester III. However, the student shall pass each course of Semester I and Semester II in order to appear for Semester IV.
- Student shall be allowed to keep term for Semester V if he/she passes Semester I, Semester II, Semester, III and Semester IV. **OR** shall pass Semester I and Semester II and fails in not more than two courses each in Semester III and Semester IV.
- Student shall be allowed to keep term for Semester VI irrespective of number of heads of failure in Semester V. However,he/she has passes Semester I, Semester II, Semester, III and Semester IV.
- A student will be allowed to keep term for Semester VIIif he/she passes each Semester V & VI **OR** fails in not more than two courses each in Semester V & VI.
- A Candidate shall not be allowed to appear in the final semester examination (Semester VIII) unless the candidate has cleared all the previous semester examinations (I to VII).

Request postfacto approval as regular Semester VI exams are due on 3rd Week of August 2023.

Thanking you,

Director
MGM School of Biomedical Sciences
Kamothe, Navi Mumbai

SCHOOL OF BIO-MEDICAL SCIENCES ★ M.G.M. KAMOTHE NAVI MUMBAI

Director
MGM School of Biomedical Science
Kamothe, Navi Mumbai

cc to: Controller of Examination, MGMIHS
Registrar, MGMIHS

Resolution No.6.7 of Academic Council (AC-48/2023): Resolved to approve the list of books from M.Sc. Clinical Embryology, M.Sc. Medical Biotechnology, M.Sc. Clinical Nutrition, B. Optometry, B.Sc. MRIT, M.Sc. MRIT & M. Optometry [Annexure-50].

Programme Name	Book Name	Author
B.Sc. & M.Sc. Medical Radiology and Imaging Technology	Christensen's Physics of Diagnostic Radiology	1.Thomas S. Curry 2. James E. Dowdey 3. Robert C. Mrurry JR
	Textbook of Radiographyc and related anatomy	1.John P. Lamnpigno 2. Leslie E. Kendrick
	Computed Tomography Physcal Principle, Clinical Application and Quality Control	1.Euclid Seeram
	Chesney's Radiogrpahic Imaging	1.John ball and Tony Price
	Textbook of Radiological Safety	1. K. Thayalan
	Radiation Protection in Medical Radiography	1. Mary Alice Statkiewicz Sherer 2. E Russell Riteenour 3.Keli Welch Haynes
	MRI in Practice	1.Catherine Westbrook 2. Carolyn Kaut Roth 3. John Talbol
	Chapman & Nakielney's Guide to Radiological Procedures	1.Nick Watson 2. Hefin Jones
	Equipments for Diagnostic Radiography	E. Forsters

Resolution No. 3.1 of Academic Council (AC-50/2024):
Resolved to approve CBCS syllabus & Indexes [ANNEXURE -3A, **3B**, 3C, 3D, 3E, 3F, 3G, 3H] along with the revised COs & POs (Semester I to VIII) [ANNEXURE -3I, 3J, 3K, 3L, 3M, 3N, 3O, 3P] for B.Sc. Medical Laboratory Technology, **B.Sc. Medical Radiology & Imaging Technology**, B.Sc. Operation Theatre & Anesthesia 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 programs (Semester III to VIII) to be effective from batch admitted in Academic Year 2024-25 onwards.

Annexure-3B of AC-50/2024

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
Sector 1, Kamothe Navi Mumbai-410209,
Tel.No.:022-27437631, 27437632, 27432890
Email. sbsnm@mgmuhs.com/Website : www.mgmsbsnm.edu.in

CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2024 - 25)

Curriculum for

B.Sc. Allied Health Sciences

B.Sc. Medical Radiology and Imaging Technology

Semester III to VIII

B.Sc. Medical Radiology and Imaging Technology

Program Outcomes (PO)

Program Code	Program Objective
PO1	**Technological aptitude:** Exhibit expertise in using a range of radiologic equipment, such as ultrasound, CT, MRI, and X-ray machines, to guarantee reliable imaging results. Apply proper patient positioning procedures to produce the finest diagnostic pictures while maintaining patient comfort and safety.
PO2	**Patient Safety and Care:** Demonstrate a thorough comprehension of patient care concepts, such as the capacity to communicate clearly, uphold patient privacy, and deliver compassionate care. Adopt radiation safety procedures to reduce patient and healthcare worker exposure.
PO3	**Clinical Proficiency:** Assess and analyses radiographic pictures accurately to help with illness diagnosis and treatment. Ensure the provision of top-notch patient care by working efficiently with healthcare teams made up of radiologists, doctors, and other medical specialists.
PO4	**Guidelines for Enticing and Law:** Respect the law and moral standards when practicing medical radiography, especially when it comes to patient privacy and getting informed permission. Keep yourself up to date on the laws and regulations that currently regulate the use of radiologic technology within these limits.
PO5	**Problem-solving with Critical Thinking:** Apply critical thinking and problem-solving abilities to evaluate intricate clinical scenarios and arrive at well-informed conclusions about imaging methods and patient treatment. Adjust to new difficulties and modifications in medical imaging technologies or practices.
PO6	**Proficiency in Communication:** When speaking with patients, healthcare teams, and other stakeholders, exhibit effective verbal and writing communication skills. Prepare reports and documentation pertaining to radiologic procedures in a clear, accurate, and succinct manner.
PO7	**Professional Growth and Continuous Learning:** By ongoing education, professional development, and participating in professional organizations, showcase your dedication to lifelong learning and being up to date with developments in medical radiography and imaging technology. Practice reflection to keep developing your professional and personal abilities.
PO8	**Research and Innovation:** Contribute to the advancement of new methods and technology by engaging in medical radiology research and innovation. To enhance patient outcomes, incorporate evidence-based approaches into the therapeutic setting.
PO9	**Cultural Proficiency:** Acknowledge and honor patients' varied histories and needs while delivering culturally sensitive treatment in a range of therapeutic contexts.
PO10	**Teamwork and Leadership:** Demonstrate leadership abilities by overseeing radiologic initiatives or departments, coaching colleagues, and fostering a cooperative healthcare environment. Function well in a multidisciplinary team while exhibiting professionalism and a dedication to provide patients with top-notch treatment.
PO11	**Holistic Development:** Acknowledge and understand about the spiritual and cultural development for the well-being of them and for the society.

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester III

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 112 L	Basics of Radiation Physics	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 113 L	Radiographic Techniques - I	2	-	-	-	**2**	30	-	-	-	**30**	**20**	**80**	**100**
BMRIT 114 L	Patient Care & Radiation Protection	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 115 CP	MRIT Directed Clinical Education - I	-	-	-	27	**9**	-	-		405	**405**	-	**50**	**50**
Practical														
BMRIT 113 P	Radiographic Techniques - I	-	-	2	-	**1**	-	-	30	-	**30**	**10**	**40**	**50**
Generic Elective Course														
GEC 001 L	Pursuit of Inner Self Excellence (POIS)	3	-	-	-	**3**	45	-	-	-	**45**	**10**	**40**	**50**
GEC 002 L	Organisational Behaviour													
Total		**11**	**0**	**2**	**27**	**21**	**165**	**0**	**30**	**405**	**600**	**80**	**370**	**450**

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester IV

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 116 L	Physics for Medical Imaging	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 117 L	Radiographic Techniques - II	2	-	-	-	**2**	30	-	-	-	**30**	**20**	**80**	**100**
BMRIT 118 L	Dark Room Techniques	2	-	-	-	**2**	30	-	-	-	**30**	**20**	**80**	**100**
BMRIT 119 CP	MRIT Directed Clinical Education - II	-	-	-	27	**9**	-	-	-	405	**405**	-	**50**	**50**
Practical														
BMRIT 117 P	Radiographic Techniques - II	-	-	2	-	**1**	-	-	30	-	**30**	**10**	**40**	**50**
BMRIT 118 P	Dark Room Techniques	-	-	2	-	**1**	-	-	30	-	**30**	**10**	**40**	**50**
Ability Enhancement Elective Course														
AEC 003 L	Computer and Applications	3	-	-	-	**3**	45	-	-	-	**45**	**10**	**40**	**50**
AEC 004 L	Good Clinical Lboratory Practice and Research Skills													
Total		**10**	**0**	**4**	**27**	**21**	**150**	**0**	**60**	**405**	**615**	**90**	**410**	**500**

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester V

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 120 L	Quality Assuarance in Medical Imaging	2	-	-	-	**2**	30	-	-	-	**30**	**20**	**80**	**100**
BMRIT 121 L	Equipment for Medical Imaging - I	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 122 L	Special Procedures in Medical Imaging	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 123 CP	MRIT Directed Clinical Education - III	-	-	-	27	**9**	-	-	-	405	**405**	-	**50**	**50**
Practical														
BMRIT 122 P	Special Procedures in Medical Imaging	-	-	2	-	**1**	-	-	30	-	**30**	**10**	**40**	**50**
Discipline Specific Elective														
DSE 001 L	Basics of Clinical Skill Learning	3	-	-	-	**3**	45	-	-	-	**45**	**10**	**40**	**50**
DSE 002 L	Hospital Operation Management													
Total		**11**	**0**	**2**	**27**	**21**	**165**	**0**	**30**	**405**	**600**	**80**	**370**	**450**

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester VI

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 124 L	Basics of Radio Therapy and Nuclear Medicine	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 125 L	Equipment for Medical Imaging - II	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 126 L	Advanced Radiographic Techniques	3	-	-	-	**3**	45	-	-	-	**45**	**20**	**80**	**100**
BMRIT 127 CP	MRIT Directed Clinical Education - IV	-	-	-	27	**9**	-	-	-	405	**405**	-	**50**	**50**
Practical														
BMRIT 125 P	Equipment for Medical Imaging - II	-	-	4	-	**2**	-	-	60	-	**60**	**10**	**40**	**50**
Total		**9**	**0**	**4**	**27**	**20**	**135**	**0**	**60**	**405**	**600**	**70**	**330**	**400**

OUTLINE OF COURSE CURRICULUM

B.Sc. Medical Radiology and Imaging Technology

Semester VII & VIII

Code No.	Core Course	Credits		Marks		
		Clinical Posing/ Rotation (CP)	Total Credits (C)	Internal Assement (IA)	Semester End Exam (SEE)	Total
BMRIT 128	B.Sc. MRIT Internship (Semester VII)	20	20	20	80	100
BMRIT 129	B.Sc. MRIT Internship (Semester VIII)	20	20	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. During Internship a candidate must have 100% attendance before the award of the degree. NOC from the Dean/Director, MGMSBS to be made mandatory while applying for Convocation Degree.

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 x15=30 M
Q No 2	Station exercise	3 x 5=15 M
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

SECOND YEAR

B.Sc. Medical Radiology & Imaging Technology

SEMESTER-III

Code No.	Core Subjects
Theory	
BMRIT 112 L	Basics of Radiation Physics
BMRIT 113 L	Radiographic Techniques - I
BMRIT 114 L	Patient Care & Radiation Protection
BMRIT 115 CP	MRIT Directed Clinical Education - I
Practical	
BMRIT 113 P	Radiographic Techniques - I
Generic Elective Course	
GEC 001 L	Pursuit of Inner Self Excellence (POIS)
GEC 002 L	Organizational Behavior

Name of the Programme	B.Sc. Medical Radiology & Imaging Technology
Semester	Semester - III
Name of the Course	Basics of Radiation Physics
Course Code	BMRIT 112 L

Course Outcomes	• Describe the basic physics and basic structure of atom to understand the radioactivity • Describe the basic equipment related to physics those can be helpful for students to understand the physical activity

Sr. No.	Topics	No. of Hrs.
1.	The Atom - Definition, Thomson Atom, Bohr Atom, Atomic Structure, Electron Binding Energy, Radioactivity laws of radioactivity and decay Schemes of different alpha, Beta, gamma ray.	4
2.	Physical quantity , its unit and measurement Fundamental and derived quantity, SI unit Radiation quantities and Units: Activity, Exposure, Kerma, Absorbed Dose, Equivalent Dose, Effective Dose.	4
3.	Capacitor ,capacitance ,conductors ,semiconductors ,insulators ,power ,ammeter and volt meter Automatic Exposure Control	2
4.	Light- Properties of light, measurement of light and its units, X- Ray spectrum, application of visible light in medicine, application of ultraviolet and infrared light in medicine.	6
5.	Heat -Definition of heat, temperature, Heat capacity, specific heat capacity, Heat transfer-conduction,convection,radiation,thermalconductivity,thermalexpansion,Newton's law of cooling, application in diagnostic Radio diagnosis (Heat dissipation X-Ray tubes).	6
6.	Sound- Nature and propagation of sound wave (the characteristics of sound, wave theory),SI unit, speed of sound in a material medium, Ultrasonic wave, production of ultrasonic wave	6
7.	Electromagnetic Radiation-Photon, Velocity and amplitude, Frequency and wavelength, Electromagnetic Spectrum, Inverse square law, Units and quantities of radiation, dose measurement for various diagnostic procedures.	7
8.	Electricity and Magnetism-Electrostatics, Laws of electrostatics, Coulomb's law, Electrodynamics, Ohm's laws, Alternative & Direct Current, Magnet, Classification of magnets, Magnetic laws. Electromagnetism – Electromagnetic Effect, Faraday's & Lenz's law of Electromagnetic Induction, Generator, Transformers, Laws of Transformers, Types of Transformers	10
Total		**45 hrs**

Reference:

1. The Physics of Diagnostic Imaging, 1st Edition, 1998, Dowsett, Kenny Johnston.
2. Physical Principles of Diagnostic Radiology, Sprawls.
3. Essential Physics for Radiographers, Ball, Moor.
4. Radiological Science for Technologist: Physics, Biology and Protection, 8th Edition, 2004, Bushong, Stewart C.
5. X-ray Physics and Equipment, Ashuworth.
6. The Fundamentals of X-ray and radium Physics, 6th Edition, Selman.

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - III
Name of the Course	Radiographic Techniques – I
Course Code	BMRIT 113 L

Course Outcomes	• Describe the basic anatomy of the human body related to radiography • Describe the positioning in relation of human anatomy. Students will be able to read the scans after the completion.

Sr. No.	Topics	No. of Hrs.
1	**Radiographic Positioning Terminology Basic Terms:** Anterior, Posterior, Superior, Inferior, Medial, Lateral, Proximal, Distal,Deep, Ipsilateral, Contralateral; **Types of planes:** Coronal, Sagittal and Axial (Transverse); Body Positions: Erect, Decubitus, Supine, Prone, Lateral Decubitus; Movements: Flexion, Extension, Abduction, Adduction, Pronation, Supination, Elevation, Depression, Eversion, Inversion	3
2	**Accessories and Instruments:** Lead aprons, Sand Bags, Lead Scale, etc; CT, Fluroscopy, Ultrasound, Portable X-ray,Mammography, C-arm	2
3	**Chest:** Posterior to Anterior, Anterior to Posterior; Lateral ; Lordotic, Apical, Ribs, High KV	10
4	**Upper Limb:** Shoulder Joint; Humerus, Elbow, Forearm; Wrist, Scaphoid, Hand	5
5	**Lower Limb** Hip Joints; Thigh; Knee, Leg; Ankle, Foot, Calcaenum	10
Total		**30 hrs**

BMRIT 113 P: Radiographic Techniques – I

Sr. No.	Topics	No. of Hrs.
	Student should prepare a journal which will contain the procedures adopted in Imaging Radiographs:	30
1	Chest	
2	Upper Extremities	
3	Lower Extremities	
4	Shoulder Girdle	
Total		**30 hrs**

Reference:

1. Merrill's Atlas of Radiographic Positioning & Procedures, 11th Edition, 2007, Frank, long, Smith.
2. Clark's positioning in Radiology, 12th Edition, 2005, Clark.
3. Medical X-ray Techniques in Diagnostic Radiology, Vander Plaals
4. Radiographic Anatomy and Positioning: An integrated approach, 1998, Comuelle, Andrea Gauthier
5. Special Techniques in Orthopedic Radiology, Stripp W

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - III
Name of the Course	Patient Care & Radiation Protection
Course Code	BMRIT 114 L
Course Outcomes	• Describe the patient vital signs and taking patient history for the preparation of scans. • Describe about the responsibilities of radiographers for the scanning and related to departments for various type of scanning. • Describe the radiation safety measure and radiation protection needed for the radiology department and radiographers. • Describe various government bodies those are responsible for the radiation safety measure and students will be able to understand the importance of radiation safety and radiation protection.

Sr. No.	Topics	No. of Hrs.
1	**Patient care and Assessment:** Taking history, Assessing current physical status, Skin temperature, color, consciousness, Breathing, Obtaining Vital signs, Electronic Patient Monitoring	5
2	**Responsibilities of the Imaging Technologist:** Medicationadministration,routesofadministration,Listoffrequentlyusedmedications **Patient transfer technique & Restraint technique-**Preparation fortransfer,wheelchairtransfer,stretchertransfer,immobilizationtechniques	4
3	**Handling the emergencies in Radio diagnosis** Reaction to contrast media, Oxygen administration and suction, Respiratory emergencies, Cardiac emergencies, Trauma, Shock **Patient care during Investigation** G.I.Tract,Biliarytract,Respiratorytract,Gynecology,Cardiovascular,Lymphaticsystem, C.N.S. etc	5
4	**Patient Education & Communication** Patient communication problems Explanation of examinations Radiation Safety / Protection Interacting with terminally ill patient Informed Consent	5
5	**Introduction to Radiation Protection, Units & Quantities-** Primary, secondary radiation, need for radiation protection, Exposure, Absorbed dose, absorbed dose equivalent, Effective dose, air KERMA, Radiation weighting factor, Tissue weighting factor, MPD **Aim & Principle of Radiation Protection-** Concept of ALARA, Cardinal Principle, ICRP regulation, Radiation Protection in: Radiography, CT ,Fluoroscopy, Mammography, Ward radiography ,radiation shielding	7
6	**Radiation monitoring:** Personnel–Film badge, TLD, OSLD, pocket dosimeter, Area monitoring Devices. **Radiobiology:** Radiolysis of water, Direct & Indirect effects of radiation, Stochastic, Deterministic effects, Somatic, Genetic effects, dose Relationship, Antenatal exposure.10 day rule, 14 day rule, 28 day rule, structural shielding, workload, use factor, occupancy factor.	6
7	**Biological effects of Radiation:** Sources of exposure in environment, Somatic & Genetic effects, Effects on cellular levels, Effects on organs, Stochastic and non- stochastic effects	7
8	**Radiation Hazard Evaluation And Control:** Philosophy of Radiation protection, effects of time, Distance & Shielding, Calculation of Work load, weekly calculated dose to radiation worker & General public, Good work practice in Diagnostic Radiology	6
Total		**45 hrs**

Reference:

1. Radiation Protection in Medical Radiography by Mary Alice Statkiewcz

Course Code - BMRIT 115 CP: MRIT Directed Clinical Education – I

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students will apply knowledge from clinical learning experience under the supervision of a radiologist or senior technologist Students are tested on intermediate clinical radiological skills.
(Total-405 hrs.)

GENERIC ELECTIVE COURSE

Name of the Programme	**B.Sc. Medical Radiology and Imaging Technology**
Semester	**Semester - III**
Name of the Course	**Pursuit of Inner Self Excellence (POIS)**
Course Code	**GEC 001 L**

Course Outcomes	• Students will become self-dependent, more debility for their study and career related matter decisive and develop intuitive • Student's ability to present their ideas will be developed. • Enhanced communication skills, public speaking & improved Presentation ability. • Students will be able to explore their inner potential and inner ability to become a successful researcher or technician & hence become more focused. • Students will observe significant reduction in stress level. • With the development of personal attributes like Empathy, Compassion, Service, Love & brotherhood, students will serve the society and industry in better way with teamwork and thus grow professionally.

Sr. No.	Topics	No. of Hrs.
1	**Spiritual Values for human excellence :** The value of human integration; Compassion, universal love and brotherhood (Universal Prayer) ; Heart based living ; Silence and its values, Peace and non-violence in thought, word and deed ; Ancient treasure of values - Shatsampatti , Patanjali's Ashtanga Yoga ,Vedic education - The role of the Acharya , values drawn from various cultures and religious practices - Ubuntu, Buddism, etc.; Why spirituality? Concept – significance ; Thought culture	10
2	**Ways and Means :** Correlation between the values and the subjects ;Different teaching techniques to impart value education; Introduction to Brighter Minds initiative; Principles of Communication; Inspiration from the lives of Masters for spiritual values - Role of the living Master	15
3	**Integrating spiritual values and life:** Relevance of VBSE (Value Based Spiritual Education) in contemporary life ; Significant spiritual values ; Spiritual destiny ; Principles of Self-management; Designing destiny	10
4	**Experiencing through the heart for self-transformation (Heartfulness Meditation):** Who am I? ; Introduction to Relaxation; Why, what and how HFN Meditation?; Journal writing for Self-Observation ; Why, what and how HFN Rejuvenation (Cleaning)? ; Why, what and how HFN connect to Self (Prayer)?; Pursuit of inner self excellence ; Collective Consciousness-concept of *egregore effect;*	10
Total		**45 hrs**

Books:

- The Art of Learning: **A Journey in the Pursuit of Excellence,** Josh Waitzkin, Simon and Schuster, 2007
- Reality at Dawn. By Shri Ram Chandra, Published by ISRC

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - III
Name of the Course	Organizational Behavior
Course Code	GEC 002 L

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.

Sr. No.	Topics	No. of Hrs.
1	Organizational Behavior - Definition - Importance - Historical Background - Fundamental concepts of OB - 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive	6
2	**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	8
3	Perception Process - Nature & Importance - Perceptual Selectivity - Perceptual Organization -Social Perception - Impression Management	6
4	Learning - Process of Learning - Principles of Learning - Organizational Reward Systems –Behavioral Management	6
5	Motivation - Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity – MoraleIndicators	6
6	Leadership - Definition - Importance - Leadership Styles - Models and Theories of LeadershipStyles	7
7	Conflict Management - Traditional vis-a-vis Modern view of conflict - Constructive and Destructive conflict - Conflict Process - Strategies for encouraging constructive conflict - Strategies for resolving destructiveconflict	6
Total		**45 hrs**

Books:

1. Organizational Behavior, 9th Ed. - Stephen Robbins
2. Human Behaviour at work - Davis and Newstorm
3. Organizational Behaviour - Uma Sekaran
4. Organizational Behaviour - Fred Luthans
5. Organizational Behaviour - K.Aswathappa
6. Human Behaviour at Work - Keith Davis
7. Organizational Behaviour - Jit S.Chandran
8. Human Relations & Organizational Behaviour - R.S.Dwivedi
9. Organizational Behaviour - McShane

SECOND YEAR

B.Sc. Medical Radiology & Imaging Technology

SEMESTER-IV

Code No.	Core Subjects
Theory	
BMRIT 116 L	Physics for Medical Imaging
BMRIT 117 L	Radiographic Techniques - II
BMRIT 118 L	Dark Room Techniques
BMRIT 119 CP	MRIT Directed Clinical Education - II
Practical	
BMRIT 117 L	Radiographic Techniques - II
BMRIT 118 L	Dark Room Techniques
Ability Enhancement Elective Course	
AEC 003 L	Computer and Applications
AEC 004 L	Good Clinical Laboratory Practice and Research Skills

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - IV
Name of the Course	Physics for Medical Imaging
Course Code	BMRIT 116 L

Course Outcomes	• It will describe the mechanics of equipment which are used for the scanning and imaging purpose • Describe the x ray generation, production and how radiation can be useful for the imaging purpose • Describe the working principle and instrumentation and function of modern equipment for the scanning and imaging purpose.

Sr. No.	Topics	No. of Hrs.
1	**Radiation Physics:** **Production of x rays:** History, introduction, Equipment, Components of x rays tubes, Anode Heel Effect, Characteristic Radiation, Bremsstrahlung Radiation. **Interaction of Radiation with Matter:** Coherent Scattering, Compton Scattering, Photoelectric absorption, Photodisintegration and Pair Production. Properties of x rays, Nature of X rays, Production of X rays, Absorption of X rays. Effects of Scattered Radiation, Factors affecting Scattered Radiation (Kilo voltage, Part Thickness, Field Size)	20
2	**X ray Tubes:** **Introduction of X rays Tubes:** History, Introduction. **Types of X rays tubes:** Conventional X rays tubes (Crookes Tube and Coolidge Tubes) Modern X ray tube (Stationary Anode X ray tube, Rotating Anode X ray Tubes, Grid Anode X ray Tube, Mammography Tube).	10
3	**Fluoroscopy, Digital Imaging and Computed Tomography:** Introduction to Fluoroscopy, History and Basic Principle and Types of Fluoroscopic Machine Introduction to Digital Imaging, History and Basic Principle Introduction to Computed Tomography, Basic Principle, Generations and History.	10
4	**Magnetic Resonance Imaging:** Types of Magnets: Permanent & Super Conducting Magnets, Magnetism: Introduction, Definition, Uses In MRI, Spining Proton, Larmor Frequency, Radiofrequency Pulse.	5
TOTAL		**45 hrs**

Reference:

1. The Physics of Diagnostic Imaging, 1st Edition, 1998, Dowsett, Kenny Johnston.
2. Physical Principles of Diagnostic Radiology, Sprawls.
3. Essential Physics for Radiographers, Ball, Moor.
4. Radiological Science for Technologist: Physics, Biology and Protection, 8th Edition, 2004, Bushong, Stewart C.
5. X-ray Physics and Equipment, Ashuworth.
6. Computed Radiography, M J Brooker.
7. The Fundamentals of X-ray and radium Physics, 6th Edition, Selman.
8. The MRI Manual, 2nd Edition, 1998, Robert b Lufkin.
9. Clinical Sonography, A Practical guide, 1998, Roger C Sanders.
10. MRI in Practice, 3rd Edition, 2005, Westbook, Rath.

Name of the Programme	**B.Sc. Medical Radiology and Imaging Technology**
Semester	**Semester - IV**
Name of the Course	**Radiographic Techniques – II**
Course Code	**BMRIT 117 L**

Course Outcomes	• Describe the basic anatomy of the human body related to radiography • Describe the positioning in relation of human anatomy. Students will be able to read the scans after the completion.

Sr. No.	Topics	No. of Hrs.
1	**Pelvic Girdle and Hip Region:** Pelvis, Sacrum, S.I Joints and Hip Joints, Special views	5
2	**Spine:** Cervical Spine, Dorsal Spine, Lumber Spine, Sacrum	5
3	**Skull:** Skull AP, Lateral, PA, Mastoids	5
4	**Facial Bones:** Para Nasal Sinuses, Orbits, Mandible, Maxilla, Nasal Bones	10
5	**Skeletal Survey:** Radiography associated with Skeletal Survey: Preparation, Views, Positions	5
Total		**30 hrs**

BMRIT 117 P: Radiographic Techniques – II

Sr. No.	Topics	No. of Hrs.
	Student should prepare a journal which will contain the procedures adopted in Imaging Radiographs:-	30
1	Pelvic Region	
2	Skull	
3	Facial Bones	
4	Skeletal Survey	
5	Vertebral Column	
Total		**30 hrs**

Reference:

1. Merrill's Atlas of Radiographic Positioning & Procedures, 11th Edition, 2007, Frank, long, Smith.
2. Clark's positioning in Radiology, 12th Edition, 2005, Clark.
3. Medical X-ray Techniques in Diagnostic Radiology, Vander Plaals
4. Radiographic Anatomy and Positioning: An integrated approach, 1998, Comuelle, Andrea Gauthier
5. Special Techniques in Orthopedic Radiology, Stripp W

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - IV
Name of the Course	Dark Room Techniques
Course Code	BMRIT 118 L

Course Outcomes	• Describe the conventional method of image development • Describe the various equipment used for the image production and image formation

Sr. No.	Topics	No. of Hrs.
1	**The Photographic Process:** Visible Light Images; Images Produced by X-radiation; Light Sensitive Photographic materials; Photographic Emulsions Illumination, Luminescence	5
2	**Film materials in x-ray departments:** Construction of Film Material, Types of Film Materials Single & Double coated films; Speed and contrast of photographic materials; Storage offilm materials and radiographs,: Temperature, Place, Light, Storage Boxes	5
3	**Intensifying screens and cassettes:** Construction of Intensifying screens; The Fluorescent material; The intensification factor; The influence of kilo voltage and scattered radiation; Cassette design and care of cassettes; Different types of Intensifying Screens	5
4	**Film processing:** Developing, Fixing, Rinsing, Washing and Drying; Constitution of Developing and Fixing materials; Manual & Automatic processing; Processing area and equipment, Dark room layout	10
5	**Radiographic image:** **Components in image quality;** The contrast, Un-sharpness and blurring effect; Size,shape and spatial relationships, Characteristics Curve, Effects of technical factors on characteristic curve.	5
Total		**30 hrs**

BMRIT 118 P: Dark Room Techniques

Sr. No.	Topics	No. of Hrs.
1. 2. 3.	Loading and Unloading of Radiographic film and Intensifying Screens Film processing techniques and dark room Compatibility tests for radiographic images	30
Total		**30 hrs**

Reference:

1. Radiographic Imaging, 4th Edition, 1987, D N Chesney, M O Chesney.
2. Principles of Radiographic Imaging, 3rd Edition, 2001, Carlton, Adler.
3. The Science of Photography, Braines H

Courses Code - BMRIT 119 CP: MRIT Directed Clinical Education – II

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate clinical radio diagnosis skills.

(Total – 405 hrs.)

ABILITY ENHANCEMENT ELECTIVE COURSE

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - IV
Name of the Course	Computers and Applications
Course Code	AEC 003 L

Course Outcomes	• Introduction to Hardware and processing of computers and storage devices. • Adept knowledge of computer software and applications such as Microsoft office (Word, Excel and Power Point) • Application of operating systems, computer networks & internet in Health Care Settings.

Sr. No.	Topics	No. of Hrs.
1	Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.	1
2	Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).	3
3	Processor and memory: The Central Processing Unit (CPU), main memory.	4
4	Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.	3
5	Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).	5
6	Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.	5
7	Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.	5
8	Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.	5
9	Introduction of Operating System: introduction, operating system concepts, types of operating system.	4
10	Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.	5
11	Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.	4
12	Application of Computers in clinical settings.	1
Total		**45 hrs**

Text books:

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

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - IV
Name of the Course	Good Clinical Laboratory Practice Research & Skills
Course Code	AEC 004 L

Course Outcomes	• Proficiency an adept knowledge of Good Clinical Laboratory Practice (GCLP), ethical principles and guidelines to ensure patient rights and welfare in clinical research. • Understand the importance of Ethical Guidelines and Good Documentation Practices (GDP) in conducting Clinical Research. • Effectively understand the Basics of Biostatistics, Research Study Designing, Methodology, Implementation and Grant Application.

Sr. No.	Topics	No. of Hrs.
1	**Introduction to Good Clinical Laboratory Practice;** Definition and principles of GCLP, Historical background and evolution, Regulatory guidelines and standards (e.g., FDA, ICH, WHO), Ethical considerations in clinical research.	10
2	**Laboratory Safety and Quality Assurance;** Laboratory safety protocols and precautions, Risk assessment and mitigation strategies, Quality control and quality assurance measures, Documentation and record-keeping practices.	5
3	**Basic of Biostatistics;** Sampling Techniques, Experimental Designs, Basic Data analysis methods, Preparation of Frequency Table, Mean, Mode and Median Analysis.	10
4	**Research Ethics and Good Documentation Practices**; Ethical principles in clinical research, Informed consent process, Good Documentation Practice (GDP) guidelines, Adverse event reporting and ethical considerations.	5
5	**Research Protocol Design and Implementation**; Components of a research protocol, Study design and methodology, Protocol review and approval process, Practical considerations in protocol implementation.	10
6	**Proposal writing and grant application process;** Components of the research proposal, General Considerations in the Proposal formulations, Stages of Proposal Evaluations, Introduction of various funding agencies.	5
Total		**45 hrs**

THIRD YEAR

B.Sc. Medical Radiology & Imaging Technology

SEMESTER-V

Code No.	Core Subjects
Theory	
BMRIT 120 L	Quality Assuarance in Medical Imaging
BMRIT 121 L	Equipment for Medical Imaging -I
BMRIT 122 L	Special Procedures in Medical Imaging
BMRIT 123 CP	MRIT Directed Clinical Education - III
Practical	
BMRIT 122 P	Special Procedures in Medical Imaging
Discipline Specific Elective	
DSE 001 L	Basics of Clinical Skills Learning
DSE 002 L	Hospital Operation Management

Name of the Programme	**B.Sc. Medical Radiology and Imaging Technology**
Semester	**Semester - V**
Name of the Course	**Quality Assurance in Medical Imaging**
Course Code	**BMRIT 120 L**

Course Outcomes	• Describe the importance of government bodies in the maintenance of radiographic equipment's and also the importance of quality assurance and quality control. • Describe the importance of quality control in the maintaining quality of radiographic image.

Sr. No.	Topics	No. of Hrs.
1	**Planning of Radio-diagnosis Department:** Location of the department, Adjacent department and areas, Basics of the imaging rooms, Patient waiting areas, Basics infrastructures of the imaging rooms	5
2	**Quality Assurance in Radio diagnosis:** Aim of quality assurance in medical imaging, Q.A. Program	5
3	**Accessory equipment:** Collimator, Cassettes and Intensifying screens, Grid, Lead rubber aprons and gloves, Viewing box, Patient positioning aids, Patients measuring calipers	5
4	**X-ray equipment:** Choosing x-ray equipments, Acceptance of new x-ray equipments, Generator, X-ray tube, column, table, potter bucky and upright bucky, Portable and mobile x-ray units	5
5	**Manual film processing:** The darkroom, Film and chemical storage, Film processing	5
6	**Making simple test tools:** Water phantom, Aluminum step wedge, Film/screen contacttest tool, Measuring calipers, Tomography test tools.	5
Total		**30 hrs**

Reference:

1. Quality Assurance Workbook, 2004, Peter J. Lloyd
2. Assurance of Quality on Diagnostic X-ray Dept, J A Gannett et al
3. Positioning and Quality Control, Mammography Today for Radiographers, 1992, Rickard, Wilson, Ferris, Blackett.
4. Computed Tomography: Physical Principles, Clinical Applications, and Quality Control, 2009, Seeram, Euclid
5. Fuch's principles of radiographic Exposures, processing and quality Control, Carroll, Quinn B

Name of the Programme	**B.Sc. Medical Radiology and Imaging Technology**
Semester	**Semester - V**
Name of the Course	**Equipment for Medical Imaging - I**
Course Code	**BMRIT 121 L**

Course Outcomes	• Describe the basics of radiographic equipment's which are to be used for the scanning such as CT, MRI and many more • Describe the scanning protocols of the radiographic equipment's which are used for the scanning and diagnosis as well.

Sr. No.	Topics	No. of Hrs.
1	**Computed Tomography (CT):** Historical developments, Principle and applications, Various generations, Definition of terms.	5
2	**Magnetic Resonance Imaging (MRI):** Principles and Applications, MRI Coils, Pulse sequences, image formation.	5
3	**Digital Radiography:** **Computed Radiography:** Principles and Applications,Construction of Cassette used in CR **Direct Radiography:** Principle and Application, Construction of Detector used in DR **Digital substraction angiography:** Principle and Application	20
4	**Basic Physics of Ultrasound:** Definition, History, Nature of Propagation, Probes, Piezoelectric Effect, Display Modes A-mode, B mode, Real Time Imaging, M-mode. **Diagnostic Ultrasound:** Historical developments, Its principle, applications and role in medicine, Various types of transducers: Their features and applications, Definition of terms.	15
Total		**45 hrs**

Reference:

1. The Physics of Diagnostic Imaging, 1st Edition, 1998, Dowsett, Kenny Johnston.
2. Physical Principles of Diagnostic Radiology, Sprawls.
3. Essential Physics for Radiographers, Ball, Moor.
4. Radiological Science for Technologist: Physics, Biology and Protection, 8th Edition, 2004, Bushong, Stewart C.
5. X-ray Physics and Equipment, Ashuworth.
6. Computed Radiography, M J Brooker.
7. The Fundamentals of X-ray and radium Physics, 6th Edition, Selman.
8. The MRI Manual, 2nd Edition, 1998, Robert b Lufkin.
9. Clinical Sonography, A Practical guide, 1998, Roger C Sanders.
10. MRI in Practice, 3rd Edition, 2005, Westbook, Rath.

Name of the Programme	**B.Sc. Medical Radiology and Imaging Technology**
Semester	**Semester - V**
Name of the Course	**Special Procedures in Medical Imaging**
Course Code	**BMRIT 122 L**

Course Outcomes	• Describe the scanning procedures and technique for the x ray in which contrast is used and the importance of these kind of scans. • Describe the role of contrast media injection for the scanning and how contrast is to be used.

Sr. No.	Topics	No. of Hrs.
1	**Contrast Media:** Introduction, History, Evaluation. Adverse Contrast Reaction in Human body. Route of Contrast Administration. Types of Contrast Media.	5
2	**Alimentary Tract**: Procedure, requirements, indications, contra indications and contrast media used. Contrast media for swallow, meal and enema. Double Contrast Study	10
3	**Urological Procedures**: Procedure, requirements, indications, contra indications and contrast media used. IVU, MCU, and RGU techniques	5
4	**Radiological procedures Pertaining to**: Salivary glands, lacrimal system, Bronchography, arthrography and Hystero Salpangio Graphy - various requirements trolley setup, indications and contra indications, contract media used	5
5	**Interventional Radiological Procedures:** IPTC, PTBD, ERCP, fine needle aspiration cytology, percutaneous nephrostomy. Cardiac catherization - embolization, dilation etc. Angiography: Cerebral, cardiac, abdominal aortography, general, renal and selective renal. Splenoporto venography Peripheral,arterial and venous angiography, precautions, radiation protection, film changers, manual automatic biplane, film types - large, miniature, cine contrast media injection procedure and technique	15
6	**Myelography and Arthrography:** Technique, contrast media used injection of contrast media indicationsand contra indications.	5
Total		**45 hrs**

BMRIT 122 P: Special Procedures in Medical Imaging

Sr. No.	Topics	No. of Hrs.
1.	Handeling of the patient before and after the procedure	30
2.	Contrast study of Alimentary canal	
3.	Contrast study of Female reproductive organ	
4.	Urological Studies	
5.	Interventional radiological procedures	
6.	General consideration of contrast study	
Total		**30 hrs**

Reference:

1. Merrill's Atlas of Radiographic Positioning & Procedures, 11th Edition, 2007, Frank, long, Smith.
2. Clark's positioning in Radiology, 12th Edition, 2005, Clark.
3. Radiological Procedures, 1st Edition, 2004, Bhargava S K
4. Double Contrast GI, 2nd Edition, Laufer, Levine
5. Myelography, 2nd Edition, Skalpe, Sortland
6. Interventional Radiology, 2nd Edition, 2005, Kessel , Lain Robertson

Courses Code - BMRIT 123 CP: MRIT Directed Clinical Education – III

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate clinical radio diagnosis skills.
(Total- 405 hrs.)

DISCIPLINE SPECIFIC ELECTIVE

Name of the Programme	**B.Sc. Medical Radiology and Imaging Technology**
Semester	**Semester - V**
Name of the Course	**Basics of Clinical Skills Learning**
Course Code	**DSE 001 L**

Course Outcomes	• Ability to Measure Vital Signs, do basic physical Examination of the patients, NG tube basics, Administration of Medicines • Understand about Asepsis, and the Cleanliness related to asepsis and on mobility of the patients

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

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - V
Name of the Course	Hospital Operation Management
Course Code	DSE 002 L

Course Outcomes	• Understand and apply the knowledge of Medico-Legal regulations and Medical Ethics in Healthcare System. • Ability to utilize Hospital Information system in Hospital services. • Understand the operation management of Equipment's and medical records in Health Care services.

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

THIRD YEAR

B.Sc. Medical Radiology & Imaging Technology

SEMESTER-VI

Code No.	Core Subjects
Theory	
BMRIT 124 L	Basics of Radio Therapy and Nuclear Medicine
BMRIT 125 L	Equipment for Medical Imaging - II
BMRIT 126 L	Advanced Radiographic Techniques
BMRIT 127 CP	MRIT Directed Clinical Education - IV
Practical	
BMRIT 125 P	Equipment for Medical Imaging - II

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - VI
Name of the course	Basics of Radiotherapy and Nuclear Medicine
Course Code	BMRIT 124 L

Course Outcome	• Elaborate the radiotherapy equipment's and characteristics of equipment's for the procedure and experiments. • Introduction of nuclear medicine, radioactivity and role of nuclear medicine in the department of radiodiagnosis.

Sr. No.	Topics	No. of Hrs.
1.	Introduction of Radiotherapy & it's types, Orthovoltage equipment with special reference to physical design requirement of tube and its accessories and interlocks, gamma ray sources used in radiotherapy especially cobalt 60 source its construction and source housing and handling mechanism	10
2.	Salient features of components of linear Accelerator like tube design, wave guide, target design beam bending system, Radio-frequency generators, Klystron, Magnetron	5
3.	Simulator, Role of portal films in treatment planning, PDD, Phantom, Tissue air ratio, Tissue maximum ratio, , beams flattering filters, scattering foils	5
4.	**Introduction to NMT and Radioactive Transformation** Basic atomic and nuclear physics, History of radioactivity, Units & quantities, Isotopes, Isobars, Isomers,Radioactivityandhalflife,Exponentialdecay,specificactivity, Modes of Radioactive decay, parent daughter decay. **Equipment of NMT:** Gamma camera, PET,SPECT(working principle)	10
5.	**Production of Radio nuclides** Reactor produced radionuclide, Reactor principles; Accelerator produced radionuclide, Radionuclide generators.	5
6.	**Radio Pharmacy & Handling & Transport of Radio-nuclides** Cold kits, Radio pharmacy used in Nuclear medicine, Radio pharmaceuticals used in various procedures, Safe handling of radioactive materials, Procedures for handling spills	10
Total		**45 hrs**

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - VI
Name of the Course	Equipment for Medical Imaging - II
Course Code	BMRIT 125 L

Course Outcomes	• Describe the advancement and recent trends of radiographic equipments which are to be used for the scanning such as CT, MRI and many more • Describe the advanced scanning protocols of the radiographic equipments which are used for the scanning and diagnosis as well.

Sr. No.	Topics	No. of Hrs.
1	**Computed Tomography Scan:** Physical Principles of Computed tomography, Data Acquisition Concepts, Instrumentation, Image Post processing and visulation tools, Electron Beam Computed Tomography, Multi slice CT, Patient dose and Quality control, CT artifacts, Indications and Contra indications.	20
2	**Advanced MRI:** Physical Principles of MRI, Equipment description, Image formation and SNR, Fast imaging, Scanning protocols, MR artifacts, Diffusion, Spectroscopy Indications and Contra-indications	15
3	**Mammography:** Basic principles of Mammography, Equipment description, Imaging technology, Uses and advantages	5
4	**Ultra Sonography :** Basic principles of ultra sound, Basics of Doppler ultra sound, Doppler flow imaging, Types of transducers, Uses and advantages	5
Total		**45 hrs**

BMRIT 125 P: Equipment for Medical Imaging - II

Sr. No.	Topics	No. of Hrs.
1	Imaging techniques of CT scan.	
2	Imaging techniques of MRI	
3	Imaging techniques in Interventional radiology.	
4	Imaging techniques in Mammography.	60
5	Imaging techniques in CR.	
6	Imaging techniques in DR.	
Total		**60 hrs**

Reference:

1. X-ray Physics and Equipment, Ashuworth.
2. Radiographic Imaging, 4th Edition, 1987, D N Chesney, M O Chesney.
3. Computed Radiography for Radiographers, 1986, M J Brooker.
4. MRI in Practice, 3rd Edition, 2005, Westbook, Rath.
5. The MRI Manual, 2nd Edition, 1998, Robert b Lufkin.
6. Essentials of Nuclear Medical Imaging, 5th Edition, 2006, Mettler, Guibertean
7. Interventional Radiology, 2nd Edition, 2005, Kessel, Lain Robertson.
8. Clinical Sonography, A, Practical Guide, 1998, Roger C Sanders
9. Merrill's Atlas of Radiographic Positioning & Procedures, 11th Edition, 2007, Frank, long, Smith.

Name of the Programme	B.Sc. Medical Radiology and Imaging Technology
Semester	Semester - VI
Name of the Course	Advanced Radiographic Techniques
Course Code	BMRIT 126 L

Course Outcomes	• Describe those technique which are used outside of the radio diagnosis department and those techniques which are participating in the image quality enhancement.

Sr. No.	Topics	No. of Hrs.
1	**Dental Radiography**: Radiography of teeth-intra oral, extra oral and occlusal view, Orthopantomogram (OPG).	15
2	**Macro Radiography**: Principal, advantage, technique and applications	5
3	**Soft Tissue Techniques**: Mammography, Localization of foreign bodies.	5
4	**Ward Mobile Radiography**: Electrical supply, radiation protection equipment and instructions to be followed for portable radiography.	10
5	**Operation Theatre Techniques**: General precautions, Aspects in techniques - Checking of mains supply and functions of equipment, selection of exposure factors, explosion risks, radiation protection and rapid processing techniques.	10
Total		**45 hrs**

Reference:

1. Radiographic Imaging, 4th Edition, 1987, D N Chesney, M O Chesney.
2. Principles of Radiographic Imaging, 3rd Edition, 2001, Carlton, Adler.
3. The Science of Photography, Braines H.
4. Clark's positioning in Radiology, 12th Edition, 2005, Clark.
5. Medical X-ray Techniques in Diagnostic Radiology, Vander Plaals
6. Radiographic Anatomy and Positioning: An integrated approach, 1998, Comuelle, Andrea Gauthier
7. Special Techniques in Orthopedic Radiology, Strip

Courses Code - BMRIT 127 CP: MRIT Directed Clinical Education – IV

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate clinical radio diagnosis skills.
(Total-405 hrs.)

INTERNSHIP

Guidelines:

1. The internship consists of Semester VII & VIII.
2. Duration of the internship shall be 365 days.
3. Internship is compulsory for partial fulfilment of the degree.
4. A Student is allowed to commence internship after appearing for Semester VI examination.
5. Student will be allowed to keep term for Semester VII, if He/She passes each semester V & VI OR fails in not more than 2 courses each in semester V & VI.
6. Candidate shall not be allowed to appear in final semester examination (Semester VIII) unless the candidate has cleared all the previous semester examinations (I to VII).

Evaluation

Formative Evaluation

- Day to day assessment of the interns during their internship postings should be done by the Head of theDepartment/Faculty assigned / Coordinator.
- 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 interns.
- This will not only provide a demonstrable evidence of the processes of training but more importantly of the interns 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 evaluations and attendance, the Head of the Department shall issue certificate of satisfactory completion of training.
- In order to complete internship, the students has to pass both semester VII & VIII exam (Internal & University) with sufficient attendance.
- The student will be awarded the degree by university only when the student has passed in all the semester (I to VIII) including 365 days of internship.

Internship Programme:

- 05 days for orientation Programme
- 300 days in Radiology Dept. (90 days each for CT,MRI, X-rays and 30 days for Mammography
- 15 days in community Medicine Department / visit to other hospitals
- 30 days for other Modalities (Special investigation & sonography)
- 15 days related to radiation safety and other Legal aspects.

RULES AND REGULATION FOR EXAMINATION OF UNDER GRADUATE AND POST GRADUATE DEGREE COURSES UNDER MGM SCHOOL OF BIOMEDICAL SCIENCES AS PER CBCS PATTERN

{ BOM 52/2018 dated 13.01.2018, BOM 55/ 2018 dated 27.11.2018, AC 40/2021 dated 15.06.2021, AC 41/2021 dated 17.02.2021, AC 42/2022 dated 26.04.2022, AC 44/2022 dated 09.12.2022, AC 46/2023 dated 28.04.2023, AC 48/2023 dated 12.12.2023, AC-50/2024 dated 27.11.2024, AC-51/2025 dated 29.04.2025}

RULES AND REGULATION FOR EXAMINATION OF UNDER GRADUATE AND POST GRADUATE DEGREE COURSES UNDER SCHOOL OF BIOMEDICAL SCIENCES OFFERING CBCS PATTERN

1. Title of the courses offered :

Under Graduate Courses (Allied Health Sciences) :

1.1 B.Sc. Medical Laboratory Technology
1.2 B.Sc. Medical Radiology & Imaging Technology
1.3 B.Sc. Cardiac Care Technology
1.4 B.Sc. Perfusion Technology
1.5 B.Sc. Medical Dialysis Technology
1.6 B.Sc. Operation Theatre & Anaesthesia Technology
1.7 B. Optometry
1.8 B.Sc. Physician Assistant in Emergency & Trauma Care

Post Graduate Courses:

1.9 M.Sc. Medical Biotechnology
1.10 M.Sc. Medical Genetics
1.11 M.Sc. Clinical Embryology
1.12 M.Sc. Molecular Biology
1.13 Master in Hospital Administration
1.14 M.Sc. Cardiac Care Technology
1.15 M.Sc. Medical Radiology & Imaging Technology
1.16 M. Optometry
1.17 M.Sc. Medical Dialysis Technology
1.18 Master of Public Health
1.19 M.Sc. Clinical Nutrition
1.20 M.Sc. Operation Theatre & Anaesthesia Technology
1.21 M.Sc. Emergency & Trauma Care Technology

2. Duration of the course:

2.1. Duration shall be for a period of four years, Embeded Internship.
2.2 Duration shall be for a period of two years for PG programme.

3. Medium of instruction: The medium of instruction and examination shall be in English

4. Letter Grades And Grade Points:

MGMSBS has adopted the UGC recommended system of awarding grades and CGPA under Choice Based Credit Semester System for all the UG/PG programes.

4.1 MGMSBS **f**ollows absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.

4.2 The UGC recommended 10-point grading system is being followed, with letter grades:

Table 1: Grades and Grade Points:

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B (Good)	7
C (Above Average)	6
F (Fail)/ RA (Reappear)	0
Ab (Absent)	0
Not Completed (NC)	0
RC (<50% in attendance or in Internal Assessment)	

4.3 A student obtaining Grade RA shall be considered failed and will be required to reappear in the examination.

4.4 Candidates with NC grading are those detained in a course (s); while RC indicate student not fulfilling the minimum criteria for academic progress or less than 75% in attendance or less than 50% in internal assessments (IA). Registrations of such students for the respective courses shall be treated as cancelled. If the course is a core course, the candidate has to re-register and repeat the course when it is offered next time.

5. CBCS Grading System - Marks Equivalence Table

5.1 Table 2: Grades and Grade Points

Letter Grade	Grade Point	% of Marks
O (Outstanding)	10	86-100
A+ (Excellent)	9	70-85
A (Very Good)	8	60 -69
B (Good)	7	55 -59
C (Above Average) – **Pass both for UG and PGs**	6	50- 54
F (Fail))/ RA (Reappear)	0	Less than 50
Ab (Absent)	0	-
NC- not completed	0	-
RC- Repeat the Course	0	0

5.2 Table 3: Cumulative Grades and Grade Points

Letter Grade	Grade Point	CGPA
O (Outstanding)	10	9.01 - 10.00
A+ (Excellent)	9	8.01 – 9.00
A (Very Good)	8	7.01 – 8.00
B (Good)	7	6.00 - 7.00
C (Above Average)	6	5.01 - 6.00

5.3 The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student,

SGPA (Si) = ∑(Ci x Gi) / ∑Ci
where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

The CGPA is also calculated taking into account all the courses undergone by a student over all the semesters of a programme,
i.e. CGPA = ∑(Ci x Si) / ∑ Ci

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester. Cumulative grade and grade point table as attached.

5.4 Final Percentage of marks (%) = C.G.P.A based on all Six Semesters/Four Semester/Nine Semester X 10

6. Assessment of a Course:

Evaluation for a course shall be done on a continuous basis. Uniform procedure will be adopted under the CBCS to conduct continuous internal assessments (IA), followed by one end-semester university examination (ES) for each course.

6.1 For all category of courses offered (Theory, Practical, Discipline Specific Elective [DE]/ Lab [DL]; Generic Elective [GE] and Ability Enhancement Courses [AE]; Skills Enhancement Courses [SE] Theory or P (Practical) & RP(Research Project), assessment will comprise of Internal Assessment (IA) and the end–semester (ES) examination.

6.2 Courses in programs wherein Theory and Lab are assessed jointly (UG or PG), the minimum passing head has to be 50% Grade in total including internal assessment. RA grade in any one of the components will amount to reappearing in both components. i.e. theory and practical.

6.3 Evaluation for a course with clinical rotation or clinical training or internship will be done on a continuous basis.

7. Eligibility to appear for the end-semester examinations for a course includes:

7.1 "Resolved to accept" 50% eligibility in internal assessment" pattern for all the CBCS programs (UG & PG) running under the constituent units of MGMIHS. (MGM School of Biomedical Sciences, MGM School of Physiotherapy, MGM Medical College (M.Sc. Medical 3 year courses).
"This will be applicable to all existing batches (for remaining regular examinations) and forthcoming batches from June 2022 onwards" .

7.2 The students desirous of appearing for university examination shall submit the application form duly filled along with the prescribed examination fee.

7.3 Incomplete application forms or application forms submitted without prescribed fee or application form submitted after due date will be rejected and student shall not be allowed to appear for examination.

8. Passing Heads

8.1 Courses where theory and practical are involved, the minimum passing head shall be 50% in total including the internal assessment.
8.2 Elective subjects – the minimum prescribed marks for a pass in elective subject will be 50%. The list of student who have opted to for elective should be submitted to the university.

9 Detention: A student not meeting any of the above criteria may be detained (NC) in that particular course for the semester. In the subsequent semester, such a candidate improve in all, including attendance and/or IA minimum to become eligible for the next end-semester examination.

10 The maximum duration for completing the course will be 6 years (minimum duration of course x 2) i.e. (4x2) =6 years for UG courses & (2x2) =4 years for PG Courses, failing which his/her registration will be cancelled. Full fees of entire course of three or two years as the case may be liable to be paid by the students.

11 A maximum 3 attempts (including the first appearance) for appearing the examination will be given to students securing "F" grade in a given course (Core course, elective course, project work/report/dissertation/field work/training work/ etc.), along with the subsequent end semester examination.

12 Carryover Pattern (ATKT rules):

- A student will be allowed to keep term for Semester II irrespective of number of heads of failure in the Semester I.
- A student will be allowed to keep term for Semester III if he/she passes each Semester I & II **OR** fails in not more than two courses each in Semester I & II.
- Student will be allowed to keep term for Semester IV irrespective of number of heads of failure in Semester III. However, the student shall pass each course of Semester I and Semester II in order to appear for Semester IV.
- Student shall be allowed to keep term for Semester V if he/she passes Semester I, Semester II, Semester, III and Semester IV. **OR** shall pass Semester I and Semester II and fails in not more than two courses each in Semester III and Semester IV.
- Student shall be allowed to keep term for Semester VI irrespective of number of heads of failure in Semester V. However, he/she has passes Semester I, Semester II, Semester, III and Semester IV.
- A student will be allowed to keep term for Semester VII if he/she passes each Semester V & VI **OR** fails in not more than two courses each in Semester V & VI.
- A Candidate shall not be allowed to appear in the final semester examination (Semester VIII) unless the candidate has cleared all the previous semester examinations (I to VII).

13 Grace Marks for UG Courses:
Resolution No. 3.10 of Academic Council (AC-50/2024): Resolved to approve the amended Grace marks rule for CBCS Allied programme (Biomedical) for UG Allied Health Sciences programmes under MGM SBS:
1. A Candidate shall be eligible for grace marks only in UG courses.
2. Maximum Grace Marks up to 5 marks may be allowed in case of failure in one or more heads of passing a subject/s or examination in to (Theory/Practical)

Resolution No. 3.24 of Academic Council (AC-51/2025):

Resolved to follow uniform grace mark guidelines as prescribed by MGMIHS (maximum upto 5 marks), applicable to Under Graduate students of Biomedical Sciences , Physiotherapy , Prosthetic & Orthotics and Pharmacy . The guidelines as prescribed by the Indian Nursing Council to be followed for B.Sc. and M.Sc. Nursing examinations

14 University End-Semester Examination (UG/PG Programs)

- There will be one final university examination at the end of every semester.
- A candidate must have minimum 75% attendance (Irrespective of the type of absence) in theory and practical in each subject to be eligible for appearing the University examination.
- The principal /dean/ director shall send to the university a certificate of completion of required attendance and other requirements of the applicant as prescribed by the university, two weeks before the date of commencement of the written examination.
- A candidate shall be eligible to sit for the examination only, if she / he has secured minimum 50% in internal assessment of that subject . The internal examinations will be conducted at college / department level.
- Notwithstanding – anything in any examination, a deficiency of attendance at lectures or practical maximum to the extent of 10% - may be condoned by the principal / dean /director.
- If a candidate fails either in theory or in practical, he/ she have to re-appear for both.
- There shall be no provision of re- evaluation of answer sheets for PG programe . Candidates may apply to the university following due procedure for recounting of theory marks in the presence of the subject experts.
- Internal assessments shall be submitted by the Head of the Department to the institute which will be then be forwarded to the university through the Director of MGMSBS at least two weeks before commencement of University theory examination.
- The university examination for first year (UG) shall consist of only theory examination and there shall be no university practical examination.

15. Supplementary examination: There shall be no supplementary examination.

16*. Re-Verification / Retotaling (UG & PG programs)

- There shall be provision of retotaling of the answer sheets, candidate shall be permitted to apply for recounting/retotaling of theory papers within 8 days from the date of declaration of results.
- Provision of revolution only for UG programs.

17. B.Sc. Allied Courses Scheme of Examination Pattern

17.1 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.

16.* Revised Re-Evaluation Rules:

This is with reference to the Circular No. 02-June/2025 - (Reference No. MGMIHS /57.2/X-1/01- 2025 dated 13.01. 2025 and Resolution no 5 of Academic Council-50, 27-11-2024). This is to inform you that for all UG & PG students there is no provision for re-evaluation of theory papers University Examination as the system of double evaluation has been implemented for all programs . However , the provision for re-totaling and photocopy of answer scripts will continue to remain in practice with effect from 01.06.2025.

17.2 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	24Marks
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.

17.3 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:

18. Internal Examination Pattern UG Second & Third Year (Semester III to VI)

18.1 Internal examination pattern UG (Second & Third Year)

Theory: 20 marks

Marks should be submitted by respective departments at least 15 days prior to onset of university examination to the university.

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	2	1	1x10	10 marks
Short answers	3	2	2x5	10 marks
Total				**Total= 20 marks**

18.2 Internal examination pattern UG (Second & Third Year)

Practical: 10 marks

Internal exam (At department level)	10 marks
Viva	5 marks
Log book	5 marks
Theory and practical	Total = 20 M

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

18.3 University Examination Pattern UG Second & Third Year (Semester III to VI)

18.4 Theory Question Paper Pattern for Core Subjects in University Examinations (Second & Third year) Under CBCS - 80 Marks

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Section 1				
MCQ	10	10	10x1	10 marks
Section 2				
Structured LAQ	3	2	2x15	30 marks
Short notes	6	5	5 x 8	40 marks
Total				**80 Marks**

General Instructions (Theory):

A. Time duration of each Theory Paper will be of Three (3) Hrs. or 1 1/2 Hrs. as the case may be.
B. Total Marks of each Theory Paper will be 80 Marks / 40 Marks.
C. There will be TWO Sections in Question Paper. Section ONE will be MCQ while Section TWO will be long & short essay questions. There will be internal option.
D. Both the Sections are compulsory.
E. Both the sections are to be written in the separate answer sheet

18.5 Practical Question Paper Pattern For University Examinations Under CBCS – 40 Marks

Exercise	Description	Marks
Q No 1	Practical exercise - 1	1 x10=10 M
Q No 2	Station exercise	3x5M=15 M
Q No 3	VIVA	10 M
Q No 4	Journal	5 M
		Total = 40 M

General Instructions (Practical):

A. All the students have to remain present at the examination center 15 minutes before the scheduled time for examination.
B. Students have to carry with them certified journal, I-card or examination receipt, and other necessary requirements for examination.
C. Candidate should not leave the practical hall without the permission of examiner.
D. Use of calculator is allowed (case to case basis) and the use of mobile phones**,** smart watches, any electronic devices is strictly prohibited in the university examination hall.
E. The candidate has to leave the laboratory only after the submission of all the answer sheets of the exercises performed.

18.5 Elective Subject Internal Examination Pattern UG (Second & Third Year) Theory: 20 marks

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	2	1	1x10	10 marks
Short answers	3	2	2x5	10 marks
Total				**Total= 20 marks**

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

18.6 Theory Question Paper Pattern For Elective Subject in University exam for UG Second and Third year (semester III to V) (AY 2020-21 onwards)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Structured LAQ	3	2	2x10	20 marks
Short notes	5	4	4 x5	20 marks
Total				**40 Marks**

18.7- Model Checklist for Evaluation of the Clinical Directed Posting (UG)

Name of the student: _____Date:_____
Program:_____
Semester: _____ Name of the Internal faculty/Observer:_____
Name of the External Faculty/Observer:_____

Core Competencies	Marks allotted	Marks obtained
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.		
Clinical Teaching		
a. Demonstrate beginning competency in technical skills.	10	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work by students		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
Independent work by student		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
Log book	10	
Viva	10	
Attendance	05	
Total	**50 Marks**	

Sign of Internal Examiner:_____
Sign of External Examiner:_____

18.8 Model Checklist for Evaluation of the Seminar Presentations B.Sc. MDT (Semester IV)

Name of the student: _____ Date:_____

Topic:_____

Name of the Faculty/ Observer: _____

Items for observation during presentation	**Marks allotted**	**Marks Obtained**
Extent of understanding of scope & objectives of the topic by the candidate	10 Marks	
Whether cross- references have been consulted	5 Marks	
Quality of slides	10 Marks	
Clarity of presentation	5 Marks	
Public speaking abilities	10 Marks	
Ability to answer questions asked on the topic	10 Marks	
Total	**50 Marks**	

Note: Assessment of seminar: the seminar shall be assessed on the basis of the content of the topic chosen and its presentation.

19. Internship Exam Pattern (Semester VII & VIII)

19.1 Internal Assessment Exam Pattern (IA) for Semester VII & VIII (Internship Program)

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	

19.2 Scheme of University Semester End Examination (SEE) for Semester VII & VIII (Internship Program) & Eligibility Criteria for Attendance.

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 x15=30 M
Q No 2	Station exercise	3 x 5=15 M
Q No 3	VIVA	15 M
Q No 4	Log Book	10 M
Q No 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

Note: 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.

20. Scheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

20.1 Marks scheme for the University exam:

Final theory marks will be 100 marks (80 marks University Theory exam + 20 Marks Internal assessment).

Question		Marks distribution	Marks allotted per section	Marks
Sec: A	MCQ	10 x 1 M = 10	10	10
Sec: B	SAQ	3/4x 5 M = 15	15	35
Sec: B	LAQ	2/3 x 10 M = 10	20	
Sec: C	SAQ	3/4x 5 M = 15	15	35
Sec: C	LAQ	2/3x 10 M = 10	20	
Total				**80 Marks**

20.2 Practical exam pattern: Total 40 marks with following breakup:

Exercise	Description	Marks
Q No 1	Practical exercise - 1	1 x20=20 M
Q No 2	Station exercise	2x5M=10 M
Q No 3	VIVA	10 M
Q No 4	Journal	NIL
Total		**40 Marks**

20.3 Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.

20.4 Breakup of theory IA calculation for 20 marks

Description	Marks
Internal exam (at department)	15 marks
Seminar	5 marks
Total	**20 Marks**

20.5 Breakup of practical IA calculation:

Description	Marks
Internal exam (at department)	10 marks
Viva	5 marks
Journal	5 marks
Total	**20 Marks**

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

20.6: Model Checklist for Evaluation of the Seminar Presentations (PG)

Name of the student: _____ Date: _____

Name of the Faculty/ Observer: _____

Items for observation during presentation	Marks allotted	Marks Obtained
Extent of understanding of scope & objectives of the paper by the candidate	10 marks	
Whether cross- references have been consulted		
Ability to defend the paper		
Clarity of presentation		
Any other observation		

Note: Assessment of seminar: the seminar shall be assessed on the basis of the content of the paper chosen and its presentation.

20.7: Model Checklist for Evaluation of the Educational Tour/Field Work/Hospital Visit/ Industrial Visit (PG)

Name of the student: _____ Date: _____

Name of the Faculty/ Observer: _____

Items for observation during presentation	Marks allotted	Marks Obtained
Educational Tour/Field Work/Hospital Visit/ Industrial Visit report / Conference/oral presentation	15	
Online MOOC/Swayam / NPTEL courses	05	
Total	**20 Marks**	

*marks to be given based on the proof submitted by the student. Formal examination not required

20.8: Model Checklist for Evaluation of the Clinical Directed Posting (PG)

Name of the student: _____Date:_____
Program:_____
Semester: _____ Name of the Internal faculty/Observer:_____
Name of the External Faculty/Observer:_____

Core Competencies	Marks allotted	Marks obtained
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.		
Clinical Teaching		
b. Demonstrate beginning competency in technical skills.	10	
Independent Work by Student guided by faculty		
b. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
c. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work by students		
b. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
Independent work by student		
b. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
Log book	10	
Viva	10	
Attendance	05	
Total	**50 Marks**	

Sign of Internal Examiner:_____
Sign of External Examiner:_____

20.9: Semester III – Dissertation (PG) (Internal Assessment)

Dissertation/Project Proposal : overall performance of the student	**Marks allotted**	**Marks Obtained**
Open mindedness/ Receptivity to feedback Integrates feedback	5 Marks	
Meets deadlines / Regularity in meeting / Consistency in communication	10 Marks	
Continuous Internal evaluation (CIE)		
Interest shown in selecting topic	5 marks	
Appropriate review	10 marks	
Discussion with guide and other faculty	10 marks	
Quality of protocol	5marks	
Preparation of proforma / log book / daily reports	5marks	
TOTAL	**Out of 50**	

20.10: Scheme of Evaluation for MGMSBS for Subjects like Dissertation/ Project Work/ Report (Semester IV)

Evaluation parameter (Semester IV)	**Continuous Internal Evaluation (CIE)**	**Semester End Evaluation (SEE)**	
	Guide	**Internal examiner**	**External examiner**
Thesis preparation, Novelty, Overall Lab Work Culture	25	-	-
Dissertation/Project work book	25	25	25
Evaluation of thesis including Viva Voce	-	50	50
Total	50	75	75
Overall Total = 200 Marks			

21. Scheme of University Examination Theory for MHA & MPH Program:

Revised Scheme of University Examination for PG Program (w.e.f. AY 2022-23)

MASTER of PUBLIC HEALTH (MPH)
&
MASTER of HOSPITAL ADMINISTRATION (MHA)

SEMESTER I & IV

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightage for PG Programs (MPH & MHA) are given in following tables

Marks Scheme for the University Examination
Final Theory Mark will be 100 Marks (80 Marks University Theory Exam + 20 Marks Internal Assessment)

21.1 Theory Paper Pattern: Marks: 80 Time: 3 Hrs.

Question Paper	Question No.	Question Type	Marks Distribution	Marks Per Section
Section A	1	LAQ (1 out of 2)	1 X 10 Marks = 10	40
	2	SAQ (5 out of 6)	5 X 06 Marks = 30	
Section B	3	LAQ (1 out of 2)	1 X 10 Marks = 10	40
	4	SAQ (5 out of 6)	5 X 06 Marks = 30	
TOTAL				**80 Marks**

Note: If the paper is combination of two sub-subjects, the each section is to be dedicated for separate sub-subject for 50% weightage each.

21.2 Practical Examination, if applicable, will be as per last approved pattern

21.3 Internal Assessment Pattern - Theory Marks – 20

Internal Theory Examination	30 Marks / 2 = 15 Marks
Seminar / Assignment	10 Marks / 2 = 05 Marks
Total	**20 Marks**

21.4: Checklist for Evaluation of Practice of Hospital Administration- Basic (MHA 105 CP)

University Exam

Name of the student: _____Date: _____

Program: _____

Semester: _____Name of the Internal Faculty/Observer:_____

Core Competencies	Marks allotted	Marks obtained
Students will be prepared for leadership roles in the hospital sector through imparting training in planning, operation by various departmental postings including orientation in the managerial aspects of clinical and support services. Students will develop critical thinking and skills of professional hospital administrator by taking initiative toanalyzetheprogram/activity		
Hospital Teaching		
a. Demonstrate competency in technical skills.	10	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work in hospital by students		
a. Protect confidentiality of electronic/manual hospital records data, information, and knowledge of technology in an ethical manner	2.5	
b. Managerial aspects through various departmental postings	05	
Independent work by student		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive at hospital at assigned times. Maintain Professional behavior and appearance	2.5	
b. Logbook	05	
Project Report		
a. Presentation	10	
b. Viva	05	
Attendance	05	
Total	**50 marks**	
Sign of Internal Examiner:_____ Sign of External Examiner:_____		

21.5: Checklist for Evaluation of Practice of Hospital Administration – Advanced (MHA 204 CP) University Exam

Name of the student:_____ Date: _____

Program: _____

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

Core Competencies	Marks allotted	Marks obtained
Students will be prepared for leadership roles in the hospital sector through imparting multidimensional knowledge of the hospital. Students will develop critical thinking and skills of professional hospital administrator, its operation, facilities so that they can work in the areas of formulating policies, planning operational action plans, managing / supervising various departmental activities and audit process.		
Hospital Teaching		
a. Demonstrate competency in technical skills.	5	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work in hospital by students		
a. Protect confidentiality of electronic/manual hospital records data, information, and knowledge of technology in an ethical manner	2.5	
b. Self-directed learning through various departmental postings	05	
c. Various audit process undertaken in departmental postings	05	
Independent work by student		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive at hospital at assigned times. Maintain Professional behavior and appearance	2.5	
b. Projects / seminars / conferences / courses completed	05	
c. Logbook	05	
Project Report		
a. Presentation	05	
b. Viva	05	
Attendance	05	
Total	**50 marks**	
Sign of Internal Examiner:_____ Sign of External Examiner:_____		

21.6: Checklist for Evaluation of Practice of Hospital Administration –Project (MHA 305 P)

UNIVERISTY EXAM

Name of the student: _____.____Date: _____

Program: _____

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

Core Competencies	Marks allotted	Marks obtained
Students will be prepared for leadership roles in the hospital sector through imparting multidimensional knowledge of the hospital. Students will develop critical thinking and skills of professional hospital administrator, its operation, facilities so that they can work in the areas of formulating policies, planning operational action plans, managing / supervising various departmental activities and audit process.		
Hospital Teaching		
a. Demonstrate competency in technical skills.	5	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work in hospital by students		
a. Protect confidentiality of electronic/manual hospital records data, information, and knowledge of technology in an ethical manner	05	
b. Self-directed learning and managerial aspects through various departmental postings	05	
a. Various audit process undertaken in departmental postings	05	
Independent work by student		
Demonstrate expected behaviors and complete tasks in a timely manner. Arrive at hospital at assigned times. Maintain professional behavior and appearance	05	
a. Projects / seminars / conferences / courses completed	10	
b. Logbook	10	
Hospital Project		
a. Presentation	30	
b. Viva	10	
Attendance	10	
Total	**100 marks**	
Sign of Internal Examiner:_____ Sign of External Examiner:_____		

21.7: Checklist for Evaluation of Practice of Public Health (Basic) MPH 105 CP University Exam

Name of the student: _____.____Date: _____

Program: _____

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

Core Competencies	Marks allotted	Marks obtained
Students will develop critical thinking and research skills , data analysis , documentation.		
Topic		
The topic and the importance of topic are precise / Independent scientific thinking/originality	2.5	
Introduction & Literature Review		
1. Does the student present enough and relevant background on what is known on the topic, existing information gap, and importance of bridging that gap?	2.5	
2. Does the student cite enough, relevant literature properly to support the information presented?	2.5	
Methods		
1. Is there enough detail of what, when, where, and how the research was performed so that other researcher can repeat the method for similar studies?	2.5	
Results		
1. Are the results presented clearly, concisely, and in logical order for each objective, hypothesis, or research question (in case of multiple objectives, hypotheses, and/or research questions)?	5	
2. Are the Pictures, Figures, Tables, and any other artwork presented of high quality (legible, labelled properly, standing alone) and described and referred in the text properly?	5	
Discussion		
1. Is the discussion presented in a logical order for each objective, hypothesis, or research question (in case of multiple objectives, hypotheses, and/or research questions)?	2.5	
2. Does the student answer the research question(s), or accept or fail to accept null hypothesis(es) proposed for the study?	2.5	
3. Does the student relate the findings to relevant literature with proper citation?	2.5	
4. Does the student present satisfactory reasons for findings that are in disagreement with previously reported results in other literature?	2.5	
Conclusions and other parts		
Does the student draw reasonable conclusion(s) based on the research findings, and present implications of the findings? Are the conclusions of any utility to the scientific community, or any other stakeholders? Are the acknowledgements and cited references properly presented?	5	
Overall Quality of Writing		
Given the entire application, what is the overall assessment of the individual thesis?	5	
Communication		
In a cogent manner	5	
Using appropriate style	2.5	
By adequately defending the results orally	2.5	
Total	**50 marks**	

Sign of Internal Examiner:_____

Sign of External Examiner:_____

21.8: Checklist for Evaluation of Practice of Public Health (Advance) MPH 204 CP University Exam

Name of the student: _____. _____Date: _____

Program: _____

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

Core Competencies	Marks allotted	Marks obtained
Students will develop critical thinking and research skills, data analysis, documentation.		
Topic		
The topic and the importance of topic are precise / Independent scientific thinking/originality	2.5	
Introduction & Literature Review		
1. Does the student present enough and relevant background on what is known on the topic, existing information gap, and importance of bridging that gap?	2.5	
2. Does the student cite enough, relevant literature properly to support the information presented?	2.5	
Methods		
1. Is there enough detail of what, when, where, and how the research was performed so that other researcher can repeat the method for similar studies?	2.5	
Results		
1. Are the results presented clearly, concisely, and in logical order for each objective, hypothesis, or research question (in case of multiple objectives, hypotheses, and/or research questions)?	5	
2. Are the Pictures, Figures, Tables, and any other artwork presented of high quality (legible, labelled properly, standing alone) and described and referred in the text properly?	5	
Discussion		
1. Is the discussion presented in a logical order for each objective, hypothesis, or research question (in case of multiple objectives, hypotheses, and/or research questions)?	2.5	
2. Does the student answer the research question(s), or accept or fail to accept null hypothesis(es) proposed for the study?	2.5	
3. Does the student relate the findings to relevant literature with proper citation?	2.5	
4. Does the student present satisfactory reasons for findings that are in disagreement with previously reported results in other literature?	2.5	
Conclusions and other parts		
Does the student draw reasonable conclusion(s) based on the research findings, and present implications of the findings? Are the conclusions of any utility to the scientific community, or any other stakeholders? Are the acknowledgements and cited references properly presented?	5	
Overall Quality of Writing		
Given the entire application, what is the overall assessment of the individual thesis?	5	
Communication		
In a cogent manner	5	
Using appropriate style	2.5	
By adequately defending the results orally	2.5	
Total	**50 marks**	

Sign of Internal Examiner:_____

Sign of External Examiner: _____

21.9: Checklist for Evaluation of Practice of Public Health-Project (MPH 305P)

Name of the student: _____. _____Date: _____

Program: _____

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

Core Competencies	Marks allotted	Marks obtained
Students will develop critical thinking abilities utilizing the healthpersonnel roles of problem solver and public health manager. Students will take initiative to analyse the program / activity and completes a project demonstrating the expertise in public health practice.		
Field Teaching		
a. Demonstrate competency in technical skills.	15	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	05	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	05	
Hands on practical work by students		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
Independent work by student		
b. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to field experiences at assigned times. Maintain professional behavior and appearance and Logbook	20	
PROJECT REPORT	25	
Viva	20	
Attendance	05	
Total	**100 Marks**	

Sign of Internal Examiner: _____

Sign of External Examiner: _____

21.10: Scheme of Evaluation for MGMSBS for Subjects like Dissertation/ Project Work/ Report (Semester IV)

Evaluation parameter (Semester IV)	**Continuous Internal Evaluation (CIE)**	**Semester End Evaluation (SEE)**	
	Guide	**Internal examiner**	**External examiner**
Thesis preparation, Novelty, Overall Lab Work Culture	25	-	-
Dissertation/Project work book	25	25	25
Evaluation of thesis including Viva Voce	-	50	50
Total	50	75	75
Overall Total = 200 Marks			

22. Dissertation/ Project Work/ Report Evaluation Guidelines for PG courses:

The Dissertation allows the student to develop and display in-depth understanding of a theme in International Studies, as well as an in-depth understanding of the appropriate research tools, approaches and theories applicable to that theme. The dissertation should be based on a well-defined and clear research question of scholarly significance, and that the dissertation develops a theoretically and methodologically informed and evidence-based answer to that question.

Scheme of Evaluation for MGMSBS for Subjects like Dissertation/ Project Work/ Report:

The assignment of marks for Project/Dissertation is as follows:

Part I- III semester

As per proforma Point No. 20.9.

Part-II- IV semester

As per proforma Point No. 20.10 & 21.10.

23. Eligibility for award of degree

23.1 A candidate shall have passed in all the subjects of all semesters (I - VIII) including compulsory embeded internship (One Year) to be eligible for award of Under Graduate degree.

23.2 A candidate shall have passed in all the subjects of all semesters (I – IV) to be eligible for award of Post Graduate degree.

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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