



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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Curriculum for B.Sc. Medical Radiology & Imaging Technology

Amended upto BOM -55/2018, Dated 27/11/20181

Amended History

1. Approved as per BOM - 23/2012, Item No. 4, Dated 30/3/2012.
2. As Amended in BOM - 43/2015 [Resolution No. 3.3(d)], Dated 06/11/2015.
3. As Amended in BOM - 48/2017 [Resolution No.5.11], Dated 24/01/2017.
4. As Amended in BOM -51/2017, [Resolution No.1.3.14.3] Dated 28/08/2017.
5. As Amended in BOM -55/2018 [Resolution No. 4.13], Dated 27/11/2018.

Curriculum for
B.Sc. (Medical Imaging Technology)

IN PURSUIT OF EXCELLENCE



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OUTLINE OF COURSE CURRICULUM

B.Sc. (Medical Imaging Technology)

Subject and hours of teaching for Theory and Practical: The number of hours of teaching theory and practical, subject wise in first year, second year and third year are given below.

Main and Subsidiary subjects are common in first year for all the B.Sc. courses.

First Year

Main Subjects (First Year)

Paper	Subjects	Teaching hours			University examination marks (Only Theory)	Internal assessment marks	Total marks
		Theory	Pracs.	Total			
Paper I	Anatomy	35 hrs	25 hrs	60 hrs	80 marks	20 marks	100 marks
Paper II					80 marks ↓	20 marks ↓	100 marks
Section A	Physiology	45 hrs	15 hrs	60 hrs.	40 marks	10 marks	
Section B	Biochemistry	40 hrs	20 hrs	60 hrs.	40 marks	10 marks	
Paper III					80 marks ↓	20 marks ↓	100 marks
Section A	Pathology	42 hrs	18 hrs	60 hrs.	40 marks	10 marks	
Section B	Microbiology	48 hrs	12 hrs	60 hrs	40 marks	10 marks	
Total:-							300 marks

Subsidiary subject (First Year)

Subjects	Teaching hours			University examination Marks	Internal assessment marks	Total marks
	Theory	Pracs	Total			
*English	60 hrs	-	60 hrs	-	-	-

- No Practical examination in any subject in I year.
- The candidates are required to get acquainted with English subject, but there will be no university examination. The colleges are required to conduct examination and maintain records.

Second YearMain Subjects (Second Year)

Sr no	Paper	Subjects	Teaching hours			University examination (Theory)	University examination (Prac.)	Internal assessment marks
			Theory	Pracs	Total			
1	Paper I	Physics of Radiology, Radiation Physics & Medical Physics	90 hrs	60 hrs	150 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)
2.	Paper II	Principals of Radiography	90 hrs	60 hrs	150 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)
3	Paper III	Dark Room Technique, Photography & Picture Archiving	90 hrs	60 hrs	150 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)
Total:-								

Subsidiary Subjects (Second Year)

Sr. no.	Subjects	Teaching hours			University examination marks	Internal assessment marks	Total marks
		Theory	Pracs	Total			
1	*Research & Biostatistics	20	-	20 hrs	-	-	-
2	*Computer application & Database Management	20	-	20 hrs	-	-	-

* Students will undergo clinical posting in relevant department for hands on training and should maintain log book to be certified by the faculty.

* Subsidiary Subjects - University examinations will not be conducted for these subjects.

Third YearMain Subjects (Third Year)

Internal assessment marks	Paper	Subjects	Teaching hours			University examination (Theory)	University examination (Prac.)	Internal assessment marks	Total marks
			Theory	Pracs	Total				
30 marks 20(T)+ 10(P)	Paper I	Radiograph Technique	100 hrs	60 hrs	160 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 marks
30 marks 20(T)+ 10(P)	Paper II	Imaging Technique	100 hrs	60 hrs	160 hrs	80 marks	40 marks (30Prac+ 10Viva)	30 marks 20(T)+ 10(P)	150 marks
30 marks 20(T)+ 10(P)	Total:-								300 marks

First Year Common Syllabus**Paper-I**
Anatomy

Placement:-First Year

Theory-35 Hours
Practical-25 Hours

Course Description

Unit	Syllabus	Lecture (Hrs)	Demo (Hrs)
1	Introduction to Anatomy <ul style="list-style-type: none"> Terminology 	1	1
2	Skeletal System <ul style="list-style-type: none"> Classification of bones Parts of developing long bone Classification of joints Appendicular skeleton Axial skeleton 	1 1 1 1	1 1 1 1
3	Muscular system <ul style="list-style-type: none"> Types Muscle groups and movements Upper limb, lower limb Neck, back, abdomen 	1 1	1 1
4	Joints <ul style="list-style-type: none"> Shoulder Hip Knee Movements and muscle groups producing movements at other joints 	1 1 1 1	1 1 1 1
5	Respiratory system <ul style="list-style-type: none"> Nose Bronchial tree Thoracic cage and diaphragm Lung , Bronchopulmonary segments Mediastinum 	1 1 1	1 1 1
6	Circulatory system <ul style="list-style-type: none"> Types of blood vessels Heart Circulation- Systemic and Pulmonary Major branches from Arch of Aorta Major Veins 	1 1 1 1	1 1

First Year

Paper-II

Section-A

PHYSIOLOGY

Placement:-First Year

Theory-45 Hours
Practical-15 Hours

Theory:-

Blood:

Composition, properties and functions of Blood.

Haemopoiesis

Haemogram (RBC, WBC, Platelet count, Hb Concentrations)

Blood Groups - ABO and RH grouping

Coagulations & Anticoagulants

5 Hrs

Anaemias: Causes, effects & treatment.

Body Fluid: Compartments, Composition.

Immunity – Lymphoid tissue

Cardio vascular system

Functions of Cardiovascular System

Structures of CVS & Functions.

Functional Anatomy of Heart & their functions, Cardiac cycle.

7 Hrs

Junctional tissues of heart & their functions.

Cardiac output

E C G Blood pressure Heart Rate.

Digestive system

Functions of Digestive system.

Functional Anatomy of Digestive System

Composition and functions of all Digestive juices.

4 Hrs

Movements of Digestive System (Intestine).

Digestion & Absorption of Carbohydrate, Proteins & Fats.

Respiratory System

Functions of Respiratory system

Functional (Physiological) Anatomy of Respiratory System.

Mechanism of respiration.

5 Hrs

Lung Volumes & capacities.

Transport of Respiratory Gases.

Regulation of Respiration

-45 Hours Total-15 Hours	<p>Nervous system Functions of Nervous system. Conduction – Conduction of Impulses, factors affecting. Synapse- transmission. Receptors Reflexes Ascending tracts Descending tracts. Functions of various parts of the Brain. Cerebro Spinal Fluid (CSF): Composition , functions & Circulation. Spinal Puncture. Autonomic Nervous System (ANS): Functions.</p>	9 Hrs
5 Hrs	<p>Special senses Vision. Structure of Eye, functions of different parts. Refractive errors of Eye and correction. Visual Pathway. Colour vision & tests for colour Blindness. Hearing: Structure and function of ear. Mechanism of Hearing. Tests for Hearing (Deafness)</p>	3 Hrs
7 Hrs	<p>Skeletal muscle physiology Properties of Muscle. Structure of skeletal Muscle, sarcomere. Neuromuscular junction & Transmission. Excitation & contraction coupling(Mechanism of contraction)</p>	3 Hrs
4 Hrs	<p>Thermoregulation Structure and function. Body temperature. Regulation of Temperature</p>	1 Hrs
5 Hrs	<p>Excretory System Excretory organs Kidneys: Functions. Nephron, Renal Glomerular Apparatus Renal circulation. Mechanism of Urine formation Mechanism of Urine Formation. Micturition., Cystometry. Diuretics. Artificial Kidney.</p>	4 Hrs

Reproductive systems

Structure & Functions of Reproductive system.

Male Reproductive System: spermatogenesis, Testosterone.

Female reproductive system: Ovulation, Menstrual cycle.

Oogenesis, Tests for Ovulation

Oestrogen & Progesterone

4 Hrs

Pregnancy test

Parturition. Contraceptives.

Lactation : Composition of Milk

Advantages of breast Feeding.

PRACTICALS

15 hours

Study of Microscope and its use

Collection of Blood and study of Haemocytometer

1 Hrs

Haemoglobinometry

2 Hrs

White Blood Cell count

2 Hrs

Red Blood Cell count

2 Hrs

Determination of Blood Groups

1 Hrs

Leishman's staining and Differential WBC Count

2 Hrs

Determination of Bleeding Time. {

1 Hrs

Determination of Clotting Time.

Pulse & Blood Pressure Recording

2 Hrs

Auscultation for Heart Sounds

Artificial Respiration – Demonstration

Spirometry- Demonstration

2 Hrs

First Year

Paper-II
Section-B

BIOCHEMISTRY

ement:-First Year

Theory-40 Hours
Practical-20Hours

4 Hrs

15 hours

1 Hrs

2 Hrs

2 Hrs

2 Hrs

1 Hrs

2 Hrs

1 Hrs

2 Hrs

2 Hrs

	Syllabus	Lect. Hrs.
	Introduction and scope of biochemistry	1
	Chemistry of carbohydrates, proteins, lipids and nucleic acid	2
	i) Carbohydrates : Structure, properties, chemical reactions and functions.	1
	Amino acid : Essential and nonessential amino acids with structure and function.	
	iii) Proteins: Definition, Classification, Structure of Proteins, Denaturation of Proteins, Primary, Secondary Tertiary and Quaternary (overview)	2
	iv) Lipids: Classification and properties. Introduction, Simple Lipids, Compound Lipids, Derived Lipids, Essential Fatty Acids.	2
	v) Nucleic acid : Structure of purine and pyrimidine bases, nucleotides and nucleosides. DNA and RNA : structure and properties.	2
	Elementary knowledge of enzymes: Classification, mechanism of enzyme action, Enzyme inhibition, enzyme specificity. Role of coenzymes	3
	Brief concept of biological oxidation: Electron transport chain. inhibitors and uncouplers briefly.	2
	Outline of digestion, absorption and metabolism of carbohydrate, proteins and fats.	2
	i) Carbohydrate metabolism:-Glycolysis, TCA cycle, Glycogen metabolism Regulation of blood Glucose Concentration, Diabetes Mellitus, Glycosuria.	3
	ii) Proteins: General amino acid reactions. Transamination, decarboxylation, deamination. Urea cycle.	2
	iii) Lipid metabolism: Cholesterol metabolism, Ketone bodies formation and breakdown	2
	iv) Nucleic acid metabolism : Purine catabolism	1
	Importance of some minerals- sodium, potassium, calcium, phosphorous, iron, copper, chloride, fluoride.	2
	Nutritional aspects of carbohydrates, fats, proteins, balanced diet.	1

8	Introduction to medical lab technology: General introduction Role of medical lab technologists, and responsibility, safety measures and first aid. Cleaning and care of general laboratory glassware and equipment. Elementary knowledge of analytical biochemistry. Principles, functions and uses of balances, centrifuge machines, colorimeters.	4
9	Collection and recording of biological specimens, separation of serum plasma preservation and disposal of biological samples/materials.	2
10	Standard solutions: Various std. solutions used , their preparation ; storage of chemicals .	2
11	Units of measurements: S.I units: Definitions, conversions; Measurement of volume : Strength , Normality ,Molarity, Molality Definitions:Mole, molar and normal solutions (preparation, Standardization), pH (Definition ,Pka value, Example, importance of Henderson-Hasselbalch equation); Buffer solutions(Definition, preparation of important solutions), pH indicators (pH papers, universal & other indicators); pH measurement :different methods (pH paper, pH meter, principle of pH meter, structure, working and maintenance.	4
	Practical and demonstration: Cleaning of glassware Preparation of various solutions Maintenance of laboratory, quality control, and first aid Single pan balance, pH- meter Handling of colorimeters Operation and maintenance Distillation of water. Serum electrolytes Na.K.Cl. Demonstration of semi automated / fully automated blood analyzers. Blood gas analyzer, Elisa reader. Demonstration of disposal of laboratory waste product and infected material. Quality Control Five demonstrations on carbohydrate ,lipid & Protein metabolism & immunochemistry	3 4 5 20 6 7 8 9
Total Theory & Practical hrs		60 hrs.

First Year

Paper-III
Section-A

PATHOLOGY

ement:-First Year

Theory-42 Hours
Practical-18 Hours

sr. No.	Topic	No. of lectures	Number of Practical	Total
1	Introduction to Pathology	01	--	01
2	Working and maintenance of instruments	02	03	05
3	General principles of Histopathology techniques collection, fixation, processing & routine staining	05	03	08
4	General principles of Cytopathology techniques collection, fixation, processing & routine staining	05	02	07
5	General principles of Haematology techniques collection, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear, automatic cell counter	05	03	08
6	General principles of Clinical Pathology techniques sample collection, processing for routine test, normal urine & urine examination	05	03	08
7	General principles of Blood Bank techniques antigen, antibody, ABO & Rh system	05	03	08
8	General principles of Autopsy & Museum	02	01	03
9	General Pathology including introduction to inflammation, circulatory disturbances & neoplasia	05	--	05
10	Systemic pathology basis and morphology of common disorders like anemia, leukemia, AIDS, TB, Hepatitis & malaria	05	--	05
11	Maintenance and medico legal importance of records and specimens	02	--	02
Total		42 + 18		60 hrs

First Year**Paper-III****Section-B****Microbiology**

Placement:-First Year

Theory-48 Hours
Practical-12 Hours

Unit	Syllabus	Lecture (Hrs)	Demo (Hrs)
1	Concepts and Principles of Microbiology <ul style="list-style-type: none"> • Historical Perspective, Koch's Postulates • Importance of Microbiology • Microscopy • Classification of Microbes 	1 1 1 1	
2	General Characters of Microbes <ul style="list-style-type: none"> • Morphology, staining methods • Bacterial growth & nutrition • Culture media and culture methods +ABS • Collection of specimen, transport and processing • Antimicrobial mechanism and action 	1 1 2 1	1 1 1
3	Sterilization and Disinfection <ul style="list-style-type: none"> • Concept of sterilization, Disinfection asepsis • Physical methods of Sterilization • Chemical methods (Disinfection) • OT Sterilization • Biological waste disposal 	1 1 1 1 1	1
4	Infection and Infection Control <ul style="list-style-type: none"> • Infection, Sources, portal of entry and exit • Standard (Universal) safety Precautions • Hospital acquired infections • Hospital Infection control Programme 	1 1 1 1	
5	Immunity <ul style="list-style-type: none"> • Types Classification • Antigen, Antibody – Definition and types • Ag-Ab reactions – Types and examples • Hypersensitivity - Definition and classification • Immunoprophylaxis – Types of vaccines, cold chain 	1 1 1 1 1	1

ry-48 Hours
ical-12 Hours

ture
rs)
Demo
(Hrs)

		• Immunization Schedule	1	
		Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests)	1	
		• Introduction	1	
		• Gram Positive Cocci	1	
		• Gram Negative Cocci	1	1
		• Enterobacteraecea	1	
		• Imp Gram Negative-Organism	1	
		• Mycobacteria	1	1
		• Anaerobic bacteria	1	
		• Spirochaetes	1	1
		• Zoonotic diseases	1	
		Mycology		
		• Introduction, Classification, outline of lab diagnosis	1	1
		List of Fungi causing:		
		• Superficial Mycoses	1	
		• Deep mycoses	1	
		• opportunistic fungi	1	
	1	Virology		
	1	• Introduction, General Properties, outline of lab diagnosis	1	1
	1	• DNA & RNA Viruses-Classification, diseases caused	1	
		• HIV Virus	1	
		• Hepatitis Virus	1	
	1	Parasitology – morphology, life cycle & outline of lab diagnosis	1	1
		• Introduction, Classification	1	
		• Protozoa- E. histolytica	1	
		• Malarial Parasite	1	
		General properties, classification, list of diseases caused by:		
		• Cestodes and Trematodes	1	
		• Intestinal Nematodes	1	
		• Tissue Nematodes	1	
	1	• Vectors		1
Total:-60 hrs.			48 hrs	12 hrs

First YearSubsidiary Subjects1. ENGLISH

Placement:-First Year

Theory-60 Hours

Course description : The course is designed to enable students to enhance ability to comprehend spoken and written English (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written English during clinical and classroom experience.

Specific objectives: At the end of the course the students are able to:

- 1) Develop good vocabulary skills for effective communication.
- 2) Effectively communicates with patients while rendering care.
- 3) Understands methods of writing and drafting letters in English.
- 4) Develop ability to read understand and express meaningfully, the prescribed text.
- 5) Plans and writes nursing process and records effectively.
- 6) Develops skills in listening.

Unit	Hours	Theory	Hours	Exercises
I	7 Hrs	<input type="checkbox"/> Review of Grammer <input type="checkbox"/> Remedial study of grammer <input type="checkbox"/> Building Vocabulary <input type="checkbox"/> Lexical sets	3 Hrs	<ul style="list-style-type: none"> • Use of Dictionary and Grammer • Practice appropriate words and expression • Revising parts of speech Pairs of confused words synonyms & Antonyms

				<ul style="list-style-type: none"> ◦ Lexical sets & collocations ◦ Using appropriate words and expressions.
II	20 Hrs	<input type="checkbox"/> Read and comprehend prescribed course books <input type="checkbox"/> Skimming & Scanning <input type="checkbox"/> Reading in sense groups <input type="checkbox"/> Reading between the lines	07 Hrs	<ul style="list-style-type: none"> ◦ Reading ◦ Summarizing ◦ Comprehension
III	5 Hrs	<input type="checkbox"/> Various forms of composition Letter writing <input type="checkbox"/> Note making & Note takings <input type="checkbox"/> Precis writings <input type="checkbox"/> Anecdotal records <input type="checkbox"/> Diary writing <input type="checkbox"/> Reports on health problem <input type="checkbox"/> Resume/CV <input type="checkbox"/> Notices, Agenda, minutes <input type="checkbox"/> Telegram <input type="checkbox"/> Essay	5 Hrs	<ul style="list-style-type: none"> ◦ Letter writing ◦ Note making & Note takings ◦ Precis writings ◦ Anecdotal records ◦ Diary writing ◦ Reports on health problem ◦ Resume/CV ◦ Notices, Agenda, minutes, telegram, essay ◦ Discussion on written reports/documents
IV	3 Hrs	<input type="checkbox"/> Spoken English Phonetics, Public speaking <input type="checkbox"/> Oral report <input type="checkbox"/> Group Discussion Debate	3 Hrs	<ul style="list-style-type: none"> ◦ Debate ◦ Participating in Seminar, Panel discussion, Symposium ◦ Telephonic Conversion

		<input type="checkbox"/> Telephonic Conversation Conversational skills (Formal, Neutral & informal situation)		Conversation in different situations, <ul style="list-style-type: none"> • Practice in public speaking
V	5 Hrs	<input type="checkbox"/> Listening Comprehension Media, audio, video, speeches etc.	2 Hrs	<ul style="list-style-type: none"> • Listening to audio, video tapes and identify the points, accent & information pattern.

Bibliography:

1. Living English Grammar & Composition Tickoo M.L. & Subramaniam A. E, Oriental Longman, New Delhi.
2. English for practical purposes Valke, Thorat patil & Merchant, Macmillan Publication, New Delhi.
3. Enriching your competence in English, by Thorat, Valke, Orient Publication, Pune
4. English Grammar & Composition Wren & Martin, S. Chand Publications-2005, Delhi.
5. Selva Rose, Carrier English for Nurses, 1st edition-1999, published by Orient Longman Pvt. Ltd.-1997, Chennai.

Common exam pattern for all 1st year

B.Sc. courses.

Main Subjects:

Paper I: Anatomy

Theory pattern: University Examination

Time: Duration: 3hrs.

Total Marks: 80 marks.

Distribution of Marks.

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x10 mks	20 marks
Short essays	8	6	6x 5 mks	30 marks
Short answers	12	10	10x 3 mks	30 marks
				Total= 80 marks

Paper II: Physiology (Section A) and Biochemistry (Section B)

Theory pattern:

Time: Duration: 3hrs.

Total Marks: 80marks.(Section A: 40 marks + Section B: 40 marks)

Distribution of marks

Paper II, Section A: Physiology.

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Paper II, Section B: Biochemistry.

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Paper III: Pathology (Section A) and Microbiology(Section B)

Theory pattern.

Time: Duration: 3hrs.

Total Marks: 80 marks: (Section A: 40 marks + Section B: 40 marks)

Distribution of marks

Paper III, Section A: Pathology

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Paper III, Section B: Microbiology

Question type	No. of questions	Questions to be answered	Question X marks	Marks
Long essays	2	1	1x10 mks	10 marks
Short essays	5	3	3 x 5 mks	15 marks
Short answers	7	5	5x 3 mks	15 marks
				Total= 40 marks

Second Year B.Sc. (Medical Imaging Technology)

Main Subjects

Paper I

PHYSICS OF RADIOGRAPHY, RADIATION PHYSICS & MEDICAL PHYSICS

Placement: Second Year

Theory=90 Hours

Practical=60 Hours

1. Physics Relevant To X-Rays, CT Scan, MRI, Ultrasound, Doppler, PET.
2. Radiation Protection.
3. Electromagnetic Induction (EMI).
4. X-Ray Production.
5. X-Ray Generator Circuits.
6. X-Ray Tubes, Electronics & Rectification.
7. Interaction of X-Ray with Matter.
8. Properties of X-Rays.
9. Magnetism.
10. Permanent & Super Conducting Magnets.
11. Spinning Proton, Precession, Larmor Frequency, Radio Frequency Pulse , T1 T2 Relaxation.
12. Instrumentation of MRI: Magnet, Shim coils, Gradient coils, Radio frequency Transmitter& Receivers.
13. Ultrasound: Definition, History, Nature, Propagation, Frequency, Wavelength, Velocity, Amplitude
14. Transducer: Piezoelectric Effect, Construction, Types of Transducer- Linear, Convex, High frequency, Low frequency, Sector, Endocavitatory, Biopsy, Endoscopic Probes.
15. Display Modes: A, B, M, Real Time.
16. Doppler Principle: Definition, CWD, PWD, Real time, Colour Flow, Power Colour Doppler.
17. Ultrasound Artifacts.

Second Year

Paper II

PRINCIPALS OF RADIOGRAPHY

Placement: Second Year

Theory=90 Hours

Practical=60 Hours

1. Positions of Patient.
2. Accessories & Instruments.
3. Upper Limb: Shoulder Joint, Humerus, Elbow, Forearm, Wrist, Scapoid, Hand.
4. Lower Limb: Hip Joints, Thigh, Knee, Leg, Ankle, Foot.
5. Pelvis & Hip Joints, SI Joints, Acetabulum.
6. Chest: PA, AP, Lateral, Apical, Lordotic, Ribs, High KV, MMR, Portable Bed Side.
7. Spine: Cervical Spine, Atlanto Axial Joint, Flexion Extention, Dorsal Spine, Lumber, Sacral, Coccygeal spine.
8. Skull. AP, PA Lat, Base, Mastoids.
9. Skeletal Survey Bone Age, Metabolic, Metastasis disease.
10. Face, PNS, Orbits, Nasal bones, Mandible, Maxilla, Zygoma.

Second Year

Paper III

Theory Classes

Dark Room Technique, Photography & Picture Archiving.

Placement: Second Year

Theory=90 Hours

Practical=60 Hours

1. Computed Radiography (CR).
2. Digital Radiography (DR).
3. Picture Archiving Communication (PAC).
4. X-Ray Films, cassettes, Hangers, Intensifying Screens.
5. Dark Room Construction.
6. Photo Chemistry.
7. Composition of developer Fixer, replenisher.
8. Film Faults.
9. Ultrasound Thermal Paper, Film, CD.
10. Recording of CT, MRI Images on Film.

Second YearSubsidiary Subjects1. RESEARCH AND BIO STATISTICS

Placement: Second Year

Theory= 20 Hours

Course Description:

Introduction to basic statistical concepts: methods of statistical analysis; and
Interpretation of data

Behavioural Objectives:

Understands Statistical terms.

Possesses knowledge and skill in the use of basic statistical and research methodology.

Unit- I: Introduction

Meaning, definition, characteristics of statistics.

Importance of the study of statistics.

Branches of statistics.

Statistics and health science including nursing.

2 hrs

Parameters and estimates.

Descriptive and inferential statistics.

Variables and their types.

Measurement scales.

Unit- II: Tabulation of Data

Raw data, the array, frequency distribution.

Stem-leaf display

2 hrs

Basics principles of graphical representation.

Types of diagrams- histograms, frequency polygons, smooth frequency polygon, commulative frequency curve, ogive.

Unit- III: Measure of Central Tendency

Need for measures of central tendency

Definition and calculation of mean- ungrouped and grouped.

Trimmed mean

Meaning, interpretation and calculation of median ungrouped and grouped.
 Meaning and calculation of median ungrouped and grouped. 4 hrs.
 Meaning and calculation of mode.
 Comparison of the mean, mode & median.
 Guidelines for the use of various measures of central tendency.

Unit- IV: Measure of Variability

Need for measure of dispersion.
 The range, the average deviation. 4 hrs
 The variance and standard deviation.
 Calculation of variance and standard deviation ungrouped and grouped.
 Properties and uses of variance and SD

Unit- V: Measures of Skewness & Kurtosis

Needs for measure of skewness & Kurtosis
 Karl pearson's co-efficient of skewness 1 hrs
 Types of Kurtosis

Unit- VI: Sampling Techniques

Need for sampling-Criteria for good samples
 Application of sampling in Community. 6 hrs
 Procedures of sampling and sampling designs errors.
 The normal distribution.
 Sampling variation and tests of significance.
 Student's t-test, chi-square test, z-test.

Unit- VII: Health Indicator

Importance of health Indicator
 Indicators of population, morbidity, mortality, health services. 1 hrs
 Calculation of rates, and ratios of health.

Recommended Books

B.K. Mahajan & M. Gupta (1995) Text Book of Preventive & Social Medicine, 2002, 17th Edition Jaypee Brothers.

Second Year

2. Computer Application & Database Management

Placement: Second Year

Theory= 20 Hours

The course enables the students to understand the fundamentals of computer and its applications.

Introduction to data processing:

Features of computers, Advantages of using computers. Getting data into/out of computers. Role of computers. What is Data processing? Application areas of computers involved in Data processing. Common activities in processing. Types of Data processing. Characteristics of information. What are Hardware and software?

Hardware Concepts:

Architecture of computers, Classification of computers, Concept of Damage. Types of storage devices. Characteristics of disks, tapes, Terminals, Printers, Network. Applications of networking concepts of PC System care, floppy care, Data care. Concept of software.

Classification of software: System software. Application of software. Operating system.

Computer system: Computer Virus. Precaution against viruses. Dealing with viruses.

Computers in Medical electronics.

Basic Anatomy of Computers.

Principles of programming.

Computer application- principles in scientific research; work processing, medicine, libraries, museum, education, information system.

Data Processing

Computer in physical therapy- principles in EMG, Exercise testing equipment, Laser.

Third Year B.Sc. (Medical Imaging Technology)

Main Subjects

Paper I

RADIOGRAPH TECHNIQUE

Placement: Third Year

Theory=100 Hours

Practical=60 Hours

1. Gastro Intestinal Tract: Barium Follow, Meal, Follow Through, Enema. Gastrograffin Meal, Cologram.
2. Urinary System: IVU, RGU, MCU.
3. Uterus & Fallopian Tubes: HSG.
4. Billiary Tract: OCG, IV Cholangiography, T Tube cholangiography, ERCP.
5. Angiography; Transfemoral Arteriography, TLA, Aortogram, Renal Arteriography.
6. Venography: Lower Limb, Upper Limb, IVC, Spleno portography.
7. Myelography.
8. Bronchography.
9. Contrast Media
10. CT Guided Procedure, CT enteroclysis, Virtual colonoscopy, bronchography,
11. Ultrasound guided procedure.
12. Mammography Conventional, MR mammography, PET mammography.
13. OPG, Dental Radiography

Third YearPaper IIIMAGING TECHNIQUE

Placement: Third Year

Theory=100 Hours

Practical=60 Hours

1. Computer Tomography History, principles, generations, 1st to spiral to multi detector CT, CT number window level & window width, scan artifacts, patient positioning, contrast media & administration, documentation, radiation dose, Protocols for Brain, PNS, Thorax, HRCT Chest, HRCT petrous bone, TM joint, Abdomen, Pelvis, Extremities, CT angio triple phase, Dual source CT, CT enteroclysis, CT virtual colonoscopy, Virtual Bronchoscopy, Virtual Sinuscopy, CT urography.

2. Magnetic Resonance Imaging. History, spinning proton, Magnetization, Precession, Larmor Frequency, Radio frequency pulse, Relaxation, T1, T2, Instrumentation-magnet permanent & super conducting, shim coils, gradient coils, radio frequency, Transmitter & receiver pulse sequences T1, T2, IR, FLAIR, STIR, Diffusion, gradient, image artefacts, MR Contrast Agents, Paramagnetic & Ferromagnetic.

3. Ultrasound Imaging, Colour Doppler. History, ultrasound characteristics-nature, propagation, frequencies, wavelength, velocity, amplitude, attenuation, transducer- piezoelectric effect, linear, convex, sector, high & low frequency, acoustic coupling media, display modes- A, B, M, REAL TIME Modes, Doppler principles, CWD, PWD, Duplex Real Time, Colour Flow, Power Colour Doppler, Ultrasound Artefacts, patient preparation, Ultrasound Guided Procedures, Safety Consideration, Document, Side Effects,

4. Positron Emission Tomography. Principles, Isotopes, Machines, 5 Fluro Deoxy Glucose, Applications.

Exam Pattern.

1. Internal Exams: TWO in number.

Theory exam

Exam	Time to conduct internal exams	Theory Marks	Practical Marks
1. Mid Term Exam	After 6 month from starting the course	40	20
2. Pre final Exam	Atleast 1 month prior to final university exam.	80	40
Total		120	60
Internal Assessment (to be scaled down from total of the two exams)		Out of 20	Out of 10

2. University Exam: (exam at the end of each year)

Final marks distribution

University Exam	Theory	Practical
University exam	80	40 (30Pra+10Viva)
Internal Assessment	20	10
Total Marks	100	50

Exam paper pattern Theory (Prefinal Exam)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x10	20 marks
Short essays	8	6	6x 5	30 marks
Short answers	12	10	10x 3	30 marks
				Total= 80 marks

Exam paper pattern Theory (Midterm Exam)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	2	1	1x10	10 marks
Short essays	4	3	3x 5	15 marks
Short answers	6	5	5x 3	15 marks
				Total= 40 marks

Heads for passing:-

1. Minimum 40% in the University paper of 80 marks and minimum 50% in the total 100 marks(80 + 20 IA)
2. 75%: (out of 100 marks): Distinction.
3. 60%: out of 100 marks): First class.
4. 50% (out of 100 marks): Pass class

A student can carry a backlog of 2 subjects in the first year but should pass the subjects in the next supplementary exam. In the second and third year, a backlog of only one subject is permitted.

Resolution No. 3.2(d): Resolved to delete the topics OSPE, Mal absorption, PUO, Gastric Analysis in Practical of Pathology (UG) for the batch of Students entering into 2nd MBBS from the academic year 2016-17 onwards.

Resolution No. 3.2(e): Resolved to add following Demos for UG Students (Pathology)-Histogram & CBC for the batch of Students entering into 2nd MBBS from the academic year 2016-17 onwards.

Resolution No. 3.2(f): Resolved that 10% of Practical marks in Grand Viva for PG examination be allotted for Dissertation Viva with immediate effect.

Keep in
all PG courses
MD/MS
& FRC

3.3 Medicine and Allied :

Resolution No. 3.3(a): Resolved to include,

- (i) Topics in Chest Medicine : ARDS, OSA and Pulmonary Thrambo-Embolism which should be covered in two lectures.
- (ii) Care of Terminally ill patient under the heading of Geriatric Medicine.

For the batch of Students entering into 3rd MBBS (Part-I) from February 2016 onwards.

Resolution No. 3.3(b): Resolved to approve the changes in syllabus of MD Geriatric Medicine (Annexure-IX) with immediate effect.

Resolution No. 3.3(c): Resolved to approve the changes in syllabus of MD in Emergency Medicine (Annexure-X) with immediate effect.

Resolution No. 3.3(d): Resolved that the basic research methodology should be taught to UG and PG students for all courses as per their regulatory Council Norms.

Keep in
all UG & PG
courses

Resolution No. 3.3(e): Resolved to accept the proposed pattern of redistribution of the marks in Dermatology and Psychiatry subjects in theory papers of Medicine subject at MBBS level for the batch of Students entering into 3rd MBBS (Part-II) from February 2016 onwards, as given below:

The change in Paper 2 section C should be as under:

Section C (Marks 10)

C1 Psychiatry Section (Marks 10)

Question 1 – long question (Marks 4)

Question 2- short answer question attempt any 2 (Marks 6)

- a.
- b.
- c.

C2 Dermatology Section (Marks 10)

Question 1 – long question (Marks 4)

Question 2 – Short answer question attempt any 2 (Marks 6)

- a.
- b.
- c.

Resolution No. 3.3(f): Resolved to adopt the change in internal assessment pattern of Community Medicine (Annexure-XI) for the batch of Students entering into 2nd MBBS from August 2016 onwards.

Resolution No. 3.3(g): Resolved to start Certificate Course and Fellowship in Critical Care Medicine (Annexure-XII) at MGM Medical College, Navi Mumbai from academic year 2016-17. Therefore, Dean, MGM Medical College, Navi Mumbai is requested to work on the feasibility and other regulatory norms to start this course.

Resolution No. 3.3(h): Resolved to start Certificate Course and Fellowship in Sleep Medicine (Annexure-XXVIII) at MGM Medical College, Navi Mumbai from academic year 2016-17. Therefore, Dean, MGM Medical College, Navi Mumbai is requested to work on the feasibility and other regulatory norms to start this course.

Resolution No. 3.3(i): Resolved to approve the Examination pattern for MD in Immuno Haematology & Blood Transfusion (Annexure-XIII) with immediate effect.

3.4 Surgery and Allied :

Resolution No. 3.4(a): Resolved that :

- (i) Topic of Polytrauma and its management be included in the Orthopedic UG syllabus in consultation with Surgery Department for the batch of Students entering into 3rd MBBS (Part-II) from February 2016 onwards.
- (ii) Following Topics be excluded from the Orthopedic UG syllabus for the batch of Students entering into 3rd MBBS (Part-II) from February 2016 onwards :
 - a) Acute poliomyelitis
 - b) Fungal infection and Leprosy in orthopedic
 - c) Cerebral Palsy and rehabilitation

Resolution passed in BOM – 48/2017, dated 24/01/2017

Item No. 5.11: BOS (Biomedical Sciences) dated 16.09.2016

- m) To review the structure of Theory Exam Pattern of B.Sc. (Paramedical) Courses: It was decided to change the pattern of Theory exam pattern with more options in SAQ (10 marks) and LAQ's (20 marks) for 2nd and 3rd year. For first year question paper pattern will remain same.

Resolution No. 5.11(m): Resolved to approve the change in the pattern of Theory exam of B.Sc. (Paramedical) Courses for 2nd and 3rd year [as per **Annexure-IX of BOM-48/2017**] while the first year question paper pattern will remain same, to be effective for batch entered in 2nd year/3rd year in Academic Year 2016-17 onwards.



MAHATMA GANDHI MISSION
MEDICAL COLLEGE & HOSPITAL
Ph-27437668, 27437990, Fax 911-22-7420320

MGMMCH/Ophthal Dept./2016/ 76

Date: 16.09.2016

To,
The Director,
MGM School of Bio Medical Sciences,
Kamothe , Navi Mumbai

Sub: Changing format of B.Sc Optometry Question paper.

Respected Sir

We Faculty of Ophthalmology Department of MGM College Kamothe along with external examiner from by D.Y. Patil Medical college Nerul wish to bring Change in format of Question paper since the existing one is not appropriate.

We all (Department of Ophthalmology as well as other Depts)who conduct paramedical courses feel that the question paper is very lengthy hence it is difficult to set question paper and check the Answer sheet.

We sincerely request you to effect the changes.

Thanking you.

Professor & HOD
Department of Ophthalmology

Dr. Varshav Grove

FOR

BEAS, Chandigarh

16/9/16

16/9/16

16/9/16

2025

(FINAL UNIVERSITY EXAMINATION- EXISTING THEORY EXAM PATTERN)

Question type	No. of questions	Questions to be answered	Question X marks	Total marks
Long essays	3	2	2x10	20 marks
Short essays	8	6	6x 5	30 marks
Short answers	12	10	10x 3	30 marks
				Total= 80 marks



MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI
SECOND B.Sc. (Optometry Technology) UNIVERSITY EXAMINATION JULY-2015
Third Year

MGMH/KAM/OPH/2015

Date :

Subject : Community Eye Health & Eye Banking

Total marks :80

INSTRUCTION :

1. Attempt all sections
2. Maximum Marks are indicated in the right
3. Illustrate the answer with suitable diagram wherever necessary
4. Please surrender your SWITCHED OFF cell phones at entry point into the examination Hall
5. Mobile phones , pagers ,bluetooth or any other such communication devices are not allowed in the examination premises and in the adjacent area

III Year

Q.1 Long Answer Question (Answer any Two)

2x10= 20marks

1. Vision 2020:Right to sight
2. National programme for control of blindness-I
3. Rehabilitation of visually handicapped

Q.2 Short Essay Question (Answer any Six)

6x5=30marks

1. Screening procedures in ophthalmology
2. School eye screening programme
3. Organisation of eye camp
4. Primary eye care
5. Enucleation
6. Preservation of donor cornea
7. Methods of publicity of eye donation
8. Contra-indication of eye donation

Q.3 Short Answer Question (Answer any 10)

10x3=30marks

1. Concepts of community ophthal
2. Visual acuity testing in school children
3. Pre- operative instructions of cataract surgery
4. Post -operative instructions of cataract surgery
5. How to donate your eyes?
6. Public education regarding common eye diseases
7. Components of an eye bank
8. Sac syringing
9. Methods to screen IOP
10. Presbyopic correction in an eye camp
11. Vitamin A prophylaxis:Doses & schedule
12. Blanket therapy in trachoma.

(COPY OF NEW PROPOSED QUESTION PAPER FORMAT)



MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI
SECOND B.Sc. (Optometry Technology) UNIVERSITY EXAMINATION JULY-2016
Third Year

MGMH/KAM/OPH/2016

Subject : Community Eye Health & Eye Banking

Date :

Total marks :80

INSTRUCTION :

1. Attempt all sections
2. Maximum Marks are indicated in the right
3. Illustrate the answer with suitable diagram wherever necessary
4. Please surrender your SWITCHED OFF cell phones at entry point into the examination Hall
5. Mobile phones , pagers ,bluetooth or any other such communication devices are not allowed in the examination premises and in the adjacent area

III Year

2x15=30 marks

Q.1 Long Answer Question (Answer any Two)

- 1) Methods of Eye Preservation.
- 2) Rehabilitation of visually handicapped
- 3) National programme for control of blindness-I

5x10=50marks

Q.2 Short Essay Question (Answer any five)

- 1) Vision 2020:Right to sight
- 2) Eye Banking
- 3) Organisation of eye camp
- 4) Primary eye care
- 5) Evisceration
- 6) Preoperative workup for corneal transplant.
- 7) Methods of publicity of eye donation

Resolution No. 1.3.14.3 of BOM-51/2017: Resolved to approve the List of Textbooks for B.Sc. Paramedical Courses / M.Sc. Molecular Biology. [Annexure XXI]

Medical Imaging Technology

Second Year & Third Year

For The Subjects in Second & Third Year	Basic radiological Physics	K. Thayalan
	Clarks Positioning In Radiography	steavert whitley,charls sloane,graham, adrian,chriissie
	merrils atlas of radiographic Positioning and Procedures(Vol-I,II,III)	EugeneFrank,Bruce Long,barbara Smith
	MRI /CT Protocol	Dr. Sunil Bhagwat
	Fundamentals of Radiological Physics	K. Thayalan
	Film Processing and Dark Room Practices	K. Thayalan

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

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



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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