



# **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 Doctor of Medicine Radio-Diagnosis**

Amended upto BOM- 57/2019, Dated 26/04/2019

## **Amended History**

1. Approved as per BOM– 04/2007, Item 12.1, Dated 14/12/2007.
2. Amended as per BOM- 48/2017, [Resolution No. 5.25]; Dated 24/01/2017.
3. Amended as per BOM-51/2017, [Resolution No.1.3.7.11], [Resolution No. 1.3.23]; Dated 28/08/2017.
4. Amended as per BOM-52/2018, [Resolution No. 3.8.2]; Dated 13/01/2018.
5. Amended as per BOM-55/2018, [Resolution No. 4.13], [Resolution No. 4.5.4.2], Dated 27/11/2018.
6. Amended as per BOM-57/2019, [Resolution No. 3.1.4.2]; Dated 26/04/2019.

## INSPIRING MINDS



### Mission

To improve quality of the life for individuals and community by promoting health, preventing and curing disease, advancing biomedical and clinical research and educating tomorrow's Physicians and Scientists.

### Vision

By 2020 the MGM University of Health Sciences will rank one of the top private Medical Institution. This will be achieved through ground breaking **discoveries in basic sciences and clinical research** targeted to prevent and relieve human suffering, **excellence in Medical Education** of the next generation of academic clinicians and intrinsic scientists.

MGM University of Health Sciences will transform the **Education of** tomorrow's Physicians and Scientists conducting **Medical Research** to advance health and improving lives by providing world-class patient care.

Many see the 21<sup>st</sup> Century as the golden age of biomedical research. The MGM University of Health Sciences will position for leadership at the horizon of this new era to promote and stabilise stand human health with a standard of excellence.

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## SYLLABUS FOR M.D. & D.M.R.D. (RADIO-DIAGNOSIS & IMAGING SCIENCES).

**GOAL:-** The broad goal of the teaching & training of Post-graduate student in Radio-Diagnosis is to make them understand & implement the knowledge regarding the role of various imaging modalities, helpful in the management of different clinical conditions. At the end of his/her training, he/she should be capable to take up a career in teaching institution or in diagnostic center or in research..

### **OBJECTIVES :-**

a) Knowledge:- At the end of the course the student shall be able to:

- 1) Explain the interaction of tile X-rays with mater to produce an image.
- 2) Fromiliarize with the principles of various imaging modalities (e.g. .US/CT/MRI ) & their applications in medicine.
- 3) Explain the biological hazards of ionizing radiation & protective measures.
- 4) Explain the normal Anatomy, Physiology of various organs and their deviation from normal) & its consequences.
- 5} Summarize the fundamental aspects of embryology & alteration in development with reference to congenital anomalies.
- 6) Select appropriate imaging modality for- study of specific condition.
- 7) Explain .the role of imaging, pre-operative, intra-operative & post-operative Conditions.
- 8) Evaluate role of imaging modalities in various therapeutic applications (Interventional Radiology)
- 9) Update information about recent advances in imaging sciences.
- 10) Effectively organize & supervise the diagnostic proceduces to ensure quality control/assurances

### **b) Skills:-**

At the end of the course the student shall be able to :

- 1) Make use of conventional & other imaging sciences to achieve definitive diagnosis. .
- 2) Analyse & interpret imaging data.
- 3) Demonstrate the skills of solving Scientific & clinical problems & decision making.
- 4) Develop skills as a self:-directed learner recognize cointinuing educational needs, select & use appropriate learning resources.
- 5) Demonstrate Comperence in basic concepts of research methodology & be able to critically analyse relevant literature. .

### **c) Integration-**

Knowledge acquired in Radio diagnosis shall help the students to integrate imaging techniques with structure & function of the human body in health & disease.

M.D. & D.M.R.D. (RADIODIAGNOSIS)  
PAPER –I

Radiation Physics. Protective measures & Physics involving imaging techniques and related basic sciences e.g. Anatomy. Physiology and Pathology.

**TOPICS.**

- 1) Radiations and production of X-rays
- 2) X-ray generators
- 3] Basic interactions between X-Rays and matter
- 4] Attenuation.
- 5] Filters and grids.
- 6] Luminescent screens.
- 7] Physical and Photographic characteristics of X-ray film & film processing
- 8] Fluoroscopic imaging -viewing and recording.
- 9] Radiographic image and its geometry.
- 10] Body section radiography.
- 11 ] Steroscopy.
- 12] Xeroradiography.
- 13] Computed tomography.
- 14] Ultrasound.
- 15] Radiation's hazards and protection.
- 16] Digital Radiography.
- 17] Nuclear magnetic resonance.
- 18] Magnetic resonance imaging.
- 19] Wet processing of films -Chemistry of Developer, fixer etc, .
- 20] Dry processing – chemistry of films & its processing.

**M.D..(RADIO-DIAGNOSIS)**  
**PAPER- II**

**Radiological Imaging in congenital & systemic diseases- I**

- a) Respiratory system: Congenital anomalies, Pediatric chest, Chest wall, pleura, diaphragm, Mediastinum, Pulmonary infections, Airway obstruction, Pulmonary neoplasms, Diffuse pulmonary diseases.
- b) Cardio-vascular system: Congenital heart Disease's, left-to-right shunts Cyanotic heart diseases, Acquired valvular heart diseases, Ischemic heart disease, Pulmonary circulation, cardiomyopathy, cardiac tumors, Pericardium, thoracic aorta.
- c) Gastro Intestinal Tract: Oesophagus, Stomach, Duodenum, Small intestine large bowel, mesentery & omentum, Pediatric abdomen.
- d) Hepato-biliary: Liver, Biliary tract, Pancreas.

# M.D. ( RADIO-DIAGNOSIS)

## PAPER-III

### Radiological Imaging in congenital & systemic diseases-II

- a) Skeletal system: Skeletal trauma benign lesions, malignant lesions, Myeloproliferative & similar disorders, metabolic and endocrine diseases, skeletal dysplasias and malformation syndromes, joint disease, bone and joint infection, radiology of soft tissues, musculo-skeletal system in children.
- b) Genito-urinary system: Renal parenchymal diseases, Renal masses. Calculus disease and urinary obstruction, urinary bladder and prostate, Renal-vascular disorders, injuries, Renal failure and transplantation, pediatric uroradiology Imaging in obstetrics and gynecology, imaging of breast.
- c) CNS: Skull, Intra-cranial tumors, Intra-cranial infections, Cerebro-vascular disease, cranial and intracranial malformations trauma, CSF disturbances, degenerative diseases of spine infections of spine, spinal tumours.

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# M.D. ( RADIO-DIAGNOSIS)

## PAPER-IV

Miscellaneous, Radiological procedures, Interventional Radiology, .Recent advances and newer techniques.

- Orbit, ENT, Dental, Reticule-endothelial system, Oncology, HIV infection and AIDS,

- Arteriography, venography.....etc.



## **D.M. R. D.**

**PAPER I : Radiation Physics, Protective measures and Physics involving imaging techniques.**

Same as M.D.

**PAPER II : Radiological imaging in congenital and systemic diseases. ( Respiratory system, Cardio Vascular System, Gastro Intestinal Tract, Skeletal system Genito Urinary System).**

**PAPER III : Hepato-biliary system, CNS, Miscellaneous, Radiological procedures and Interventional procedures & Interventional Radiology.**

## **PRACTICAL EXAMINATION :**

*(As per Direction No. 01/2008 dtd. 26/05/2008)*

### **SYLLA BUS/COURSE CONTENT**

#### **MD/DMRD**

#### **A. BASIC RADIOLOGY**

##### **I. IMAGING TECHNIQUES AND MODALITIES**

- 1.1.1 Department Organization: Digital Imaging and PACS:
- 1.1.2 Digital imaging and PACS: Picture Reliving and Communication System
- 1.1.3 Digital Imaging and PACS: what should a radiologist expect from PACS
- 1.1.4 Digital Imaging and PACS: Image processing in Computed Radiography
- 1.2 Intravascular Contrast Media
- 1.3 Whole body Computed Tomography: Recent Advances
- 1.4 Magnetic Resonance Imaging Basic Principles
- 1.5 Ultrasound : general Principles
- 1.6 Radionuclide imaging
  - 1.6.1 Radionuclide imaging: General Principles
  - 1.6.2 Radionuclide imaging: Pediatric Nuclear Medicine
- 1.7 Dual Energy X-ray Absorptiometry
- 1.8 Functional and Physiological Imaging
- 1.9 Medicolegal issues in Diagnostic Radiology
- 1.10 Radiation Protection and patient doses in diagnostic radiology

#### **II. RESPIRATORY SYSTEM :**

##### **1.1 Techniques of Investigations**

- 1.1.1 Standard Techniques
- 1.1.2 Tomography: a) Conventional film Tomography
  - b) Computed Tomography
- 1.1.3 Digital Radiography
- 1.1.4 Magnetic Resonance Imaging
- 1.1.5 Radionuclide Imaging
  - a) Ventilation
  - b) Other thoracic scanning techniques

1.1.6 Bronchography

1.1.7 Ultrasound

1.1.8 Angiography

1.1.9 Lung Biopsy & Other Interventional Techniques.

## 1.2 Normal Chest:

1.2.1 The Lungs (Radiological Anatomy) & CT Terminology)

1.2.2 The Central Airways

1.2.3 The Lungs beyond Hila

1.2.4 The Hila

1.2.5 The Mediastinum : a) CT & MRI

b) Plain film appearances

i) The junctional lines :

ii) The right Mediastinum above azygous vein

iii) The left Mediastinum above Aortic arch

vi) The supra aortic Mediastinum on lateral view

v) The right Middle Mediastinum border below azygous arch.

vi) The left cardiac border below aortic arch

vii) The para spinal lines

viii) The retrosternal line

1.2.6 The Diaphragm

## 1.3 Interpretation the Chest Radiograph :

1.3.1 Identification of the Radiograph

1.3.2 Technical Consideration

1.3.3 Detection and Description of abnormalities: .i) Silhouette Sign

ii) Alterations

iii) Consolidation

iv) Collapse

v) Nodular Opacities

vi) Ring Opacities

vii) Linear/ Interstitial/ Pleural, /Chest Wall

Opacities.

viii) Abnormal Transradiancy

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## 1.4 The Chest Wall, Pleura & Diaphragm

### 1.4.1 Chest Wall :

- i) Soft tissue /Breasts
- ii) Ribs /Sternum/Clavicle, Spine

### 1.4.2 The Pleura :

- i) Normal Pleura
- ii) Pleural Pathologies

### 1.4.3 The Diaphragm :

- i) Height/ Eventration/Movements/Paralysis
- ii) Hernias/Trauma/Neoplasm

## 1.5 The Mediastinum :

### 1.5.1 Techniques .

- 1.5.2 Mediastinal Masses:
- i) Thyroid/ Para Thyroid Masses/Thymic tumors/Tymic hyperplasia/Teratoma/ Germcell Tumor.
  - ii) Mediastinal lymphadenopathy
  - iii) Neurogenic Tumors
  - iv) Extra medullar hematopoiesis/Mesenchymal tumors/ Herniation of / Mediastinal lipomatosis/ Aneuryum

### 1.5.3 Differential Diagnosis:

- 1.5.4 Other Mediastinal Lesions: i) Acute/ fibrosing Mediastinitis

## 1.6 Pulmonary Infections in Adults .

### 1.6.1 Pneumonia

### 1.6.2 Associated features and complications of pneumonia

### 1.6.3 Pulmonary tuberculosis

### 1.6.4 HIV & AIDS

## 1.7 Large Airway Obstruction :

- 1.7.1 Collapse: General features /Collapse of individual lobes / entire lung/ segmental collapse/  
Rounded /obstructive collapse

### 1.7.2 Obstructive Pneumonitis/ Bronchoscope/Bronchiectasis

**1.8 Pulmonary lobar Collapse essential considerations :**

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**1.9 Chronic airflow Obstruction :**

1.9.1 Asthma:

1.9.2 Chronic Bronchitis and Emphysema

1.9.3 Bronchiolitis

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**2.0 Pulmonary Neoplasms :**

2.0.1 Bronchial Carcinomas

2.0.2 Benign Pulmonary Tumors

2.0.3 Malignant Lymphoma

2.0.4 Metastases

2.8

2.0.5 The solitary Pulmonary Nodule

**2.1 Diffuse Pulmonary Disease / Industrial Lung Disease / HRCT :**

2.1.1 Pulmonary Oedema :

2.1.2 Diffuse pulmonary Haemorrhage

2.1.3 Inhalation of particulate matter

2.1.4 Diffuse pulmonary Fibrosis

II

2.1.5 Sarcoidosis / Collagen Vascular Disease / Systemic Vasculitis / Lymphoid Disorders of Lungs / Pulmonary Eosinophilia / Drug induced Lung Disease

**2.2 Chest Trauma :**

**2.3 Pulmonary Thromboembolism :**

2.3.1 Imaging Chest Radiograph/ Radionuclide Study / Pulmonary Arteriography/ CT / MRI

**2.4 Post Operative & Critically ill Patients :**

2.4.1 Cardiopulmonary Disease

2.4.2 Post Thoracotomy Radiograph

2.4.3 Support and Monitoring apparatus

2.4.4 Radiation Therapy

**2.5 Chest Radiography after Lung Transplantation :**

## **26 Congenital Pulmonary Anomalies :**

- 2.6.1 Abnormal Development of Lung Bud
- 2.6.2 Abnormalities of separation of the lung bud from the foregut
- 2.6.3 Abnormalities of Pulmonary Vasculature
- 2.6.4 Ectopic or Hamartomatous Development

## **2.7 The Infant and Young Child :**

- 2.7.1 Pathologies of Diaphragm
- 2.7.2 Pleural Abnormalities
- 2.7.3 Inflammation
- 2.7.4 Airway Obstruction
- 2.7.5 Diffuse Lung Disease .
- 2.7.6 Respiratory Distress in Newborn Baby

## **2.8 Interventional Techniques in Thorax:**

- 2.8.1 Biopsy Procedures
- 2.8.2 Thoracic Drainage Procedure
- 2.8.3 Thoracic Sympathectomy
- 2.8.4 Therapeutic Embolisation
- 2.8.5 Dilatation & Stenting Techniques
- 2.8.6 Extraction Techniques.

## **III. THE HEART AND GREAT VESSELS**

### **3.1 Cardiac Anatomy and Enlargement- :**

- 3.1.1 Plain Radiography
- 3.1.2 Enlargement of various chambers on Plain Radiography

### **3.2 Echo Cardiography including Doppler .**

### **3.3 Nuclear Cardiology:**

### **3.4 Digital Imaging of Cardiovascular System .**

### **3.5 Magnetic Resonance of Heart and Circulation .**

### **3.6 Congenital Heart Disease :**

- 3.6.1 General Principles
- 3.6.2 Left to right shunts .
- 3.6.3 Central Sinuses
- 3.6.4 Other Congenital Heart Disease

3.7 Acquired Heart Disease: i) Non Rheumatic/ Rheumatic Mitral VD  
ii) Tricuspid VD  
iii) Aortic VD

3.8 Ischaemic Heart Disease : i) Coronary Atreriography  
ii) Left Ventriculography  
iii) Angina Pectoris  
iv) Myocardial Infarction  
v) Mechanical Complication of MI

3.9 Pulmonary Circulation : i) Anatomy and Physiology  
ii) Pulmonary Vascularity in Heart Disease  
iii) Pulmonary Arterial hypertension/ Its Imaging  
iv) MR in Pulmonary Vascular Abnormalities .

3.10 Cardiomyopathy, Cardio Tumors, Trauma :

3.11 The Imaging of Prosthetic Cardiac Valves :

3.12 The pericardium :

3.13 Thoracic Aorta :

3.14 Interventional Procedures and Heart Disease :

#### IV. THE GASTROINTESTINAL TRACT:

4.1 The Abdomen: Plain Radiographic findings In acute abdomen

- 4.1.1 Normal appearances
- 4.1.2 Abdominal Calcification/Dilatation of bowel/Pneumoperitoneum
- 4.1.3 The Post Operative Abdomen
- 4.1.4 Inflammatory Conditions

## **4.2 The Esophagus**

- 4.2.1 Anatomy and Functions
- 4.2.2 Methods of Examination
- 4.2.3 Pathologies of Esophagus
- 4.2.4 Motility Disorders
- 4.2.5 Extrinsic lesions/ miscellaneous conditions

## **1.3 The stomach**

- 4.3.1 Radiological anatomy and methods of examination
- 4.3.2 Inflammatory Diseases
- 4.3.3 Neoplastic Conditions
- 4.4.4 Radionuclide Studies in Stomach

## **4.4 The Duodenum**

- 4.4.1 Anatomy and Normal Appearances
- 4.4.2 Methods of Radiological Examination
- 4.4.3 Peptic ulceration
- 4.4.4 Gastro heterotopia /diverticula
- 4.4.5 Neoplasms benign and malignant

## **4.3 The Small Intestine**

- 4.5.1 Anatomy and normal appearances
- 4.5.2 Methods of radiological examination
- 4.5.3 Crohns disease/Cœliac Disease/Neoplasms/various conditions

## **6 The Large Bowel**

- 4.6.1 Anatomy and Normal Appearances
- 4.6.2 Methods of Radiological Examination
- 4.6.3 Tumors
- 4.6.4 Diverticular Disease
- 4.6.5 Colitis
- 4.6.6 Aids
- 4.6.7 Miscellaneous Conditions

## **4.7 Peritoneum, Mesentery and Omentum**

- 4.7.1 Peritoneal spaces and reflections
- 4.7.2 Abnormalities of Peritoneum
- 4.7.3 Abnormalities of Mesentery
- 4.7.4 Abnormalities of greater Omentum



#### **4.8 Gastrointestinal Angiography.**

4.8.1 General Consideration

4.8.2 Gastro intestinal bleeding

#### **4.9 Interventional Radiology in Gastrointestinal tract**

4.9.1 Introduction

4.9.2 Esophagus

4.9.3 Stomach and Duodenum

4.9.4 Small Intestine

4.9.5 Colon and Rectum

#### **4.10 Pediatric Gastrointestinal Radiology**

4.10.1 The Neonate

4.10.2 The Infant and Older Child

### **V. Liver, Biliary tract, Pancreas, Endocrine System and Lymphoma**

#### **5.1 The Liver**

5.1.1 Normal and variant Anatomy

5.1.2 Liver Imaging Techniques

5.1.3 Diffuse Disease

5.1.4 Focal Disease

5.1.5 Intervention

#### **5.2 The Biliary Tract**

5.2.1 Anatomic Consideration

5.2.2 Methods of investigation

5.2.3 Biliary Disorders

#### **5.3 Interventional Techniques Hepatobiliary System**

5.3.1 Liver Biopsy

5.3.2 Biliary Obstruction

5.3.3 Malignant Biliary Obstruction

5.3.4 Percutaneous Cholangiography and Biliary Drainage Procedures

5.3.5 Vascular Interventional Techniques in Hepatobiliary System

#### **5.4 Radiology of Liver Transplantation**

5.4.1 Indications

5.4.2 Pre Transplant Assessment

5.4.3 Radiological Procedures before Transplantation

5.4.4 Post Transplantation Monitoring and Complications

## **5.5 The Pancreas**

- 5.5.1 Embryology and Anatomy
- 5.5.2 Congenital Anomalies
- 5.5.3 Multisystem Diseases with Pancreatic involvement
- 5.5.4 Pancreatitis
- 5.5.5 Pancreatic Neoplasms
- 5.5.6 Trauma
- 5.5.7 Interventional Radiology in Pancreas

## **5.6 Imaging of the Endocrine System :**

- 5.6.1 Hypothalamic-Pituitary Axis
- 5.6.2 Pineal Gland
- 5.6.3 Thyroid Gland
- 5.6.4 Parathyroid Gland
- 5.6.5 Pancreatic & Gastrointestinal Endocrine Disorders
- 5.6.6 Carcinoid Tumors
- 5.6.7 Adrenal Glands
- 5.6.8 Female Reproductive System
- 5.6.9 Male Reproductive System

## **5.7 Reticuloendothelial Disorders : Lymphoma**

- 5.7.1 Epidemiology
- 5.7.2 Histopathological Classification
- 5.7.3 Staging Investigation and Management
- 5.7.4 Extranodal Manifestation of Lymphoma
- 5.7.5 Monitoring response to therapy

## **5.8 Reticuloendothelial Disorders: The Spleen**

- 5.8.1 Imaging Techniques
- 5.8.2 Normal Anatomy
- 5.8.3 Splenomegaly
- 5.8.4 Benign Mass Lesions
- 5.8.5 Malignant Mass Lesions
- 5.8.6 Splenic Trauma

## **5.9 Paediatrics Liver Biliary Tract and Spleen :**

5.9.1 Techniques

5.9.2 Approach

5.9.3 Liver

5.9.4 Biliary Disease

5.9.5 Spleen

## **5.10 Paediatrics Endocrine and Bone Density Imaging :**

5.10.1 Ultrasound

5.10.2 Nuclear Medicine

5.10.3. Magnetic resonance Imaging

5.10.4 Bone Densitometry in Children

## **5.11 Neuroblastoma :**

## **VI Genito Urinary Tract :**

**6.1 Methods of Investigation :**

**6.2 Radionuclide Imaging in Genito Urinary Tract :**

**6.3 Urodynamics**

**6.4 Reno Vascular Disease:**

6.4.1 Renal Arteriography

6.4.2 Vascular Abnormalities

6.4.3 Radiological Management of Reno Vascular Disease

**6.5 Renal Parenchymal Disease**

6.5.1 Normal Appearance

6.5.2 Renal Parenchymal Disease

6.5.3 Parasitic Infections

**6.6 Renal Masses :**

6.6.1 Methods of Analysis

6.6.2 Pathological Renal Masses

6.6.3 Neoplastic Renal Masses

**6.7 Calculus Disease & Urothelial Lesions**

6.7.1 Calculus Disease

6.7.2 Nephrocalcinosis

6.7.3 Urothelial Tumors

## **6.8 Urinary Obstruction:**

6.8.1 Pathophysiology

6.8.2 Causes of Obstruction

## **6.9 Radiological Evaluation of Urinary Bladder, Prostate & Urethra :**

## **6.10 Injuries to the Genito Urinary Tract :**

## **6.11 Renal Failure and Transplantation :**

## **6.12 Interventional Uroradiology :**

## **6.13 Imaging of the Kidneys & Urinary Tract in Children**

6.13.1 Embryology

6.13.2 Techniques .

6.13.3 Interventional Procedure "

## **6.14 Imaging of Paediatric Pelvis :**

6.14.1 Imaging Techniques ;

6.14.2 Normal Anatomy

6.14.3 Congenital Anomalies

6.14.4 Pelvis Masses

6.14.5 Scrotal Disease

## **VII Skeletal System :**

### **7.1 Skeletal Trauma**

### **7.2 Bone Tumors : General Characteristics & Benign Lesions**

### **7.3 Bone Tumors : Malignant Lesions**

### **7.4 Myeloproliferative and Similar Disorders**

7.4.1 Generalised/Localised Decreased in Bone Density

7.4.2 Generalised/Localised Increased in Bone Density

7.4.3 Delayed Skeletal Maturity

### **7.5 Metabolic and Endocrine Disease of the Skeletal**

### **7.6 Skeletal Dysplasias and Malformation Syndrome**

### **7.7 Joints Diseases :**

7.7.1 Rheumatoid Arthritis

7.7.2 Other Connective Tissue Disease

7.7.3 Crystal Deposition Arthropathy

7.7.4 Degenerative Joint Disorders/Degenerative spine

7.7.5 Arthrography/ HPOA/ Pachy Dermoperiostitis

**7.8 Bone and Soft tissue Infection :**

**7.9 Imaging of Soft tissue :**

**7.10 Bone Tumors in Children :**

7.10.1 Imaging approach

7.10.2 Benign Bone Tumors

7.10.3 Malignant Bone Tumors

**7.11 The Radiology of Non Accidental Injury in Children :**

**7.12 Paediatric Musculo -Skeletal Trauma**

**7.13 Radiology of Arthritides in Children**

**7.14 Radiology of Soft tissue in Children**

**7.15 Bone and Soft tissue infection in Children.**

**VIII. The Reproductive System :**

**8.1 Ultrasound in Obstetrics and Gynaecology**

8.1.1 Indication

8.1.2 Instrumentation in US Techniques

8.1.3 Gynecological infertility

8.1.4 Assessing Tubal Patency

**8.2 Imaging in Gynaecology**

**8.3 Hysterosalpingography**

**8.4 The Breast & its Imaging**

**8.5 Breast Cancer**

**8.6 Male Reproductive System**

**IX Central Nerve System :**

**9.1 Skull and Brain : Methods of Examination and Anatomy**

**9.2 Cranial and Intracranial Pathology : Tumors in Adults**

**9.3 Cranial and Intracranial Pathology : Cerebro Vascular Disease and Non Traumatic  
Intracranial Haemorrhage**

**9.4 Cranial and Intracranial Pathology : Infections, AIDS, Demyelinating and Metabolic  
Disease**

**9.5 Cranial and intracranial Pathology : Trauma, Bone Pathology, CSF: Disturbances,  
Epilepsy**

**9.6 Spine: Method of Investigation**

**9.7 Imaging of Spinal Pathology**

**9.8 Scoliosis in Children**

**9.9 Neonatal Head and Spine Sonography**

**9.10 Neurology in Children**

**X. The Orbit; ENT; Face; Teeth:**

**10.1. The Orbit**

10.1.1 Anatomy / Techniques

10.1.2 Intraocular Abnormalities

10.1.3 Lacrimal Gland Tumors

10.1.4 Muscular Tumors

10.1.5 Intra/Extra Canal Tumors

**10.2 Ear, Nose and Throat Radiology**

10.2.1 The Ear

10.2.2 Nose and Paranasal Sinuses

10.2.3 Pharynx

**10.3. Maxillofacial Radiology**

10.3.1 Fractures of Maxilla

10.3.2 TM Joint

10.3.3 Salivary Glands

**10.4. Dental Radiology**

**10.5. Pediatrics, Eye & Orbit :**

10.5.1 Imaging Techniques

10.5.2 Child with Proptosis or an Orbital mass

10.5.3 Child with Orbital Infection

10.5.4 Child with White Eye

10.5.5 Child with Development Abnormalities

**10.6. Paediatric ENT Imaging**

**B. RADIOLOGICAL PHYSICS & X-RAY TECHNOLOGY:**

1. Radiation :
2. Production of X -Rays :
3. X- Ray Generators :
4. Basic Interaction between X- Rays and Matter :
5. Attenuation:
6. Filters :
7. X- Ray beam restrictors :
8. Physical characteristics of x- Ray films & film Processing :
9. Photographic characteristics of X- Ray films :
10. Fluroscopic imaging and image intensifier
11. Viewing & recording of the Fluroscopic Image :
12. The Radiographic Image :
13. Geometry of the Radiographic Image :
14. Body section Radiography:
15. Stereoscopy:
16. Xero - Radiography :
17. Computed Tomography:
18. Ultrasound
19. Digital Radiography:
20. Nuclear Magnetic Resonance:
21. Magnetic Resonance Imaging :
22. Radiation hazards & Protection :
23. Electric & Protection :
24. Cine Angiography:
25. Atomic structure, Radioactive Isotopes & Gamma Camera :
26. Positron Emission Tomography:
27. Digital Subtraction Angiography:
28. Catheters, guides wires, dilators, balloons & stents:
29. Pictorial Achieving & Communicating System (PACS) :
30. DICOM :

C. DARK ROOM TECHNIQUES

1. Layout of Ideal Dark Room: maintenance and its accessories :
2. Developer: ingredients & their action :
3. Developer: exhaustion & methods of determination :
4. Replenisher & rapid development :
5. Fixer: ingredients & their action :
6. Fixer: exhaustion & methods of determination :
7. Effect of temp on standard development/fixing time & methods to maintain it. :
8. Tropical processing
9. Intensifying screens /construction, types and advantages :
10. Rare earth intensifying screens :
11. Intensification factor :
12. Cassette: construction & care
13. Factors affecting image details :
14. Factors affecting image contrast & density :
15. Grids : construction & types
16. Cones & collimeter :
17. X Ray films -construction, types & storage :
18. Film faults in dark room & their prèvention: .
19. Film fog :
20. Hangers: .
21. Safe light :
22. Automatic developing unit :
23. Day light loading and unloading of films :



## LIST OF TEXTBOOKS AND REFERENCE BOOKS

### FOR RADIOLOGICAL DIAGNOSIS (MD/DMRD)

1. Textbook of Radiology and Medical Imaging by David Sutton (international students edition) 7<sup>th</sup> ed., Churchill Livingstone.
2. Grainger & Allison's Diagnostic Radiology: A Textbook of Medical Imaging. 4<sup>th</sup> Ed., 2001 Churchill Livingstone, Inc.
3. Davidson's Radiology of the Kidney and Genitourinary Tract, 3rd Ed. WB Saunders 1999.
4. Diagnostic Ultrasound, 2nd edition, by Carol M. Rumack, Stephanie R Wilson J. William Charboneau Mosby Inc.
5. Magnetic Resonance Imaging, 3rd Ed., Stark, David; William, Bradley, Chapt 30. 1919, Mosby
6. Computed Body Tomography with MRI Correlation, 3rd edition Joseph K T. Lee Stuart S. Sagel, et al, Lippincott Williams & Wilkins.
7. Textbook of Nuclear Medicine, Wilson MA Philadelphia Lippincott-Raven Publishers
8. Pediatric Body CT. Marilyn J. Stegle Lippincott Williams, & Williams 1999
9. Essential physics for Radiographers by Chesney Blackwell Scientific Publications Melbourne
10. Positioning in radiography by K. C. Clark Iford limited William Heinemann Medical books Ltd, London.
11. Radiology of Bone diseases by Greenfield, Lippincott company, Philadelphia and Toronto
12. Analysis of Roentgen sing by Meshan wilsaunders Company.
13. Christenson Curry Basics of Radio- physics
14. Chest Roentgenology by Benjamin Felson, WB Saunders Company
15. Diagnosis of Diseases of chest by Fraser Pare's WB Saunders Company
16. Margulis and Burhenne's Alimentary tract Radiology by Frenny and Stevenson, Mosby.
17. Abdominal and General Ultrasound by Davifd Codgrove, Churchill Livingstone.
18. Ultrasonography in Obstetrics and Gynecology by Callen, , WB Saunders.
19. Abdominal-pelvic MRI by Richard C Semelka Wiley-liss Publishers

20. Head and Neck imaging by Petersom, Mosby .
21. Caffey's Paediatric Diagnostic Imaging, Mosby.
22. Interventional Radiology procedure Manual. by MA Braun, Churchill Livingstone.
23. CT and MRI Imaging of whole Body by John Hagg, Mosby..
24. Neuroimaging by William W Orrison, WB Saunder's
25. Annie Osborn's neuroradiology.
- 26 Breast Imaging by Gilda Cardenosa, Lippincott Willams and Wilkins.
27. MR Imaging of Brain and Spine by scott W. Atlas, Lippincott Williams and Wilkins.
28. Musculoskeletal ultrasound by Marnix T. Van Holsbeeck.
29. Palmer Manual of Diagnosta ultrasound.
30. An Atlas of Signs in Radiology by Eisenberg
31. Clinical application of Doppler ultrasound by K. Taylor, Lippincott Raven.
32. Dunnick's Textbook of Uroradiology Willams & Wilkins, Baltimore.
33. Kirk's Practical Pediatric Imaging. Lippincott Raven Publishers  
(Lippincott Williams & Wilkins).

**LIST OF JOURNALS FOR RADIODIAGNOSIS**  
**(MD/DMRD)**

1. Indian Journal of Radiology and Imaging.
2. British Journal of Radiology and Imaging.
3. American Journals of Roentgenology.
4. American Journals of Neuroradiology.
5. Scandinavian Journal of Radiology and Imaging.
6. Canadian Journal of Radiology.
7. Radiologic Clinics of North America.
8. Medical Imaging International Journal.
9. Asia Pacific Journal of Radiology.
10. ACTA-American Journal of Radiology.
11. Radiology Rounds.

## MGM INSTITUTE OF HEALTH SCIENCES, NAVI MUMBAI

### MARKLIST FOR PRACTICAL AND VIVA-VOCE EXAMINATION

EXAM CENTRE: \_\_\_\_\_ COURSE / EXAM : PG –

DATE OF EXAMINATION: \_\_\_\_\_ EXAMINATION FOR: M.D. (RADIO DIAGNOSIS)

Seat No	Long Case	Short case		Spots (40x2 marks)	Film reading	Clinical Total	Table Viva/ equipments	Dissertation Viva	Viva Total	Final Total
	80 Marks	40 Marks	40 Marks							

NAME OF EXAMINER	COLLEGE	SIGNATURE WITH DATE
1.		
2.		
3.		
4.		

## IN PURSUIT OF EXCELLENCE

### MGM DEEMED UNIVERSITY OF HEALTH SCIENCES

#### Constituent Colleges

#### Navi Mumbai

M.G.M. Medical College  
M.G.M School of Biomedical Science  
M.G.M School of Physiotherapy  
M.G.M New Bombay College of Nursing  
M.G.M College of Nursing

#### Aurangabad

M.G.M. Medical College  
M.G.M School of Biomedical Science  
M.G.M School of Physiotherapy  
M.G.M College of Nursing



**MAHATMA GANDHI MISSION**

### AURANGABAD

- MGM's Jawaharlal Nehru Engineering College
- MGM's Institute of Management
- MGM's Mother Teresa College of Nursing
- MGM's Mother Teresa Institute of Nursing Education
- MGM's College of Journalism & Media Science
- MGM's Medical Center & Research Institute
- MGM's College of Fine Arts
- MGM's Dr. D. Y. Pathnikar College of Comp. Sc. & Tech.
- MGM's Hospital & Research Center
- MGM's College of Agricultural Bio-Technology
- MGM's Dept. of Bio-Technology & Bio-informatics.
- MGM's Inst. of Hotel Management & Catering Tech.
- MGM's Institute of Indian & foreign Languages & Comm.
- MGM's College of Physiotherapy
- MGM's Hospital, Ajabnagar
- MGM's Sangeet Academy (Mahagami)
- MGM's Institute Naturopathy & Yoga
- MGM's Sports Club & Stadium
- MGM's Institute of Vocational Courses
- MGM's Horticulture
- MGM's Health Care Management
- MGM's Junior College of Education (Eng. & Mar.)
- MGM's Sanskar Vidyalaya (Pri. & Sec. - Mar.)
- MGM's Clover Dale School (Pri. & Sec. - Eng.)
- MGM's First Steps School (Pre-Primary - English)
- MGM's Sanskar Vidyalaya (Pre-Primary - Marathi)
- MGM's School of Biomedical Sciences

### NAVI MUMBAI

- MGM's College of Engineering & Technology
- MGM's Institute of Management Studies & Research
- MGM's Dental College & Hospital
- MGM's College of Physiotherapy
- MGM's College of Media Science
- MGM's Institute of Research
- MGM's New Bombay Hospital, Vashi
- MGM's Hospital, CBD
- MGM's Hospital, Kamothe
- MGM's Hospital, Kalamboli
- MGM's Infotech & Research Centre
- MGM's Pre-Primary School (English & Marathi)
- MGM's Primary & Secondary School (Eng. & Mar.)
- MGM's Junior College Science
- MGM's Junior College of Vocational Courses
- MGM's Florence Nightingale Inst. Nursing Edu.
- MGM's College of Nursing
- MGM's College of Law

### NANDED

- MGM's College of Engineering
- MGM's College of Fine Arts
- MGM's College of Computer Science
- MGM's College of Journalism & Media Science
- MGM's Centre for Astronomy & Space Tech.
- MGM's College of Library & Information Science

### PARBHANI

- MGM's College of Computer Science

### NOIDA (U.P.)

- MGM's College of Engineering & Technology



MGM University of Health Sciences  
(Education - Health Services - Research)  
A Mission started, nurtured and Managed  
by Professional Doctors, Scientists Engineers...



**MGM INSTITUTE OF HEALTH SCIENCES**

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



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Website: [www.mgmuhs.com](http://www.mgmuhs.com)

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

**Resolution No. 5.25:** Resolved to institute 6 monthly progress Report for PG Students of all Courses from the batches admitted in 2016-17. [Annexure-XVII of BOM-48/2017]



**Mahatma Gandhi Mission's Medical College and Hospital  
Navi Mumbai**

**Six monthly Progress Report for Postgraduate Students**

**PART A**

Name of the PG student: \_\_\_\_\_

Department: \_\_\_\_\_

Admitted in (Month and Year): \_\_\_\_\_

Name of the PG guide: \_\_\_\_\_

Report for the period: \_\_\_\_\_ to \_\_\_\_\_

Attendance: \_\_\_\_\_ days ( \_\_\_\_\_ %)

**PART B**

**Grading as per performance**

Grade	Percentage
A	80% and above
B	65% to 79%
C	50% to 64%
D	Below 50%

1. OPD work:
2. Ward work:
3. Lab work:
4. OT work:
5. ICU work:
6. Teaching assignments:



**PART C**

**Progress of Thesis**

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**PART D**

*Activities from serial No. 1 to 5 should be rated on a scale of 0 to 10.*

**1. Case Presentations**

Sr. No.	Topic	Date	Guide	Marks

**2. Microteaching**

Sr. No.	Topic	Date	Guide	Marks

**3. Recent Advances**

Sr. No.	Topic	Date	Guide	Marks

#### 4. Seminars

Sr. No.	Topic	Date	Guide	Marks

#### 5. Journal Clubs

Sr. No.	Journal	Title of Paper	Date	Guide	Marks

#### 6. Marks obtained in tests

Sr. No.	Date	Theory / Practical	Marks obtained

#### 7. Any other academic activity conducted:

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**PART E**

**1. Papers presented**

Sr. No.	Title of Paper	Authors	Event	Date

**2. Posters presented**

Sr. No.	Title of Poster	Authors	Event	Date

**3. Publications**

*(Note: Mention only those publications that are published or are accepted for publication during the said period only)*

Sr. No.	Title of Paper	Authors	Journal	Year/Vol/ Issue	Page Nos	Indexed/ Non-Indexed	Status

**Certificate by the PG Guide**

This is to certify that Dr. \_\_\_\_\_, has an attendance of \_\_\_\_\_% , during the period \_\_\_\_\_ to \_\_\_\_\_. His /Her performance during the said period has been **satisfactory/ average / unsatisfactory**.

**Overall Grading:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Name and Signature of PG guide:**

---

**Certificate by the Head of Department**

This is to certify that the performance of Dr. \_\_\_\_\_, during the period \_\_\_\_\_ to \_\_\_\_\_, has been **satisfactory/ average / unsatisfactory**.

**Overall Grading:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Name and Signature of HOD:**

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**Final Remarks**

**Satisfactory / Average / Unsatisfactory**

**Director (Academics)**

**Dean**

**Date:**

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**Resolution No. 1.3.7.11 (i) of BOM-51/2017:** Resolved that the following Bioethics topics in PG Curriculum are to be included for PG students of all specialization and a sensitization of these topics can be done during PG Induction programme:

- Concept of Autonomy
- Informed Consent
- Confidentiality
- Communication Skills
- Patient rights
- Withholding / Withdrawing life-saving treatment
- Palliative Care
- Issues related to Organ Transplantation
- Surgical Research and Surgical Innovation
- Hospital Ethics Committee
- Doctor-Patient relationship

Resolution No. 1.3.23 of BOM-51/2017: Resolved to implement a Structured Induction programme (07 days) for PG students. [Annexure-XLIV]

MGM INSTITUTE OF HEALTH SCIENCES  
Navi Mumbai

Induction Program for newly admitted Postgraduate students

Day 1	<ul style="list-style-type: none"><li>• Address by Dean, Medical Suptd, Director (Academics)</li><li>• Pre-test</li><li>• Communication Skills</li><li>• Universal Safety Precautions</li><li>• Biomedical Waste Management</li><li>• Infection Control Policy</li></ul>
Day 2	<ul style="list-style-type: none"><li>• Emergency services</li><li>• Laboratory services</li><li>• Blood Bank services</li><li>• Medicolegal issues</li><li>• Prescription writing</li><li>• Adverse Drug Reaction</li><li>• Handling surgical specimens</li></ul>
Day 3	<ul style="list-style-type: none"><li>• Principles of Ethics</li><li>• Professionalism</li><li>• Research Ethics</li><li>• Informed Consent</li><li>• Confidentiality</li><li>• Doctor-Patient relationship</li></ul>
Day 4	<ul style="list-style-type: none"><li>• Research Methodology</li></ul>
Day 5	<ul style="list-style-type: none"><li>• Synopsis writing</li></ul>
Day 6	<ul style="list-style-type: none"><li>• Dissertation writing</li><li>• Statistics</li></ul>
Day 7	<ul style="list-style-type: none"><li>• ATLS</li><li>• Post-test</li></ul>

The Induction Program will be conducted in the first week of June.

Timing: 9.30 am to 3.30 pm

(Prof. Dr. Siddharth P. Dubhashi)  
Director (Academics)

Resolution No. 3.8.2 of BOM-52/2018: It was resolved to have the following Allied posting for PG students:

**g) Radiology:**

**Mandatory postings:**

I. Obstetric OBGY	60 days
II. Emergency Medicine	60 days
III. General Medicine	30 days
IV. Surgery	30 days



**Resolution No. 4.5.4.2 of BOM-55/2018:** Resolved to have 10 short notes out of 11 (10 marks each) in all the papers in university examination for PG courses including superspeciality. To be implemented from batch appearing in April/May 2019 examination onwards for MD/MS/Diploma and August/September 2019 examination onwards for superspeciality.

**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 1<sup>st</sup> 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 1<sup>st</sup> formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

**Resolution No. 3.1.4.2 of BOM-57/2019:**

- i.** Resolved to include “Gender Sensitization” into UG (from new batch 2019-2020) and PG (from existing batches) curricula. [**Annexure-21**]
- ii.** Resolved to align the module of “Gender Sensitization” with MCI CBME pattern for MBBS students.
- iii.** Resolved that Dr. Swati Shiradkar, Prof., Dept. of OBGY., MGM Medical College, Aurangabad will coordinate this activity at both campuses.

## **Annexure - 21**

**Gender sensitization for UG (2<sup>nd</sup> , 3<sup>rd</sup> , 8<sup>th</sup> semesters) and PG (3 hours)**

### **INCLUSION OF “ GENDER SENSATIZATION” IN CURRICULUM**

#### **Introduction :**

The health care provider should have a healthy gender attitude, so that discrimination, stigmatization, bias while providing health care will be avoided. The health care provider should also be aware of certain medico legal issues related with sex & gender.

Society particularly youth & adolescents need medically accurate, culturally & agewise appropriate knowledge about sex, gender & sexuality. So we can train the trainers for the same. It is need of the hour to prevent sexual harassment & abuse .

To fulfill these objectives, some suggestions are there for approval of BOS.

#### **Outline**

- 1)For undergraduates :- Three sessions of two hours each, one in 2<sup>nd</sup> term, one in 3<sup>rd</sup> term & one in 8<sup>th</sup> term.
- 2)For Faculties and postgraduates :- One session of two hrs .
- 3)For those want to be trainers or interested for their ownself, value added course, which is optional about sex, gender, sexuality & related issues.

### **Responsibility**

ICC of MGM, MCHA , with necessary support from IQAC & respective departments.

### **Details of undergraduate sessions**

#### **1)First session in 2<sup>nd</sup> term**

**Aim** – To make Students aware about the concept of sexuality & gender.

To check accuracy of knowledge they have,

To make them comfortable with their own gender identify & related issues.

To make them aware about ICC & it is functioning.

**Mode** – Brain storming , Interactive power point presentation experience sharing.

**Duration** – Around two hours

**Evaluation** – Feedback from participants.

#### **2)Second session in 3<sup>rd</sup> / 4<sup>th</sup> term**

**Aim** – To ensure healthy gender attitude in these students as now they start interacting with patients.

To ensure that the maintain dignity privacy while interacting with patients and relatives, particularly gender related.

To make them aware about importance of confidentiality related with gender issues.

To encourage them to note gender related issues affecting health care & seek solutions.

Mode – focused group discussions on case studies, Role plays & discussion.

--3--

Duration – Around two hours.

Evaluation – Feedback from participants.

Third session in 8<sup>th</sup> term.

**Aim** – To understand effect of gender attitudes on health care in various subjects.

To develop healthy gender attitude while dealing with these issues.

**Mode** – Suggested PBL by departments individually. ( In collaboration with ICC till faculty sensitization is complete)

**Evaluation** – Feedback

\*\*\*\*

**FOR POSTGRADUATES**

Session of 2-3 hrs preferably in induction program.

**Aim** – To introduce medically accurate concept of gender, sex, gender role & sex role.

To ensure healthy gender attitude at workplace.

To understand gender associated concepts on health related issues & avoid such bias while providing health care.

To make them aware about ICC & its functioning.

**Mode** – Interactive PPT

Role plays & discussion

**Duration** – 2 to 3 hrs

**Evaluation** – Feedback.

**FOR FACULTIES**

Session of 2 hours may be during combined activities.

**Aim** – To ensure clarity of concept about gender & sex.

To discuss effect of these concepts on health-related issues.

To identify such gender & sex-related issues in individual subject specialties.

To discuss methodology like PBL for undergraduate students when they are in 7<sup>th</sup>-8<sup>th</sup> semester.

**Mode** – Role play

    Focused group discussion

    Case studies

**Evaluation** – Feedback.

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# 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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