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### 1. Name of Degree:

Doctor of Medicine in Radiology & Imaging / MD (Radiology & Imaging).

### 2. Course, pattern & Duration :

Residency programme of 5 years consisting of Phase A – 2 years (6 month, 6 month, 6 month and 6 month)

Phase B – 3 years (3rd, 4th & 5th year).

### 3. Eligibility:

MBBS or equivalent qualification registered with BMDC.

- 1 year in internship after passing MBBS or equivalent qualification registered with BMDC.

### 4. Selection :

- Selection of the candidate will be on central basis following the rules and regulations for selection for MD Residency course in BSMMU.

### 5. Residency Part A(Basic subjects& Rotational Training in parent and Respective Departments )

#### i. 6 months: Departmental Orientation

- a) Conventional X-ray techniques
- b) Contrast studies
- c) Patient management regarding various imaging modalities.
- d) Radiological anatomy.

**ii. 6 months: Clinical orientation with placement in different specialties**

- a) Internal Medicine 15 days
- b) Paediatric 15 days
- c) Neuromedicine 15 days.
- d) General surgery 15 days
- e) Hepatobiliary surgery 15 days
- f) Nurosurgery 15 days.
- g) Otolaryngology 15 days
- h) Urology 15 days.
- i) Emergency 15 days
- j) Orthopedic 15 days.
- k) Obs and Gynae 15 days
- l) Nuclear Medicine 15 days.

**iii. 6 months**

- a) Radiological physics X- ray, CT, USG, MRI & Nuclear Imaging.
- b) Radiography

**iv. 6 months ( Theoretical classes will be arranged by negotiation with respective departments)**

- a) Radiological Anatomy
- b) Bio- statistics.

**6. Residency phase B ( 3rd, 4th & 5th year)**

Successful candidate in part A examination will be eligible to enter into the residency programme phase B and structured course for final part of MD (Radiology & Imaging).

This part comprises of core theory of Radiology, Practical, Departmental seminars, Case presentation, Journal club, Research on specific topic and thesis paper and at least two publication in recognized Journals.

**7. Log Book:**

Log book will be maintained throughout the long 5 years to monitor the course and for assessment.

**8. Monitoring and Evaluation:**

- a) Residency programme will be monitored and evaluated by Log Book throughout the course
- b) University examination on Radiological Physics, Radiological & Functional Anatomy and Bio-statistic will be taken after 2 years of completion of phase A residency training.
- c) Those who will not be able to pass this examination, may be allowed to sit for next 4 consecutive examinations.
- d) At the end of phase B of 3 years duration a candidate will have to sit for a final examination for MD (Radiology & Imaging).

**9. Aims and Objective of the training:**

- i. Residents shall acquire adequate standard of knowledge, skills and attitudes patients care and examinations in Radiology & Imaging.
- ii. Residents will have a humanitarian approach and good communication skill with patients, attendants, colleagues and other axillary staffs.
- iii. Residents shall acquire competency in Radiology and Imaging, Practical skill and radiographic techniques and should be able to perform special & routine radiological procedures.



**10. Assessment of Competence:**

Phase A competency can be assessed by phase A university examination.

It will be taken at the end of 2 years course (phase A).

A multi format examination will be taken comprising written, clinical and practical examination.

**i) Written :**

Written test will be used to assess knowledge and problem solving components of competence. It will be taken as

a) MCQ

b) Short narrative question.

**ii) Oral, Practical and clinical**

The traditional unstructural clinical viva voce examination will be replaced by more structural objective type of examination known as objective structured practical examination ( OSPE )

**iii) Phase B examination will comprise of written, oral, practical & clinical examination and thesis submission and defense.**

a) Written, oral, practical and clinical examination will be taken as traditional way.

In course of time both clinical and oral examinations may be structured to ensure uniformity.

b) The examinee must submit the thesis at least six months before appearing the Part- B final examination.

iv) The examinee will be certified after Completion of Part – B course.

Passing the oral, practical & clinical examination and -written examination.

After satisfying the examiner in the thesis defense examination.

**11. Format of examination**

**Phase A (Candidate will be eligible to appear in the Part - A final examination after satisfactory assessment by department including log book).**

<b>I. Radiological physics</b>	<b>Parts of Examination</b>	<b>Marks allotted</b>	<b>Pass Mark</b>
Paper – I Radiological Physics, Basic Electronics and Basic Physics of X- Ray, CT Scan & Nuclea Imaging, Computed and Digital radiography. Clinical application of CT techniques PET, SPECT, DEXA	Written (Essay type & short narrative)	100+100	60+60
Paper – II Basic Physics of Ultrasound and MRI with their clinical application. Clinical Radiology	Oral + Practical for part I & II	100	60
<b>II. Anatomy and Bio-statistic</b>	<b>Parts of Examination</b>	<b>Marks allotted</b>	<b>Pass Mark</b>
Paper – I Radiological and functional anatomy	Written (Essay type & short narrative)	100+100	60+60
Paper– II Biostatistics	Oral + Practical for part I & II	100	60

**Phase B (Core Training in Radiology)**

Parts of Examination	No of examination paper	Name of subject	Marks allotted	Pass Mark
Written	Paper – I General Radiology	Respiratory Radiology Cardiovascular Radiology GI Radiology Musculoskeletal Radiology Nuclear Imaging	100	60
"	Paper – II Special Radiology	Neuro-radiology Head Neck Radiology Urogenital Radiology Breast and soft tissue Radiology Interventional & vascular Radiology	100	60
Oral	Paper I & II		100	60
Clinical and practical Paper	I & II (OSPE)		100	60
Log Book assessment			100	75
Thesis Defense			100	60

**12. Core Subject****(For Phase-B)****I. Bones, Joints system and Muskulo skeletal system:**

- Congenital skeletal anomalies, skeletal dysplasia, Chromosomal disorders.
- Periosteal reaction, bones and joints infection sareoid.
- A vascular necrosis: Osteo chondritis: miscellaneous bone lesion.
- Diseases of joint
- Tumours & tumour like conditions of bone (1)
- Tumours & tumour like donditions of bone (2)
- Disorders of the lympho reticular system & other hemopoietic disorders.
- Metabolie & endoerine disorders affecting bone.
- Skeletal trauma: general considerations.
- Skeletal trauma:- regional.

**II. The Respiratory system:**

- The normal chest : Methods of investigation & differential diagnosis.
- The mediastinum
- The pleura.
- Tumours of thepleura.
- Pulmonary infections.
- Diseases of the airways: Collapse & consolidation.
- Diffuse lung disease.



- Chest trauma: The postoperative chest intensive care; radiation.
- The chest in children.

### **III. The Cardio vascular system**

- Pericardium
- The normal heart, Methods of examination.
- The pulmonary evaluation.
- Acquired heart disease.
- Congenital heart disease.
- Arteriography and interventional angiography.
- Phlebography.
- The lymphatic system.

### **IV. The gastro intestinal & abdomen:**

- The salivary glands, pharynx & esophagus.
- The stomach & the duodenum.
- The small intestine.
- The colon
- The acute abdomen : abdominal trauma.
- The biliary tract.
- The liver & spleen.
- The pancreas.
- The adrenal glands.
- The pediatric abdomen.

### **V. The Reproductive and Urogenital tracts.**

- Imaging investigation of the urogenital tract.

- The kidneys.
- The ureter and upper urinary tract obstruction.
- The bladder & prostate.
- The urethra.
- The scrotum, testis & penis.
- Obstetric & obstetric ultrasound.
- Gynaecological Image.

### **VI. ENT, Eyes, Teeth, Soft tissues:**

- The pharynx & larynx : The neck.
- The sinuses
- The petrous temporal bone
- The orbit
- Ultrasound of the orbit
- Teeth & jaws
- The soft tissues
- The breast

### **VII. The Skull & Central nervous system:**

- The skull
- The Neuroradiology of the spine
- Angiography in Neuroradiology
- Interventional Neuroradiology
- Intra cranial lesions.

### **VIII. Mammography.**

### **IX. Ultrasound of different systems in adult & children including Echocardiogram.**

**X. Duplex & Colour Doppler**

**XI. CT scan of whole body**

**XII. MRI of whole body.**

**XIII. Nuclear imaging of different systems.**

**Procedure to be observed and done personally by Residents**

1. Dark room and film processing.

2. Radiography – Conventional X-ray, CT, MRI, USG & Mammography.

3. Contrast Examination:

- Barium study of esophagus.
- Ba – meal stomach and duodenum.
- Ba – meal follow through
- Small bowel enema (Enteroclysis).
- Ba-enema examination of large gut.
- IVU
- MCU & RGU
- Myelogram
- Salogram
- Dacrocystogram
- Fistulogram
- Lopogram
- Hysterosalpingogram
- PTC
- ERCP.

**4. Interventronal radiology:**

- Ultrasonogram & CT guided biopsy / Drainage etc.
- Angioplasty
- Stenting
- PCN etc.

**13. Course Contents (Phase-A)**

**Basic subjects:**

**1. Radiological Anatomy:**

1. Gross Anatomy with special stress on normal

- Radiological appearance.
- Musculo-skeletal system
- Kidney and urinary bladder
- Male & Female genital tracts
- Heart and blood vessels
- Nervous system
- Respiratory system
- Gastro intestinal system.

2. Developmental anatomy:

3. Applied anatomy in the form of identification of normal images of various parts of the body in radiographs & other Imaging systems.

**2. Genetics & Immunology:**

**1. Genetics –**

- Introduction of genetics.



- The normal marvotype-cytogeneties: Nature of genetic disorder.
- Mutation : Predisposition and causes.
- Chtogentic disorder
- Mendelian disorder: Introduction (Biochemical Basis) Antosomal Dominant disorders, Autosomal recessive disorders sex-linked disorders.
- Multifactorial inheritance disorders.
- Disorders with variable genetic background.

### 1. Immunology:

- Immunological aspect of various disease: general principle
- Immunological aspect of various disease: major immunological features, immunological pathogenesis, immunological diagnosis and immunology.
- Hypersensitivity and drug reaction.
- Auto immunity and auto immune disease.
- Immunodeficiency disorders.
- Transplantation Immimology
- Tumour Immunology.

### 3. Radiological Physics:

#### i. General Physics –

- Structure of atom
- Electromagnetic Radiation
- Interaction of radiation with matter
- Detection of Ionising radiation
- X-ray machine and production of X-ray
- Types of properties of X-ray

- Hazards of Radiation
- Protection from Radiation.

### ii. Basis electronics and computer in medical science.

- Ohms law
- Transformer
- Cathode ray tube
- AC and DC current Diode valve
- Rectification
- Semiconductor & semiconductor diode
- Application of computer in medical science.

### iii. Radiography :

- X-ray film, cassette, cassette holder
- Intensifying and fluoroscopic screen image intensifier
- Primary Radiological Image
- Development and Fixation of Image
- Dark room errors
- Factors focusing radiographic quality
- Autoproessiong.

### iv. Basic physics of

- Ultrasonography
- Computerized axial topography (CT)
- Magnetic Resonance Imaging (MRI)
- Nuclear Imaging
- Soft tissue Radiography
- The Mammography

- Tele-radiology, Digital imaging PACS etc.

#### **4. Medical Biostatistics:**

- Basic concept of biostatic : definition, importance, uses scope and limitation and definitions and concepts of important terms and rates used in medical and vital statistics, standard death rates and concise life tables.
- Methods of data collection and concept of sampling
- Basic concept of probability and Frequency & probability distribution-concept and their application in medicine.
- Methods of displaying and projecting data.
- Correlation and regression and measures of variability.
- Basic concept of experimental designs to medial science clinical trial.
- Test of significance
- Methods and principles of recording and maintenance of information and requirements of health information system.