Dr. M.G.R. EDUCATIONAL AND RESEARCH INSTITUTE
Deemed to be University

Maduravoyal, Chennai – 600 095, Tamilnadu, India
(An ISO 2001:2018 Certified Institution)

Universty with Graded Autonomy Status

SYLLABUS & CURRICULUM
for
M.D. RADIODIAGNOSIS

2020 onwards

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Dr. M.G.R. EDUCATIONAL AND RESEARCH INSTITUTE TRUST

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.D. IN RADIODIAGNOSIS

PREAMBLE

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The Goal of this program is to impart training in conventional and modern radiology and imaging techniques so that the post graduate student becomes well versed and competent to practice, teach and conduct research in the discipline of radiology.

The student should also acquire basic knowledge in the various sub-specialties of radiology.

These Guidelines also would also help to standardize Radio-diagnosis teaching throughout the country so that it will benefit in achieving competent radiologist with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content.

This has necessitated retention of “domains of learning” under the heading “competencies”.

SPECIFIC LEARNING OBJECTIVES

The objective of the program is to train a student to become a skilled and competent radiologist to conduct and interpret various diagnostic/interventional imaging studies (both conventional and advanced imaging), to organize and conduct research and teaching activities and be well versed with medical ethics and legal aspects of imaging/ intervention.

COURSE OVERVIEW

DURATION OF THE COURSE

The period of certified study and training for the Post-Graduate MD RADIO - DIAGNOSIS shall be Three Academic years (six academic terms). The academic terms shall mean six months training period.

COMMENCEMENT OF ACADEMIC SESSION

The academic session for the Post-Graduate shall commence from July of the Academic Year.

DATE OF EXAMINATION

The candidates admitted up to May/June of the academic year shall be registered for that academic year and shall take up their Final Third Year regular examination in May /November of the academic year after completion of 3 years/36 months.

NUMBER OF EXAMINATIONS

The University shall conduct not more than two examinations in a year, for any subject, with an interval of not less than 4 and not more than 6 months between the two examinations.

ATTENDANCE

All candidates joining the postgraduate training programme shall work as full time residents during the period of training, attending not less than 80% (eighty percent) of the training during each calendar year, and will be given full time responsibility, assignments and participation in all facets of the educational process.

The period of training for obtaining the degrees shall be three completed years including the period of examination.

TRAINING PROGRAMME

Three years Course:

FIRST YEAR

General Radiology – 4 Months

Ultrasound – 3 Months

CT Scan – 2 1/2 Month

MRI – 2 1/2Month

AFTERNOON SESSION

Basic Sciences - 12 Months

Medical Physics - 12 Months

SECOND YEAR

General Radiology – 1 ½ Months
Ultrasound - 3 Months
CT Scan - 2 ½ Months
MRI - 2 ½ Month
Nuclear/Neuro Medicine – 1 month (elective postings)
Onco Radiology - 1 Month (elective postings)
Cardiovascular Radiology – 15 days

Third Year

General Radiology - 3 Months

Ultrasound - 3 Months

CT Scan - 3 Months

MRI - 3 Months

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

A post graduate student on completing MD (Radiodiagnosis) should acquire knowledge in the following areas, and be able to:

a. Acquire good basic knowledge in the various sub-specialties of radiology such as chest radiology, neuro-radiology, GI-radiology, uro-radiology, cardio-vascular radiology, musculoskeletal, interventional radiology, emergency radiology, pediatric radiology and women's imaging.

b. Independently conduct and interpret all routine and special radiologic and imaging investigations.

c. Provide radiological services in acute emergency and trauma including its medicolegal aspects.

d. Elicit indications, diagnostic features and limitation of applications of ultrasonography, CT and MRI and should be able to describe proper cost effective algorithm of various imaging techniques in a given problem setting.

e. Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.

f. Able to decide on further specialization to be undertaken in any of the branches in Radiodiagnosis such as gastrointestinal radiology, uro-

radiology, neuro-radiology, vascular radiology, musculoskeletal radiology, interventional radiology etc.

g. Able to formulate basic research protocols and carry out research in the field of radiology- related clinical problems.

h. Acquire knowledge and teaching capabilities to work as a post graduate student /consultant in Radiodiagnosis and conduct teaching programmes for undergraduates, post graduates as well as paramedical and technical personnel.

i. Interact with other specialists and super-specialists so that maximum benefit accrues to the patient.

j. Should be able to organize CME activities in the specialty utilizing modern methods of teaching and evaluation.

k. Acquire knowledge to impart training in both conventional radiology and modern imaging techniques so that the post graduate student is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging.

12. Acquire knowledge of interventional radiology.

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well
   as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

Practical Training will include two major aspects:

A) Interpretation of images, and B) Skill in performing a procedure.

A) Interpretation of images:

The student should be able to interpret images on all imaging modalities of diseases of following organs :

1. Musculo-skeletal System - Interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, endocrine and metabolic, neoplastic and miscellaneous conditions.
2. Respiratory System - Interpretation of diseases of the chest wall, diaphragm, pleura and airway; pulmonary infections, pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease, chest trauma; post-operative lung and X-ray in intensive care.
3. Cardiovascular System - Interpretation of diseases and disorders of cardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, colour Doppler, CT, MRI, Angiography and Isotopes Studies.
4. Gastro-intestinal tract and hepato-biliary pancreatic system - Interpretation of diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery: acute abdomen, abdominal trauma. Diseases and disorders of liver, biliary system and pancreas.

5. Urogenital System - Interpretation of various diseases and disorders of genitorurinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.

6. Central Nervous System (C.N.S.) - Interpretation of diseases and disorders of the head, neck and spine covering, congenital, infective, vascular, traumatic neoplastic degeneration metabolic and miscellaneous condition.

7. Imaging in Emergency Medicine.
8. Imaging in Obstetrics and Gynecology.
9. Imaging of Breast and interventional procedures.
10. ENT, EYE and Dental Imaging.
11. Imaging of endocrine glands and those involved with metabolic diseases.
12. Clinical applied radionuclide imaging.
13. Interventional Radiology

B) Skills in performing a procedure the student should be able to perform the following procedures:

1. GIT contrast studies: Barium studies (swallow, upper GI, Follow through, enema); fistulogram; sialogram; cologram/ileostogram,

2. GU: Excretory urography, MCU, RGU, nephrostogram, genitogram,

3. Ultrasound: Studies of whole body including neonatal trans-fontanel studies, Doppler studies

4. CT scan: should be able to position a patient, plan study as per the clinical indication, do reconstruction of images, perform triple phase study, perform & interpret advanced applications like CT enterography, CT angiography etc.

5. MRI: plan and perform MRI studies of whole body

6. DSA: should be able to describe the techniques, do (if available to student) transfemoral puncture and insert catheter, help in angiographic procedures both diagnostic and interventional.

7. Radiography: should be able to independently do radiography of common and some important uncommon views of different body parts. This includes positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films. The student should be familiar with not only conventional radiography but with CR and DR systems.

8. Interventional radiology: The student should be able to perform simple, common non- vascular procedures under ultrasound and fluoroscopy guidance e.g. abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc.

9. The student should have knowledge of common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents, names of common catheters, handling of intravenous contrast reactions; techniques, indications and contraindications for various procedures.

COURSE CONTENT

1. BASIC SCIENCES RELATED TO RADIO-DIAGNOSIS

(a) Radiation physics and Radio-Biology,

(b) Radiological anatomy and pathology of various organ systems

(c) Imaging Techniques,

(d) Radiograph,

(e) All the postgraduate students (First year to Final year PG s) should know the concept of monitoring of TLD badges.(It will give the

information regarding radiation exposure for the people working in Radiology Department)

Includes all aspects of: Fundamentals of electromagnetic radiation, X-Ray production, characteristic properties of X-Rays, units of radiation, radiation measurement, X-ray equipments, X-Ray films, intensifying screens, other X-Ray appliances, dark room equipments and procedures, II TV, cine fluorography, tomography.

- ❖ Quality assurance.
- ❖ Radiation hazards and principle and methods of radiation protection.
- ❖ Contrast media : types, chemistry, mechanisms of action, dose schedule, routes of administration, their potential adverse reactions and management.
- ❖ Clinical applications of important isotopes and instrumentation in Nuclear medicine with advances in both.
- ❖ Physics and applications of advanced imaging i.e., Ultrasound, CT, MRI, Angiography (DSA), PET etc.
- ❖ Practical experiments in physics : A list of experiments, which a resident should be able to do and interpret the results, is available in the department

Radiological Physics

1. Introduction of general properties of radiation and matter: Fundamentals of nuclear physics and radioactivity
2. Interaction of x-rays and gamma rays with matter and their effects on irradiated materials
3. X-ray Generating Apparatus
4. Screen-film radiography
5. Film processing: Dark room, dry processing, laser /dry chemistry cameras, artifacts.

6. Fluoroscopy: Digital including flat panel units, fluoroscopy cum radiography units
7. Digital radiography: Computed Radiography, Flat panel radiography
8. Other equipments: Ultrasound including Doppler, CT, MRI and DSA
9. Contrast Media (Iodinated, MR & Ultrasound) - types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management
10. Nuclear Medicine: Equipments and isotopes in various organ systems and recent advances
11. Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film-less department and for Teleradiology
12. Radiation protection, dosimetry and radiation biology
13. Image quality and Quality Assurance (QA)
14. Recent advances in radiology and imaging

The student should have knowledge of the following physics experiments:

1. Check accuracy of kVp and timer of an X ray unit
2. Check accuracy of congruence of optical radiation field
3. Check perpendicularity of x ray beam
4. Determine focal spot size
5. Check linearity of timer of x ray unit
6. Check linearity of mA
7. Verification of inverse square law for radiation
8. Check film screen contact

9. Check film screen resolution
10. Determine total filtration of an x ray unit
11. Processor quality assurance test
12. Radiological protection survey of an x ray unit
13. Check compatibility of safe light
14. Check performance of view box
15. Effect of kVp on x ray output
16. Radiography and processing techniques
17. Processing techniques: includes dark room and dry processing.
18. Radiography of the musculo-skeletal system including extremities.
19. Radiography of the chest, spine, abdomen and pelvic girdle.
20. Radiography of the skull, orbit, sinuses.
21. Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
22. Contrast techniques and interpretation of the Central Nervous system.
23. Contrast techniques and interpretation of the cardiovascular system including chest.
24. Contrast techniques and interpretation of the genito - urinary system including Obstetrics and Gynaecology.
25. Paediatric radiology including MCU, genitogram, bone age.
26. Dental, portable and emergency (casualty) radiography.

2. RESPIRATORY SYSTEM

Goal

At the completion of the course the resident should be able to interpret conventional and advanced (CT, MRI) chest examinations, differentiating normal from abnormal cases and be able to recognize specific imaging pattern of different diseases.

Content Coverage

Diseases of the chest wall, diaphragm, pleura and airways; pulmonary infections; pulmonary vasculature; pulmonary neoplasms; diffuse lung disease; mediastinal disease; chest trauma; post- operative lung and X-Rays in intensive care.

Essential Objectives

1. Should be able to localize the chest pathology into one of the following compartments: pulmonary, pleural, mediastinal, extra-pleural, extra-thoracic, diaphragmatic, infradiaphragmatic.

2. Recognize chest pathology that requires urgent or emergency treatment and describe this in an adequate manner: Pneumothorax, traumatic aortic rupture, esophageal rupture, acute pulmonary embolism, CHF and tracheo-bronchial foreign bodies.

3. Recognize acute and chronic patterns of bacterial and viral pneumonia's, occupational diseases, allergic states.

4. Recognize acute and chronic cardiac failure patterns and non-cardiogenic edemas.

5. Understand the radiographic features and precipitating causes of adult and infant respiratory distress syndrome.

6. Recognize and describe appropriately the various manifestations of benign and malignant neoplasm's of the lung.

Evaluation

Resident's progress through daily observation of work

At the end of the rotation an assessment by a small group of faculty.

Maintain a log book showing techniques learnt during the rotation – to be supervised.

3. Gastrointestinal (GIT) and Hepato-Biliary-Pancreatic System

Goal

At the completion of this course the resident should be able to interpret both the conventional and other newer (ultrasound, CT, MRI, angiography) examinations.

This includes examination of GIT

i.e., esophagus, upper gastrointestinal study, follow through for small bowel (including small bowel enterolysis) and enema (both conventional and double contrast) for colon.

It also includes examination of liver, biliary system and pancreas using all the imaging modalities available to a radiologist including specialized investigations like ERCP, PTC and interventional procedures like abscess drainage, Percutaneous Transhepatic biliary drainage (PTBD, internal and external), tumor embolization, Radiofrquency (RF) ablation etc.

During this posting resident also performs other investigations done using fluoroscopic guidance e.g; hysterosalpingography (HSG); fistulogram, sinogram, T-Tube cholangiography, sialography etc. and he/she should be able to perform and interpret studies using these modalities.

Diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery, acute abdomen, abdominal trauma using conventional and newer imaging methods like CT, MRI, DSA, isotope studies.

Diseases and disorders of hepato-biliary-pancreatic system using conventional & newer imaging methods.

Essential Objectives

1. Learn to evaluate the clinical condition & needs of a patient and to decide the appropriate studies and approach for examining the GIT or hepato-biliary-pancreatic system of a patient.
2. Learn a proper approach to fluoroscopy: this includes developing proficiency in GIT fluoroscopy, mastering the equipment and using proper radiation protection measures (both for the patient and the operator).
3. Learn the basic pathology and patho-physiology of GIT/hepato-biliary-pancreatic diseases.
4. Learn to communicate the findings both at fluoroscopy and in films, in an accurate, succinct and meaningful way.

Evaluation

Day to day observation of residents work including documentation and interpretation

Assessment by a group of faculty at the end of the rotation.

Log book will be maintained of the procedures learnt.

4. GENITO-URINARY SYSTEM

Goal

At the completion of this course resident should be able to perform, direct the radiography and interpret the conventional radiological examinations of the urinary tract.

These includes: excretory urography (intravenous pyelography); cystograms, micturating cystourethrography (MCU) and retrograde urethrography (RGU).

[HSG is included under GIT rotation]. In addition the resident should be able to perform and interpret other diagnostic imaging modalities and procedures which are used to evaluate urinary tract pathology i.e., ultrasound, CT, MRI, angiography, as well as various interventional procedures like percutaneous nephrostomy, kidney biopsy, stent placement, antegrade pyelography, tumor embolization etc. Obstetrics and gynaecology ultrasound : separate posting in III year.

Hysterosalpingography : already included with GIT posting.

Content Coverage Imaging :

conventional, ultrasound, CT, MRI, angiography; of various diseases and disorders of genitourinary system.

These includes :

congenital, inflammatory, traumatic, neoplastic, calculus and miscellaneous conditions.

Essential Objectives

1. Recognize and evaluate emergency conditions involving the urinary tract including trauma, infection, vascular compromise and obstruction.

2. Recognize and understand the patho-physiology of stone disease.
3. Recognize patterns of infectious diseases and the modalities necessary for diagnostic evaluation.
4. Understand the complete evaluation of renal mass lesions and the evaluation of other urinary tract neoplasms, including the detection and staging of the tumor.
5. Recognize the difference between the pattern of diseases affecting the genitourinary tract of adults and that of children and understand and identify the common conditions affecting the peadiatricgenito-urinary system on imaging.

Evaluation

Day to day, based on daily work assessment by a group of faculty at the end of the posting.

Maintain a log book

5. MUSCULOSKELETAL SYSTEM

Goal

At the end of the course the resident should be able to correctly interpret all the common abnormalities of the bones and joints.

He/She should have a good understanding of the common congenital abnormalities, arthritis, bone and joint trauma, neoplastic conditions, metabolic bone disease and inflammatory diseases.

He/She should also have an understanding of the role of CT/MRI in all these conditions and should be able to perform and interpret CT/MRI in diseases of musculo-skeletal system.

Content Coverage Imaging (Conventional, ultrasound, CT, MRI, angiography, Radio-isotope studies) and interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, neoplastic and miscellaneous conditions.

Essential Objectives

1. Communicate precisely and cogently radiographic descriptions of bone and joint trauma.
2. Differentiate various forms of arthritis and know correlative laboratory and clinical findings.
3. Enumerate the radiographic features that differentiate benign and malignant bone tumors with a basic familiarity of more common tumors.
4. Know radiographic features of acute and chronic osteomyelitis and discitis (including tuberculosis).
5. Recognize differential features of osteoporosis (including Bone Mineral Density or BMD assessment techniques e.g; US, CT, Dexa) including various endocrine and metabolic diseases e.g; osteomalacia, hyperparathyrodism etc.
6. Know the application and interpretation of ultrasound/CT/MRI / angiography in one or more of the above situations.

Evaluation

Through daily sessions assessment by a small group of faculty at the end of the posting.

Will maintain a log book

6. CARDIOVASCULAR RADIOLOGY/ECHO CARDIOGRAPHY

Goal

Goal is to provide experience in the role of imaging in cardiovascular diseases by different techniques including cardiac cathaterization and cardiac angiography, Digital subtraction angiography (DSA) and interventional procedures in non cardiac arterial and venous diseases.

Content Coverage

Diseases and disorders of cardiovascular system including congenital conditions and the role of imaging by conventional, ultrasound, Echo, color-Doppler, CT, MRI, angiography (including DSA) and radionuclide studies. It also includes interventional procedures e.g; balloon angioplaty, embolization etc.

Essential Objectives

1. Understand the anatomy and common pathology of congenital and acquired cardiac conditions.
2. Correlate plain film findings of common congenital abnormalities with those shown by angiography and explain the pathophysiology including abnormal pressure measurements.
3. Correlate plain film findings and the echocardiographic studies of patients with acquired valvular diseases and other common pathologic conditions including pericardial pathology.
4. Understand the role of newer modalities like CT/MRI, in aortic diseases e.g., aorto- arteritis, aortic dissection and aortic aneurysm.
5. Should be able to perform fluoroscopy on patients before and after valve replacement and identify those with complications after valve replacement.

6. Understand the principle and logic behind various interventional procedures carried out in the cardiovascular labs e.g; PTCA, balloon dilatation of valvular lesions, septostomy etc.

Evaluation

Day to day assessment by a small group of faculty

Maintain a log book to be checked by faculty in charge

7. NEURORADIOLOGY

Goal

At the end of the course the resident should be able to demonstrate reasonable proficiency in the assistance during performance as well as in the interpretation of all neuro-radiological studies.

This includes angiograms, both cerebral and non-cerebral studies, transluminal angioplasties, embolization procedures and myelography.

They should also be able to perform and interpret CT and MRI of head and spine.

Content Coverage

Includes imaging (using conventional and newer methods) and interpretation of various diseases and disorders of the head, neck and spine covering congenital lesions, infective lesions, vascular lesions, traumatic conditions and neoplasia. It also includes a number of interventional procedures carried out in the department of neuroradiology.

Essential Objectives

1. Know detailed normal neuro-imaging anatomy on different imaging modalities.

2. Identify pathologic conditions (listed under the content) on images acquired using different techniques and communicate the report in a concise manner.

3. Participate in daily neuroradiology conferences held with the neurosurgery or neurology units.

Evaluation

Day to day based on reporting and procedures performed by a small group of faculty.

Will maintain a log book to be checked by faculty in neuroradiology.

8. GENERAL RADIOLOGY

Goal

In this rotation the resident learns to evaluate conventional radiographs.

This includes radiographs of : chest, abdomen, pelvis, skull, spine, musculo-skeleton and soft tissues. Resident is posted in OPD and indoor radiography rooms for this purpose.

During indoor posting, he/she will also have the additional responsibility of directing, evaluating and reporting mammographic procedures including related interventional procedures.

Essential objectives

1. Learns to direct and perform radiography on patients.
2. He/she should be able to decide on further imaging views based on the clinical suspicion and the initial imaging.
3. Write reports on the radiographs obtained in a methodical, concise and precise way and communicate it to the referring unit.
4. Present interesting cases in the departmental meets.

9. ULTRASOUND (INCLUDING GYNAE/OBSTETRICS)

Goal

At the completion of this rotation the resident should be able to perform and interpret all ultrasound studies. These studies include : abdomen, pelvis, small parts, neonatal head, color-duplex imaging (including peripheral i.e; extremity arterial and venous studies), obstetrics/gynaecology (in the dept of Gyn/Obstet) and interventional procedures using ultrasound guidance.

The resident should have a thorough knowledge of the common abnormalities of the abdominal/pelvic organs, retroperitoneal structures, neck, chest, extremities and small parts (thyroid/parathyroid, scrotum, orbit, breast).

Essential Objectives

1. Determine or select the appropriate diagnostic procedure for the clinical problem.
2. Demonstrate proficiency in patient scanning using appropriate techniques and instrumentation.
3. Modify the procedure, if required, based upon the observed abnormalities (pathology).
4. Analyze the results of the diagnostic procedure, make diagnosis and record the findings.
5. Communicate findings, diagnosis and other relevant information to the referring physician.
6. Present interesting ultrasound cases in the departmental conferences/meetings.

Evaluation

Ongoing basis using day to day work presentations in departmental meets

Maintain a log book

10. CT Goal/Objectives

The goals/objectives to be achieved by the end of this rotation are:

1. Select CT protocol according to the clinical diagnosis. He/she should be able to direct and modify (if required) the performance of the CT examination

2. Demonstrate knowledge of the CT findings of the common pathologic conditions occuring in the head, neck, chest, abdomen, pelvis, and in the soft tissues and musculo-skeletal system.

3. Resident should be familiar with both the conventional and different modified CT techniques (High resolution, Dual phase, CT angio, BMD, multi slice CT etc.)

4. Interpret conventional and modified body CT examinations (including HRCT, dual/triple phase CT, CT portography, virtual CT etc.) with a reasonable degree of accuracy.

5. Demonstrate proficiency in verbal and written reporting of CT findings and differential diagnosis.

6. Demonstrate knowledge of the limitations (and potential fallacies) of CT imaging of various pathologic conditions and be able to perform correlations with other imaging modalities including formulations of recommendations for additional appropriate imaging procedures.

7. Perform CT guided biopsy procedures under guidance of seniors. 8. Present interesting cases of CT in the departmental meetings.

Essential Objectives

1. The resident will review the daily body CT schedule and based upon the known clinical information and review of other radiologic studies of the

same patient done earlier, select the most appropriate CT imaging protocol for the each patient. This may include altering an existing CT protocol to provide the most appropriate examination for an individual patient.

2. Develop a working knowledge of the actual performance of the CT examinations. This includes starting intravenous lines, amount and timing of injecting i.v. contrast, and actual operation of CT machine.

3. Review and report all the completed body CT examinations. Initially this will be under the supervision of the seniors but later independently – but all repots will be signed by the faculty incharge.

4. Participate and present CT cases in departmental and inter departmental meets.

Evaluation

On daily basis after observing reporting and working in the CT room by a group of faculty

Maintain a log book under the supervision of faculty incharge.

11. Angiography and Interventional Radiology

Goal

At the completion, the resident should be able to perform the most common non-cerebral angiographic studies.

He/she should have a good basic understanding of both; the vascular interventional procedures such as angioplasty, embolization using various embolizing agents; as well as the various non-vascular interventional procedures such as percutaneous nephrostomy, stenting, abscess drainage, PTC/PTBD, percutaneous biopsy, balloon dilatation of the esophagus etc.

He/she should have a good understanding of the various equipment and available catheters and guidewires and other technical aspects of special procedures.

In addition he/she should know all the potential risks and complications of these procedures and their management.

Essential Objectives

1. Evaluate the requisition for appropriate clinical information to determine if additional information is needed.
2. Determine or select appropriate diagnostic procedure for the clinical problem.
3. Assist and perform appropriate procedures under supervision and modify procedures based on observed abnormalities (pathology).
4. Know the potential risks and complications of procedures performed.
5. Know normal vascular anatomy applicable to angiographic procedures performed and know normal anatomy and landmarks to perform other non-vascular procedures.
6. Present interesting cases in the departmental meets.

Evaluation

Day to day evaluation by a group of faculty

Will maintain a log book

12. Paediatric Radiology

Goal

Intention is to train residents to perform common radiologic procedures and to be able to interpret paediatric studies in order that they can appropriately deal with examinations of children in a non paediatric hospital environment.

At the completion the resident should be able to interpret most of the conventional and newer paediatric examinations which includes: upper airways, chest, genito-urinary, gastro-intestinal and musculo-skeletal systems. Resident should be familiar with many of the neurologic conditions encountered in neonates and children.

Resident should also be able to perform transfontanelle cranial ultrasound. Content Coverage: Common diseases and disorders of different organ systems covering congenital, inflammatory, traumatic, neoplastic and other miscellaneous conditions, using both conventional and newer imaging methods.

Essential Objectives

1. Understand the appropriate indications for various imaging procedures and determine that the patient has been properly prepared for the procedure.
2. Know the standard radiographic views for paediatric examinations.
3. Learn to recognize and evaluate imaging manifestations (on conventional and newer methods) of common paediatric conditions occurring in the head/neck, chest, abdomen/pelvis and in the musculoskeleton.
4. Perform paediatric fluoroscopic examinations with skill and accuracy.
5. Understand and apply the knowledge and principle of radiation protection, both for the child and the operator.

13. RADIOLOGY IN EMERGENCY MEDICINE

Goal

At the end of the course, resident should be able to give an evaluation of the emergency radiographic examinations. He/she should also be familiar with medicolegal cases (MLC) procedures.

Essential Objectives

1. Determine and direct radiography in emergency patients and review and interpret the radiographs.
2. If study is incomplete then determine additional views or repeat views.
3. Know indications for and limitations of the common emergency imaging procedures.
4. Communicate findings, diagnosis and other relevant information to the emergency room physician.
5. He/she should be able to perform (some under supervision) and interpret special imaging procedures needed in emergency room e.g; barium studies, excretory urography, CT, ultrasound, Doppler and angiography.

14. ONCOLOGIC RADIOLOGY

Goal

At the end of the rotation the resident should be able to interpret radiological investigations in patients with neoplastic diseases (both benign and malignant).

He/she should be able to perform, interpret and diagnose these patients.

Essential objectives

1. Understand pathology and patho-physiology of common neoplasms.
2. Learn the algorithmic approach to image these patients based on the suspected disease, its biological behaviour and potential and limitations of various imaging modalities.
3. Perform appropriate investigation (both conventional and newer methods), interpret the results and reach at a reasonable diagnosis/ differential diagnosis based on the clinical and biochemical results.
4. Learn to communicate the results in a precise way in a written report to the concerned unit.
5. Present interesting cases in the departmental meets.

15. NUCLEAR MEDICINE

Goal

At the completion of this rotation the resident should be able to interpret common nuclear medicine examinations (including cardiac cases).

He /she should be able to evaluate the examinations for completion and determine what further images (including non nuclear medicine) need to be done.

He/she should have a good understanding of the physical and biological properties of the commonly used radiopharmceuticals and become familiar with safe handling of isotopes and basic radiation safety measures while dealing with isotopes.

Essential objectives

1. Review all cases performed each day.

2. Interpret the results of the procedures and give an appropriate diagnosis.
3. Observe and help in some common procedures performed in the department (e.g; thyroid, kidney, bone, cardiac scans), understand the principle underlying the procedure and the basis for using a particular isotope in an investigation.

Evaluation Day to day by the nuclear medicine staff.

DISSERTATION

Thesis

1. Every candidate pursuing MD degree course is required to carry out work on a selected research project under the guidance of a recognised post graduate teacher. The results of such a work shall be submitted in the form of a dissertation.
2. The dissertation is aimed to train a post graduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, comparison of results and drawing conclusions.
3. Chief guide will be from the department of Radio-diagnosis while co-guides will be from either the department of Radio-diagnosis or other disciplines related to the dissertation topic.
4. Every candidate shall submit a thesis protocol to the Dean of the Institute in the prescribed proforma containing particulars of proposed dissertation work four months from the date of commencement of the course.

   The thesis protocol shall be sent through the proper channel.

Protocol in essence should consist of:-

(a) Introduction and objectives of the research project.

(b) Brief review of literature

(c) Suggested material and methods

(d) Bibliography

5. Such thesis protocol will be reviewed and the dissertation topic will be registered by the Institute. No change in the dissertation topic or guide shall be made without prior approval of the Dean of the Institute.

6. Submission of thesis. Thesis will be submitted at the end of two and a half (2.5) years.

Thesis should consist of

(e) Introduction

(f) Review of literature

(g) Aims and objectives

(h) Material and methods

(i) Results

(j) Discussion

(k) Summary and Conclusions

(l) Tables (m)

Annexures (n)

Bibliography

7. Two copies of dissertation thus prepared shall be submitted to the Dean six months before the final examination.

8. The dissertation shall be valued by two external examiners appointed by the Institute.

Approval of dissertation work is an essential precondition for a candidate to appear in the final MD examination.

Dissertation is graded as follows: Highly commendable – Commendable – Satisfactory – Rejected

Log Book

The logbook is a record of the important activities of the candidates during his training, Internal assessment should be based on the evaluation of the logbook. Collectively, logbooks are a tool for the evaluation of the training programme of the institution by external agencies. The record includes academic activities as well as the presentations and procedures carried out by the candidate.

Format for the logbook for the different activities is given in Tables 1, 2 and 3. Copies may be made and used by the institutions.

Procedure for defaulters: Every department should have a committee to review such situations. The defaulting candidate is counselled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the requirements in spite of being given adequate chances to set himself or herself right.

Teaching and Learning Activities

A candidate pursuing the course should work in the institution as a full time student. No candidate should be permitted to run a clinic/laboratory/ nursing home while studying postgraduate course. Each year should be taken as a unit for the purpose of calculating attendance.

Every student shall attend teaching and learning activities during each year as prescribed by the department and not absent himself/herself from work without valid reasons.

A list of teaching and learning activities designed to facilitate students acquire essential knowledge and skills outlined is given below.

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated.
   a) **Didactic Lectures:** Recommended for selected common topics for postgraduate students of all specialties. Few topics are suggested as examples:
      1) Bio-statistics.
      2) Use of library
      3) Research Methods
      4) Medical code of Conduct and Medical Ethics.
      5) National health and Disease Control Programs.
      6) Communication Skills etc.
      7) Initial introductory lectures about the subject.

These topics may preferably taken up in the first few weeks of the 1st year.

   b) **Integrated Lectures:** These are recommended to be taken by multidisciplinary teams for selected topics, e.g. Jaundice, Diabetes Mellitus, Thyroid etc.

2. **Journal Club:** Recommended to be held once a week. All the PG students are expected to attend and actively participate in discussion and enter in the logbook relevant details. Further, every candidate must make a presentation from the allotted journal(s) of selected articles at least four times a year and a total of 12 presentations in three years. The presentations would be evaluated using checklists and would carry weightage for internal assessment (See Checklist in Chapter IV). A timetable with names of the students and the moderator should be announced at the beginning of every year.
3. **Subject seminar:** Recommended to be held once a week. All the PG students are expected to attend and actively participate in discussion and enter in the logbook relevant details. Further, every candidate must present

on selected topics at least four times a year and a total of 12 seminar presentations in three years. The presentations would be evaluated using checklists and would carry weightage for internal assessment (See Checklist in Chapter IV). A timetable for the subject with names of the student and the moderator should be scheduled at the beginning of every year.

4. **Student Symposium:** Recommended as an optional multi disciplinary programme. The evaluation may be similar to that described for subject seminar.
5. **Ward Rounds:** May be service rounds or teaching rounds.
6. **Mortality & Morbidity Meetings:** Recommended once a month for all postgraduate students.
7. **Inter Departmental Meetings:** Strongly recommended particularly with departments of Surgery, Orthopedics and Medicine at least once a month. These meetings should be attended by postgraduate students and relevant entries must be made in the Logbook.
8. **Teaching skills:** Postgraduate students must teach Undergraduate students (e.g. Medical, Nursing) by taking demonstrations, bed side clinics, tutorials, lectures etc. Assessment is made using a checklist by faculty. Record of their participation should be kept in Logbook. Training of postgraduate students in Educational Technology is recommended.
9. **Continuing Medical Education Programmes (CME):** At least 2 state / national level CME programmes should be attended by each student in 3 years.[Atleast one Paper and One Poster Presentation is Mandatory]
10. **Conferences:** Attending conferences is optional. However, participation & presentation of scientific paper should be encouraged.
11. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent

for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination

ASSESSMENT

Formative Assessment

During the training programme Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

SCHEME OF EXAMINATION

Part – I – (at the end of First year)

Theory

Tile of the paper : Paper – I Medical Radiation Physics as applied Radio Diagnosis (Anatomy, Pathology Basic concepts, Production of x-rays, Interaction of radiation with matter, Radiography, Fluoroscopy, Special radiography, Modern Imaging Systems, Nuclear Medicine, Radiation Biology and Radiation Protection)

Duration in hours : 3 hours

Maximum marks : 100

Part – II (Final) – (at the end of Third year)

Theory

Tile of the Paper : Paper -1 : Basic sciences related to radiology

Paper II: Chest, CVS, CNS including Head & Neck, Eye, ENT, Musculo- skeletal, Pediatric radiology and Mammography.

Paper III - Abdominal Imaging including GI, GU, Hepatobiliary, Endocrine and metabolic, Obstetrics and Gynaecology and Interventional radiology

Paper IV: Recent advances, nuclear medicine; Radiology related to clinical specialties

Duration in hours for each paper : 3 hours
Maximum marks for each paper : 100

Clinical Examination :

No. of Cases	Duration	Marks
Long Case 1 X 90	1 Hours	90
Short Cases 3 X 30 [includes ultrasound]	30 minutes	90
Communication Skill		20
Total		200

Oral Examination: Instruments - 20 Contrast-20, Viva- 40, Log Book – 20
Total – 100

Summative Assessment

i.e., assessment at the end of training The summative examination would be carried out as per the Rules given in Postgraduate Medical Education Regulations- 2000.

Postgraduate Examination

The Post Graduate Examination was conducted in three parts.

1. **Thesis:**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis (Dissertation). Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination.

The thesis shall be examined by a minimum of two external examiners, who shall not be the examiners for Theory and Clinical examination.

A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. **Theory Examination**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training.

Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole.

The examination for M.D. shall be held at the end of 3rd academic year.

An academic term shall mean six month's training period.

There shall be four question papers, each of three hours duration. Each paper shall consist of 10 short essay questions carrying 10 marks each. Total marks for each paper will be 100.

Paper I	= 100 Marks
Paper II	= 100 Marks
Paper III	= 100 Marks
Paper IV	= 100 Marks
Total	**400 Marks**

Paper I: Basic sciences related to Radiology (consists of Anatomy, Pathology, Basic and Radiation Physics, Imaging Techniques, and Film processing).

Paper II: Chest, CVS, CNS including Head & Neck, Eye, ENT, musculo-skeletal, pediatric radiology and Mammography.

Paper III: Abdominal Imaging including GI, GU, Hepatobiliary, endocrine and metabolic, Obstetrics and Gynaecology and Interventional radiology

Paper IV: Recent advances, nuclear medicine; Radiology related to clinical specialties All papers would consist of short answer questions (minimum 10) covering all aspects of the course.

3. Practical/clinical and oral Examination (will include cases, spots, ultrasound procedure, physics, implements etc)

   Max Marks :300 [Long case 100, 2 short case -100, Spotters – 40 Viva – 50,Pedegogy 10]

   Practical Examination will have:

   1. 3-4 Cases
   2. Film Quiz (40 – 60 Spots)
   3. To perform Ultrasound on a patient

   Oral/Viva voce will include: - Radiation Physics and quality assurance - Implements, Catheters and contrast - Cassettes, films, dark room, equipment - Radiographic techniques, Radiological procedures, - Gross pathology

MAXIMUM MARKS

Maximum marks for M.D. Radiodiagnosis	Theory	Practical & Viva	Grand Total
	400	300 (Practical – 200 & Viva – 100)	700

MARKS QUALIFYING FOR A PASS

Obtaining a minimum of 40% marks in each theory paper and not less than 50% cumulatively in all the four papers for degree examination. Obtaining of 50% marks in Practical examination shall be mandatory for passing the examination as a whole in the degree examination.

Examination and Evaluation

a) All the Post Graduate Examiners shall be recognised Post Graduate Teachers holding recognised Post Graduate qualifications in the subject concerned.

b) For all Post Graduate Examinations, the minimum number of Examiners shall be four, out of which at least two (50%) shall be External Examiners, who shall be invited from other recognised universities from outside the State. Two sets of internal examiners may be appointed for M.D./M.S.

c) Under exceptional circumstances, examinations may be held with 3 (three) examiners provided two of them are external and Medical Council of India is intimated the justification of such action prior to publication of result for approval. Under no circumstances, result shall be published in such cases without the approval of Medical Council of India.

d) The guidelines regarding appointment of examiners are as follows:-

1. No person shall be appointed as an examiner in any subject unless he/she fulfills the minimum requirements for recognition as a Post Graduate teacher as laid down by the Medical Council of India. No person shall be appointed as an internal examiner in any subject unless he/she has three years experience as recognized PG teacher in the concerned subject. For external examiners, he/she should have minimum six years of experience as recognized PG teacher in the concerned subject. Out of internal examiners, one examiner shall be a Professor and Head of Department or Professor.

2. There shall be at least four examiners in each subject at an examination out of which at least 50% (Fifty percent) shall be external examiners. The external examiner who fulfils the condition laid down in clause – 1 above shall ordinarily be invited from another recognised university, from outside the State: provided that in exceptional circumstances examinations may be held with 3 (three) examiners if two of them are external and Medical council of India is intimated with the justification of such examination and the result shall be published in such a case with the approval of Medical council of India.

3. An external examiner may be ordinarily been appointed for not more than three years consecutively. Thereafter he may be reappointed after an interval of two years.

4. The internal examiner in a subject shall not accept external examinership for a college from which external examiner is appointed in his subject.

5. The same set of examiners shall ordinarily be responsible for the written, practical or part of examination.

6. There shall be a Chairman of the Board of paper – setters who shall be an external examiner and shall moderate the question papers.

7. The Head of the Department/Professor of the department/institution concerned shall ordinarily be one of the internal examiners and second internal examiner maybe from same institution or preferably other institution under same university. Two externals shall be from different universities at least one from different state

8. Number of candidates The maximum number of candidates to be examined in Clinical / practical and Oral on any day shall not exceed six for M.D./M.S. degree.

9. Number of examinations The university shall conduct not more than two examinations in a year, for any subject, with an interval of not less than 4 and not more than 6 months between the two examinations.

Evaluation of Answer Scripts

The answer books will be valued by two examiners.

One of the two examiners will be from this university and the other will be from any other university. The Average of the two marks secured by the candidate will be taken into account.

If the difference between two marks exceeds 15%, the answer scripts shall be valued by the third examiner. The average of the nearest two marks shall be considered as the final mark.

No re-evaluation of theory answer paper is permitted.

Suggested Reading

Books (latest edition)

1. Text book of Radiology & imaging – David Sutton
2. Diagnostic Radiology – Graninger& Allison

3. Diagnostic ultrasound – Volume I & II – Rumack Carol, M
4. Cranial MRI and CT – Lee S. Howard
5. CT and MR Imaging of the whole body – Haaga
6. Clinical Sonography : A Practical Guide – Sanders Roger
7. Chest Roentgenology – Felson Benjamin
8. Radiology of the Chest – Armstrong
9. HRCt of the Lung – Richard Webb
10. Introduction to Vascular Ultrasonography – Zweibel, W.J.
11. Ultrasound in Obstetrics & Gynecology – Peter W. Callen
12. Diagnostic Neuroradiology – Anne G. Osborn
13. Christensen's Physics of Diagnostic Radiology – Thomas S. Curry et al.
14. Clarke's Positioning in Radiology : R.A. Swallow et al
15. Fetal & Paediatric USG – Cohen
16. Applied Radiological Anatomy – Butler
17. Applied Radiological Anatomy – Butler
18. Clinical Doppler Ultrasonography – Paul L. Allen
19. Clinical Magnetic Resonance imaging – Edelman et al
20. Textbook of Gastrontestinal Radiology- Gore and Levine (Saunders)
21. MRI of Brain and Spine - Scott Atlas (LWW)
22. Diagnosis of Diseases of the Chest -Fraser
23. Diagnostic Imaging Series: (Amirsys, Elsevier) Abdominal Imaging, Orthopedics, Head and Neck, Neuroradiology, Pediatric Radiology Chest, Obstetrics, Breast
24. MRI in Orthopedics and Sport Injuries - Stoller
25. Skeletal Radiology - Greenspan
26. Abdominal-Pelvic MRI - Semelka (lWW)
27. Caffey's Pediatric Radiology
28. AIIMS-MAMC-PGI's Comprehensive Textbook of Diagnostic Radiology, Volumes 1, 2, 3

Journals 03-05 International Journals and 02 National

List of Journals

1) Indian Journal of Radiology and Imaging
2) Clinical Radiology
3) British Journal of Radiology
4) American Journal of Roentgenology
5) Radiology clinics in North America
6) Recent Advances in Radiology and Imaging
7) Text book of Radiology
8) Lancet
9) Journal of Diagnostic Medical Sonography
10) Seminar in Ultrasound
11) Clinical Nuclear Medicine
12) Journal of Vascular and Interventional Radiology
13) Journal of computed assisted Tomography.

Monitoring Learning Progress

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only also helps teachers to evaluate students, but also students to evaluate themselves. The monitoring be done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using checklists that assess various aspects. Model Checklists are given in this Chapter which may be copied and used.

The learning out comes to be assessed should included:

(i) Personal Attitudes, (ii) Acquisition of Knowledge, (iii) Clinical and operative skills, and (iv) Teaching skills.

i) Personal Attitudes. The essential items are:

- ❖ Caring attitudes
- ❖ Initiative
- ❖ Organisational ability
- ❖ Potential to cope with stressful situations and undertake responsibility
- ❖ Trust worthiness and reliability
- ❖ To understand and communicate intelligibly with patients and others
- ❖ To behave in a manner which establishes professional relationships with patients and colleagues
- ❖ Ability to work in team
- ❖ A critical enquiring approach to the acquisition of knowledge

The methods used mainly consist of observation. It is appreciated that these items require a degree of subjective assessment by the guide, supervisors and peers.

ii) **Acquisition of Knowledge :** The methods used comprise of `Log Book' which records participation in various teaching / learning activities by the students. The number of activities attended and the number in which presentations are made are to be recorded. The log book should periodically be validated by the supervisors. Some of the activities are listed. The list is not complete. Institutions may include additional activities, if so, desired.

Journal Review Meeting (Journal Club): The ability to do literature search, in depth study, presentation skills, and use of audio- visual aids are to be assessed. The assessment is made by faculty members and peers attending the meeting using a checklist (see Model Checklist – I)

Seminars / Symposia: The topics should be assigned to the student well in advance to facilitate in depth study. The ability to do literature search, in depth study, presentation skills and use of audio- visual aids are to be assessed using a checklist (see Model Checklist-II)

Clinico-pathological conferences : This should be a multidisciplinary case study of an interesting case to train the candidate to solve diagnostic and therapeutic problems by using an analytical approach. The presenter(s) are to be assessed using a check list similar to that used for seminar.

Medical Audit: Periodic morbidity and mortality meeting be held. Attendance and participation in these must be insisted upon. This may not be included in assessment.

iii) **Clinical skills**

Day to Day work : Skills in outpatient and ward work should be assessed periodically. The assessment should include the candidates' sincerity and punctuality, analytical ability and communication skills (see Model Checklist III).

Clinical meetings : Candidates should periodically present cases to his peers and faculty members. This should be assessed using a check list (see Model checklist IV).

Clinical and Procedural skills : The candidate should be given graded responsibility to enable learning by apprenticeship. The performance is assessed by the guide by direct observation. Particulars are recorded by the student in the log book. (Table No.3)

iv) Teaching skills : Candidates should be encouraged to teach undergraduate medical students and paramedical students, if any. This performance should be based on assessment by the faculty members of the department and from feedback from the undergraduate students (See Model checklist V)

vi) Periodic tests: In case of degree courses of three years duration, the concerned departments may conduct three tests, two of them be annual tests, one at the end of first year and the other in the second year. The third test may be held three months before the final examination. The tests may include written papers, practicals / clinicals and viva voce.

In case of diploma courses of two years duration, the concerned departments may conduct two tests, one of them be at the end of first year and the other in the second year three months before the final examination. The tests may include written papers, practicals / clinicals and viva voce.

vii) **Work diary / Log Book**- Every candidate shall maintain a work diary and record his/her participation in the training programmes conducted by the department such as journal reviews, seminars, etc. Special mention may be made of the presentations by the candidate as well as details of clinical or laboratory procedures, if any conducted by the candidate.

viii) **Records:** Records, log books and marks obtained in tests will be maintained by the Head of the Department and will be made available to the University or MCI.

Log book

The log book is a record of the important activities of the candidates during his training, Internal assessment should be based on the evaluation of the log book. Collectively, log books are a tool for the evaluation of the training programme of the institution by external agencies. The record includes academic activities as well as the presentations and procedures carried out by the candidate.

Format for the log book for the different activities is given in Tables 1,2 and 3 . Copies may be made and used by the institutions.

Procedure for defaulters: Every department should have a committee to review such situations. The defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the requirements in spite of being given adequate chances to set himself or herself right.

Format of Model Check Lists

Check List -I. MODEL CHECK-LIST FOR EVALUATION OF JOURNAL REVIEW PRESENTATIONS

Name of the Student: **Name of the Faculty/Observer:**

Date:

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Article chosen was					
2.	Extent of understanding of scope & objectives of the paper by the candidate					
3.	Whether cross references have been consulted					
4.	Whether other relevant publications consulted					
5.	Ability to respond to questions on the paper / subject					
6.	Audio-Visual aids used					
7.	Ability to defend the paper					
8.	Clarity of presentation					
9.	Any other observation					
	Total Score					

Check List - II

MODEL CHECK-LIST FOR EVALUATION OF SEMINAR PRESENTATIONS

Name of the Student: **Name of the Faculty/Observer:**
Date:

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Whether other relevant publications consulted					
2.	Whether cross references have been consulted					
3.	Completeness of Preparation					
4.	Clarity of Presentation					
5.	Understanding of subject					
6.	Ability to answer questions					
7.	Time scheduling					
8.	Appropriate use of Audio-Visual aids					
9.	Overall Performance					
10.	Any other observation					
	Total Score					

Check List - III

MODEL CHECK LIST FOR EVALUATION OF CLINICAL WORK IN WARD / OPD

(To be completed once a month by respective Unit Heads including posting in other departments)

Name of the Student: **Name of the Unit Head:**

Date:

Sl. No.	Points to be considered	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Regularity of attendance					
2.	Punctuality					
3.	Interaction with colleagues and supportive staff					
4.	Maintenance of case records					
5.	Presentation of cases during rounds					
6.	Investigations work up					
7.	Bedside manners					
8.	Rapport with patients					
9.	Counseling patient's relatives for blood donation or Postmortem and Case follow up.					
10.	Overall quality of Ward work					
	Total Score					

Check List - IV

EVALUATION FORM FOR CLINICAL PRESENTATION

Name of the Student: **Name of the Faculty:**

Date:

Sl. No	Points to be considered	Poor 0	Below Average 1	Average 2	Above Average 3	Very Good 4
1.	Completeness of history					
2.	Whether all relevant points elicited					
3.	Clarity of Presentation					
4.	Logical order					
5.	Mentioned all positive and negative points of importance					
6.	Accuracy of general physical examination					
7.	Whether all physical signs elicited correctly					
8.	Whether any major signs missed or misinterpreted					
9.	Diagnosis: Whether it follows logically from history and findings					
10	Investigations required ▪ Complete list					
	▪ Relevant order					
	▪ Interpretation of investigations					
11.	Ability to react to questioning Whether it follows logically from history and findings					
12.	Ability to defend diagnosis					
13.	Ability to justify differential diagnosis					
14.	Others					
	Grand Total					

Check List - V

MODEL CHECK LIST FOR EVALUATION OF TEACHING SKILL PRACTICE

Sl. No.		Strong Point	Weak Point
1.	Communication of the purpose of the talk		
2.	Evokes audience interest in the subject		
3.	The introduction		
4.	The sequence of ideas		
5.	The use of practical examples and/or illustrations		
6.	Speaking style (enjoyable, monotonous, etc., specify)		
7.	Attempts audience participation		
8.	Summary of the main points at the end		
9.	Asks questions		
10.	Answers questions asked by the audience		
11.	Rapport of speaker with his audience		
12.	Effectiveness of the talk		
13.	Uses AV aids appropriately		

Check list VI

MODEL CHECK LIST FOR DISSERTATION PRESENTATION

Name: **Faculty/observer:**
Date:

Sl. No.	Points to be considered divine	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Interest shown in selecting a topic					
2.	Appropriate review of literature					
3.	Discussion with guide & other faculty					
4.	Quality of Protocol					
5.	Preparation of proforma					

Checklist-VII

CONTINUOUS EVALUATION OF DISSERTATION WORK BY GUIDE / CO-GUIDE

Name of the Student: **Name of the Faculty/Observer:**
Date:

Sl. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Periodic consultation with guide/co-guide					
2.	Regular collection of case material					
3.	Depth of analysis / discussion					
4.	Departmental presentation of findings					
5.	Quality of final output					
6.	Others					
	Total Score					

LOG BOOK

Table 1 : Academic activities attended

Name: **Admission Year:**

College:

Date	Type of Activity Specify Seminar, Journal Club, Presentation, UG teaching	Particulars

LOG BOOK

Table 2 : Academic presentations made by the student

Name: **Admission Year:**

College:

Date	Topic	Type of Presentation Specify Seminar, Journal Club, Presentation, UG teaching etc.

LOG BOOK

Table 3 : Diagnostic and Operative procedures performed

Name: **Admission Year:**

College:

Date	Name	ID No.	Procedure	Category O, A, PA, PI*

* Key:
- O - Washed up and observed
- A - Assisted a more senior Surgeon
- PA - Performed procedure under the direct supervision of a senior surgeon
- PI - performed independently

Model Overall Assessment Sheet

Name of the College: Academic Year:

Sl. No	Faculty Member & Others	Name of Student and Mean Score									
		A	B	C	D	E	F	G	H	I	J
1											
2											
3											
4											
5											
Total Score											

Note: Use separate sheet for each year.