

The Draft CBME Curriculum for PG Clinical is being Circulated for Comments and Suggestions. The Suggestions are to be sent to RGUHS by mail to dcd.rguhs@gmail.com and copy to be mailed to Chairman BOS PG Clinical ravikdoc@gmail.com

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M.D. RADIO-DIAGNOSIS CURRICULUM

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PREAMBLE

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

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”.

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2. GOAL

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

The postgraduate training course would be to train a resident who will:

- Provide competent professional services, backed by scientific knowledge and skill base.
- Exercise empathy and a caring attitude and maintain high ethical standards.
- Continue to evince keen interest in continuing education in the specialty irrespective of whether he is in a teaching institution or is a practicing specialist.
- Be a motivated 'teacher' – defined as a specialist keen to share his knowledge and skills with a colleague or a junior or any learner.

3. 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.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain (Knowledge):

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

1. 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.
2. Independently conduct and interpret all routine and special radiological and imaging investigations.
3. Provide radiological services in acute emergency and trauma including its medico- legal aspects.
4. 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.
5. Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.
6. 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.
7. Able to formulate basic research protocols and carry out research in the field of Radiology- related clinical problems.
8. Acquire knowledge and teaching capabilities to work as a post graduate student /consultant in Radio diagnosis and conduct teaching programs for undergraduates, post graduates as well as paramedical and technical personnel.
9. Update oneself by self-study and by attending courses, conferences and seminars relevant to the specialty.
10. Interact with other specialists and super-specialists so that maximum benefit reaches to the patient.
11. Should be able to organize CME activities in the specialty utilizing modern methods of teaching and evaluation.
12. 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.

13. Undertake audit, use information technology tools and carry out research, both basic and clinical, with the aim of publishing his/her work and presenting the work at various scientific forums.

13. Acquire knowledge of Interventional Radiology.

B. Affective Domain (Attitude and Communication abilities)

- a) 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 in a congenial working atmosphere.
- b) Adopt ethical principles in all aspects of his/her practice. Care is to be delivered irrespective of the social status, caste, creed or religion of the patient. Respect patient's rights and privileges including patient's right to information and right to seek a second opinion.
- c) Develop communication skills to word reports, in particular the skill to explain various options available in management and to obtain a true informed consent from the patient. To take into account the social and economic, environmental aspects while planning diagnostic procedures.
- d) Apply high moral and ethical standards while carrying out human or animal research.
- e) Be humble and accept the limitations in his knowledge and skill and to ask for help from colleagues when needed.
- f) To apply radiation safe techniques to the patient.

B. Psychomotor Domain (Skills):

- a) Take a proper clinical history, examine the patient, perform essential diagnostic procedures and order relevant tests and interpret them to come to a reasonable diagnosis about the condition
- b) Provide basic and advanced lifesaving support services (BLS & ALS) in emergency situations. To perform basic interventional procedures.
- c) Undertake complete patient monitoring including the care of the patient.
- d) Developing skills in the art of discussing the case with clinicians and to maintain cordial relationship with other departments.
- e) Radiology principles in legal medicine and trauma care.

To acquire skills in diagnosing the diseases, two major aspects are:

- 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
2. Respiratory System
3. Cardiovascular System
4. Gastro-intestinal tract and hepato-biliary pancreatic system
5. Urogenital System
6. Central Nervous System (C.N.S.)
7. Imaging in Emergency Medicine.
8. Imaging in Obstetrics and Gynecology.
9. Imaging of Breast and interventional procedures.
11. 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) Skill in performing a procedure:

The student should be able to perform the following procedures:

Year	Procedural skill to be performed
1 st	<ul style="list-style-type: none">● Radiography - Conventional radiography and CR/ DR systems. (Including positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films).● GIT contrast studies - Barium studies (swallow, upper GI, Follow through, enema); fistulogram; sialogram; cologram/ileostogram● GU contrast studies - Excretory urography, MCU, RGU, nephrostogram, genitogram● Ultrasound: Studies of whole body including neonatal neurosonogram, doppler and antenatal studies.
2 nd	<ul style="list-style-type: none">● CT scan – Observership and positioning a patient, planning study as per the clinical indication, reconstruction of images, perform triple phase study; Interpretation of basic CT studies such as CT brain, CT abdomen

	<ul style="list-style-type: none"> ● MRI: Observership and positioning a patient, planning study as per the clinical indication, perform contrast studies; Understanding physics and basic sequences
3 rd / Final	<ul style="list-style-type: none"> ● CT: Perform & interpret all CT scans, including advanced applications like CT enterography, CT angiography etc. ● MRI: Planning and interpretation all CT scans, including advanced applications like MR spectroscopy, DWI, Angiography. ● 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. ● 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.). 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.

4. SYLLABUS: Course Contents

a) **Basic science related to Radio-diagnosis:**

Radiological Anatomy, Physiology and Pathology of different system of the body and Radiographic Techniques concerned to each system.

Radiological Physics and Radio-Biology: Fundamentals of electricity and electromagnetic induction, electromagnetic radiation, X-ray production, characteristic properties of X-Rays, units of radiation, radiation measurement, X-ray equipment, 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. Imaging Techniques

Physics and applications of advanced imaging i.e., Ultrasound, Computed Tomography, Magnetic Resonance imaging, Angiography (Digital Subtraction Angiography), Positron Emission Tomography, Single Photon Emission Computed Tomography, Conventional Radiography, Digital Radiography, Digital Fluoroscopy, Flat panel detector system etc. Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film less department, Tele-Radiology and Digital Imaging.

Basics of Radiotherapy and equipments of Radiotherapy: Clinical applications of important isotopes and instrumentation in Nuclear Medicine with advances in both.

b) **Respiratory system**

Diseases and disorders of Chest wall, Diaphragm, Pleural disease and air way disease, Pulmonary vasculature, Pulmonary infections, Pulmonary neoplasms, Diffuse lung disease, Mediastinal disease, Chest Trauma, Congenital and Acquired developmental conditions, Post-operative lung and Intensive care and Interventions.

c) **Gastro-intestinal tract and Hepato-biliary Pancreatic system –**

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. Newer methods of imaging Hepato-bilio-pancreatic system like Isotopes study, MRI, spiral CT and DSA.

d) **Central Nervous System (C.N.S.)**

Diseases and disorders of the head, neck and spine covering congenital, infective, vascular, traumatic neoplastic, degenerative, metabolic and miscellaneous conditions. Newer methods of imaging like perfusion studies, Cisternography, Tractography, MR spectroscopy.

e) **Cardiovascular system**

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.

f) Endocrinal system

Imaging of disorders, disease and congenital conditions of endocrinal glands – Pituitary, Adrenal, Thyroid, Para-thyroid and Pancreas.

g) Urogenital System –

Diseases and disorders of Genito-urinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.

h) Musculo-skeletal system:

Role of conventional, Ultrasound, Radio Nuclide studies, CT, MRI and interventions of disease, disorders and congenital conditions of muscles, soft tissue, bones and joints.

i) Women's imaging:

Role of imaging in Obstetrics, Gynecology and Breast imaging.

j) ENT, Eye and Dental imaging.

k) Imaging in Emergency medicine.

l) Interventional Radiology

Includes all procedures like Interventional Imaging and interventional treatment.

m) Recent trends and Advances

Includes all information and imaging information that is published in National and International Journals and references: Vascular Ultrasound, PACS, Digital X-ray, CT, MRI and Clinical applications of Nuclear Medicine.

The student should have knowledge of the following physics experiments:

- Check accuracy of kVp and timer of an X ray unit
- Check accuracy of congruence of optical radiation field
- Check perpendicularity of x ray beam
- Determine focal spot size
- Check linearity of timer of x ray unit
- Check linearity of mA
- Verification of inverse square law for radiation
- Check film screen contact
- Check film screen resolution
- Determine total filtration of an x ray unit
- Processor quality assurance test
- Radiological protection survey of an x ray unit
- Check compatibility of safe light
- Check performance of view box
- Effect of kVp on x ray output

Radiography and processing techniques

1. Processing techniques: includes dark room and dry processing.
2. Radiography of the Musculo-skeletal system including extremities.
3. Radiography of the chest, spine, abdomen and pelvic girdle.
4. Radiography of the skull, orbit, sinuses.
5. Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
6. Contrast techniques and interpretation of the Central Nervous system.
7. Contrast techniques and interpretation of the cardiovascular system including chest.
8. Contrast techniques and interpretation of the Genito - urinary system including Obstetrics and Gynecology.
9. Pediatric radiology including MCU, genitogram, bone age.
10. Dental, portable and emergency (casualty) radiography.

6. LIST OF PRESCRIBED COMPETENCIES FOR THE RESIDENTS

Abbreviations: *SGD*- Small group discussion, *OSCE*- (Objective Structured Clinical Examination),

WPBA- workplace based assessment.

Number	Year residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
1. RADIATION PHYSICS							
1.1	I	Discuss the history of discovery of X-rays & evolution.	K	K	N	Seminar	Short essay/ MCQ
1.2	I	Describe Electromagnetic radiation & its properties.	K	K	Y	Seminar	Short essay/ MCQ
1.3	I	Explain Production of X-rays, types & its properties.	K	KH	Y	Lecture	Written/Viva
1.4	I	Describe Interaction of X-rays with matter & their practical implications.	K	KH	Y	Symposium	Short essay/ MCQ
1.5	I	Discuss principles, parts & types of X-ray tube & its dissipation mechanisms.	K	KH	Y	SGD/ Lecture	Short essay/ MCQ/ OSCE/ demonstration
1.6	I	Explain principles & types Electric generators including rectifiers & transformers	K	KH	Y	Symposium/ SGD	Short essay/ MCQ/ viva
1.7	I	Discuss Collimators & filtration of X- rays	K	KH	Y	Lecture/ demonstration	Short essay/ MCQ/ viva
1.8	I	Describe principles of beam restricting devices & their applications	K	KH	Y	Symposium/ demonstration	Short essay/ MCQ/ viva
1.9	I	Discuss scattered radiation & Explain construction, principles, types, applications of grids & grid artefacts	K	KH	Y	SGD/ Lecture	Short essay/ MCQ/ demonstration

1.10	I	Explain construction, types of film, cassettes, screens & their applications	K	KH	Y	SGD/ Lecture	MCQ/ demonstration
1.11	I	Identify X-ray Tube, Collimator, Filters, Film, Cassette, Screens & grid	S	SH	Y	demonstration	OSCE/ viva
1.12	I	Explain process of latent image formation	K	KH	Y	SGD/ Lecture	Short essay
1.13	I	Demonstrate steps of manual processing of radiographic film in dark room, loading & unloading of cassette.	S	SH	Y	demonstration	Long Essay
1.14	I	Discuss layout of darkroom & its siting.	K	KH	Y	Lecture/ demonstration	Long Essay/ demonstration
1.15	I	Demonstrate processing of film in auto-processor	S	SH	Y	demonstration / SGD	Demonstration/ MCQ
1.16	I	Compare manual processing with auto-processing	K	KH	Y	SGD	Short essay/ MCQ
1.17	I	To list & describe the factors affecting the image quality in conventional radiography.	K	KH	Y	SGD	Short essay/ MCQ
1.18	I	Demonstrate the ability to adjust & comment on the exposure factors during acquisition of radiograph.	S	SH	Y	Symposium	demonstration
1.19	I	To describe the principles of mammography	K	KH	Y	Seminar	Short essay
1.20	I	To list & discuss the uses of devices to improve the radiographic quality.	K	KH	Y	Seminar	Long Essay
1.21	I	To explain the principle of digital imaging acquisition (CR/DR) & compare with conventional radiography.	K	KH	Y	Seminar	Long Essay

1.22	I	To describe the principles of Fluoroscopy, Image Intensifier & list the techniques to reduce radiation.	K	KH	Y	Symposium	Short essay
1.23	I	Classify and describe contrast media used in fluoroscopic procedures and CT scans.	K	KH	Y	Seminar	Long Essay
1.24	I	Demonstrate the ability to identify contrast reaction and manage them appropriately.	S	SH	Y	SGD	Case presentation
1.25	I	To explain miniature radiography, Xero-radiography, duplication & magnification techniques.	K	KH	Y	SGD	Short essay
1.26	I	Identify artefacts in Conventional and Digital radiography and suggest corrective measures.	S	SH	Y	Symposium/ Lecture	OSCE
1.27	I	Demonstrate & interpret radiography of extremities, skull, spine, abdomen, thorax & pelvic girdle.	S	SH	Y	Demonstration	Log book
1.28	I	Describe nature of ultrasound waves, propagation velocity intensity & equations.	K	KH	Y	Seminar	Short essay
1.29	I	To explain principles of acoustic impedance & list tissue properties that determine it.	K	KH	Y	Seminar	Short essay/ viva
1.30	I	Describe the principles of piezoelectric effect.	K	KH	Y	Seminar/ Lecture	Short essay
1.31	I	Discuss construction of ultrasound transducer & its types	K	KH	Y	Lecture	Short essay/ MCQ

1.32	I	Enumerate different modes of ultrasound.	K	K	Y	Seminar	Short essay
1.33	I	Explain principles of spatial & temporal resolution of ultrasound images.	K	KH	Y	SGD	demonstration / Short essay
1.34	I	Demonstrate ability to use the knobs of ultrasound equipment for optimum image quality.	S	SH	Y	demonstration	Demonstration/ Short essay
1.35	I	Explain Doppler effect & application of pulsed & continuous wave Doppler & spectral wave form analysis.	K	KH	Y	Lecture	WPBA
1.36	I	Demonstrate correct method of acquiring the Doppler waveform & interpret.	S	SH	Y	demonstration	demonstration
1.37	I	Describe & identify major artefacts of ultrasound & Doppler artefacts & list their causes & utility.	K/S	KH/SH	Y	SGD	Long Essay
1.38	I	Describe thermal, mechanical biological effects of ultrasound waves	K	KH	Y	Seminar	Short essay
1.39	II	Describe ultrasound contrast media, indications & limitations.	K	KH	Y	Self-directed learning	Long Essay
1.40	I	Discuss principles of Tomography.	K	KH	Y	Self-directed learning	Short essay
1.41	I	Describe generations of CT scanners and its detectors	K	KH	Y	Workshop/ Symposium	Long Essay
1.42	II	Discuss image reconstruction algorithms and process of image display in CT.	K	KH	Y	Workshop/ Self-directed learning	Short essay
1.43	I	Describe the concept of Hounsfield units, window width and window level and their application in interpretation.	K	KH	Y	Workshop/ Symposium	Short essay

1.44	I	Demonstrate the ability to position the patient for CT scan of various body parts and perform scans optimally.	S	SH	Y	demonstration	demonstration
1.45	I	Discuss CT dosimetry including CTDI and DLP and their optimization and CT dose reduction.	K	KH	Y	Self-directed learning	Short essay
1.46	I	Identify CT artefacts and suggest corrective measures.	S	SH	Y	demonstration	demonstration
1.47	II	Describe Nuclear magnetic resonance and basic principles of image formation in MRI.	K	KH	Y	Symposium	Long Essay
1.48	II	Explain instrumentation of MRI and utility of RF coils.	K	KH	Y	Self-directed learning	Long Essay/ Short essay
1.49	II	Discuss principles and applications of basic sequences of MRI including Spin echo, gradient, inversion recovery, fat Suppression techniques and echo-planar imaging.	K	KH	Y	Self-directed learning/ SGD	Long Essay/ Workshop
1.50	II	Demonstrate the positioning of patient and RF coils in the MRI for MRI scan of various body parts.	S	SH	Y	Symposium	demonstration

1.51	II	Plan MRI sequences for different body parts and conditions on console for optimal image acquisition and interpret images.	S	SH	Y	Demonstration/	OSCE/ demonstration
1.52	II	Describe MRI artefacts and MRI safety measures.	K	KH	Y	Problem based learning	Short essay/ MCQ
1.53	II	Name and explain MRI contrast media, their applications and adverse effects.	K	KH	Y	Lecture/ demonstration	Short essay/ MCQ
1.54	III	Perform and interpret advances MRI sequences like Angiography, diffusion, perfusion spectroscopy and functional MRI.	S	SH	Y	demonstration	Short essay/ MCQ
1.55	III	Describe principles, techniques and applications of PET, SPECT, Scintigraphy.	K	KH	Y	Self-directed learning/ Symposium	Long Essay
1.56	I	Discuss different types of cameras.	K	KH	Y	Self-directed learning/ Symposium	Long Essay
1.57	I	Demonstration of printing a film.	K/S	KH/SH	Y	demonstration	demonstration
2. CLINICAL RADIOLOGY AND IMAGING INFOMATICS							
2.1	I	Practice eliciting appropriate clinical history and perform examination prior to imaging.	S	SH	Y	Seminar	demonstration
2.2	I	Explain to the patient regarding preparation required prior to imaging	A	SH	Y	Self-directed learning	Log book
2.3	I	Communicate the results of imaging to the patient and counsel appropriately.	A	SH	Y	Problem based learning	Log book
2.4	I	Explain the infrastructure of imaging informatics including Picture Archiving & Communicating Systems (PACS), RIS & HIS.	K	KH	Y	SGD	Long Essay/ Short essay

2.5	I	List informatics standards including DICOM.	K	KH	Y	Symposium	Short essay
2.6	I	Demonstrate ability to retrieve archive cases from PACS	S	SH	Y	demonstration	demonstration
2.7	I	To discuss Tele-Radiology, Tele-medicine & e- learning tools	K	KH	Y	SGD	Long Essay
2.8	I	Demonstrate ability to use the imaging console including various image reformation applications.	S	SH	Y	Demonstration/ SGD	demonstration
2.9	I	Discuss ergonomics of Radiology console room including view box, monitors etc..	K	KH	Y	Symposium	demonstration
2.10	I	Adapt standardized templates of structured reporting.	S	SH	Y	SGD	WPBA
2.11	I	Enumerate biological effects of radiation & principles of radiation protection including ALARA.	K	KH	Y	SGD	Long Essay
2.12	I	Discuss radiation dosimetry, dose recommendations & regulatory boards	K	KH	Y	Self-directed learning	Long Essay
2.13	I	Planning of radiology department	K	KH	Y	Problem based learning	Short essay
2.14	I	Demonstrate the correct usage & parts of various dosimeters and radiation protection equipments.	S	SH	Y	Demonstration/ SGD	Long Essay
2.15	I	Discuss methods of reducing the radiation dose to patients.	K	KH	Y	SGD	Long Essay

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
3. RESPIRATORY SYSTEM							
3.1	I	Describe Segmental anatomy of lungs, pulmonary circulation	K	K	Y	Self-directed learning	Short essay
3.2	I	Interpretation of normal chest radiograph	K	K	Y	Self-directed learning	demonstration
3.3	I	Demonstrate Positioning and techniques of chest radiograph	K,S	SH,P	Y	demonstration	Log book
3.4	I	History taking for lung pathologies	K,A,C	K,P	Y	Self-directed learning	Log book
3.5	I	Planning for HRCT chest protocol and Pulmonary angiogram	K,S	SH,P	Y	demonstration	Long Essay
3.6	I	Radiographic patterns of Pulmonary infections in children and adults	K	KH	Y	Seminar	Short essay
3.7	I	Radiographic features of lung tumors	K	KH	Y	Seminar	Short essay
3.8	I	Radiographic features of ILD	K	KH	Y	Lecture	Long Essay
3.9	I	Describe the mechanism and causes of lung collapse. Discuss the imaging of various pattern of lung collapse.	K	KH	Y	Symposium	Short essay
3.10	II/III	Role of CT in Pulmonary infections	K	KH	Y	Seminar	Long Essay
3.11	II/III	Classify Lung tumors and discuss role of	K	KH	Y	Seminar	Short essay

		CT and MRI in evaluation of lung tumors					
3.12	II/III	HRCT patterns in ILDs	K	KH	Y	Symposium	Long Essay
3.13	II/III	Describe the imaging features of occupational lung diseases	K	KH	Y	Seminar	Long Essay
3.14	II/III	USG guided pleural fluid aspiration and pig tail insertion	S	SH,P	Y	SGD	Long Essay
3.15	II/III	USG/CT guided FNAC/Biopsy of lung mass	S	SH,P	Y	Symposium	Long Essay
3.16	II/III	Role of imaging in pulmonary thrombo embolism	K	KH	Y	Seminar	Short essay
3.17	II/III	Discuss the pre and postnatal imaging features of congenital lung diseases	K	KH	Y	Seminar	Long Essay
3.18	II/III	Imaging evaluation of respiratory distress in newborn.	K	KH	Y	Lecture	Long Essay
3.19	II/III	Discuss the imaging of cystic and cavitating lesions of the lung	K	KH	Y	SGD	Long Essay
3.20	II/III	Imaging approach to a case of solitary pulmonary nodule	K	KH	Y	SGD	Long Essay
3.21	II/III	Imaging in non-infective granulomatous diseases	K	KH	Y	Symposium	Short essay
3.22	II/III	Imaging approach to mediastinal mass	K	KH	Y	Seminar	Short essay
3.23	II/III	Imaging findings of diaphragm and related pathologies	K	KH	Y	Seminar	Short essay
3.24	II/III	Imaging of the pleural and chest wall and rib pathologies	K	KH	Y	Lecture	Long Essay

3.25	II/III	Imaging in pulmonary edema and ARDS	K	KH	Y	Demonstration/ Symposium	Short essay
3.26	II/III	Imaging in chronic obstructive air way disease	K	KH	Y	Seminar	Short essay
3.27	II/III	Chest radiography in trauma, ICU care and post op period	K	KH	Y	demonstration	demonstration
3.28	II/III	Imaging in poisoning, drowning, post chemo-radiotherapy	K	KH	Y	demonstration	demonstration
3.29	II/III	Vascular Intervention procedures related to respiratory system	K	KH	Y	Symposium/ Workshop	Long Essay

No	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y / N)	Suggested teaching Learning method	Suggested assessment method
4. GASTROINTESTINAL SYSTEM							
4.1	I	Describe the basic anatomy and physiology in clinical practice relevant to imaging examinations of the gastrointestinal tract, hepatobiliary tract, pancreas	K/S	K/KH/S H	Y	Seminar	Long Essay
4.2	II	Choose appropriate imaging protocol considering different pathologies of gastrointestinal system.	K/S/ A	K/KH/S H	Y	SGD	Short essay
4.3	III	Understand the common surgical procedures, expected post-operative imaging appearances and common complications	K	K/KH	Y	Demonstration	demonstration

4.4	II	To understand indications, contraindications and limitations of relevant specialized barium/contrast imaging examinations of the gastrointestinal and hepatobiliary tract and to perform them.	K/S	K/KH/S H	Y	Demonstration	Demonstration / Workshop/ Case presentation
4.5	III	To confidently report abdominal radiographs and to propose other imaging techniques in cases of acute abdomen	K/A	K/KH/P	Y	demonstration	demonstration / Case presentation
4.6	III	Observe and perform other investigations done using fluoroscopic guidance - fistulogram, sinogram, T-tube cholangiography, sialography etc.	K/S	K/KH/SH	Y	Demonstration/SGD	Long Essay/ demonstration / Log book
4.7	III	Observe the performance of examination of liver, biliary system and pancreas using all the imaging modalities including specialized investigations like ERCP, PTC and interventional procedures like abscess drainage, percutaneous trans hepatic biliary drainage (PTBD, internal and external), tumor embolization, radiofrequency (RFA) ablation etc.	K/S	K/KH	Y	SGD/ Workshop	Long Essay/ Log book
4.8	II	Understand the indications and limitations of ultrasound, CT and MR in gastrointestinal system and the role of DSA and	K	K/KH	Y	SGD/ demonstration	Log book/ OSCE

		isotope studies.					
4.9	II	Understand indications, limitations and contraindications of various interventional radiology techniques	K	K/KH	Y	Workshop/ SGD	WPBA/ Log book
4.10	II	Describe the imaging features of diseases and disorders of omentum, peritoneum and mesentery.	K	K/KH	Y	Lecture/ SGD	Long Essay
4.11	II	Discuss the imaging features of diseases and disorders of hepato-biliary-pancreatic system.	K/S	K/KH/SH	Y	SGD/ Symposium	Long Essay
4.12	III	Esophagus: Describe the anatomy and normal appearances, plan and perform the Radiological investigation like barium studies, CT, MRI) and to describe the imaging features of various diseases like hiatus hernia, oesophagitis, neoplasm, oesophageal varices, associated dermatological conditions, trauma, oesophageal web, motility disorders, oesophageal diverticulum, extrinsic oesophageal compression, post-operative changes, scintigraphy.	K/S	K/KH/SH	Y	Seminar	Short essay

4.13	II	The Stomach –Describe the anatomy and normal appearances, plan and perform the radiological and imaging investigations and to describe the imaging features of various diseases like inflammatory diseases, tumors, structural and functional abnormalities, extrinsic masses, post- operative stomach- USG, CT, MRI, examination, radionuclide studies	K/S	K/KH/SH	Y	Seminar	Short essay
4.14	II	The Duodenum and small Bowel-Describe the anatomy and normal appearances, plan and perform the radiological investigations (barium meal follow through, enteroclysis, CT, MRI, with CT/MRI enteroclysis, virtual endoscopy) and to describe the imaging features of various diseases like neoplasms, infections, and infestations, radiation enteritis, mechanical small bowel intestinal obstruction, ischemia, intramural hemorrhage, diverticulitis, neuromuscular disorders, malabsorption syndromes, immunological disorders etc.	K/S	K/KH/SH	Y	Seminar	Short essay/ demonstration

4.15	III	Large Bowel- Describe the anatomy, colonic function, plan and perform the investigations like (Barium, CT, MRI, Colonography, virtual colonoscopy) and to describe the imaging features of various diseases like tumors, diverticular diseases, colitis, miscellaneous conditions, appendicitis, Scintigraphy detection of bleeding,	K/S	K/KH/SH	Y	Seminar/ Lecture	Short essay/ demonstration
4.16	I	Liver: Describe the gross anatomy, plain film diagnosis, investigations like USG, CT, MRI, MRCP, PTC, ERCP, T-tube cholangiography, vascular studies, hepatobiliary interventions.,	K/S	K/KH/SH	Y	Seminar/ Symposium	Long Essay/ Log book
4.17	I	Understand the pathophysiology of portal hypertension and role of imaging.	K	KH	N	Seminar/ Symposium	Long Essay/ Log book
4.18	II	Plan, perform and interpret imaging of liver for focal masses, diffuse liver disease, and inflammatory diseases of liver,	K/S	K/KH/SH	Y	Symposium/ demonstration	Short essay/ MCQ

4.19	II	Describe the imaging features of various gall bladder and biliary diseases, gall bladder masses,	K	K/KH	Y	Problem based learning	Short essay/ MCQ
4.20	II	Understand the pre and post operative assessment and imaging in liver transplantation.	K	K/KH	Y	demonstration	demonstration
4.21	II	To plan, perform and interpret the imaging of various pathologies of spleen.	K	K/KH/SH	Y	Lecture/ Seminar	Short essay
4.22	I	Pancreas- Describe the embryology, radiological anatomy, perform and interpret radiological techniques of examination to arrive at diagnosis and observe the interventional treatment of diseases of Pancreas.	K/S	K/KH/SH	Y	Long Essay/ Symposium	Short essay/ MCQ
4.23	II	Understand and describe the GI manifestation of AIDS; Radiological evaluation, techniques, lesions, oesophagitis, lesions involving stomach, small bowel, colon, biliary tract, lymphadenopathy	K/S	K/KH	Y	Long Essay/ demonstration /Problem based learning	demonstration / Short essay

4.24	II	List indications and assist & interpret GI angiography, SMA & IMA angiography, angiography in portal hypertension, PTA and mesenteric ischemia.	K/S	K/KH	N	Long Essay/ demonstration /Problem based learning	demonstration / Short essay
4.25	III	Pediatric GI imaging: to understand, plan, perform and interpret imaging of various pediatric GI pathologies like intestinal obstruction, atresia, atresia, small bowel atresia, anal atresia and imperforate anus, anomalies of rotation and mid gut volvulus, enteric	K/S	K/KH/SH	Y	Long Essay/ demonstration /Problem based learning	demonstration / Short essay
		duplication, hypertrophic pyloric stenosis, gastro oesophageal reflux and hiatus hernia, Hirschsprung's disease, colonic immaturity, neonatal small left colon syndrome, meconium plug syndrome, meconium ileus, intussusceptions, necrotizing enterocolitis					
4.26	II	Plan, perform an interpret various imaging in abdominal trauma.	K/S	K/KH/SH	Y	Long Essay/ demonstration /Problem based learning	demonstration / Short essay

4.27	III	Enumerate the causes and describe the pathophysiology of vascular conditions of Bowel and Mesentery and to plan, perform and interpret appropriate imaging technique including scintigraphy for diagnosis of GI bleeding and ischemic bowel disease.	K	K/KH/SH	Y	Long Essay/ demonstration /Problem based learning	demonstration / Short essay
4.28	II	Perform the sonological examination of abdomen	K /S	K/KH/SH	Y	demonstration	OSCE

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
5. CENTRAL NERVOUS SYSTEM							
5.1	I	Describe the skull base anatomy and identify different neural foramina.	K	K	Y	Seminar	Long Essay
5.2	I	Identify the grey and white matter appearance in different MRI sequences. Application of different MR sequences in CNS.	K	K	Y	Seminar	demonstration
5.3	I	Describe arterial anatomy of circle of Willis. Imaging features and interventions in aneurysm of circle of Willis.	K	P	Y	Lecture	Short essay
5.4	I	Imaging anatomy of Dural venous sinuses and imaging findings of cerebral venous thrombosis.	K	KH	Y	Seminar	Short essay/ MCQ

5.5	I	Describe the course of Cranial nerves and imaging anatomy.	K	K	Y	Symposium	Short essay
5.6	I	MR anatomy of Hippocampus. Imaging in Epilepsy	K	KH	Y	Symposium	Long Essay
5.7	I	Radiological anatomy of Sella turcica. Imaging features of pituitary adenoma.	K/C	S	Y	Seminar	Long Essay
5.8	I	Anatomy of CP angle. Discuss imaging features of lesions in CP angle with approach	K	SH	Y	Seminar	Short essay
5.9	I	Describe the imaging appearance of acute extra axial and intra axial hemorrhage.	K	K	Y	demonstration	Long Essay
5.10	II	Innumerate causes and imaging features of non- traumatic hemorrhage.	K/A	K	Y	Symposium	Short essay/ MCQ
5.11	II	Classify AV malformations of brain. Imaging features and interventions in AV malformation of brain.	K/S	P	Y	SGD	Seminar
5.12	II	WHO classification of the CNS neoplasm. Imaging features of extra axial and intra axial neoplasms.	K	K	Y	Symposium	Short essay
5.13	II	Intraventricular tumors approach.	S	P	Y	SGD	Short essay/ MCQ
5.14	II	Imaging features of Meningioma with differential diagnosis.	K	K	Y	Long Essay	Short essay
5.15	II	Differential diagnosis and imaging findings of intracranial neoplasm that cross midline.	K/S	KH	Y	Seminar	Short essay
5.16	III	Innumerate posterior fossa neoplasms/Imaging approach in posterior fossa neoplasms	K	SH	Y	Lecture	Short essay/ MCQ

5.17	III	Differential diagnosis cystic lesions posterior fossa. Describe in detail about imaging findings in Dandy walker malformations	K	S	Y	Symposium	Short essay
5.18	III	Innumerate causes of suprasellar masses. Describe imaging features of craniopharyngioma.	K/S	SH	Y	Symposium/ Lecture	Short essay
5.19	II	Pathogenesis of Hypoxic ischemic encephalopathy	K/A	P	Y	Lecture	Long Essay
5.20	II	Arnold Chiari malformation	S	K	Y	Seminar	Short essay
5.21	II	Imaging in neonatal hydrocephalus	K	P	Y	Seminar	Short essay
5.22	II	Classification of spinal dysraphism. Approach for diagnosis of spinal dysraphism.	K / A	P	Y	Symposium	Long Essay
5.23	III	Imaging findings in Holoprosencephaly	K/S	SH	Y	Seminar	Long Essay
5.24	III	Tethered cord syndrome.	C	SH	Y	Lecture	Long Essay
5.25	III	Imaging in Craniosynostosis	K/S	K	Y	Lecture	Short essay/ MCQ
5.26	III	Imaging features in TORCH infection in neonates	K	SH	Y	Symposium	Short essay
5.27	II	CNS manifestations in HIV	K	K	Y	Symposium	Long Essay
5.28	III	Imaging in CNS tuberculosis. Differences between NCC and CNS Tuberculomas.	K/C	KH	Y	Symposium	Short essay
5.29	II	Imaging techniques and findings in neurodegenerative diseases	K	KH	Y	Symposium	Short essay
5.30	III	Innumerate various Neurocutaneous syndromes and describe in detail the imaging features of TS / SWS.	K/S	SH	Y	SGD	Long Essay

5.31	III	Multiple sclerosis and its mimics	K/S	K	Y	Symposium	Short essay
5.32	III	MR Cisternography. Enumerate subarachnoid cisterns and its normal anatomy.	S	P	Y	Symposium	Long Essay

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
6. CARDIOVASCULAR SYSTEM							
6.1	I	Describe cardiac anatomy and embryology to better understand structural defects	K	KH	Y	Seminar	Long Essay
6.2	I	Describe pericardial anatomy and enumerate pericardial pathologies	K	K	Y	Seminar	Short essay
6.3	I	Describe vascular anatomy with appropriate embryological anatomy	K	KH	Y	Lecture/ SGD	Short essay/ MCQ
6.4	I	Describe coronary vascular anatomy, normal and abnormal variations	K	K	Y	Symposium	Long Essay
6.5	I	Describe Radiographic (X-ray) cardiovascular anatomy, views obtained and imaging appearances of pathologies	K/S	KH/ SH	Y	Seminar	Short essay
6.6	II	Describe imaging methods, variations, protocols, indications, contraindications of cardiac and coronary CT and angiography	K/S /C	KH/ SH	Y	SGD	Short essay/ MCQ
6.7	III	Describe imaging methods, variations, protocols, indications, contraindications of cardiac and coronary MRI and	K/S /C	KH/ SH	Y	Workshop	OSCE

		angiography					
6.8	II	Describe cardiomyopathies and role of imaging in the diagnosis of the same	K	KH	Y	Seminar	Long Essay
6.9	III	Describe various congenital heart diseases, with the understanding of embryology, physiology, flow dynamics, imaging methods and appearances, and briefly about available treatment techniques (Including interventions)	K	KH	Y	Symposium	Short essay/ Long Essay
6.10.	III	Describe various pericardial pathologies and their imaging assessment	K	K	Y	Seminar	Short essay
6.11.	III	Describe role of imaging in the assessment of ischemic heart disease, imaging techniques with more knowledge about role of MRI and nuclear imaging techniques	K	KH	Y	Workshop	OSCE
6.12.	III	Role of cardiac nuclear imaging techniques	K	K	Y	Lecture	Long Essay
6.13	III	Described aneurysms (Thoracic and abdominal), pseudo aneurysms, dissections, vascular emergencies, vascular malformations, Coarctations and other vascular anomalies with detailed knowledge about role of interventional radiology in the management	K	KH	Y	SGD	Short essay
6.14	III	Described valvular pathologies, radiographic appearances and role of MRI	K	K	Y	Seminar	Short essay/ MCQ

		in diagnosis and prognostication of these pathologies					
6.15	II	Described role of imaging techniques in the detection of vasculitis	K	K	Y	Self-directed learning	Log book
6.16	III	Described cardiac tumors, imaging mimics and role of imaging	K	KH	Y	Problem based learning	Long Essay
6.17	II	Role of ultrasound in the detection and diagnosis of arterial pathologies including thrombosis, aneurysms and PVD's (Integrated approach with knowledge of Interventional Radiology)	K/ S/C	KH/SH /P	Y	Workshop/ demonstration	demonstration
6.18	III	Role of ultrasound in the detection and diagnosis of venous pathologies including thrombosis and varicosities (Integrated approach with knowledge of Interventional Radiology)	K/ S/C	KH/SH /P	Y	demonstration	demonstration

6.19	III	Role of Ultrasound in the diagnosis and management of Carotid and extra cranial vertebral artery pathologies (Integrated approach with knowledge of Interventional Radiology)	K/ S/C	KH/SH /P	Y	SGD	Case presentation
6.20	II	Described 2D echocardiography and understand basic views and imaging appearances	K	K	Y	demonstration	demonstration

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
7. GENITOURINARY SYSTEM							
7.1	I	Describe embryologic development of Genito urinary tract	K	KH	Y	demonstration	demonstration
7.2	I	Describe the anatomy, and functions of Genito -urinary tract and role of imaging	K	K,SH,	Y	Seminar	Long Essay
7.3	II	Role of different imaging modalities in GUT pathologies.	K,S	K,SH,P	Y	SGD/ Workshop	OSCE
7.4	I	Value of Plain KUB X –ray in renal/ureter/bladder /Adrenal lesions.	K,S,	K,SH	Y	Seminar	Short essay
7.5	II	Enumerate common congenital anomalies of Genito- urinary system and role of imaging in diagnosis	K,A	KH,SH	Y	Lecture	Short essay/ MCQ
7.6	II	Antenatal evaluation of Genito-urinary system	K, S, C	KH,SH,P		demonstration	demonstration
7.7	II	Describe fetal cystic renal diseases and value of imaging	K,S	KH,SH	Y	Seminar	Short essay/ MCQ
7.8	II	Grading and Imaging in Vesico ureteric reflux	K,S	KH,SH	Y	Self-directed learning	Long Essay/ Log book
7.9	II	Describe etiology, clinical presentation and the role of imaging in urinary tract infections	K,S	KH,SH	Y	Seminar	Long Essay
7.10	II	Imaging in renal trauma and grading.	K,S,C	KH,SH,P	Y	demonstration	demonstration / Log book

7.11	III	Describe Role of various imaging modalities in obstructive uropathy	K,S,C	KH,SH	Y	Seminar	Case presentation
7.12	II	Describe etiopathogenesis of Reno- vascular hypertension and role of various imaging modalities	K,S	KH,SH,P	Y	Lecture/ SGD	Short essay/ MCQ
7.13	II	Discuss Cystic renal lesions in pediatrics and adults Role of different imaging modalities	K,S	KH,SH	Y	Problem based learning	Viva
7.14	III	Describe acute and chronic renal failure and role of different imaging modalities .	K,S	KH,SH	Y	Lecture	OSCE
7.15	III	Describe medical renal disease and role of imaging	K,S	KH,SH	Y	demonstration	demonstration
7.16	II	Etiologies of hematuria and value of imaging in hematuria	K,S	KH,SH	Y	SGD	Short essay/ MCQ
7.17	II	Causes and Imaging in unilateral and bilateral renal enlargement	K,S	KH,SH	Y	Symposium/ Lecture	demonstration
7.18	III	Imaging in renal cortical necrosis	K,S	KH,SH	Y	Seminar	Short essay
7.19	III	Classify pediatric renal neoplasms and value of imaging modalities	K,S	KH,SH	Y	Lecture	Long Essay
7.20	II	Classify adult renal tumors and discuss the role of imaging in evaluation of renal tumors	K,S	KH,SH	Y	Long Essay/ SGD	Long Essay
7.21	III	Describe the role of imaging in renal transplantation and its complications	K,S	KH,SH	Y	Seminar	Short essay
7.22	II	Classify urachal	K,S	KH,SH,P	Y	Lecture	Short essay/ MCQ

		anomalies and value of imaging					
7.23	II	Describe the congenital anomalies of urinary bladder	K,S	KH,SH	Y	Problem based learning	Case presentation
7.24	III	Imaging in bladder trauma and grading	K,S,C	KH,SH,P	Y	Self-directed learning	Short essay
7.25	II	Describe infective and inflammatory conditions of bladder	K,S	KH,SH	Y	Lecture/ SGD	Long Essay
7.26	III	Classify bladder neoplasms and role of imaging	K,S	KH,SH	Y	Seminar	Long Essay
7.27	I	Describe benign disorders of prostate and role of imaging	K,S	KH,SH,P	Y	SGD/ Seminar	Short essay
7.28	III	Describe the role of imaging in Prostatic neoplasms	K,S	KH,SH	Y	demonstration	demonstration
7.29	III	Describe congenital/acquired urethral lesions and value of imaging modalities	K,S	KH,SH	Y	Seminar	Short essay
7.30	II	Describe the anatomy, congenital anomalies of testis and role of imaging	K,S	KH,SH	Y	Seminar	Short essay/ MCQ
7.31	II	Describe the evaluation of testicular trauma and value of imaging in trauma	K,S,C	KH,SH,P	Y	Seminar/ Lecture	Short essay
7.32	II	Describe various causes of acute scrotum and role of imaging	K,S,A,C	KH,SH,P	Y	Problem based learning	OSCE
7.33	III	Describe imaging in extra testicular scrotal disorders - extra testicular neoplasms, hydrocele ,	K,S	KH,SH,P	Y	Self-directed learning	Demonstration/ Short essay

		varicocele etc..					
7.34	II	Classify testicular tumors and role of imaging	K,S	KH,SH	Y	Seminar	Long Essay/ Case presentation
7.35	II	Describe The normal physiology of erection with a sound knowledge on role of imaging in erectile dysfunction.	K,S,A,C	KH,SH,P	Y	Lecture	Short essay
7.36	II	Describe the Various causes of male infertility and role of imaging	K,S,C	KH,SH	Y	SGD	Short essay/ MCQ
7.37	III	Describe and classify intersex disorders and role of imaging	K,S,C	KH,SH	Y	Seminar	Short essay/ MCQ
7.38	I	Describe the normal anatomy of retro peritoneum/ and imaging approach to retroperitoneal masses	K	KH,SH	Y	Long Essay	OSCE

No	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH /P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
8. MUSCULOSKELETAL SYSTEM							
8.1	I	Draw a neat labelled diagram of carpal tunnel. Describe the role of various imaging modalities in carpal tunnel syndrome.	K	K	Y	demonstration	Short essay
8.2	I	Describe anatomy of growth plate. Describe salter Harris classification of fractures.	K	K	Y	Seminar	Short essay/ MCQ
8.3	I	Describe the radiological anatomy of knee joint and pathological conditions of knee joint.	K	K	Y	Seminar/ Lecture	Long Essay
8.4	I	Describe MRI anatomy of shoulder joint.	K	K	Y	SGD	Long Essay
8.5	I	Describe the role of MRI in rotator cuff injuries	K/S/C	KH/SH	Y	Problem based learning	Case presentation
8.6	I	Describe the calcium metabolism and radiological changes in hyperparathyroidism.	K	K	Y	Seminar	Short essay/ MCQ
8.7	I	Discuss various radiographic techniques of patella.	K	K	Y	Problem based learning	Case presentation
8.8	I	Bone scintigraphy	K/S/C	KH/SH	Y	Workshop	Demonstration/ OSCE

8.9	I	Radiography of scaphoid	K	K	Y	demonstration	demonstration
8.10	II	Classify bone tumors in detail. Describe radiological features of osteo sarcoma.	K	KH/SH	Y	Symposium	Short essay/ MCQ
8.11	II	Enumerate the causes of osteolytic lesion of bone. Describe the radiological approach in a case of osteolytic lesion.	K/S	KH/SH	Y	Lecture	Long Essay
8.12	II	Classify periosteal reaction, Describe various periosteal reaction in detail.	K/S	KH/SH	Y	SGD	Short essay/ MCQ
8.13	II	Describe radiological features and complications of Fibrous dysplasia.	K	K	Y	Problem based learning	Case presentation
8.14	II	Radiological approach (imaging modalities and interpretation) in a lytic lesion of skull.	K/S/C	KH/SH	Y	Self-directed learning	Case presentation
8.15	II	Role of various radiological modalities and interpretation of the findings in a case of skeletal metastases.	K/S/C	KH/SH	Y	Problem based learning	Case presentation
8.16	II	How to investigate radiologically a case of swollen (painful and painless) phalanx.	K/S/C	KH/SH	Y	demonstration	demonstration
8.17	II	Classify seronegative arthropathies. How do you investigate a young adult with h/o low back ache and recommendation of	K/S/C	KH/SH	Y	Seminar	OSCE

		additional laboratory investigations					
8.18	II	Diffuse idiopathic skeletal hyperostosis	K/S/C	KH/SH	Y	SGD	Short essay
8.19	II	Explain about metabolic disorders of bone. Role of radiograph in diagnosis.	K/S/C	KH/SH	Y	Lecture	Long Essay
8.20	II	Soft tissue calcifications	K/S/C	KH/SH	Y	Self-directed learning	Short essay/ MCQ

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8.21	II	Radiological assessment in a suspected case of rheumatoid arthritis with role of advanced imaging.	K/S/C	KH/SH	Y	Problem based learning	Case presentation
8.22	II	Describe role of parathormone in Calcium metabolism and Radiological findings in hyperparathyroidism.	K	KH	Y	Seminar	Short essay
8.23	II	Vit D metabolism and interpretation of various radiological signs in rickets	K/S	KH/SH	Y	Seminar/ Lecture	Short essay/ MCQ
8.24	II	Vit D metabolism and interpretation of various radiological signs in scurvy	K/S	KH/SH	Y	Seminar	Short essay
8.25	II	Describe vascular anatomy of hip. Radiological approach in a case of painful hip in old age.	K/S/C	KH/SH	Y	Symposium	Long Essay
8.26	II	Describe radiological features of Paget's disease	K	K	Y	Problem based learning	Case presentation
8.27	II	Describe Etiopathogenesis and radiological approach in a case of acute osteomyelitis.	K/S	K	Y	Seminar/ SGD	Short essay
8.28	II	Describe Etiopathogenesis and radiological approach to a case of chronic osteomyelitis.	K	KH	Y	Seminar/ SGD	Short essay
8.29	II	How to evaluate a case of sinus around long bone (perform and interpretation of	K/S/C	KH/SH/ P	Y	demonstration	demonstration

		sinogram)					
8.30	II	Sonological evaluation in a case of DDH.	K/S	KH/SH/P	Y	Problem based learning	Case presentation
8.31	II	Causes and D/d of Acro osteolysis.	K	K	Y	Seminar	Short essay
8.32	II	Classify skeletal dysplasia. Describe the radiological approach in a case of skeletal dysplasia.	K/S/C	KH	Y	Seminar	Short essay/ MCQ
8.33	II	Skeletal manifestation and imaging interpretation of thalassemia and sickle cell anemia.	K/S	K	Y	Problem based learning	Case presentation
8.34	II	Sonological examination of shoulder joint	K/S/C	KH/SH/P	Y	Seminar	Long Essay
8.35	II	Sonological examination of Knee joint	K/S/C	KH/SH/P	Y	Seminar	Long Essay
8.36	III	Classify bone tumors. Describe radiological features of GCT.	K	KH/SH	Y	Problem based learning	Case presentation
8.37	III	Classify the tumors around knee joint, how to come to a diagnosis of same.	K/S/C	KH/SH	Y	SGD	Case presentation
8.38	III	Advances in imaging in multiple myeloma and interpretation of same	K/S	K/KH	Y	Symposium	Short essay/ MCQ
8.39	III	Radiological approach in sclerotic lesion of bone	K	K	Y	Seminar	Short essay
8.40	III	Describe the radiological features of gout and pseudo gout.	K	K	Y	SGD	Short essay

8.41	III	Radiological approach and interpretation (including advance techniques) in compressed vertebral fracture.	K/S/C	KH/SH	Y	Problem based learning	Case presentation
8.42	III	Describe etiopathogenesis and radiological features of Perthe's disease.	K	K	Y	Seminar	Viva/ Short essay
8.43	III	Approach and role of various imaging modalities in a case of spinal TB.	K/S/C	KH/SH	Y	Case studies	Case presentation
8.44	III	How do you evaluate a suspected case of spinal TB and role of intervention in managing psoas abscess	K/S/C	KH	Y	SGD	Long Essay
8.45	III	Discuss the role of MRI in bone marrow diseases	K	K	Y	Long Essay	Short essay
8.46	III	Radiological evaluation of case of low back ache radiating to both lower limbs.	K/S	KH/SH	Y	Seminar	Short essay
8.47	III	How do you perform MR arthrogram	K/S/C	KH/SH/P	N	Seminar	demonstration
8.48	III	Investigating a suspected case of cervical spine fracture (primary aid, positioning and modalities)	K/S/C	KH/SH	Y	Problem based learning	Case presentation
8.49	III	MRI of soft tissue tumors	K/S/C	KH/SH	Y	Lecture	Short essay/ MCQ

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
9. WOMEN'S IMAGING							
9.1	I	Describe female reproductive anatomy, with knowledge on reproductive physiology	K	KH	Y	Seminar	Short essay/ MCQ
9.2	I	Menstrual physiology and pathologies of menstrual disorders with sound knowledge on differentials for the same, including knowledge of common pathologies such as endometriosis, adenomyosis etc.	K/S	KH/SH/P	Y	SGD	Long Essay
9.3	I	Describe normal fetal physiology	K	KH	Y	Seminar	Short essay
9.4.	I	Describe normal fetal embryology	K	KH	Y	Seminar	Short essay
9.5.	I	Indications of imaging modalities during pregnancy, including knowledge on radiation safety in pregnancy	K/A/C	KH	Y	Seminar	demonstration
9.6.	I	Describing fetal cardiac anatomy, physiology and sound knowledge about fetal cardiac echocardiography	K/S/C	KH/SH/P	Y	Lecture	Long Essay
9.7.	I	Described fetal CNS anatomy, embryology with diagnosis of various anomalies	K/S/C	KH/SH/P	Y	Seminar	Short essay/ MCQ
9.8.	II	Describe fetal genitourinary anomalies	K/S/C	KH/SH/P	Y	Seminar	Case presentation

9.9.	II	Describe fetal gastrointestinal anomalies with diagnosis of various anomalies (Including anomalies of the fetal abdominal wall)	K/S/C	KH/SH/P	Y	Seminar/ Problem based learning	Case presentation
9.10.	II	Fetal thoracic anomalies and their assessment	K/S	KH/P	Y	SGD	Short essay
9.11.	III	Fetal musculoskeletal anomalies, including assessment for dwarfism and limb anomalies	K/S	KH/P	Y	Problem based learning	Case presentation/ Short essay
9.12.	III	Fetal facial, head and neck anomalies	K/S	KH/P	Y	Seminar	Short essay/ Case presentation
9.13.	III	Fetal first trimester scan protocol with check list	K/S	KH/SH/P	Y	demonstration	demonstration
9.14.	III	Fetal hydrops – Diagnosis and imaging findings	K/S	KH/SH/P	Y	demonstration	Case presentation
9.15.	III	Fetal demise – Diagnosis with special emphasis on role of communication and urgent imaging evaluation	K/S/A/C	KH/SH	Y	demonstration	demonstration
9.16.	II	Fetal NT/ NB scan and described role in diagnosing fetal aneuploidies and anomalies	K/S/C	KH/SH/P	Y	Seminar/ demonstration	Short essay/ demonstration
9.17.	II	Describe biophysical profile, it's radiological assessment and its importance in obstetrics	K/S	KH/P	Y	Lecture	Long Essay
9.18.	II	20 weeks scan – Fetal anomaly assessment	K/S	KH/P	Y	demonstration	demonstration
9.19.	III	Diagnosis of fetal aneuploidies – Imaging modalities, early markers, serum and blood investigations and their correlation	K/S	KH/SH	Y	Problem based learning	demonstration / Problem based learning

9.20.	II	IUGR – Description, diagnosis, ultrasound diagnosis with role of fetal growth parameters	K/S	KH/SH/P	Y	Seminar	Long Essay
9.21.	II	Fetal growth restriction sonography in Doppler role of the same	K/S	KH/SH/ P	Y	Seminar	Long Essay
9.22.	II	Fetal Doppler – Middle cerebral artery, Ductus venosus, Abdominal isthmic index, PA, Umbilical artery, tricuspid regurgitation.	K/S	KH/SH/P	Y	Lecture	Short essay
9.23.	I	Describe placental anatomy, with knowledge about placental structural variants	K	K	Y	demonstration	demonstration
9.24.	I	Describe placental abnormalities including adherent placentation and low-lying placentation	K	KH/P	Y	SGD	Short essay/ MCQ
9.25.	II	Retained placental of conception with differentials including knowledge of uterine arteriovenous malformations	K/S	KH/P	Y	Seminar	demonstration
9.26.	II	Communicating diagnosis of fetal anomalies to treating obstetrician, patient and attenders	K/A/C	K	Y	Symposium	demonstration
9.27.	II	Describe gestational trophoblastic pathologies and imaging findings	K	KH/P	Y	Seminar	Written/Viva
9.28.	II	Imaging of ectopic pregnancy – Detection, Variants, emergent management	K	KH/P	Y	SGD	Short essay/ MCQ
9.29.	II	Evaluation of bleeding during pregnancy – causes with imaging findings	K	KH/P	Y	Symposium	Written/Viva

9.30.	II	Twin pregnancy – Role of imaging and its diagnosis with management; Complications of twin gestation	K	KH/P	Y	Workshop	Short essay/ MCQ
9.31.	I	Described PCPNDT act with sound knowledge of its provisions, rules and regulations.	K/A/C	K	Y	Lecture	Long Essay
9.32.	II	Describe diagnosis of uterine structural anomalies and role of imaging modalities to detect the same.	K/S	KH/P	Y	Seminar	Long Essay
9.33.	II	Alternative diagnostic imaging methods in the evaluation of female infertility including Sonosalpingography	K	K	Y	Symposium	Short essay
9.34.	III	MRI and CT protocols, imaging planes and contrast amount to be given	K/S	KH/SH/P	Y	demonstration	demonstration / Case presentation
9.35.	III	Describe Cervical malignancies with appropriate knowledge on imaging modalities used in detection and staging of the same	K	KH/P	Y	Symposium	demonstration
9.36.	II	Describe vaginal malignancies with appropriate knowledge on imaging modalities used in detection and staging of the same	K	KH/P	Y	Seminar	Short essay
9.37.	III	Describe ovarian malignancies (Benign and malignant variants) with appropriate knowledge on imaging modalities used in detection and staging of the	K	KH/P	Y	Lecture	Long Essay

		same					
9.38.	III	Describe endometrial malignancies with appropriate knowledge on imaging modalities used in detection and staging of the same	K	KH/P	Y	Symposium	Case presentation
9.39.	II	Polycystic ovaries – Role of imaging and biochemical parametric correlation	K / S	KH/P	Y	SGD	Short essay
9.40.	II	Follicular studies – communication skills	K	KH/SH/ P	Y	demonstration	demonstration
9.41.	II	Role of radiology in Urogynecology disorders	K	K	Y	demonstration	demonstration
9.42.	III	Interventions done in pregnancy (Obstetric)	K	KH	Y	Symposium	Case presentation
9.43.	III	Gynecological interventions including uterine artery embolization	K	KH	Y	Lecture	Long Essay
9.44.	III	Transvaginal ultrasound – Performing technique, knowledge on working physics, imaging appearances of common pathologies	K/S/C	KH/SH/P	Y	demonstration	demonstration
9.45.	II	Hysterosalpingography – Technique, indications, contraindications, performing independently	K/S/C/A	KH/SH/P	Y	Seminar	Short essay
9.46.	III	Obstetric interventions –	K	KH	Y	demonstration	Case presentation
9.47.	III	3D and 4D ultrasonography and their role in obstetrics, gynecology and fetal medicine	K / S	KH/P	Y	Symposium	Short essay/ MCQ
9.48.	I	Understand anatomy and physiology	K	K	Y	Lecture	Long Essay

		of breast, changes with age and patterns of disease spread and principles of differentiation between normal breast, benign and malignant disease					
9.49.	I	Describe a mammographic unit, principles behind the mammographic unit, mammographic technique and why is it different from conventional X-Ray unit.	K	KH	Y	SGD	Short essay
9.50.	I	Physics of image production and how it affects image quality in mammography, ultrasound and breast MRI with determining optimal imaging examination.	K	KH	Y	Symposium	Short essay/ MCQ
9.51.	I	Understand basic principles in population screening and assessment of screen detected abnormalities.	K	KH/P	Y	demonstration	demonstration
9.52.	II	BIRADS and new BIRADS system for lesion characterization in all imaging modalities and quality assurance.	K	KH	Y	Symposium	Written/Viva
9.53.	II	Breast ultrasound – Identify cystic/solid mass, recognize the typical features of benign and malignant lesions, normal and abnormal axillary lymph nodes.	K/S/C	KH/SH	Y	Seminar	Written/Viva

9.54.	II	Breast mammogram- understand physiologic changes in breast with age, differentiate between normal breast, benign and malignant disease.	K/S/C	KH/SH	Y	Lecture	Short essay/ MCQ
9.55.	II	Role of breast cancer screening and guidelines.	K	KH	Y	demonstration	demonstration
9.56.	II	Role of conventional and digital mammography in screening of breast cancer, benign and malignant lesions of the breast.	K	KH	Y	demonstration	Case presentation
9.57.	II	Clinical presentation, pathogenesis and basic principles of treatment of breast disease.	K	KH	Y	demonstration	demonstration
9.58.	II	Interpretation of breast mammograms.	K/S/C	KH/SH	Y	Workshop / demonstration	Case presentation
9.59.	III	Image guide cyst aspiration, abscess drainage, fine needle aspiration and core biopsy under supervision, vacuum assisted biopsy, stereotactic FNAC and biopsy.	K/S/A/C	KH/SH	Y	Symposium	Short essay/ MCQ
9.60.	III	MRI breast with emphasis on use of volume MRI with newer sequences in breast imaging like DWI and PWI	K/S/C	KH/SH	Y	Workshop	demonstration
9.61.	III	Breast tomosynthesis.	K/S/C	KH/SH	Y	Lecture	Long Essay
9.62.	III	Role of MRI, PET, thermography, electrography, CT, image guided interventions for diagnosis and therapy of breast lesions.	K/S/C	KH/SH	Y	Seminar	Long Essay

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
10. HEAD AND NECK IMAGING							
10.1	I	Radiological anatomy (Including anatomical variation) and Imaging in Imaging of the Paranasal Sinuses	K	KH	Y	Lecture	Demonstration/ Short essay
10.2	I	Describe HRCT of temporal bone.	K/S/C	K	Y	Seminar	Short essay
10.3	I	Show HRCT of petrous bone.	K/S	K	Y	demonstration	demonstration
10.4	I	Normal radiological anatomy of Suprahyoid and Infrahyoid neck	K	K	Y	Seminar	Short essay/ Long Essay
10.5	I	Radiological anatomy and embryology of thyroid gland.	K	K	Y	Seminar	Short essay/ MCQ
10.6	I	Radiology anatomy of oral cavity and GBS.	K/S	KH	Y	Seminar	Short essay/ MCQ
10.7	I	Radiology anatomy of Hypopharynx.	K/S	KH	Y	Seminar	Short essay
10.8	I	Radiology anatomy and classification of Larynx.	K/S	KH/SH	Y	Seminar	Written/Viva
10.9	I	Anatomy and imaging evaluation of salivary gland lesions.	K/S	KH	Y	Long Essay/ Seminar	Case presentation / Long Essay
10.10	I	Anatomical division of skull base with imaging techniques.	K/S	KH	Y	Seminar	Short essay
10.11	I	Anterior skull base– anatomy and imaging.	K/S/C	KH/SH	Y	Seminar	Short essay/ MCQ
10.12	I	Middle skull base– anatomy and imaging.	K/S/C	KH/SH	Y	Seminar	Short essay/ MCQ

10.13	I	Posterior skull base– anatomy and imaging.	K/S/C	KH	Y	Seminar	demonstration
10.14	I	Radiological anatomy and importance of neck spaces.	K/S/C	KH	Y	Workshop	Long Essay
10.15	I	Radiological anatomy of neck nodes.	K/S/C	KH	Y	demonstration	Short essay
10.16	I	Sialography	K/S/C	KH	Y	demonstration	demonstration
10.17	II	Radiological anatomy and imaging of Temporomandibular joint.	K/S/C	KH	Y	Seminar/ Lecture	Short essay/ MCQ
10.18	II	Radiology anatomy of Nasopharynx and oropharynx	K/S	KH/SH	Y	Seminar	OSCE
10.19	II	Imaging of the Globe and Orbit	K/S/C	K	Y	Seminar	Short essay/ MCQ
10.20	II	Imaging in orbital trauma	K/S/C	KH/SH	Y	Seminar	Short essay/ MCQ
10.21	II	Imaging in prevertebral space	K	KH	Y	Seminar	Short essay/ MCQ
10.22	II	Maxillofacial Imaging – anatomy and imaging modalities	K/S	KH	Y	Seminar	Short essay/ MCQ
10.23	II	Imaging of developmental anomaly of thyroid gland	K/S/C	KH/SH/ P	Y	demonstration	demonstration
10.24	II	Congenital anomalies of ear and the temporal bone	K/S/C	K	Y	Seminar	Short essay/ MCQ
10.25	II	Imaging of Temporal Bone Fractures	K/S/C	K	Y	Seminar	Short essay/ MCQ
10.26	II	Classification of Maxillofacial bones fracture and role of imaging	K/S/C	KH/SH	Y	Lecture	Long Essay
10.27	II	Imaging in inflammatory and vascular lesions of orbit	K/S/C	KH/SH	Y	Symposium	Written/Viva

10.28	II	Imaging in inflammatory sinus diseases	K	KH	Y	Symposium	Written/Viva
10.29	II	Imaging in Inflammatory Diseases of the external ear and middle ear	K/S	K	Y	Symposium	Written/Viva
10.30	II	Imaging in Nodular thyroid disease	K/S/C	KH/SH	Y	Symposium	Written/Viva
10.31	II	Radiological evaluation in diffuse thyroid disease	K/S/C	KH/SH/ P	Y	SGD	Case presentation
10.32	II	Radiological evaluation of benign and malignant thyroid nodules	K/S/C	KH/SH	Y	SGD	Case presentation
10.33	II	Classification and imaging of neck nodal masses	K	K	Y	Symposium	Written/Viva
10.34	II	Imaging in ocular lesions	K/S/C	KH/SH	Y	Seminar	Short essay/ MCQ
10.35	II	Imaging in orbital lesion	K/S/C	KH/SH	Y	Seminar	Short essay/ MCQ
10.36	II	Imaging in benign and malignant lesion of mandible	K/S/C	KH/SH	Y	Seminar	Short essay/ MCQ
10.37	III	Imaging in Craniovertebral Junction Anomalies	K/S/C	KH/SH	Y	Seminar	Short essay/ MCQ
10.38	III	Imaging of the Neck Spaces	K	KH	Y	Seminar	Short essay/ MCQ
10.39	III	Imaging in Inflammatory Diseases of the inner ear	K/S	K	Y	Seminar	Short essay/ MCQ
10.40	III	Imaging in Inflammatory lesions of head and neck	K	KH	Y	Seminar	Short essay/ MCQ
10.41	III	Imaging evaluation of vascular tinnitus and other vascular disease of temporal bone and ear	K/S/C	K	Y	Seminar	Short essay/ MCQ

10.42	III	Imaging evaluation of dysplastic condition of temporal bone and otosclerosis	K/S/C	K	Y	Seminar	Short essay/ MCQ
10.43	III	Imaging in vascular lesions of neck	K/S/C	KH/SH/ P	Y	Seminar	Short essay/ MCQ
10.44	III	Imaging in neoplastic lesions of the paranasal sinuses	K	K	Y	Seminar	Short essay/ MCQ
10.45	III	Imaging in benign lesions of neck	K/S/C	KH/SH/ P	Y	Seminar	Short essay/ MCQ
10.46	III	Imaging in malignant lesions of neck	K/S/C	KH/SH/ P	Y	Seminar	Short essay/ MCQ
10.47	III	Imaging in non-nodal neck masses	K	K	Y	SGD	Case presentation
10.48	III	Imaging and staging of cancers of oral cavity	K/S/C	KH/SH	Y	SGD	Short essay
10.49	III	Imaging and staging of cancers of Nasopharynx and oropharynx	K/S/C	KH/SH	Y	Lecture	Case presentation/ Long Essay
10.50	III	Imaging and staging of cancers of Hypopharynx	K/S/C	KH/SH	Y	Seminar	Short essay
10.51	III	Imaging and staging of cancers of Larynx	K/S/C	KH/SH	Y	Workshop	Written/Viva
10.52	III	Post treatment imaging in neck cancers	K/S/C	KH/SH	Y	Lecture	Long Essay
10.53	III	Endovascular Management of Craniofacial Vascular Lesions	K/S/C	KH/SH	Y	demonstration	demonstration

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
11. PEDIATRIC RADIOLOGY							
11.1	II	Radiological approach towards an infant presents with acute onset of bilious vomiting	K	KH	Y	SGD	demonstration
11.2.	III	Radiological findings in a suspected case of non-accidental trauma	K	K	Y	Seminar	Short essay/ MCQ
11.3.	III	Radiological approach in an infant presents with abdominal mass	K	KH	Y	Lecture	Long Essay
11.4.	III	Causes and radiological findings in new -born with unilateral and bilateral hydro-uretero-nephrosis	K	KH	Y	Problem based learning	Case presentation
11.5.	III	Radiological approach towards new-born with respiratory distress	K	K	Y	Problem based learning	Case presentation/ Short essay
11.6.	III	Pneumo-peritoneum in infants, enumerate the various causes and radiological findings	K	KH	Y	Seminar	Short essay/ MCQ
11.7.	III	Child presents with fever, stridor and dysphagia. Role of radiologist in emergency duty	K/S/C	KH/SH	Y	Problem based learning	simulation
11.8.	III	Radiological and clinical differences between slipped capital femoral epiphyses disease, Perthe's disease and	K/S/C	KH/SH	Y	SGD	Long Essay

		developmental dysplasia of hip					
11.9.	II	Diaphragmatic hernias in new-born Radiological findings in various modalities	K	KH	Y	Seminar	Short essay/ MCQ
11.10.	II	Ventral hernias in children	K	KH	Y	Seminar	Short essay
11.11	III	Intestinal obstruction in children- Competency to diagnose using plain radiograph	K	K	Y	demonstration	Case presentation
11.12	III	Radiological manifestations of hemolytic disorders in children.	K	K	Y	demonstration	demonstration
11.13	II	Right iliac fossa pain in children- Enlist the various causes with imaging features	K	K	Y	Seminar/ demonstration	demonstration / Case presentation
11.14	III	Skeletal dysplasia's in children- Radiological manifestations				Lecture	Long Essay
11.15	III	Phacomatoses in children- Enlist the diseases with imaging features	K	KH	Y	SGD	Short essay/ MCQ
11.16	III	Cranial and Intracranial Complications in pre terms- Radiological manifestations	K	K	Y	Seminar	Short essay/ MCQ
11.17	III	Ability of a competent radiologist in evaluation of congenital heart diseases in children by using plain chest radiograph	K	KH	Y	SGD	Short essay

11.18	I	Ability of a competent radiologist in evaluation of lower respiratory tract diseases in children by using plain chest radiograph	K	K	Y	Lecture	Practical demonstration
11.19	I	Competency of a radiologist to narrow down the differentials of benign and malignant bone diseases using plain radiograph	K	K	Y	SGD	Case presentation
11.20	II	Arthritis in children. Enumerate the causes with imaging appearances	K	KH	Y	Seminar	demonstration
11.21	III	Acute scrotal pain in children. Enlist the causes with imaging features.	K/S/C	KH/SH/P	Y	SGD	Short essay/ MCQ
11.22	III	Congenital genitourinary tract anomalies- Radiological features.	K/S/C	KH/SH/P	Y	Seminar	Case presentation/ Short essay
11.23	III	Abdominal cystic lesions in fetus during antenatal scan. Enumerate the key sonographic features to narrow down the differentials	K/S/C	KH/SH/P	Y	Lecture	demonstration / Short essay/ MCQ
11.24	III	Radiological changes of metabolic leuko encephalopathy in children	K	K	Y	Seminar	Short essay

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
12. RECENT ADVACES							
ONCORADIOLOGY							
12.1.	III	Interpret radiological investigations in patients with neoplastic diseases (both benign and malignant)	K/S	KH/SH	Y	Problem based learning/ Lecture	Case presentation
12.2	II	Understand pathology and patho-physiology of common neoplasms.	K	K/KH	Y	Seminar	Short essay/ MCQ
12.3	III	Learn the algorithmic approach to image these patients based on the suspected disease, its biological behavior and potential and limitations of various imaging modalities.	K/S	KH/SH	Y	SGD	demonstration
12.4	III	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.	K/S	KH/SH	Y	Workshop	demonstration

12.5	III	Communicate the results in a precise way in a written report to the concerned unit.	K/S/A	KH/SH	Y	SGD	demonstration
NUCLEAR MEDICINE							
12.6	III	Evaluate the Examinations for Completion and determine what further images (including non-nuclear medicine) need to be done.	K/S	KH/SH	Y	Seminar	Short essay
12.7	III	Understand of the physical and biological properties of the commonly used Radio-Pharmaceuticals and become familiar with safe handling of isotopes and basic radiation safety measures while dealing with isotopes.	K	K/KH	Y	Lecture	Long Essay

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
13. SPECIAL INVESTIGATIONS							
13.1	I	Fluoroscopy: General principle – Real time imaging – positioning – Fluoroscopic equipment optical coupling – photo spot cameras – spot film – cineradiography	K	KH	Y	demonstration	demonstration
13.2	II	Knowledge and consent forms, patient preparation for conventional procedures	K/S	KH/SH	Y	demonstration	demonstration
13.3	II	To identify positioning considerations for radiographic procedures, describing the process employed to complete radiographic procedures, recognizing the need for proper film ID and marking	K/S	KH/SH	Y	demonstration	demonstration
13.4	II	Barium studies- different types – Barium swallow Barium meal study of upper GIT	K	K	Y	Problem based learning	Case presentation/ demonstration

		Barium meal follow through Single contrast & Double contrast Barium enema					
13.5	II	IVU - To perform and interpret	K/S	KH/SH	Y	SGD	Short essay
13.6	II	Cystogram, RGU, MCU - pathological conditions and its interpretation				Workshop	Short essay
13.7	II	Hysterosalpingography - pathological conditions and its interpretation	K	KH	Y	demonstration	demonstration
13.8	II	Fistulogram - pathological conditions and its interpretation	K	K	Y	Seminar/ demonstration	demonstration / Short essay
13.9	III	Angiography, Diagnostic & therapeutic, venography, Lymphangiogram	K	KH	Y	Seminar	Short essay
13.10	III	Recognizing need for radiation protection	K/S/C	KH/SH	Y	SGD	Short essay/ MCQ
13.11	II	Post procedural patient care	K/S/C	KH/SH	Y	Seminar	demonstration
13.12	II	Types of contrast media used and dosage alternative contrast used-side effects and its identification-treatment of complication during the procedure	K	KH	Y	Seminar	Short essay/ MCQ
13.13	III	CT enterography and CT enteroclysis findings	K	KH	Y	Seminar	Short essay

13.14	III	MR Enteroclysis protocol and its clinical application	K	K	Y	Seminar	Long Essay
13.15	III	Indications, contraindications, procedure of percutaneous nephrostomy	K	K	Y	Workshop	Short essay/ MCQ

Number	Year of residency	Competency The student should be able to	Domain K/S/A/C	Level K/KH/SH/P	Core (Y/N)	Suggested teaching Learning method	Suggested assessment method
14. EMERGENCY RADIOLOGY							
14.1	I	Enumerate causes of acute pain abdomen. Role of Ultrasound in acute abdomen.	K	KH	Y	Seminar	Case presentation
14.2	II	Imagining features of pneumothorax, pneumoperitoneum and intestinal obstruction on plain radiograph	K	K	Y	Lecture	Case presentation
14.3	I	Role of chest and abdomen radiography in emergency situations – foreign body ingestion	K	KH	Y	Self-directed learning	Short essay
14.4	III	Head trauma, findings that warrant immediate surgical intervention.	K	KH	Y	Self-directed learning	Case presentation
14.5	III	CT features of	K	K	Y	Seminar	Short essay

		hypertensive bleed.					
14.6	II	Post traumatic sequelae in brain	K	KH	Y	Seminar	Short essay/ MCQ
14.7	II	Role of CT in facio-maxillary trauma	K/S/C	KH/SH	Y	Symposium	Written/Viva
14.8	I	Imaging in acute stroke	K/S/C	KH/SH	Y	SGD	Written/Viva
14.9	I	Imaging in of Blunt Abdominal and Chest Trauma	K	KH	Y	Self-directed learning	Case presentation
14.10	II	What are the categories of renal injury? Radiological investigations and appearances in a case of renal trauma	K	KH	Y	Seminar	Short essay/ MCQ
14.11	II	CT features of liver trauma and discuss role of intervention	K	K	Y	Symposium	OSCE/ Short essay
14.12	II	Grading, imaging appearances and complications of pancreatic trauma	K	K	Y	Seminar	Short essay
14.13	II	Imaging in a patient with splenic trauma	K	K	Y	Seminar	Short essay
14.14	I	Emergency drugs with doses that should be available in radiology department				SGD	Short essay
14.15	II	Types of contrast media reactions and its management	K	KH	Y	Seminar	Short essay/ MCQ
14.16	III	Extravasation of IV contrast medium and its management	K	K	Y	demonstration	demonstration
14.17	III	Contrast induced nephrotoxicity: prevention and management.	K	KH	Y	Seminar	Short essay

14.18	III	Imaging in spine trauma, classification of spine injury, radiographic findings, role of CT and MRI.	K	K	Y	Seminar	OSCE
14.19	III	Role of MRI in the evaluation of shoulder joint in trauma	K	K	Y	demonstration	Case presentation
14.20	III	MR Imaging of Traumatic knee	K	KH	Y	demonstration	demonstration
14.21	III	Ultrasound Imaging in Ectopic Pregnancy	K/S/C	KH/SH/P	Y	demonstration	Case presentation
14.22	III	Ultrasound Imaging in Acute DVT	K/S/C	KH/SH/P	Y	Seminar	demonstration
14.23	III	Ultrasound Imaging in Testicular & Ovarian Torsion	K/S/C	KH/SH/P	Y	Seminar	Case presentation
14.24	III	Various Imaging in polytrauma.	K	K	Y	SGD	Written/Viva
15. ARTIFICIAL INTELLIGENCE							
15.1	III	Basics and recent trends of artificial intelligence and its importance	K	K	Y	Seminar	Written/Viva
15.2	III	Applications of AI in diagnostic imaging	KH	KH	Y	Symposium	Short essay
15.3	III	Programming of artificial intelligence	K/KH	K/KH	Y	Seminar	Short essay

7. TEACHING AND LEARNING METHODS

- Emphasis should be given to various small group teachings rather than didactic lectures.
 - **Film reading/Case presentation:** once a week.
 - **Seminars / Symposia** – once a week; Theme based student centered.
 - **Journal club/ Review:** once a week, at least 4- 6 times a year per student.
 - **Inter-departmental Meetings:** Strongly recommended particularly with departments of Orthopedics, surgery, OBG and medicine at least once a month. These meetings should be attended by postgraduate students.
 - **Clinico-radiological-pathological meets: once a month.**
 - **Guest Lectures: To be organized once a month. Preferable to include basic science lectures and recent advances.**
 - **Skill lab sessions: Once a fortnight** for all three years.
 - **Mortality & Morbidity meetings with audit: Once a month.**
 - **Ward Rounds:** May be service rounds or teaching rounds.
- a). **Service rounds:** Postgraduate students should do ward rounds wherever necessary for interventional procedures and for follow-ups of patients who have undergone imaging.
- i)For pre anesthetic evaluation of the patients posted for interventions. ii)And to do the post procedural follow.
- b) **Teaching rounds:** For case presentation (interventional/ interdepartmental case presentations).
- **Dissertation evaluation:** Periodically evaluated and submitted six months before the final examination.
 - **Maintenance of log book:** Residents to update daily and supervised and signed by the faculty in charge once a week.
 - The post graduate students shall be required to participate in the teaching and training program of undergraduate students (includes allied sciences, paramedical and nursing) and interns.
 - A post graduate student of a postgraduate degree course in broad specialties/super specialties 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 post graduate degree examination.
 - Should have attended two conferences/CMEs/Workshops during his tenure as a postgraduate
 - Department should encourage e-learning activities.

8. ROTATION POSTING: AS SUGGESTED BY NATIONAL MEDICAL COMMISSION (NMC)

During the three-year course, suggested rotations according to NMC are as follows: -

1. Conventional chest, abdomen, musculoskeletal including
8 months skull, spine, PNS and mammography etc.
2. Contrast studies: G.U., GIT, Hepato-biliary,
8 months angiography etc. including fluoroscopic guided interventions
3. US, Doppler and US guided interventions
8 Months
4. CT and CT guided interventions
6 Months
5. Emergency radiology
2 Months
6. M.R.I.
2 Month
7. Elective posting
2 Months

During each posting, post graduate student should be able to perform the procedures and interpret the findings.

PROPOSED SCHEDULE FOR ROTATION

1 st Year (1/6)	Conventional Chest & abdomen	Conventional skull, spine, Musculo- skeletal etc.	US	Contrast studies - GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US
(2/6)	US & interventions	Conventional skull, spine, Musculo- skeletal etc.	CT	Contrast studies -- GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US & interve- ntions
2 nd Year (3/6)	Conventional Chest & abdomen	Contrast studies - GIT & other fluoroscopic investigations including angiography	Contrast studies - G.U. tract	US & interventions	Emergency	CT
(4/6)	Conventional skull, spine, Musculo- skeletal etc.	Contrast studies - G.U. tract including pediatric MCU/Genito- gram	US & intervent- ions	US & Doppler	Emergency	MRI

3rd year (5/6)	Conventional Chest & mammo- graphy	Contrast studies - GIT & other fluoroscopic investigations including angiography	US & Doppler	Emergency	CT & inter- ventions	Elective
(6/6)	Conventional Musculo- skeletal & mammo- graphy	Contrast studies - G.U. tract including pediatric MCU/Genito- gram	CT& inter- ventions	CT & inter- ventions	MRI	Elective

During the training program, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory

Elective postings (2 months as per NMC): For advanced exposure and interpretation.

- 1) Neuro-radiology and intervention preferably NIMHANS
- 2) For cancer radio-diagnosis and Nuclear Medicine in an oncology department or institute.
- 3) Cardiology Imaging

9. ASSESSMENT

Assessment should be comprehensive and objective assessing the competencies stated in the course. The assessment is both **formative** and **summative**. **Formative** is spread over the entire duration of the program and the **summative** is as per university examination pattern.

FORMATIVE ASSESSMENT:

The formative assessment is continuous as well as end-of-term with regular feedback to the resident for the candidate overall improvement. The former is being based on the feedback from the senior residents and the consultants concerned. All the consultants in which resident is working will give marks based on performance. These marks will be summated over a period of tenure. End-of-term assessment is held at the end of each semester (up to the 5th semester). Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.

The learning outcomes to be assessed should include: (i) Personal Attitudes, (ii) Acquisition of Knowledge, (iii) Clinical and operative skills, (iv) Teaching skills and (v) Dissertation and research (vi) logbook maintenance.

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure II)

- i) **Personal Attitudes.** The essential items are:
- Caring attitudes
 - Initiative
 - Organizational 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:**

Mainly involves quarterly assessment done during the MD training based on:

1) **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, Chapter IV)

2) **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, Chapter IV)

3) **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.

4) **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.

5) **Self Directed learning**

Periodic tests: Internal assessments should be frequent covering all domains of the subject The departments should 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.

iii) **Clinical skills**

Day to Day work: Skills in various modalities should be assessed periodically. The assessment should include the candidates' sincerity, availability, diligence, punctuality, analytical ability and communication skills.

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

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 logbook.

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 Annexure I Model Checklist)

iv) **Dissertation/ Research in the Department:** Periodic presentations are to be made in the department. Initially the topic selected is to be presented before submission to the University for registration, again before finalization for critical evaluation and another before final submission of the completed work (See Annexure I- Model Checklists)

v) **Work diary / Log Book-**

A candidate shall maintain a log book of training (assisted / performed), certified by the concerned post graduate teacher / Head of the department / senior consultant. It is a part of internal assessment.

This log book shall be made available to the board of examiners for their perusal at the time of the final examination.

The log book should show evidence that the before mentioned subjects were covered (with dates and the name of teacher(s) The candidate will maintain the record of all academic activities undertaken by him/her in log book.

1. Personal profile of the candidate
2. Educational qualification/Professional data
3. Record of case histories

4. Procedures learnt
5. Record of case Demonstration/Presentations
6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.
7. Images of the appropriate cases/procedures to be maintained whenever necessary.

vi) **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.

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.

SUMMATIVE ASSESSMENT:

The summative assessment would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Postgraduate Examination was conducted in three parts:

1) **Thesis:**

- Every candidate pursuing MD/MS degree course is required to carry out work on a selected research project under the guidance of a recognized post graduate teacher. The results of such a work shall be submitted in the form of a thesis (Dissertation).
- 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.
- Every candidate shall submit to the Registrar (Academic) of the University in the prescribed proforma, a synopsis containing particulars of proposed dissertation work six months from the date of commencement of the course on or before the dates notified by the University. The synopsis shall be sent through the proper channel.
- Such synopsis will be reviewed and the dissertation topic will be registered by the University. No change in the dissertation topic or guide shall be made without prior approval of the University.
- The dissertation should be written under the following headings:

- Introduction
- Aims or Objectives of study
- Review of Literature
- Material and Methods
- Results
- Discussion
- Conclusion
- Summary
- References (Vancouver style)
- Tables
- Annexures

The written text of dissertation shall be not less than 50 pages and shall not exceed 150 pages excluding references, tables, questionnaires and other annexures. It should be neatly typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should be avoided. The dissertation shall be certified by the guide, head of the department and head of the Institution.

Dissertation thus prepared shall be submitted to the Registrar (Evaluation), six months before final examination on or before the dates notified by the University.

The dissertation shall be valued by examiners appointed by the University. Approval of dissertation work is an essential precondition for a candidate to appear in the University examination.

2) Theory (400 marks)

The examinations shall be organized on the basis of marking system to evaluate and to certify postgraduate level of knowledge, skill and competence at the end of training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole.

There shall be four question papers, each of three-hour duration. Each paper shall consist of **ten essay questions** each carrying 10 marks. Total marks for each paper will be 100. Questions on recent advances may be asked in any or all the papers. Details of distribution of topics for each paper will be as follows:

There shall be four theory papers (Based on guidelines of NMC):

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 Gynecology 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: 300 marks

i) Practical cases:(200 marks)

Practical Examination will have:

1. 3-4 Cases
2. Film Quiz (50 – 60 Spots)
3. To perform Ultrasound on a patient

ii) Viva-Voce(100 marks):

All examiners will conduct viva-voce conjointly on candidate's comprehension, analytical approach, expression and interpretation of data. It includes:

- a) All components of course contents.
- b) Spotters of conventional & newer imaging techniques.
- c) Instruments, catheters, contrasts including their techniques and procedures.
- d) Radiation physics and quality assurance.
- e) In addition, candidates may be also be given case reports, charts, gross specimens, etc., for interpretation.
- f) Pedagogy Exercise-A topic based on his/her dissertation is given. He/she is asked to present on the topic for 5-10 minutes.

Theory examinations (Total= 400)

Paper	Pattern of question	Marks
Paper 1	10 questions, each will carry equal 10 marks	100
Paper 2	10 questions, each will carry equal 10 marks	100
Paper 3	10 questions, each will carry equal 10 marks	100
Paper 4	10 questions, each will carry equal 10 marks	100

Practical examination and viva voce (Total=300)

S. NO	EXAMINATION	MARKS
1	Long case	80
2	Short Cases (2) (includes Ultrasonography)	40x2
3	Spotters	40
4	Viva-Voce	100

10. RECOMMENDED READING

Must read books (latest edition)

1. Textbook of Radiology and Imaging – Volume 1 and 2 by David Sutton.
2. Grainger and Allison's Text Book of Diagnostic Radiology.
3. Felson's Principles of Chest Roentgenology.
4. Fundamentals of Diagnostic Radiology – Brant and Helms.
5. Diagnostic Ultrasound- Rumack and Levine.
6. Osborn's brain Imaging, Pathology and Anatomy – Anne G Osborn.
7. AIIMS-MAMC-PGI's Diagnostic Radiology series – Volume 1, 2 and 3.
8. Introduction to Vascular Ultrasonography – Zweibel.
9. Christensen's physics of Diagnostic Radiology.
10. MRI made easy – Govind Chavan.
11. Clarks Positioning in Radiography.
12. Imaging atlas of Human Anatomy – Weir and Abharams.
13. Aids to Radiological Differential Diagnosis – Chapman.
14. Guide to Radiological procedures – Chapman and Nakielny's.
15. Radiological procedures – A guideline – Dr Bhushan N Lakkar.

Reference Books:

1. Magnetic Resonance Imaging of the Brain and Spine – Scott W. Atlas.
2. Primer of Diagnostic Imaging – Mukesh G Harisinghani, John W Chen, Ralph Weissler
3. Head and Neck Imaging – Peter M Som & Hugh D Curtin
4. Diagnosis of Diseases of Chest –Fraser.
5. High resolution CT of lung – W Richard Webb, Nestor L Muller, David P Naidich
6. CT and MRI of the whole body – John R Haaga, Daniel T Boll
7. Textbook of Gastro-Intestinal Radiology – Gore & Levine
8. Abdominal-Pelvic MRI-Semelka(IWW)
9. Caffey's Paediatric Radiology.
10. Orthopaedic imaging – A practical approach – Adam Greenspan
11. Diagnostic imaging – Breast – Berg & Birdwell
12. Textbook of Uroradiology – N Reed Dunnick, Carl M Sandler, Jeffrey H Newhouse
13. Yochum and Rowe's essential of skeletal radiology
14. Musculo-skeletal MRI – Helms, Major, Anderson, Kaplan.
15. A practical guide to fetal echocardiography. Normal and abnormal hearts – Alfred Abuhamad,

Rabih Chaoui

16. Callen's ultrasonography in Obstetrics and Gynaecology.
17. Radiology review manual – Wolfgang Danhert.
18. Handbook of interventional radiologic procedure – Krishna Kandarpa
19. Margulis and Burhenne's Alimentary tract radiology
20. Moulds positioning.
21. Manual of diagnostic ultrasound – P. E. S Palmer
22. Computed Body Tomography with MRI correlation – Edward Y Lee
23. Breast Imaging – Daniel B Kopans
24. Farr's physics for medical imaging.
25. The essential physics of Medical imaging – Jerrald T Bushberg
26. Techniques in Diagnostic Radiology – Whitehouse
27. MRI of Musculoskeletal System – Thomas H Berquist
28. Magnetic resonance imaging in orthopedics and sports medicine – David W Stoller
29. Pediatric neuroradiology Brain – Paolo Tortori- Donati
30. Davidson – GUT.
31. Magnetic resonance imaging – David D Stark, William G Bradley
32. Biostatics – Basic and advanced – Manju Pandey

Journals

1. The Indian Journal of Radiology and Imaging
2. Radiology Clinics of North America
3. Radio graphics
4. British Journal of Radiology
5. American Journal of Roentgenology.
6. MRI Clinics of North America
7. Journals of US Medicine
8. Journal of Vascular Interventional Radiology
9. European Journal of Radiology
10. American Journal of Neuroradiology
11. Egyptian Journal of Radiology and Nuclear Medicine
12. Seminars in USG, CT and MRI.

ADDITIONAL READING

1. Indian Council of Medical Research, "Ethical Guidelines for Biomedical Research on Human Subjects", I.C.M.R, New Delhi, 2000.
2. Code of Medical Ethics framed under section 33 of the Indian Medical Council Act, 1956. Medical Council of India, Kotla Road, New Delhi.

3. Francis C M, Medical Ethics, J P Publications, Bangalore, 1993.
4. Indian National Science Academy, Guidelines for care and use of animals in Scientific Research, New Delhi, 1994.
5. International National Committee of Medical Journal Editors, Uniform requirements for manuscripts submitted to biomedical journals, N Engl J Med 1991; 424-8
6. Kirkwood B R, Essentials of Medical Statistics , 1st Ed., Oxford: Blackwell Scientific Publications 1988.
7. Mahajan B K, Methods in Bio statistics for medical students, 5th Ed. New Delhi, Jaypee Brothers Medical Publishers, 1989.
8. Compendium of recommendations of various committees on Health and Development (1943-1975). DGHS, 1985 Central Bureau of Health Intelligence, Directorate General of Health Services, min. of Health and Family Welfare, Govt. of India, Nirman Bhawan, New Delhi. P - 335.
9. National Health Policy, Min. of Health & Family Welfare, Nirman Bhawan, New Delhi, 1983
10. Srinivasa D K et al, Medical Education Principles and Practice, 1995. National Teacher Training Centre, JIPMER, Pondicherry
11. AERB.gov.in – Regulatory requirements and guidelines for Diagnostic Radiology facilities.
12. PCPNDT – Preconception and prenatal diagnostic techniques.

11. ANNEXURES I- 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
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 consulted other relevant publications					
2	Whether consulted cross references have been					
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

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 covered.					
3	Clarity of Presentation					
4	Logical order					
5	Mentioned all positive and negative points of importance					
6	Whether any major signs missed or misinterpreted					
7	Diagnosis: Whether it follows, logically from history and findings					
8	Investigations required					
	Complete list					
	Relevant order ▪ Interpretation of imaging					
9	Ability to react to questioning Whether it follows logically From history and findings					
10	Ability to defend diagnosis					
11	Ability to justify differential diagnosis					
12	Others					
	Grand Total					

Check List - IV

MODEL CHECK LIST FOR EVALUATION OF TEACHING SKILL PRACTICE

Sl. No.	Points to be considered	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 V

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-VI

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					

ANNEXURE - II

Postgraduate Students Appraisal Form Pre/Para/Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training :

Sl. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
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										
6.	Thesis/Research work										
7.	Log Book Maintenance										

FROM.....TO.....

PUBLICATION

YES/NO

REMARKS*

***REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

Signature of Assessee

Signature of Consultant

Signature of HOD

12. REFERENCES

1)NMC

Guidelines for competency based post graduate training program for MD in Radiodiagnosis.

<https://www.nmc.org.in/wp-content/uploads/2019/09/MD-Radiodiagnosis.pdf>

2) RGUHS

MD Radiodiagnosis curriculum 2000

https://www.rguhs.ac.in/courses_rguhs.htm

13. MEDICAL ETHICS SENSITIZATION AND PRACTICE

Introduction

There is now a shift from the traditional individual patient, doctor relationship, and medical care. With the advances in science and technology and the needs of patient, their families and the community, there is an increased concern with the health of society. There is a shift to greater accountability to the society. Doctors and health professionals are confronted with many ethical problems. It is, therefore necessary to be prepared to deal with these problems. To accomplish the Goal (i), General Objective (ii) stated in Chapter II (pages 2.1 to 2.3), and develop human values it is urged that *ethical sensitization* be achieved by lectures or discussion on ethical issues, clinical case discussion of cases with an important ethical component and by including ethical aspects in discussion in all case presentation, bedside rounds and academic postgraduate program.

Course Contents

1. Introduction to Medical Ethics

What is Ethics

What are values and norms

Relationship between being ethical and human fulfillment

How to form a value system in one's personal and professional life. Heteronomous Ethics and Autonomous Ethics

Freedom and personal Responsibility

2. Definition of Medical Ethics

Difference between medical ethics and bio-ethics Major Principles of Medical Ethics 0

Beneficence = fraternity

Justice = equality

Self-determination (autonomy) = liberty

3. Perspective of Medical Ethics

The Hippocratic oath

The Declaration of Helsinki

The WHO Declaration of Geneva International code of Medical Ethics (1993) Medical Council of India Code of Ethics

4. Ethics of the Individual The patient as a person The Right to be respected Truth and Confidentiality The autonomy of decision

The concept of disease, health and healing The Right to health

Ethics of Behavior modification The Physician – Patient relationship Organ donation

5. The Ethics of Human life

What is human life

Criteria for distinguishing the human and the non-human Reasons for respecting human life

The beginning of human life Conception, contraception Abortion

Prenatal sex-determination

In vitro fertilization (IVF), Artificial Insemination by Husband (AIH) Artificial Insemination by Donor (AID),

Surrogate motherhood, Semen Intrafallopian Transfer (SIFT),

Gamete Intrafallopian Transfer (GIFT), Zygote Intrafallopian Transfer (ZIFT), Genetic Engineering

6. The Family and Society in Medical Ethics

The Ethics of human sexuality Family Planning perspectives Prolongation of life

Advanced life directives – The Living Will Euthanasia

Cancer and Terminal Care

7. Profession Ethics

Code of conduct

Contract and confidentiality Charging of fees, Fee-splitting Prescription of drugs

Over-investigating the patient

Low – Cost drugs, vitamins and tonics Allocation of resources in health cares Malpractice and Negligence

8. Research Ethics

Animal and experimental research / humanness Human experimentation

Human volunteer research – Informed Consent Drug trials

9. Ethical workshop of cases Gathering all scientific factors Gathering all human factors

Gathering all value factors

Identifying areas of value – conflict, setting of priorities, Working out criteria towards decisions

Recommended Reading

Francis C.M., **Medical Ethics**, 1 Ed, 1993, Jaypee Brothers, New Delhi, p 189, Rs. 60/-