SYLLABUS AND POST GRADUATE TRAINING PROGRAMME FOR M.D. RADIO DIAGNOSIS

Peramble :

Our purpose is to standardize Radio diagnosis teaching at Post Graduate level so that it will benefit in Achieving uniformity in undergraduate teaching as well and resultantly creating competent Radiologist with appropriate expertise.

Program Objectives :

The objectives 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.

Specific learning Objectives :

A Resident on completing his / her MD (Radio Diagnosis)

1. Acquir good basic knowledge in the various sub – specialties of Radiology such as Neuroradiology, GI radiology, Uroradiology, Vascular Radiologyj, Musculokeletal, Interventional Radiology, Emergency Radiology, Paediatric Radiology and Imaging of breast
2. Independently conduct and interpret all routine and special radiolocia and imaging investigations.
3. Provide radiological services in acute emergency an trauma including its medicolegal aspects.
4. Elicit indications, diagnostic features and limitations of applications of ultrasound, CT and MRI and should be able to describe proper cost effective algorithm of various imaging techniques in a given problem setting.

SYLLABUS FOR M.D. – AUDIO DIAGNOSIS

Part – I Medical Radiation Physics as applied to Radio – Diagnosis

1. **Basic concepts :**

   Radiation and atom – Electromagnetic radiation – Structure of atom – Atomicnucleus – Radioactivity – Nuclear fission and fusion

2. **Production of X- rays :**

   X – ray production – X – ray tubes – Tube rating charts – Interaction of electron with target Intensity and quality of x-ray beams

3. **Interaction of radiation with matter :**

   Particle interaction – photon interaction – coherent scattering photoelectric effect – Compton scattering – pair production – their relative importance.

   Attenuation – Attenuation coefficient – Factors affecting attenuation – Applications to Diagnostic Radiology

4. **Radiography :**

Film screen radiography – Cassettes – Intensifying Screens – Radiographic film – Digital Radiography – Scattered radiation – Methods to reduce scattered radiation – Grid characteristics – Grid artifacts – Moving grids – Air gaps – Filters – Cones and Cylinders – Collimators Radiographic image quality – contrast – Noise – Spatial resolution

5. **Fluoroscopy :**

General principle – Real time imaging – positioning – Fluoroscopic equipment optical coupling – photospot cameras – spotfilm – cineradiography

6. **Special radiography :**

Stereo radiography – Conventional tomography – Digital subtraction angiography – Mammography – Recent developments in Radiography.
Computed Tomography – Basic principles – Historical developments – CT generators- image acquisition – Reconstruction techniques – Artifacts – Display.

7. **Modern Imaging systems :**

Ultrasound – Basic principles – production of ultrasound – Interaction of Ultrasound with matter – images acquisition – image quality – Artifacts – Doppler ultrasound – Biological safety Magnetic Resonance Imaging – Basic principles – Image acquisition – Reconstruction techniques – image characteristics – Artifacts – MRI instrumentation – Biological safety.

8. **Nuclear Medicine :**

Radioactivity – Radionuclide production – Radiopharmaceuticals – Radiation detector s- Thyroid probe – Well counter – Dose calibrator – Counting Statistics

Nuclear imaging – Augar scintillation camera – computers in Nuclear imaging.
Nuclear tomography – single photon emission computer tomography positron emission tomography – Recent advances

9. **Radiation Biology :**

Bilogical effects of Radiation – Interaction of radiatioj with tissue – Cellular Radio – Biology – Response of organs to radiation – Acute radiation syndrome – Radiationa induced carcdinogenesis – Hereditary effects of radiation – Radiation effect in utero – recent concepts.

10. **Radiation protection**

Natural radiation – Occupational exposures – Personnel dosimetry – Film badge – TLD pocket dosimeter – Area monitoring survey meters – Contraol of radiation – Time, distance shielding – Protective barrier specificaatin – Workload, use factor, Occupancy factor – Planning diagnostic and Nuclear Medicaine departments.

Guidelines for safe work practice – Regulatory agencies – Atomic energy regulatory agencies – Atomic energy regulatory board – Radiation protection rules in India – ICRP Recommendations – Dose equivalent limits – Recent concepts.

Part II

Radiology – Course contents :

1. Musculo – skeletal system
2. Respiratory system
3. Cardiovascular system
4. Gastrointestinal system
5. Urogenital tract
6. CNS including Spine
7. Imaging of Obstetrics & Gynecology
8. ENT, EYES, Teeth, Soft tissue, Breast
9. Endocrine System
10. Clincally applied Radio – Nuclide imaging
11. Contrast agents

Training in different organ systems :

Various Diseases involving the following systems (A student should have adequate knowledge of procedures and interpretation of all conventional and advancd imaging techniques and interventions whenever needed)

1. Musculo skeletal system – Interpretation of disease of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, metabolic and endocrine neoplastic and miscellaneous conditions.
2. Respiratory system – Diseses of the chest wall, diaphragm, pleura and airway, pulmonary infections, pulmonary vasculature, pulmonary neoplasm, diffuse lung disease, mediastinal disease, chest trauma, post – operative lung and x-ray in intensive care.
3. Cardiovascular system – Diseases and disorders of the cardiovascular system (Congenital and acquired condtion) and the role of imaging by conventional radiology, ultrasound, color Doppler, CT, MRI, Angiography and Isotope studies.
4. Gastro intestinal tract and Hepato – biliary pancreatic system – diseses and disorders of mounth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery, acute abdomen, abdominal trauma. Disease and disorders of Hepato – billary pancreatic system.
5. Urogenital system – various diseases and disorders of Genito – Urinary system including congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous, degenerative, metabolic conditions.
6. Central Nervous system including imaging (conventional and newer methods) and Intepretation of various diseases and disorders of the head, neck and spine Covering congenital, infective, Vascular, Traumatic, neoplastic, degenerative, Metabolic and miscellaneous condition.
7. Radiology of Emergency Medicine.
8. Radiology of Obstetric and Gynecology
9. Evaluation of Breast by imaging and interventions
10. ENT, Eyes and teeth
11. Endocrine glands
12. Clinical applied radionuclide Imaging.
13. Interventional Radiology related to different systems of body.

M.D. – RADIO DIAGNOSIS
TRAINING PROGRAMME

Three Year Courses :

First Year :

Basic Physics, Medical Physics, General Radiology, Ultrasound & CT concurrently	12 months

Second Year :

General Radiology	5 months
Ultrasonogram	2 months
C.T. Scan	2 months
MRI 1	
Nuclear Medicine	1 month
Intervention	1 month

Third Year

General Radiology	2 months
Ultrasonogram	1 month
C.T.Scan	2 months
MRI	2 months
Nuclear Medicine (PET)	1 month
Elective (Obst and Gyn.)	1 month
Elective Paediatric	1 month
Intervention	2 months

During the three years course, the student will work in the following areas

1	Conventional Chest	3 months
2	Conventional Musculoskeletal including skull, spine, PNS	3 months
3	Genito urinary system	2 months
4	Gastro Intestinal system	3 months
5	US including Doppler	6 months
6	CT (Body + Head – 3 months each)	6 months
7	Emergency Radiolgy	2 months
8	MRI	4 months
9	Interventional Radiology including Aniography	3 months
10	Nuclear Medicine including PET Scan	1 months
11	Elective Posting (O & G, Paediatrics)	2 + 1 month

PROPOSED SCHEDULE FOR ROTATION OF RESIDENTS

1st year (1/6)	Chest	Chest	Musculo Skeletal	GU	GU	Ultrosound
1st year (2/6)	Ultrosound	CT (Head)	CT (Body)	GIT	GIT	Ultrosound
2nd year (3/6)	Chest + Mammography	Musculo Skeletal	Musculo Skeletal	GIT	Emergency Radiology	CT (Head)
2nd year (4/6)	CT (Body)	Ultrosound + Doppler	Intervention	Ultrosound	MRI	Nuclear Medicine
3rd year (5/6)	CT (Head)	MRI	PET	Intervention	MRI	CT (Body)
3rd year (6/6)	MRI	Emergency Radiology	Intervention	Ultrosound	Elective (Obst & Gynec)	Elective (Paediatrics)

POSTGRADUATE EXAMINATION

a) Theory

Part –I

Paper I – Medical Radiation Physics as applied to Radio Diagnosis
(Basic concepts, Production of x- rays, Interaction of radiation with matter, Radiography, Fluoroscopy, Special radiography, Modern imaging systems, Nuclear Medicine, Radiation Biology and Radiation Protection)

Part – II

Paper – I – Radio Diagnosis including imaging Breast
(Cardiovascular System, Respiratory System, Gastro intestinal including Hepato biliary, Endocrine, Chest and Breast)

Paper – II – Radio Diagnosis including Interventional Radiology (Genitourinary, Retroperitoneum, CNS including Head, Nech & Spine, Musculoskeletal, O & G, ENT and interventional Radiology)

Paper – III – Radio Diagnois including Nuclear Medicine (Recent Advances, Nuclear Medicine and Radiology related to Clinicl Specialties)

b) practicals :

A) One Long and Two Short cases
B) Practical and Viva

I. Spot film diagnosis (40 – 50)
II. Techniques
III. Implements / Contrast media
IV. Nuclear Medicine

SCHEME OF EXAMINATION

Part – I – (at the end of First year)

Theory	Tile of the paper	Duration in hours	maximum marks
Paper – I	Medical Radiation Physics as applied to Radio Diagnosis (Basic concepts, Production of x-rays, interaction of radiation with matter, Radiography, Fluoroscopy, Special radiography, Modern Imaging Systems, Nuclear Medicine, Radiation Biology and Radiation Protection)	3 Hours	100

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

Theory	**Tile of the paper**	**Duration in hours**	**Maximum marks**
Paper I -	Radio Diagnosis including Breast	3 Hours	100

(Cardiovascular System, Respiratory System, Gastro intestinal System, including Hepato biliary, endocrine, Chest, Breast)

Paper – II – Radio Diagnosis including interventional Radiology

3 Hrs. 100

(Genitourinary, Retroperitoneum, CNS including Head, Neck & Spine, Musculoskeletal, O & G, ENT, Eye and Interventional Radiology)

Pape – III	Radio Diagnosis including Nuclear Medicine	3 Hours	100

(Recent Advances, Nuclear Medicine and Radiology related to clinical specialities)

Clinical Examination :

	No. of Cases	Druraion	Marks
Long Case	1 X 90	1 Hours	90
Short Cases	3 X 30	30 minutes	90
Communication Skill			20
		Total	**200**

Oral Examination :

Instruments	-	20
Contast	-	20
Viva	-	40
Log Book	-	20
Total	-	**100**

Marks Qualifying for a pass :

1.	50% of marks in the university theory examinations	-	150 / 300
2.	50 % of marks in the university clinical examinations	-	100 / 200
3.	Viva Voce	-	100
4.	Aggregate of 2 & 3	-	150 / 300
	Total	**-**	**600**

(maximum number of candidates to be examined per day – 6) -

Recommended List of Books and Journals

Text Books :

1. Text book of Radiology & imaging – David Sutton
2. Diagnostic Radiology – Graninger & Allison
3. Diagnostic ultrasound – volume I & II – Rumack Carol, M
4. Cranial MRI and CT – Lee S. Howard
5. CT and MR Imaging of the whole body – Haaga
6. Clinical Sonography : A Practical Guide – Sanders Roger
7. Chest Roentgenology – Felson Benjamin
8. Radiology of the Chest – Armstrong
9. HRCt of the Lung – Richard Webb
10. Introduction to Vascular Ultrasonography – Zweibel, W.J.
11. Ultrasound in Obstetrics & Gynecology – Peter W. Callen
12. Diagnostic Neuroradiology – Anne G. Osborn
13. Christensen's Physics of Diagnostic Radiology – Thomas S. Curry et al.
14. Clarke's Positioning in Radiology : R.A. Swallow et al
15. Fetal & Paediatric USG – Cohen
16. Applied Radiological Anatomy – Butler
17. Applied Radiological Anatomy – Butler
18. Clinical Doppler Ultrasonography – Paul L. Allen
19. Clinical Magnetic Resonance imaging – Edelman et al

Theory : Four papers of 3 hours each.

Paper	Titles	Duration	Marks
Part I			
Paper I	Basic Sciences in Dermatology, Venerology & Leprosy	3 hrs.	100
Part II			
Paper I	General & Tropical Dermatology including Venereology, Leprosy & their Social Public Health & Preventive Aspects	3 hrs.	100
Paper II	Dermatology including skin Manifestations of Systemic Diseases & Therapeutics	3 hrs.	100
Paper III	Recent Advances in Dermatology, Venerology & Leprosy	3 hrs.	100

DDVL

Theory : Three papers of 3 hours each.

Part – I

1. Basic Sciences in relation to Dermatology, Venereology and Leprosy.

Part - II

1. Principles of Dermatology Diagnosis and Therapeutics
2. Venereology and Leprosy