

## TEACHING SCHEDULE FOR POST GRADUATES STUDENTS

Time 8.00 – 9.00 am

Days: Mon/Wed/Sat

Sl. No.	Topic	No. of Hours	Faculty
01	Basic Physics Structure of atom Electromagnetic radiation: Definition, spectrum, properties and wave/quantum theories. Radioactivity: Natural and artificial, units, exponential decay, specific activity, physical biological and effective half life, properties of alpha, beta and gamma radiations, Soddy Fajan's displacement law of radio activity.	2	SPS
02	Production of X-Rays Construction and working principle of stationary anode and rotating anode X-ray tube, Line focus principle, process of X-ray generation. Heel effect	2	SPS
03	Luminescent screens Construction of intensifying screen, New phosphor technology.	1	SPS
04	X-Ray Films Construction of film, latent image	1	SPS
05	Dark Room Techniques Film processing, manual and automatic film processor, Dark room design	1	SPS
06	Interaction of X-Rays with Matter Thomson – Rayleigh scattering Photo electric effect Compton scatter	1	SP
07	Effects of X & Gamma Radiation Heat, excitation, ionization, range of secondary electrons, chemical, biological, photographic, fluorescent, phosphorescent, thermoluminescent.	2	SP

08	Attenuation Attenuation, absorption, scatter, exponential law, attenuation coefficients (linear and mass), half-value thickness. Homogenous and heterogenous radiation comparison.	1	SP
09	Filters Inherent, added and K Edge filters X-Ray Beam Restrictors Aperture diaphragm, cone, cylinder, collimator <b>Practical 1</b> Congruence between optical and radiation fields.	3	SP
10	Grids Principles, construction, working and types Evaluation of grid performance, grid cut off and air gap technique <b>Practical 2</b> Verification of grid cut off	3	SP
11	<b>Test 1</b>		
12	X-Ray Generators Transformers, rectifiers, filament circuits, high voltage circuits, tube rating, types of generators: capacitor discharge generators, battery power generators, medium frequency generators, falling load generators. Modern X-Ray tubes: metal ceramic x-ray tube and grid control x-ray tube. <b>Practical 3</b> Qualitative determination of suitable kVp for the given object Qualitative determination of suitable mAs for the given object	6	SPS
13	<b>Fluoroscopy</b> Image intensifier: Construction, operation, brightness gain, optical couplings, display and recording.	2	SP
14	<b>Mammography</b> X-Ray tube design, Film cassettes, exposure factors, magnification technique	1	SP
15	Computer Radiography	1	SPS
16	Digital Radiography / PACS	1	SPS
17	Photographic characteristics of films	1	SPS
18	Radiographic Imaging Image contrast and image quality	1	SPS

19	<p>Geometric factors influencing Imaging</p> <p><b>Practical 4</b></p> <p>Determination of magnification by changing object to film distance (OFD)</p> <p>Determination of magnification by changing focus to film distance (FFD)</p> <p>Beam alignment test</p>	2	SPS
20	<b>Test 2</b>		
21	<p><b>Computed Tomography</b></p> <p>Basic principles, generations, CVCT, DSR</p> <p>Slip ring technology, Helical CT, Data acquisition system, Image reconstruction algorithms, image quality, formation of CT image, Image display, post processing techniques, artifacts.</p>	10	SP
22	<p><b>Ultrasound</b></p> <p>Basic acoustics and relevant terms</p> <p>Production and characteristics of ultrasound</p> <p>Transducer: Principles, Construction, working and types, Interaction of ultrasound with matter.</p> <p>Image display modes, ultrasound controls.</p> <p>Real time ultrasound, Doppler ultrasound: Continuous wave, pulsed, duplex scanning, color and power, harmonic imaging, image quality, biological effects, ultrasound artifacts</p>	10	SP
23	<b>Test 3</b>		
24	<p><b>Magnetic Resonance Imaging</b></p> <p>Basic principles, MRI instrumentation: types of magnets, types of coils, types of receiver coils, gradient coils, RF shield.</p> <p>Types of pulse sequences, K space, advanced sequences, MR Angiography, MRI artifacts, Magnetic and RF safety, MR contrast agents.</p>	10	SPS
25	<p>Radiation Protection / Regulations</p> <p>Aim of radiation protection, radiation quantities and units, radiation protection in radiography and fluoroscopy, radiation monitoring instruments, personnel monitoring device. Biological effects of radiation, maximum permissible dose and AERB regulations.</p> <p><b>Practical 5</b></p> <p>Radiation protection survey</p>	2	SPS
26	<p><b>Quality Control of X-Ray Units</b></p> <p>Methods of assessing image quality and their relationship to specifications of system performance.</p> <p>Methods of monitoring equipment performance.</p>	2	SP
27	<p>Recording Devices</p> <p>Mutiformat camera, wet laser camera, Dry laser camera.</p>	1	SPS

28	<p><b>Nuclear Medicine</b>  Working principle, radiopharmaceuticals, technetium99m generator, principle construction and working of scintillation spectrometer, rectilinear scanner and gamma camera. Control of internal radiation hazards, contamination and decontamination, waste disposal.</p> <p><b>Practical 6 &amp; 7</b>  Determination of decay constant and half – life (<math>T_{1/2}</math>) of the given radioisotope  Contamination Monitoring</p>	3	SP
29	<b>Test 4</b>		
30	<b>Model Exam</b> (Prior to Final Exam)		