UP STATE PARAMEDICAL FACULTY

DIPLOMA IN M.R.I. TECHNICIAN --134

DURATION - 02 YEARS+3 month internship

SYLLABUS: FIRST YEAR

TOPICS

1. Anatomy 2. Radiological Anatomy , 3. Physics of MRI , 4. Indication and Contraindication of MRI , 5. Radiation Hazards, Radiation Protection , 6. Contrast-Media

SECOND YEAR

1. Anatomy 2. Radiological Anatomy 3. Indication and Contraindication of MRI 4. Pathologies as seen on MRI 5. MRI Physics 6. Non Ionic & Ionic Contrast 7. Contrast Reaction and its Management. , 8. MRI Patient Positioning & Preparation 9. MRI Procedures
10. Radiation Hazards, Radiation Protection, Contrast-Media , 11. 3T MRI, MR angio, MRCP
12. Recent Advances.

FIRST YEAR -- PAPER

Paper	Topics/subject	Marks		Duration
Paper-I	Introduction to Anatomy, Physiology, Human body, Anatomical Posture, Descriptive Terms in Anatomy, Planes of body, Cells, Tissues, System, Membranes, Glands, Body fluid. Cartilages, Bones muscles, Skeletal System, Function of Skeleton, Classification of bones, Descriptive terms used in osteology, Joints of Skeleton / myology/orbit/pns/face/ neck Bones of Appendicular Skeleton. Bone of limb. Vertebra, Sacrum, Coccyx. Sternum, Ribs.Bones of skull, sutures of skull, Paranasal sinuses, Facial bones. Abdominal Regions, Solid organs of abdomen/ Excretory organs, G.I.T. The urinary system, Mediastinum, Heart,	75	100	3hrs

	Aorta. Respiratory System. Reproductive System. Nervous System . hepatobiliary/ lymphatic /vascular system **Radiological Anatomy** MRI slices—axial coronal and sagittal sections of human body			
	Internal assessment	25		
Paper-ll	Basic Concepts- What is matter, anatomic structure, isotopes, ions specific gravity, temperature scales, electro, magnetic radiation. Electricity & Magnetism- What is electrostatics, inverse square law, types of bonds, electrical field and electrical potential, electrificion possible, conductors and insulators, electrostatics, static discharge. HISTORY AND DISCOVERY OF MRI/ NMR PHYSICS OF MRI- □ General overview □ The concept of longitudinal magnetization □ Larmour equation □ The concept of transverse magnetization □ Radio frequency pulses □ The concept of t1 and t2 weighted images □ Contrast enhanced MRI □ MR Sequences □ Fastimaging sequencesGradient fields and gradient coils □ Summary of MR processMajor components of an MRI □ Magnets HELIUM SUPERCONDUCTION 1.5TESLA/3TESLA/8TESLA Self test Indications and Contraindication of MRI (Do's & Don't of MR	75	100	3hrs
	Internal assessment	25		

practical	Patient Prerequisites, Patient Postitioning, Patient Consent M.R.I Filming, Dark Room, Indication & Contraindication of MRI Contrast reaction management with IV Fluid: 02 /steroids etc. , Performing head and spine MRI ASSIST in performing body and Musculoskeletal scans	100		3hrs

SECOND YEAR --- PAPER

Paper	Topics/subject	Marks		Duration
Paper-I	Nervous System (C.N.S., P.N.S., A.N.S.) Brain, Cerebrum, Basal Ganglia, Thalamus. Hypothalamus, Ventricles, CerebroSpinal Fluid and pathway, Brain Stem, Cerebellum, Spinal Cord. GIT Digestive System, Alimentary Tract, , Pharynx, Mesentery Oesophagus. Stomach, Small Intestine, Large Intestine, Salivary Glands FACE/ORBIT/PNS COURSE OF MAJOR VESSELS AND LYMPHATICS MAJOR NODES Neck and Larynx, Hepatobiliary Bones and muscles of limbs Circulatory System, Heart, Pulmonary Circulation, Systemic Circulation, Aorta. Respiratory System,	**75**	**100**	**3hrs**
	Radiological Anatomy, MRI safety, Do's and don't's of MRI Indication and contraindication of MRI Non Ionic & Ionic Contrast NEGATIVE & POSITIVE CONTRAST Contrast Reaction and its Management. ROUTES OF CONTRAST ,			

	Radiation Hazards and protection			
	Internal Assessment.	**25**		
Paper -II	BASICS AND PHYSICS Magnetisation Properties, Types of Magnetic characteristics of the Nucleus, Nuclear Magnetic properties of the elements, Larmor Equation, Geometric Orientation. Resonance and excitation, Free induction decay: T2 Relaxation, Return of Equilibrium : T1 Relaxation, Comparison of T1 and T2. Angiography and magnetization transfer contrast, Time of flight (TOF) CONCEPTS Spin echo, Fast spin echo, Parts of MRI, Artifacts, Machine dependent artifacts, Motion artifacts, Motion artifacts, Chemical shift artifacts, Magnet, Resistive magnet, Superconductive magnet, Permanent Magnet, Safety and Bio-effects. Pulse sequences, Time of repetition and partial saturation- (i) T1 Weighting (ii) Spin (proton density) weighting (iii) T2 weighting (iv) Inversion recovery (v) Short tau inversion recovery (STIR) (vi) Fluid attenuated Inversion recovery (FLAIR). Gradient recall echo (GRE), Perfusion weighted MRI, Diffusion weighted MRI, Magnetization transfer contrast. MRS, Tractography, DTI , Patient preparation and positioning Pathologies as seen on MRI Recent Advances – 3T MRI, MR angio, MRCP, MRS, Tractography, DTI	**75**	**100**	**3hrs**

	Nose, Pharynx, Trachea, Bronchus, Lungs. Urinary System, Kidneys, Ureters, Urinary Bladder, Urethra.Orbit, Occipital Bone, Parietal Bone, Temporal Bone, Frontal Bone Frontal Bone, Sphenoid Bone, Ethmoid Bone,Vertebral Column, Slice Anatomy-Brain, Neck Thorax, Abdomen, Pituitary, Orbit, P.N.S., Limbs, Vertebra in C.T. Scan. Axial, Coronal & Saggital. Anatomy of Body--- Internal assessment 25			
practical	Pediatric MRI , Performing Contrast Head and spine MR MRCP, MR angiography. Performing body MR Performing musculoskeletal MR Assisting MRS	100		3hrs

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