

STATE MEDICAL FACULTY OF WEST BENGAL

MODIFIED SYLLABUS FOR : DRD [TECH] COURSE - 2013

SYLLABUS OF ANATOMY

Preliminary Course : 1ST YEAR

- General Anatomical terms & Regions of body. Enumeration of different systems of body.
- Musculo-skeletal System:
 - (i) Basic knowledge about skeletal muscles and ligaments.
 - (ii) Bones: Classification, microscopic anatomical parts and simple microscopic structure.
Sesamoid bones.
Skull bones: Name, position and functions. Sella turcica. Paranasal sinuses. Petromastoid bone. Orbit. Vault and Base of the skull.
Spine: Enumeration. Short anatomy of Atlas, Axis, Typical cervical vertebra, Typical thoracic vertebra, Typical lumbar vertebra, Sacrum & Coccyx.
Pelvis: formation, parts, enumeration of bones.
Bones of upper & lower extremities, enumeration and short anatomy of long bones. Articulated hand and foot: Enumeration and identification of bones, particularly scaphoid, Talus, Calcaneum, Patella.
 - (iii) Joints: General consideration and classification. Synovial fluid. Description in short of : Hip joint, Knee joint, Ankle joint, Shoulder joint, Elbow joint, Wrist joint with chief relations and movements.
- Thorax & Mediastinum: Boundary & contents of thoracic cage and mediastinum. Short anatomy of Diaphragm.
- Abdominal and Pelvic Cavity: Boundary & contents.
- Respiratory system: Parts. Short description of Nasal cavity. Larynx, Trachea, Bronchi & Alveoli, Lungs: Lobes, Broncho-pulmonary segments, Hilum of lung, Artery supply & venous drainage.
- Cardio-vascular system: Heart and great vessels, Pericardium: Definition & functions, Chambers of heart and valves. Cardiac (Pulmonary & Systemic) circulation. Cardiac muscle & Pace maker. Parts of aorta, Short anatomy of Arch of aorta, Carotid & Vertebral arteries, Enumeration of limb arteries, Thoracic & Abdominal aorta, Short anatomy of SVC, IVC and lower limb veins. Definition of Lymphatic system & Lymph node.
- Alimentary (GI) system: Short anatomy of Mouth, Tongue, Salivary glands, Pharynx, Tonsils, Oesophagus, Stomach, Small & Large intestine, Liver and Biliary tract, Spleen, Pancreas, Mesentery & omentum.

- Genito-urinary system: Urinary system: Kidneys, Ureters, Urinary bladder, Urethra: Male & Female, Prostate, Reproductive system: Male genital tract: Scrotum & Testis, Penis, Vas deferens, Seminal vesicles, Female genital tract: Uterus & fallopian tubes, Ovaries, Vagina, Menstrual cycle, Mammary gland.
- Nervous system: Peripheral & Central, Autonomic: Definition Enumeration of parts, Functions in short, Brain: Subdivisions, Lobes, Ventricles, Spinal cord, Meninges & C.S.F Enumeration of cranial & spinal nerves.
- Endocrine glands: enumeration and functions, Short anatomy of Pituitary, Thyroid and Adrenals.
- Related clinical anatomy, wherever applicable.

SYLLABUS OF RADIOLOGICAL PHYSICS

Preliminary Course : 1ST YEAR

- 1) Structure of atom, Atomic No., Mass No., Isotopes & Radio-isotopes, Binding energy, Quantum level, etc.
- 2) Electromagnetic radiation, spectrum.
- 3) Production of Cathode rays and X-rays. Types of X-rays: Soft, Hard, Characteristic, Bremsstrahlung.
- 4) X-ray tube: construction. Cathode, anode & Types of X-ray tubes. Thermionic emissions, Line focus principle, Heel effect.
- 5) X-ray generators: Parts. Electric supply: Single phase/three phase supply, Ac/DC current, defn. of amp. Volt, electron volt.
- 6) Control panel: Parts with labeling, Switches: mechanical, electronic.
- 7) Transformer assembly: Electromagnetic induction, Laws of transformers, Capacitors and Rectifiers, solid state rectifier, Rectification: types.
- 8) HT circuit, Low voltage circuit: diagrams and description.
- 9) Exposure timers: Interlock and other safety devices.
- 10) Portable and Mobile X-ray machines. Mammography X-ray machine.
- 11) Filters and filtration.
- 12) X-ray beam restrictors: diaphragms, cones, cylinders, Collimators.
- 13) Interaction of X-rays with matter.
- 14) Scatter radiation and Grids. Construction and types of grids. Advantages and disadvantages. Grid cut-off. Grid performance.
- 15) Fluorescence, phosphorescence: Fluoroscopy and IITV (Image intensifier) alongwith its construction, spot film device.
- 16) Digital X-ray: CR, DR, DSA, Tele-radiology, PACS.
- 17) Basic idea about X-ray films and picture production, Umbra, penumbra.
- 18) Basic idea about cassette, screen and dark room work.
- 19) Inverse square law. Measurement of radiation: radiation units.
- 20) Hazards of radiation. Radiation protection, Principles and measures. National & International recommendations, Dosimeters: TLD Badges, its construction.

SYLLABUS OF RADIOGRAPHIC TECHNIQUES AND RADIOGRAPHIC ANATOMY

Final Course : 2ND YEAR

- Contrast Media: Oral and intravascular, Barium compounds, iodinated compounds, ionic and Non-ionic types. Reaction to contrast media: Hazards: prevention.
- Skeletal system: Upper limb, Lower limb, Shoulder girdle, Pelvic girdle and Hip joints, Thorax, Vertebral column, Skull and facial bones, Teeth and jaw, Orbit, different types of fractures.
- Paranasal sinuses: Eyeball, Lachrymal system, Orbital USG.
- Respiratory system: Upper respiratory passage: Larynx, trachea, Soft tissue of nasopharynx and neck, Lungs and Pleura. Diaphragm: functions, movements during respiration. Bronchography: defn. HRCT for Bronchus.
- Cardio-vascular system: Heart and Mediastinum. Great vessels, Aorta, Retrocardiac, retrosternal spaces, Echocardiography, Cardio-angiography, Multi-slice CT angio, Pace maker placement, Diaphragmatic hernia.
- Abdomen and Genitourinary system: Anatomy in short. X-ray of abdomen IVU, Cystography, MCU, urethrography: Ascending, decending, Common pathologies.
- Alimentary system: Short anatomy, Ba-preparations, Ba swallow of oesophagus, Ba-meal of stomach & duodenum and follow through, Ba examn. Of ileocaecal region, small bowel enema, Barium enema, Cologram, Invertogram/pronogram. Sinography and fistulography, X-ray of abdomen in erect posture, Sialography.
- Hepatebiliary system: Cholangiography: T-Tube and PTC (Percutaneous transhepatic), ERCP, MRCP, USG, Interventional radiology: Direct, US guided.
- Spleen: Spleno-portal venography: Defn. US guided, Dopplar study.
- Obstetrics and Gynaecology: Antenatal USG, Radiation ptotection during pregenancy, 10 day rule, Hystero-salpingography.
- Central nervous system: Routine and special projections of skull, carotid & Vertebral angiography, CTA, MRA, Myelography: Defn.
- Operation theatre techniques and ward radiography: C-arm X-ray machine.
- Special techniques: High KV technique, Low KV technique and Mammography: Magnification radiography.
- Digital X-ray: C.R. D.R.

Radiographic photography and Dark-room Techniques:

- X-ray Film: Construction, Types of emulsion, characteristics and control, screen & non-screen films, Film under & over exposure, Film speed and Film contrast.
- Intensifying Screen: Construction, Fluorescence. Type of intensifying screens, Rare earth screen intensification factors. Cleaning and general care of screen.
- X-ray cassette: Construction, testing and proving good screen contact, general care.
- Dark Room Processing: Defn., steps, suitable fresh water supply.
- X-ray film Developers: types: powder and liquid solution, how to prepare? Functions and constituents of developer, medium & high contrast developers. Ultra-rapid development, Standardization by time and temperature, Exhaustion of developer, replenishers and Farmer's reducer.
- X-ray Fixers and fixation: How to prepare? Constituents of fixer and fixating agents. Time of fixation, silver recovery.
- Processing: Steps, storage of dry chemicals, storage of solutions, Technical and processing faults, Film fog, etc.. Operation theatre processing: Dish units, Refrigeration. Use of Ice.
- Dark Room: Construction, Storage of Films.
- Radiographic Image: Factors affecting image contrast, detail, sharpness, image quality depending on exposure time, filters, distance, screen, grid, film speed and dark room processing.
- Presentation of Radiograph: Identification of film: Lead letters and lead numbers, actinio markers, aspect for direct and stereo viewing, Mounting of dental films.
- Presentation accessories: View boxes, spot-light, illuminators, projectors and viewing screens for miniature and cine-radiography, magnifiers. Embossing machine, film trimmers, corner cutters, dental mounts and cutter, filling units.

Construction of X-ray Room and arrangement of different rooms in an X-ray set up:

Care and maintenance of equipment: General principles and routine use, Radiographic calibration procedure. Tube rating charts.

First Aid: Shock, convulsion, asphyxia, artificial respiration, Administration of Oxygen, Burns and scalds. Electric shock and burns. Wound, haemorrhage, pressure points, Tourniquet, Injuries to Bones, Joints and muscles, Dressing of Bandages, Plaster of Paris technique, Splints, Drug reaction, Poisons, Basic Nursing.

Drug in Department: Storage labeling. Checking, Regulation regarding dangerous drugs, Units of measurement.

Medical Ethics: Ethical law and professional etiquettes applied to members of profession associated with medicine.

Nursing and Handling of patients: Hospital and Departmental procedure, Hospital staffing and organization. Records and departmental statistics. Medico-legal aspects. Appoints. Stock taking and stock keeping.

Care of patients: Reception, Elementary hygiene.

Nursing Care: Temperature, pulses and respiration. Application of sterile dressings.

Preparation of patients for General X-ray examination: Departmental instructions to out-patients or ward-staff. Instructions for various special investigations. Nursing care before and after special X-ray. Drug allergy.

Principles of asepsis: Methods of sterilization. Care and identification of instruments. Setting of trays and trolleys. Elementary operating theatre procedure.

Computed Tomography – More classes should be allotted for CT & MRI

History:

Basic principle and data acquisition/C.T. generations, Gantry and patient table – Travel Speed, Load capacity, X-ray tubes.

Rotating anode; cooling system; Collimeter; Pencil beam; Fan beam

Anode heat storage capacity; Detector system : Type, number, Efficiency

Rectifier

Scan parameters; Scan time, Number of views per second, Reconstruction time, scan cycle time, Acquisition matrix, Display matrix, Slice thickness.

Image reconstruction; Pixel & Voxel; C.T. Number & Hounsfield Number.

Image display; matrix, pixel, voxel, Window level, Window width, Double Window, Partial Volume phenomenon.

Image quality: Patient exposure; Resolution

Ultrafast C.T., Dynamic C.T. & C.T. angiography, C.T. guided FNAC.
3D C.T./Artefacts

Radiation dose aspects.

Clinical application – Scan planes specially in Cranial C.T. [Gross anatomy of conventional planes] Indication and contra-indication; Patient preparation and positioning
Contrast enhanced C.T.

Magnetic Resonance Imaging:

BASIC PHYSICS WITH PRACTICAL APPLICATIONS:

Magnets – types, powers, magnetism Radio Frequency (RF) pulse T_1 (longitudinal relaxation time) T_2 (transverse relaxation time)

Basic sequences, basic parameters and basic tissue (like fat and water)

Different types of coils.

Contrast agents, MR angiography and dynamic MR.

Spectroscopy.

Hazards, safety and limitations.

Ultrasonography:

Basic Physics : Characteristic of sound; Propagation of sound; Interaction between ultrasound and matter attenuation and reflection; Transducers; Ultrasound display, A, TM, B-mode Gray scale imaging; Scanning methods; Doppler techniques; Artefacts
Safety Application.
