BRIT-1st Year

SEMESTER-1
ANATOMY-1

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Introduction: human body as a whole	Demonstrate surface anatomy, MSK, Vascular and cardiopulmonary system.	Definition of anatomy and its subdivisions Anatomical nomenclature and terminology (planes &positions) Surface Anatomy of main structures and vessels	S.I.S Demonstrations Group discussions Tutorials	8
Applied anatomy & Joints	Enumerate and distinguish all types of bones, joints and connective tissue	Musculoskeletal system: Connective tissue & its modification, tendons, membranes, special connective tissue. Bone structure, blood supply, growth, ossification, and classification. Muscle classification, structure and functional aspect. Joints classification, structures of joints, movements, range, limiting factors, stability, blood supply Nerve supply, dislocations and applied anatomy.	S.I.S Demonstrations Group discussions Tutorials	8
Upper extremity	Enumerate bones of upper limb, their joints and the muscles of upper limb	Bony architecture Joints – structure, range of movement Muscles – origin, insertion, actions, nerve supply Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies Radiographic identification of bone and joints Applied anatomy	S.I.S Demonstrations Group discussions Tutorials	4
Lower Extremity	Demonstratebones of lower limb, their joints and the muscles of lower limb	Bony architecture Joints – structure, range of movement Muscles – origin, insertion, actions, nerve supply Major nerves – course, branches and implications of nerve injuries Development of limb bones, muscles and anomalies	S.I.S Demonstration Seminars Group Tutorials	6
Spine and thorax	Enumerate all vertebrae or whole spine	Back muscles -Superficial layer, Deep muscles of back, their origin, insertion, action andnerve supply. Vertebral column – Structure & Development, Structure & Joints of vertebra. Thoracic cage	S.I.S Demonstrations Seminars Group discussions Tutorials	6

Head and neck: Cranium	Enumerate main muscles of head and neck	Facial Muscles – origin, insertion, actions, nerve supply Temporal mandibular Joints – structure, types of movement	S.I.S Demonstrations Tutorials	4
Cardiovascular system	Demonstrate heart, chambers, internal and external features of heart.	Circulatory system – major arteries and veins of the body, structure of blood vessels Heart structure, positions, chambers, valves, internal & external features Blood supply to heart Conductive system of heart	S.I.S Group discussions Tutorials	2
Lymphatic system:	Enumeratefunction of lymphatic circulation	Circulation, structure & functions Lymph nodes		2
Gastro-intestinal system (with relevant applied anatomy)		Partsofthe gastrointestinal tract Gross anatomy of Tongue, stomach, small and large intestine, liver, gall bladder Pancreas and other digestive organ& related applied anatomy		
Respiratory system	Demonstratepleural cavity, lungs anatomy and great vessels, opening of diaphragm	Partsof respiratory system with salient gross features of lung Brief description of intercostal muscles andPara-nasal air sinuses	S.I.S Demonstrations Group discussions Tutorials	6

ANATOMY PRACTICAL

1) Identification and description of all anatomical structures.
2) Demonstration of dissected parts (upper extremity, lower extremity, thoracic & abdominal viscera, face and brain).
3) Demonstration of skeleton-articulated and disarticulated.
4) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

BRIT –1st Year
SEMESTER-1

PHYSIOLOGY

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guideline	Teaching Methods	Hrs
General Physiology	Enumerate cell physiology and transportation of cell membrane	Cell: morphology, Structure and function of cell organelles Structure of cell membrane Transport across cell membrane Intercellular communication Homeostasis	S.I.S Demonstrations Seminars Group discussions Tutorials	8
Blood	Explain composition of blood, blood group types.	Introduction-composition & function of blood W.B.C., R.B.C., Platelets formation & functions, Immunity Plasma: composition, formation & functions, Plasma Proteins: -types & functions, Blood Groups-types, significance, determination. Hemoglobin Haemostasis Lymph-composition, formation, circulation &functions	S.I.S Demonstrations Seminars Group discussions Tutorials	8
Cardiovascular system	Enumerate cardiovascular physiology, function, cardiac cycle, Blood pressure, ECG, Shock definition.	Conducting system-components, impulse conduction Heart valves Cardiac cycle-definition, phases of cardiac cycle, Cardiac output-definition, normal value, determinants. Stroke volume and its regulation. Heart rate and its regulation: Arterial pulse, Blood pressure-definition, normal values, factors affecting blood pressure. Shock-definition, classification, causes and features, Basic idea of ECG, Cardiovascular changes during exercise	S.I.S Demonstrations Seminars Group discussions Tutorials	8
Respiratory System	Explainrespiratory system, pulmonary circulation and related pathology.	Mechanics of respiration Lung volumes and capacities, Pulmonary circulation, transport of respiratory gases, Factors affecting respiration, Regulation of respiration-neural regulation, voluntary control and chemical regulation, Hypoxia, Hypercapnoea, Hypocapnoea, Artificial respiration Disorders of respiration- dyspnoea, orthopnoea, hyperpnoea, hyperventilation, apnoea, Tachypnoea, Respiratory changes during exercise.	S.I.S Demonstrations Seminars Tutorials	**8**

Nerve Muscle Physiology	Classify muscles and should know the functioning of motor-neuron junction. Explain basic knowledge of EMG.	Muscles-classification, structure, properties, Excitation, contraction, coupling, Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise . Nerve – structure and function of neurons, classification, properties Resting membrane potential & Action potential their ionic basis, All or None phenomenon Neuromuscular transmission Ionic basis of nerve conduction. Concept of nerve injury &Wallerian degeneration Synapses. Electrical events in postsynaptic neurons Inhibition & facilitation at synapses . Chemical transmission of synaptic activity Principal neurotransmitters. Chemical transmission of synaptic activity Principal neurotransmitters.	S.I.S Demonstrations Seminars Tutorials	**8**
Nervous system	Enumerate reflexes & basic functioning sense organs. Should be able to know motor mechanism.	Introduction, central and peripheral nervous system, functions of nervous system. Reflexes-monosynaptic, polysynaptic, superficial, deep &withdrawal reflex Sense organ, receptors, electrical& chemical events in receptors. Sensory pathways for touch, temperature, pain, proprioception & others. Control of tone & posture: Integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions. Motor mechanism: motor cortex, motor pathway: the descending tracts - pyramidal & extrapyramidal tracts- origin, course, termination & functions. Upper motor neuron and lower motor neuron paralysis. Special senses-eye, ear, nose, mouth Water excretion, concentration of urine-regulation of Na+, Cl-, K+ excretion	S.I.S Tutorials Powerpoint presentation	**8**
Digestive System	Enumerate Physiology of GI tract	Digestion & absorption of nutrients, Gastrointestinal secretions & their regulation Functions of Liver & Stomach	S.I.S Demonstrations	**6**

BRIT-1st Year

Semester-1

BASIC PHYSICS

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
General Physics	Enumerate basic physics required to understand the basics of X-ray hardware	Electrical charges, potential difference, current and resistance. Ohms Law for electrical circuit, direct current, alternating current, conductors, semiconductors, insulators, power, ammeter and voltmeter. Electromagnetism, Electromagnetic Induction: Self and Mutual, Capacitor, capacitance.	S.I.S Powerpoint Presentations Problem Based Learning Tutorials	8
Electric system, Components and Control in X-Ray Circuit	Enumerate equipment attachment of X-ray Equipment Like transformer, wires, switches etc. Should know the technical aspects of all procedures	Electric supply & Distribution; diagnostic X-Ray circuits- X-Ray Tube, Transformers, types of transformers, losses. The Tube Stand and Control of panel: Rectification; diodes and rectifiers, semiconductors, Incoming light circuits (Phases – Single & Triple Phase modes, Three Phase 6-pulse mode, Three phase 12-pulse mode; Specialized X-Ray Generators & Transformers. Basic X-Ray circuits transformers laws and types used in X-Ray machine. The rectification of high tension, control of kilovoltage, filament circuit and tube current	S.I.S Demonstrations Group discussions Tutorials Demonstrations	10
Exposure switches and Timer / AEC	Enumerate basics of switches required and timers	Exposure switches and relays timers and its radiographic application. Beam limiting devices, Absorption co-efficient, grids, cones and filter. Electronic Timers; Automatic Exposure Control Timers, Phototimer	S.I.S Tutorials	10

BRIT –1st Year
Semester-1
IMAGE ACQUISITION, PROCESSING & ARCHIVING

Topic	Learning outcomes (At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
X-ray film and Image processing:	Demonstrate composition of film, screens, cassette, processing solution, the usage and effect of light	Composition of single and double coatedradiographic films, Screen &Non Screen films, structure of film, characteristic curve. characteristics (speed, base + fog, gamma, latitude), effect of grain size on film response to exposure, interpretation of characteristics curve, latent image formation, process of film developing (composition of developer, Fixer and other processing solution), common errors and faults while processing (densitometry), automatic processing unit (processing cycle), developer & Fixer replenishment and silver recovery.	S.I.S, Demonstration Seminars Group discussions Tutorials	8
Film storage and handling	Perform best storage guidelines for film storage and handling	Film storage rules and guidelines, film handling and care	S.I.S Demonstrations Seminars Tutorials	8
Intensifying screens and cassettes	Enumerate: Select cassette size, Demonstrate Loading & unloading of films	(size, construction and function), types ofintensifying screens and relative advantage, loading and unloading of cassettes and their care/maintenance, effects of kV and mA on variation of emitted radiation intensity, determination of relative speeds, film contrast, film screen contact.	S.I.S Tutorials Demonstrations	10
Image Processing	Demonstratehow to insert image plate for processing, taking the images & doing post processing	Image formation, latent image, processing: manual processing,automatic processing. Developer, fixer, rinser components, replenisher. Manual technique of developing film, Automatic film processor, common errors in processing.	S.I.S, Demonstration Group discussions Tutorials	12

Factors affecting image quality	Explain image quality, density & contrast, blur	meaning of radiographic image contrast, density,resolution, sharpness, magnification and distortion of image, noise and blur, radiographic illuminators and viewing conditions, visual acuity and resolution, quality assurance of the related equipment and its benefits with respect to visual assessment	S.I.S, Demonstration Tutorials	6
Dark Room	Demonstrate the purpose and function of dark room	Introduction, purpose and location of dark room, layout of dark room,entrance, pass box, hatch, hangers, safe light, criteria of safe light, safe light test.	S.I.S, Demonstration Group discussions Tutorials	12
DICOM	Demonstrate DICOM and its features	Introduction, advantages, disadvantages	S.I.S Demonstrations	6
Digital Radiography & Computed Radiography	Demonstrate DR and CR and its their software features	Introduction, advantages, disadvantages	S.I.S, Demonstration	6
PACS	Explain PACS and its features	Introduction, advantages, disadvantages (Functions with HIS/RIS)	S.I.S, Demonstration Tutorials	6
Teleradiology	Explain Tele-Radiology and its software	Introduction, advantages, disadvantages	S.I.S, Group discussions Tutorials	6

PRACTICAL

IMAGE ACQUISITION, PROCESSING & ARCHIVING

Topic
o Loading and unloading of X-ray Films o Technique, Safety concern, Handling in loading and unloading films o Dark Room Procedures o Developer, fixer content. Developing technique, Fixing technique o Safe light test o Safe light principal, benefits and its location o Cleaning & maintenance of Cassette. o Safe and hygienic handling of cassettes and maintenance o Light leakage test in Cassettes o Cassettes safety and image quality features o Handling and storage of X-ray Film & Film Boxes o Handling of X-ray films, easy to achieve locations, safe places of storage. o Using techniques of films by size of open boxes o Editing images in CR & Taking prints o Application of CR, its instrumentations, DRY and Laser printer, CR Printer's application. o DICOM o Application, Functions, Features and its advantages. o Automatic processor o Application, principal. Working technique, work load handling in automatic processor.

BRIT-1st Year
Semester-2

ANATOMY-II

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Nervous system:	Enumeratethe function of brain, Nervous system, motor system, blood supply of brain, anatomy of brain, cranial nerves, CSF formation and about spinal cord.	Classification of nervous system Nerve – structure, classification, microscopy with examples. Neurons, classification with examples. Simple reflex arc. Parts of a typical spinal nerve/Dermatome:Central nervous system – disposition, parts and functions Cerebrum, Cerebellum, Midbrain & brain stem Blood supply & anatomy of brain. Spinal cord-anatomy, blood supply, nerve pathways Pyramidal, extra pyramidal system,Thalamus, hypothalamus, Structure and features ofmeninges Ventricles of brain, CSF circulation Development of nervous system & defects Cranial nerves – (course, distribution, functions and palsy) Sympathetic nervous system, its parts and components Parasympathetic nervous system Applied anatomy	S.I.S Seminars Group discussions Tutorials	8
Sensory system	Enumerateauditory system	Structure and function of Visual system, Auditory system, Gustatory system, Olfactory system, Somatic sensory system	S.I.S	4
Urinary system	Demonstrateanatom y of urinary system, location of kidney.	Pelvic floor, innervations Kidney, Ureter, bladder, urethra	S.I.S Demonstrations Group discussions Tutorials	6
Genital system – male and female	Enumerateblood vessels of reproductive system	Reproductive system of male, Reproductive system of female	S.I.S Demonstrations Tutorials	4
Endocrine system	Enumeratehormone secretion of glands and blood supply	Pituitary gland, Thyroid, Parathyroid	S.I.S Group discussions Tutorials	2

Embryology		Spermatogenesis & oogenesis Ovulation,fertilization, Placenta, Fetal circulation.		

ANATOMY PRACTICAL

5) Identification and description of all anatomical structures.

6) Demonstration of dissected parts

7) Demonstration of skeleton-articulated and disarticulated.

8) Surface anatomy: Surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.

BRIT-1st Year
Semester-2

PHYSIOLOGY

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Renal System	EnumeratePhysiology of kidney	Physiology of kidney and urine formation Glomerular filtration rate, clearance, Tubular function	S.I.S Demonstrations Tutorials	**6**
Physiology of urinary bladder and urethra	Explain Physiology of lower Urinary tract	Ureter, bladder, urethra	S.I.S Demonstrations	**6**
Endocrinology	Label Physiology of the endocrine glands	Physiology of the endocrine glands – , Hormones secreted by these glands, their classifications and functions. Adrenal, Gonads Thymus, Pancreas. Pituitary, Pineal Body, Thyroid, Parathyroid	S.I.S Powerpoint Presentations	**6**

Male & female reproductive system	EnumeratePhysiolo gyof reproductive system	Male -Functions of testes, pubertal changes in males, testosterone -action & regulations of secretion. Female -Functions of ovaries and uterus, pubertal changes, menstrual cycle, estrogens and progestron -action and regulation.	S.I.S Demonstrations	**8**

BRIT-1st Year

SEMESTER-2

RADIATION PHYSICS

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
X-Ray Tubes	Use X-ray equipment and maintenance of equipment. Should know the Warm-up procedures of X-ray machine and cooling methods. To be able to know how to use X-Ray exposure switches.	Fixed and rotating anode, faults in X-Ray tubes, Grid Controlled X-Ray Tube, Mammography X-Ray Tube, Heavy Duty X-Ray Tube, Micro-Focus X-Ray Tube; Tube Rating and Tube Support- Tube heat Ratings, Line Focus principle, Anode Cooling chart, Type of X-Ray Tube Stands. Tube overload indication, X-Ray Tube over Load Protection Circuits,	S.I.S Demonstrations Seminars Group Discussion Tutorials	14
Image Intensifier	Demonstrate work flow Digital/IITV fluoroscopy equipment handling	Fluoroscopic equipment, Digital Fluoroscopic, Dental radiographic equipment, Portable and Non-Portable equipments	S.I.S Tutorials Demonstrations	10
Care and maintenance	Demonstrate Handling, care and maintenance of equipment & accessories	Maintenance and care of all X-Ray equipment and accessories.	S.I.S Tutorials Demonstrations	8

Practical

Radiation Physics

1) X-Ray tubes and accessories, general features.
2) Portable X-Ray Equipment.
3) Image intensifier, its features, spot film.
4) Radiation protection devices
5) Effects of kV and mAs.
6) Maintenance of X-ray equipment and accessories.
7) Mammography X-Ray tube
8) Dental X-Ray unit.

BRIT –1st Year

SEMESTER-2
GENERAL RADIOGRAPHY-I

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Role of Radiographer in Hospital practice and Patient care	Demonstrate his communications skills and behavior	Appearance and behavior of radiographer, professional conduct, code of ethics.	S.I.S Demonstrations Seminars Group discussions Tutorials	10
All View and techniques Chest:	Explain advantage of breath holding technique in Chest and Abdomen scans.	All View and techniques Chest to visualize lung fields and heart, diaphragm, Sternum,	S.I.S, Demonstration Group discussions Tutorials	8
All Views and techniques of Upper Limb	Enumerate surface Anatomy of body. Should know all views of radiography according to part.	Fingers, Hand, Carpal Tunnel, Wrist Joint, Ball catcher view, Forearm, Elbow Joint, Head of Radius and Ulna, Humerus, all view of Shoulder joint like Acromio-clavicular joint, Scapula, Sterno – Clavicular joint etc.	S.I.S, Demonstrations Seminars Group discussions Tutorials	12
All Views and techniques of Lower Limb	Demonstrate the best view for better diagnosis.	Toes, Foot, Calcaneum, Inter-condylar Notch, Ankle Joint, Tibia and Fibula, Patella, Knee joint, Femur.	S.I.S, Demonstrations Tutorials	16

PRACTICAL
GENERAL RADIOGRAPHY-I

Topic
Regional Radiography: **a.** All Views and techniques of Upper Limb: Fingers, Hand, Carpal Tunnel, Wrist Joint, Ball catcher view,Forearm, Elbow Joint, Head of Radius and Ulna, Humerus, all view of Shoulder joint like Acromio-clavicular joint, Scapula, Sterno – Clavicularjoint etc. **b.** All Views and techniques of Lower Limb: Toes, Foot,Calcaneum, Inter-condylar Notch, Ankle Joint, Tibia and Fibula, Patella, Knee joint, Femur. **c.** All Views and techniques of Skull: Cranium, facial bones, temporal bones,temporo-mandibular joints, mandible, Paranasal Sinuses.

BRIT –2nd Year

SEMESTER-3
GENERAL RADIOGRAPHY-II

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
All Views of Hip and Pelvis:	Explain how to take good quality images with as low as radiation dose. .	Theatre procedure for Hip, Pinning and Reduction, Pelvis, Sacro-ilac Joint, Pelvis Bone, Acetabulum**.**	S.I.S, Demonstrations Tutorials	10
All Views and techniques of Skull	Enumerate immobilization technique and immobilization devices.	Cranium, facial bones, temporal bones, temporo-mandibular joints, mandible, Paranasal Sinuses.	S.I.S, Demonstration Tutorials	8

All Views and techniques of Vertebral Column	Use positioning devices.	Cervical Spine, Thoracic spine, Lumbar spine, Sacrum, Coccyx	S.I.S, Demonstration Tutorials	8
All views and techniques Abdomen	Work in clinical practice and know about patient care	All View and techniques Chest to visualize gastro-intestinal tract, urinary tract	S.I.S, Demonstration Seminars Group discussions	6
Skeletal Survey.	Enumerate all views of Skeletal survey	All views required for skeletal survey	S.I.S Demonstration	2

PRACTICAL

GENERAL RADIOGRAPHY-II

Topic
Regional Radiography:. **a.** All Views of Hip and Pelvis: Theatre procedure for Hip, Pinning and Reduction, Pelvis, Sacro-ilac Joint, Pelvis Bone, Acetabulum**.** **b.** All Views and techniques of Skull: Cranium, facial bones, temporal bones,temporo-mandibular joints, mandible, Paranasal Sinuses. **c.** All Views and techniques of Vertebral Column: Cervical Spine, Thoracic spine, Lumbar spine, Sacrum, Coccyx d. All views and techniques Abdomen: Gastro-intestinal tract, urinary tract Skeletal Survey.

BRIT-2nd Year

Semester-3

MAMMOGRAPHY &ECHOCARDIOGRAPHY

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Mammography	Performthe procedure of mammography scanning	Mammography, History of mammography, Mammographic equipment, Mammographic radiation dose and exposureDedicated mammographic unit and its special	S.I.S Demonstrations Seminars Group discussions Tutorials	8

		features, Types of mammograph Routine Mammographic Positioning & Views with additional views and technical considerations, Wire localization in mammography BI-RADS Term, Limitation of mammography, Beam limiting Device in mammography, Radiation Safety, Radiation Hazards in mammography, Film screen mammography,Digital mammography, MRI Breast introduction, USG Guided FNAC & Biopsy of Breast's abnormal collection or tissue		
Echocardiography:	Explain patient preparation.	Introduction, indication and image formation. Uses of color Dopplerin echocardiography and equipment description with transducer.	S.I.S Demonstrations	10

BRIT –2nd Year

SEMESTER-3

ULTRASOUND&DOPPLER INCLUDING 4D

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs

Ultrasound	Enumerate the principle of USG equipment. Explain the types of transducers and its uses according to scan. Demonstrate the switches and knobs of USG equipment	Principle & history of Ultrasound, advantages and disadvantages ofultrasound, Types of Ultrasound, Equipment description, Indication and Clinical Application, Physics of ultrasound imaging, Physics of transducers, Physics of Doppler, Ultrasound tissue characterization, Potential for three dimensional ultrasound, Artifacts in ultrasound, Comparison of ultrasound equipment Computerization of data, Image recording, Ultrasound jelly & Safety of ultrasound.	S.I.S Demonstrations Seminars Group discussions Tutorials	12
Abdomen and pelvis ultrasound	Demonstrate the patient preparation of USG scans.	Pathologies and indications, patient preparation,positioning and scanning technique.	S.I.S Demonstrations Tutorials	10
Neck	Demonstrate and Explain the patient preparation of USG scans.	Pathologies and indications, patient preparation, positioning and scanningtechnique.	S.I.S Demonstrations Tutorials	18
Orbit		Pathologies and indications, patient preparation, positioning and scanningtechnique.		10
Submandibular gland		Pathologies and indications, patient preparation, positioning andscanning technique.		12
Thorax		Pathologies and indications, patient preparation, positioning and scanningtechnique		10
Breast		Pathologies and indications, patient preparation, positioning and scanningtechnique.		8
Scrotum		Pathologies and indications, patient preparation, positioning and scanningtechnique		12
Color Doppler imaging. **The obstetric Ultrasound examination**	Demonstrate the patient preparation of USG scans. Explain how to handle the register, consent forms filling of under act of PC &PNDT patient's scans	Method of gynecologic ultrasound examination,Assessment of Normal fetal growth, fetalbehavior states, fetal breathing movements, fetal cardiac activity.	S.I.S Demonstrations Seminars	10

USG Contrast Media	Explainphysiology behind the USG contrast media	Types of Ultrasound Contrast media and its advantages	S.I.S Demonstrations Group discussions	18

PRACTICAL
ULTRASOUND &DOPPLER INCLUDING 4D

USG: Equipment, Transducer, Applications of various procedures in well-equipped Hospitalsand Diagnostic Centers

Patient Preparation for ultrasound whole abdomen, upper abdomen, lower abdomen (pelvis), Obstetrics (pregnancy) Level- I & II

Contrast media in USG

BRIT –2nd Year
SEMESTER-3
RADIATION HAZARDS & RADIATION PROTECTION

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Radiation protection	Enumerate the guidelines of all respective organization.	Principles, history & development-National &internationalagencies, AERB, BARC, ICRP, WHO, IAEA and their role. Equivalent dose-effective dose Sievert- rem. Sources of radiation-natural man made & internal exposures.	S.I.S Demonstrations Group discussions Tutorials	18

Biological effects of radiation	Enumerate the risk and effects of the radiation.	Effects on cell-stochastic & deterministic effects-radiation risk-tissues at risk-genetic, somatic& fetus risk-risk at other industries. Does equivalent limits philosophy-ICRP (60) AERB guidelines.	S.I.S Demonstrations Seminars Group discussions Tutorials	12
Planning of radiation installation-protection primary &secondaryradiation	Label &Demonstrate how to use and care of all types of lead aprons	Leakage andscattered radiation. Concepts of workload use factor occupancy factor & distance. Barrier design barrier materials-concrete, brick & lead. Primary & secondary barrier design calculations. Design of doors. Control of radiation-effects of time distance and shielding.	S.I.S, Demonstration Seminars Group discussions Tutorials	10
Personnel monitoring systems	Demonstrate the handling and how to use TLD's and badges as per guidelines	Principle and objective-film badge: guidelines for usethermo luminescent dosimeter badge-pocket dosimeter. Area monitoring and radiation survey Practical use of survey meter, zone monitors and phantoms. Survey in x-ray, fluoroscopy and CT scan units.	S.I.S, Group discussions Tutorials	**8**

PRACTICAL
RADIATION HAZARDS & RADIATION PROTECTION

1) Knowledge of all hazards, education of general Public by posters and seminars
2) Safety of women and children , pregnant women, safety of patient attendants, radiation workers and hospital staff, checking of lead aprons, leakage radiation from tube head, radiation survey in and around X – ray installation.
3) Use of TLD film badges, GM counters, Scintillation detectors, Liquid scintillator, Pocket dosimeters and use of protective devices etc. Keeping of dose records of radiation workers, steps after high exposure report and investigations.
4) Biological effects of radiation- The cell effect of ionizing radiation on cell. Somatic effects and hereditary effect. Stochastic and deterministic effect.

BRIT-2nd Year
SEMESTER-4
HOSPITAL PRACTICE AND CARE OF PATIENT

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Introduction to hospital staffing	Enumerate the documentations, consents and management of patient care	Hospital staffing and administration.	S.I.S Demonstrations Tutorials	8
Medical records and documentation		Medical records and documentation	S.I.S Demonstrations Tutorials	4
Legal issues	Demonstrate the handling of PND documents &Explain PNDT act, rule and documentation	Legal issues in radiology department, PNDT Act	S.I.S Demonstrations Tutorials	6
Professional ethics	Enumerate the ethics	Professional ethics and Code of conduct of radiographer	S.I.S Demonstrations Tutorials	6
Handling of patients	Demonstrate the patient care and handling	Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients, infectious patients	S.I.S Demonstrations Tutorials	4
Departmental Safety	Enumerate the sterile procedures and infection control techniques	Safety from hazards due to radiation, electricity etc	S.I.S Demonstrations Tutorials	6
Infection control		Skin care, donning of gowns, gloves, face masks, head caps, shoe covers.	S.I.S Demonstrations Tutorials	4
Vitals signs	Demonstrate how to management of patient transfer with care	Vitals signs. How to measure vital signs	S.I.S Demonstrations Tutorials	8
Body mechanics and transferring of patient		Draw sheet lift, use of slide boards, wheelchair to couch, couch to wheelchair, couch to table, three men lift and four men lift.	S.I.S Demonstrations Tutorials	6

First aid	Enumerate the theoretical and practical knowledge of first aid	Artificial respiration, haemostasis, first aid techniques, ABCD management	S.I.S Demonstrations Tutorials	10
Anesthesia		Local anesthesia and general anesthesia, uses in hospital Facilities regarding general Anesthesia in the X-ray department	S.I.S Demonstrations Tutorials	10
Adverse reactions	Enumerate emergency drugs and uses of emergency drugs	Management of adverse reactions to contrast media	S.I.S Demonstrations Tutorials	8

PRACTICAL
HOSPITAL PRACTICE AND CARE OF PATIENT

1. Medical records and documentation
2. Legal issues in radiology department, PNDT Act
3. Professional ethics and Code of conduct of radiographer
4. Handling of patients: Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients, infectious patients
5. Departmental Safety
6. Infection control: skin care, donning of gowns, gloves, face masks, head caps, shoe covers.
7. Vitals signs
8. Body mechanics and transferring of patient, draw sheet lift, use of slide boards, wheelchair to couch, couch to wheelchair, couch to table, three men lift and four men lift.
9. First aid: artificial respiration, haemostasis
10. Local anesthesia and general anesthesia
11. Facilities regarding general Anesthesia in the X-ray department
12. Management of adverse reactions to contrast media

BRIT-2nd Year
SEMESTER-4
INTRODUCTION TO CT SCAN & MRI

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
C.T.Scan:	Demonstrate surface anatomy, MSK, Vascular and cardiopulmonary system.	Basic principle of CT scan, history of CT Scan, EMI, advantages anddisadvantages, Equipment description.	S.I.S Demonstrations Seminars Group discussions Tutorials	8
Computed Tomography:	Enumerate-distinguish all types of bones, joints and connective tissue	Scanning principle, Image acquisition, Image reconstruction,Image manipulation, Image display and documentation, Scanning parameters.	S.I.S Demonstrations Seminars Group discussions Tutorials	10
Generation of CT Scanner,	Explainthe history and generations	Advantages and disadvantages.	S.I.S Seminars Group discussion	**12**
MRI	Enumerate the principle and hardware of the equipment.	History of MRI, Magnetism, Basic Principle, hardware etc	S.I.S Demonstrations Group discussions Tutorials	**12**
Contrast media	Explain the dose of contrast media.	Types of Contrast agents used in MRI	S.I.S Demonstrations Group discussions Tutorials	**10**
Imaging Instrumentation	Demonstrate how to take good quality of image	Physical and physiological basis of magnetic relaxation,Image contrast and noise	S.I.S, Demonstration Group discussions Tutorials	**10**
Basic pulse sequences	Perform the scan &Should know the principle of protocol	Spin Echo, Inversion Recovery, Gradient Echo	S.I.S, Demonstration Group discussions Tutorials	**12**
MRI, CT, USG	Enumerate the related anatomy	Imaging techniques related pathology including cross sectional anatomy	S.I.S Tutorials	**14**

BRIT –2nd Year
SEMESTER-4
SPECIAL INVESTIGATIONS & PATHOLOGY

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Patient preparation for Special procedure and related contrast Media	Explain indication, contraindication and reactions of contrast media	Contrastmedia, types of contrast media, contra indications for contrast media, reactions to contrast, anaphylactic shock, Myocardial Infarction. Emergency in Radiology Department, emergency drugs and its dose.	S.I.S Demonstrations Seminars Group discussions Tutorials	14
Excretory System:	Demonstrate how to take in minimum numbers of exposures in each special investigation	Introduction, pathology of urinary system, indications, apparatus,procedure and patient care. Intravenous pyelography / Intra venous Urography, Retrograde, Urethrography, Micturation, Cysto-Urethrography, Percutaneous nephorostomy	S.I.S Demonstrations Seminars Group discussions Tutorials	14
Biliary tree	Demonstratethe positioning and technique of the special studies**.**	Introduction, pathology of biliary tree, indications, apparatus, procedureand patient care. Oral Cholecystography, Percutaneous Transhepatic Cholangiography, T-Tube Cholangiography, Bronchography, Arthrograpgy, Myelography, Dacrocystography (DCG), Endoscopic Retrograde CholangioPancreatography, sialography	S.I.S Demonstrations Tutorials	12
G.I.Tract	Explainthe technique of all GIT study according to investigation	Introduction, pathology of GI tract, indications, apparatus, procedure andpatient care Barium Swallow, Barium Meal Study, Small bowel Enema, Barium meal Follow Through, Barium Enema, Double Contrast Studies, Gastrograffin study	S.I.S Demonstrations Group discussions Tutorials	14

Introduction, Indications, Contraindications, Apparatus, Procedure technique and Patient Care:	Demonstrate surface anatomy. To be able to know the technique behind the radiography	Hysterosalpingography (HSG), High K.V Technique, Soft tissue Radiography, Air gap technique, Forensic Radiography, Foreign bodies Radiography, Theatre Radiography,Radiography in Emergency Room, Macroradiography Conventional Tomography	S.I.S Demonstrations Group discussions Tutorials	12

PRACTICAL
SPECIAL INVESTIGATIONS & PATHOLOGY

1. Radiography in various positions for all the special radiological procedures, using contrast media
2. Identification of various films for all the special radiological procedures, using contrastmedia and related pathologies

BRIT-2nd Year
SEMESTER-4
RADIATION HAZARDS & RADIATION PROTECTION-II

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
AERB safety code and ethics	Enumerate how to work as per the AERB safety guideline in clinical setup.	Built in safety specifications for diagnostic x-ray,fluoroscopy and CT units, Specifications for radiation protection devices-room layout. Operational safety-Radiation protection programme- Personnel requirements and responsibilities-regulatory controls.	S.I.S, Demonstration Seminars Group discussions Tutorials	8
Patient protection-Safe work practice in diagnostic radiology-	Demonstrateradiation protection and patient care	Radiation absorbeddose from general dental fluoroscopy x-ray and CT examinations-X-ray examinations during pregnancy x-ray examinations associated with illness, not associated with illness-medico-legal or insurance purpose x-ray examination-medical research x-ray avoidance of	S.I.S, Demonstration Seminars Group discussions Tutorials	16

		unnecessary radiation dose.		
Radiation emergencies-situation handling	Enumerate radiation emergencies &radiation protection and patient care	Safety and prevention-legal requirementsrecent developments in radiation safety related topics.	S.I.S, Demonstration Seminars Tutorials	8

PRACTICAL

Radiation Hazards & Protection-II

1) Use of TLD film badges, GM counters, Scintillation detectors, Liquid scintillator, Pocket dosimeters and use of protective devices etc. Keeping of dose records of radiation workers, steps after high exposure report and investigations.
2) Biological effects of radiation- The cell effect of ionizing radiation on cell. Somatic effects and hereditary effect. Stochastic and deterministic effect.

Quality Assurance & Quality Control

3) Quality control tests for X-ray unit.
4) Quality control tests for radiation leakage
5) Quality control tests for cassettes
6) Quality control tests for radiation shielding devices.

BRIT-3rd Year
SEMESTER-5
MRI-BASIC PRINCIPLE AND TECHNIQUES

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
MRI	Enumerate the principle and hardware of the equipment.	History of MRI, Magnetism, Basic Principle, hardware etc	S.I.S Demonstrations Group discussions Tutorials	**12**
Contrast media	Explain the dose of contrast media.	Types of Contrast agents used in MRI	S.I.S Demonstrations Group discussions Tutorials	**10**
Imaging Instrumentation	Demonstrate how to take good quality of image	Physical and physiological basis of magnetic relaxation,Image contrast and noise	S.I.S, Demonstration Group discussions Tutorials	**10**

Basic pulse sequences	Perform the scan &Should know the principle of protocol	Spin Echo, Inversion Recovery, Gradient Echo	S.I.S, Demonstration Group discussions Tutorials	**12**
Bio-effects and safety in MRI	Demonstrate the patient care in MRI	Hazards, Bio-effects and safety in MRI.	S.I.S, Demonstration Group discussions Tutorials	**10**
MRI (Plain & Contrast)	Enumeratetechnical aspects, protocol and planning techniques for all scans	Brain, Face, Sinuses, Neck, Mastoids, Pituitary, Salivary gland, IAC, Thorax, Abdomen, Pelvis, Whole Spine, Extremities: Indications. Contraindications, Patient preparation, Protocols and patient care.	S.I.S, Demonstration Group discussions Tutorials	**12**
Artefacts	Enumerate all types of artefacts and its correction	Artefacts in MRIand their correction.	S.I.S, Demonstration Seminars Group discussions Tutorials	**14**

MRI-BASIC PRINCIPLE AND TECHNIQUES
PRACTICAL:

1) Physics, scanning principle and image formation in MRI
2) Identification of different parts of MR scanner
3) Applications of various procedures in well-equipped Hospitals and Diagnostic Centers

BRIT-3rd Year
SEMESTER-5
CT- BASIC PRINCIPLE & TECHNIQUES

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
C.T.Scan:	Demonstrate surface anatomy, MSK, Vascular and cardiopulmonary system.	Basic principle of CT scan, history of CT Scan, EMI, advantages anddisadvantages, Equipment description.	S.I.S Demonstrations Seminars Group discussions Tutorials	8
Computed Tomography:	Enumerate-distinguish all types of bones, joints and connective tissue	Scanning principle, Image acquisition, Image reconstruction,Image manipulation, Image display and documentation, Scanning parameters.	S.I.S Demonstrations Seminars Group discussions Tutorials	10
Generation of CT Scanner,	Explainthe history and generations	Advantages and disadvantages.	S.I.S Seminars Group discussion	**12**
NCCT & CECT	Perform the scan and Demonstrateall technical aspects and protocols	Brain, Face, Sinuses, Neck, Mastoid, Temporal Bone (HRCT), Pituitary, IAC, Thorax (Routine & HRCT), Abdomen, Pelvis, Extremities: Indications. Contraindications, Patient preparation, Protocols and patient care.	S.I.S Demonstration Seminars Group discussions Tutorials	**20**
Artefacts	Explaindifferent types of Artefacts and correction	CT Scanner artefactsand their correction.	S.I.S Demonstration Group discussions Tutorials	**8**
Contrast media used in CT	Perform contrast scans &calculate contrast dose as per patient and management of contrast reaction.	Dose, indications, contra indications and adverseeffects. Emergency drugs stored in CT scan room	S.I.S, Demonstration Seminars Group discussions Tutorials	**10**
Quality assurance and quality control	Demonstratethe QA and QC doing himself and take care of QA & QC papers	Purpose, Benefit and record maintaining or QA & QC	S.I.S, Demonstration Seminars Group discussions Tutorials	**12**

PRACTICAL
CT-BASIC PRINCIPLE AND TECHNIQUES

1) Physics, scanning principle and image formation in CT

2) Identification of different parts of CT scanner

3) Applications of various procedures in well-equipped Hospitals and Diagnostic Centers

4) Quality control of CT

BRIT-3rd Year
SEMESTER-5
NUCLEAR MEDICINE & PET SCAN

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Nuclear Medicine	Explain the application in Nuclear medicine	Applications and Apparatus for nuclear medicine	S.I.S Demonstrations Tutorials	10
Gamma Camera	Enumerate Basic knowledge about gamma camera, its parts and their functions	Application, Function and instrumentation	S.I.S Demonstrations Group discussions Tutorials	12
SPECT:	Enumerate the applications, indications, contraindications and advantages of PET Scan	Definition, Applications, Clinical uses, advantages & disadvantages	S.I.S, Demonstration Tutorials	5
PET-CT:		Definition, Applications, Clinical uses, advantages & disadvantages	S.I.S, Demonstration Tutorials	**5**
PET-MRI:		Definition, Applications, Clinical uses, advantages & disadvantages	S.I.S, Demonstration Tutorials	**6**
PET CT & PET MRI		Benefits vs risk or PET-CT and PET-MRI	S.I.S, Demonstration Tutorials	**6**
Radionuclides	Demonstratetypes of radionuclide, its uses and handling with	Characteristics and half-life of Radionuclides. Commonly used Radionuclides	S.I.S, Demonstration Group discussions Tutorials	12

Protocols	radiation protection	Routine protocols	S.I.S, Demonstration Tutorials	4
Indication, contraindications of PET Scans.	Explain proper protocols and technical aspects for all studies	Indication and contraindications of PET	S.I.S, Demonstration Seminars Group discussions Tutorials	10
Patient Preparation		Patient preparation technique in PET Scan.	S.I.S, Demonstration Tutorials	10

PRACTICAL

NUCLEAR MEDICINE & PET SCAN

1. Nuclear Medicine
2. Gamma Camera
3. PET CT & PET MRI
4. Radionuclides

BRIT-3rd Year
SEMESTER-5
RESEARCH & BIOSTATISTICS

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Introduction	Explain definition. Role of Biostatistics, Uses inferential statistics and types of measurement scales.	Definition and characteristics of statistics Importance of the study of statistics Branches of Statistics Statistics of and health sciences including nursing Parameters and estimates Descriptive and inferential statistics Variables and their types Measurement scales	S.I.S Demonstrations Group discussions Tutorials	18
Tabulation of Data	Enumerate benefits of raw data. Should be able to draw all diagrams (With labeling), cumulative frequency and Probability.	Raw Data, the array, frequency distribution Basic principles of graphical representation Types of diagrams – histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, normal probability curve	S.I.S Demonstrations Group discussions Tutorials	12
Measures of Central Tendency	Enumerate&Explain central tendency its applications and practical uses. To be able to calculation of means for group and ungroup data, Mode and median.	Introduction: Uses, applications and practical approach Definition and calculation of mean for ungrouped and grouped data Meaning, interpretation and calculation of ungrouped and grouped data Meaning and calculation of mode Comparison of mean and mode Guidelines for the use of various measures of central tendency	S.I.S Demonstrations Group discussions Tutorials	16
Measures of Variability	Perform & label deviation, average deviation and mean deviation its applications and practical uses. To be able to understand standard deviation and its definition	Introduction: Uses, applications and practical approach The range, average deviation or mean deviation The variance and standard variation Calculation of Variance and standard variation for ungrouped and grouped data Properties and uses of variance and standard deviation	S.I.S Demonstrations Group discussions Tutorials	16

Sampling Techniques	Explain sampling, Raw data its methods, criteria and uses. To be able to know application of sampling in community. Should know test of significance.	Introduction: Uses, applications and practical approach Criteria for good samples Application of Sampling in Community Sampling Methods, Sampling and Non- Sampling errors Sampling variation and tests of significance	S.I.S Demonstrations Group discussions Tutorials	18

BRIT-3rd Year
SEMESTER-6
ADVANCES IN CT

Topic	Learning outcomes(At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Advancement in CT	Enumerate how to prepare the patient, indication and contraindication	Spiral CT, Preparation of Patient, Contrast Media, Indications andContraindications, Technical Aspects of various procedures in CT	S.I.S Demonstrations Tutorials	10
Cardiac multislice CT	Demonstrate the technical aspects, protocol and procedure	Prospective ECG, Triggering Retrospective ECG Gating	S.I.S Demonstrations Tutorials	12
CT Fluoroscopy	Enumerate the protocol and technical aspects of the CT fluoroscopy procedure	Principle and Image Reconstruction Technique, Radiation Safety	S.I.S, Demonstration Group discussions Tutorials	12
CT Urography:	Can perform the scan.	Principle and Image Reconstruction Technique, Radiation Safety	Demonstration PowerPoint lectures Group discussions Tutorials	12
CT Enterography:	Demonstrate - Proper Protocol Technique Planning	Principle and Image Reconstruction Technique, Radiation Safety	S.I.SDemonstration Seminars Power Point Group discussions Tutorials	10
CT Angiography:	Demonstrate proper protocol and post processing of all special procedures	Principle and Image Reconstruction Technique, Radiation Safety	S.I.S, Demonstration Seminars Group discussions Tutorials	18
CT guided Biopsy:	Explain procedure to set and management for the this procedure	Principle and Image Reconstruction Technique, Radiation Safety	S.I.S, Demonstration Seminars Group discussions Tutorials	16

PRACTICAL

ADVANCES IN CT

Application of various advanced procedures in well equipped Hospital and Diagnostic Centers:

1. All angiography procedures,
2. Liver triple phase
3. CT guided Biopsy
4. CT guided FNAC
5. Enterography

BRIT-3rd Year
SEMESTER-6
ADVANCES IN MRI

Topic	Learning outcomes (At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Advances in MRI	Demonstrate Preparation of Patient, Contrast agent, Indications andContraindications Technical Aspects of various procedures in MRI	To know the patient preparation and filling of MRI consent form.	S.I.S Demonstrations Seminars Group discussions Tutorials	12
Fast pulse sequences	Enumerate&Explain pulse sequences like Turbo Spin Echo, Echo Planar Imaging, Single Shot sequences etc	Should know the principle of the sequences	S.I.S Demonstrations Group discussions Tutorials	18
MRCP	Demonstrate Prospective ECG, Triggering Retrospective ECG Gating,	To able to know proper protocols and technical aspects for all studies.	S.I.S, Demonstration Seminars Group discussions Tutorials	6
Spectroscopy	Demonstrate Principle, Planning and Image Reconstruction Technique			**6**
MR Urography	Demonstrate Principle, Planning and Image Reconstruction Technique	Should know the planning technique for all scans		8
MR Enterography	Demonstrate Principle, Planning and Image Reconstruction Technique	Should know the less time consuming sequences.		8
MR Angiography	Explain Principle, Planning and Image Reconstruction Technique			8
Functional MRI	Explain Principle, Planning and Image Reconstruction Technique			5

CSF Flow Study:	Explain Principle, Planning and Image Reconstruction Technique			5
Diffusion Tensor Imaging	Explain Principle, Protocol and Planning			2
MR guided Biopsy	Explain Principle and Image Reconstruction Technique			**2**

PRACTICAL
ADVANCES IN MRI

1. Principles of magnetic resonance imaging, Instrumentation, basis of magnetic relaxation of T1W & T2W, Image contrast and noise, Inversion recovery pulse sequence, Rapid scan techniques, Fast spin-echo and echo-planar imaging, Fast and water signal separation methods.

2. Spectroscopy, Artifacts, Flow phenomena, Contrast agents, Interventional magneticresonance imaging, Bioeffects and safety,

3. MRI Breasts, liver, Adrenal gland, kidney, Urinary bladder, Knee, Shoulder, Brain, Salivary gland, Spine, Neck, CE Angiography, perfusion, Dynamic MRI, Spectroscopy, MRCP, Function MRI etc.

BRIT-3rd Year
SEMESTER-6
INTERVENTION IN DIAGNOSTIC RADIOLOGY

Topic	Learning outcomes (At the end of the training program student should be able to)	Teaching Guidelines	Teaching Methods	Hrs
Interventional Radiology	Explain basic knowledge about interventional radiology and its applications etc	Definition, Indication, Clinical Application, advantages, disadvantages, risks etc.	S.I.S Demonstrations Seminars Group discussions Tutorials	12

Name of different type of Procedure sand description	Demonstrate about gamma camera, its parts and their functions	All MRI Angiography All C.T. Angiography All Biopsy, FNAC, MRI Guided. All Biopsy, FNAC, USG Guided. All Biopsy, FNAC CT Scan Guided USG, CT Scan Guided Tapping Nerve Blocks. Radiofrequency Ablation Stereotactic Brain Biopsy.	S.I.S Demonstrations Seminars Group discussions Tutorials	28
DSA	Perform or Demonstrate proper positioning of patient and management, handling for all DSA procedures. Should be familiar with DSA software and post processing of procedure	Introduction, its application, instrumentation, all DSA procedures and its advantages, disadvantages and risks vs benefits ratio. Patient's preparation for DSA procedures	S.I.S, Demonstration Seminars Group discussions Tutorials	40

PRACTICAL

INTERVENTION IN DIAGNOSTIC RADIOLOGY

1. All MRI Angiography
2. All C.T. Angiography
3. All Biopsy, FNAC, MRI Guided.
4. All Biopsy, FNAC, USG Guided.
5. All Biopsy, FNAC CT Scan Guided
6. USG, CT Scan Guided Tapping
7. Nerve Blocks.
8. Radiofrequency Ablation
9. Stereotactic Brain Biopsy.
10. DSA: Introduction, its application, instrumentation, all DSA procedures and itsadvantages, disadvantages and risks vs benefits ratio. Patient's preparation for DSAprocedures.

BRIT-3rd Year
SEMESTER-6
PROJECT REPORT

Students have to carry out a research project (on any topic related to radiology) under the supervision of a faculty. The project report has to be prepared on the basis of the research work carried out. The assessment is done on the basis of the work done and the presentation and viva.