SGT UNIVERSITY
SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY
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Faculty of Allied Health Sciences

Bachelor of Science (Radio-Imaging Technology)(BRIT)

Syllabus

2017

S. No	Subject	Paper Code	Theory Examination		Practical Examination		Total Marks	Credits
			Univ. Exam.	Internal Assess-ment	Univ. Exam.	Internal Assess ment		
1st Year								
1st Semester								
1	Anatomy- I		60	40	60	40	200	3+1
2	Physiology-I		60	40	-	-	100	3
3	Basic Physics		60	40	-	-	100	4
4	Image Acquisition, Processing & Archiving		60	40	60	40	200	4+2
5	Communication Skills & Personality Development-I		60	40	-	-	100	2
Total			**300**	**200**	**120**	**80**	**700**	**19**
2nd Semester								
1	Anatomy- II		60	40	60	40	200	3+1
2	Physiology- II		60	40	-	-	100	3
3	Radiation Physics		60	40	60	40	200	4+2
4	General Radiography- I		60	40	60	40	200	4+2
5	Fundamentals of Computer Science-II		60	40	-	-	100	2
	Total		**300**	**200**	**240**	**160**	**800**	**21**
2nd Year								
3rd Semester								
S. No	**Subject**	**Paper Code**	**Theory Examination**		**Practical Examination**		**Total Marks**	**Credits**
			Univ. Exam.	**Internal Assess-M ment**	**Univ. Exam.**	**Internal Assess ment**		
1	General Radiography- II		60	40	60	40	200	4+2
2	Mammography and Echocardiography		60	40	-	-	100	4
3	Ultrasound & Doppler including 4D		60	40	60	40	200	4+2
4	Radiation Hazards& Protection-I		60	40	60	40	200	4+2
5	Environmental Science		60	40	-	-	100	4
	Total		**300**	**200**	**180**	**120**	**800**	**26**
4th Semester								
1	Hospital practice & Care of Patient		60	40	60	40	200	4+2
2	Introduction of CT Scan & MRI		60	40			100	4
3	Special Investigations& Pathology		60	40	60	40	200	4+2
4	Radiation Hazards& Protection-II		60	40	60	40	200	4+2
	Total		**240**	**160**	**180**	**120**	**700**	**22**
03rd Year								
5th Semester								
S. No	**Subject**	**Paper Code**	**Theory Examination**		**Practical Examination**		**Total Marks**	**Credits**
			Univ. Exam.	**Internal Assess-ment**	**Univ. Exam.**	**Internal Assess-ment**		
1	Magnetic Resonance Imaging-Basic principle and techniques		60	40	60	40	200	4+2
2	Computed Tomography -Basic principle and techniques		60	40	60	40	200	4+2
3	Nuclear Medicine & PET Scan		60	40	60	40	200	4+2
4	Research Methodology & Biostatistics		60	40			100	4
	Total		**240**	**160**	**180**	**120**	**700**	**22**

			6th Semester					
1	Advances in CT		60	40	60	40	200	4+2
2	Advances in MRI		60	40	60	40	200	4+2
3	Intervention in Diagnostic Radiology		60	40	60	40	200	4+2
4	Research Project		60	40	60	40	200	6
	Total		**240**	**160**	**240**	**160**	**800**	**24**

BRIT 1st Year
Semester – 1
Anatomy – I

Total Marks- 60 Paper code - Hours- 50

S.No.	Topics To Be Covered	Teaching Hours	Domain
Chapter 1	**Introduction: human body as a whole** Definition of anatomy and its subdivisions Anatomical nomenclature and terminology (planes &positions) Surface Anatomy of main structures and vessels	4	Must Know Desirable to know Nice to know
Chapter 2	**Applied anatomy& Joints** 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	4	 Must Know Desirable to know
Chapter 3	**Upper extremity** 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	4	 Must Know
Chapter 4	**Lower extremity** 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	4	 Must Know
Chapter 5	**Spine and thorax** Back muscles -Superficial layer Deep muscles of back, their origin, insertion, action and nerve supply. Vertebral column – Structure & Development, Structure & Joints of vertebra. Thoracic cage	4	 Must Know

Chapter 6	**Head and neck: Cranium** Facial Muscles – origin, insertion, actions, nerve supply Temporal mandibular Joints – structure, types of movement	4	Must Know
Chapter 7	**Cardiovascular system (with relevant applied anatomy)** Heart-Size,location, chambers. Circulation -Systemic &pulmonary Great vessels of the heart, branches of aorta. Overview of blood vessels of upper extremity and lower extremity	4	Must Know Desirable to know
Chapter 8	**Lymphatic system- (with relevant applied anatomy)** Salient features of lymphatic organs (spleen, tonsil, thymus, lymph node)	4	Desirable to know
Chapter 9	**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	4	Must Know Desirable to know
Chapter 10	**Respiratory system (with relevant applied anatomy)** Partsof respiratory system with salient gross features of lung Brief description of intercostal muscles andPara-nasal air sinuses	4	Must Know Desirable to know

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– I

Total Marks- 60 Paper code - Hours- 50

Chapter 1	General Physiology Cell: morphology, Structure and function of cell organelles Structure of cell membrane	Must Know	2
	Transport across cell membrane Intercellular communication Homeostasis		2
Chapter 2	Blood Introduction-composition & function of blood	Must Know	2
	W.B.C., R.B.C., Platelets formation & functions, Immunity		1
	Plasma: composition, formation & functions, Plasma Proteins: - types & functions, Blood Groups-types, significance, determination.	Desirable to know	2
	Hemoglobin, Haemostasis	Nice to know	2
	Lymph-composition, formation, circulation & functions		2
Chapter 3	Cardiovascular system Conducting system-components, impulse conduction Heart valves Cardiac cycle-definition, phases of cardiac cycle,	Must Know	2
	Cardiac output-definition, normal value, determinants.		1
	Stroke volume and its regulation.	Nice to know	2
	Heart rate and its regulation: Arterial pulse, Blood pressure-definition, normal values, factors affecting blood pressure.	Must Know	2
	Shock-definition, classification, causes and features, Basic idea of ECG, Cardiovascular changes during exercise	Desirable to know	2
Chapter 4	Respiratory System Mechanics of respiration Lung volumes and capacities	Must Know	2
	Pulmonary circulation, transport of respiratory gases		2
	Factors affecting respiration, Regulation of respiration-neural regulation, voluntary control and chemical regulation	Desirable to know	2
	Hypoxia, Hypercapnoea, Hypocapnoea,	Nice to know	1
	Artificial respiration		1
	Disorders of respiration- dyspnoea, orthopnoea, hyperpnoea, hyperventilation, apnoea, Tachypnoea, Respiratory changes during exercise.	Must Know	2
Chapter 5	Digestive System Digestion & absorption of nutrients, Gastrointestinal secretions & their regulation Functions of Liver & Stomach	Must Know	2
Chapter 6	Nervous system Introduction, central and peripheral nervous system, functions of nervous system.	Must Know	1
	Reflexes-monosynaptic, polysynaptic, superficial, deep &withdrawal reflex Sense organ, receptors, electrical& chemical events in receptors.	Nice to know	2
	Sensory pathways for touch, temperature, pain, proprioception & others.		2
	Control of tone & posture: Integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions.		1

	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	Desirable to know	2
	Water excretion, concentration of urine-regulation of Na+, Cl-, K+ excretion	Nice to know	1
Chapter 7	Nerve Muscle Physiology Muscles-classification, structure, properties, Excitation, contraction, coupling, Motor unit, EMG, factors affecting muscle tension, Muscle tone, fatigue, exercise .	Desirable to Know	2
	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.	Nice to Know	2
	Concept of nerve injury &Wallerian degeneration Synapses. Electrical events in postsynaptic neurons Inhibition & facilitation at synapses .		2
	Chemical transmission of synaptic activity Principal neurotransmitters. Chemical transmission of synaptic activity Principal neurotransmitters.		1

BRIT 1st Year
Semester – 1
Basic Physics

Total Marks- 60 Paper code - Hours- 40

Chapter 1-	**General Physics** Electrical charges, potential difference, current and resistance.	Must Know	2
	Ohms Law for electrical circuit, direct current, alternating current, conductors, semiconductors, insulators, power, ammeter and voltmeter.		4
	Electromagnetism Electromagnetic Induction: Self and Mutual, Capacitor, capacitance		2
Chapter 2-	**Electric system, Components and Control in X-Ray Circuit** Electric supply & Distribution; diagnostic X-Ray circuits-X-Ray Tube	Must Know	2
	Transformers, types of transformers, losses.		4
	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.	Desirable to know	6
	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	Must Know	4
Chapter 3-	Exposure switches and Timer / AEC Exposure switches and relays timers and its radiographic application.	Must Know	6
	Beam limiting devices, Absorption co-efficient, grids, cones and filter.		6
	Electronic Timers; Automatic Exposure Control Timers, Phototimer		4

BRIT 1st Year

Semester – 1

Image Acquisition, Processing & Archiving

Total Marks- 60 Paper code - Hours- 40

Chapter 1	X-ray film and Image processing Composition of single and double coatedradiographic films, Screen & Non Screen films, structure of film, characteristic curve. characteristics (speed, base + fog, gamma, latitude).	Must Know	2
	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).	Desirable to know	2
	Common errors and faults while processing (densitometry), automatic processing unit (processing cycle), developer & Fixer replenishment and silver recovery	Must Know	2
Chapter 2	Film storage and handling Film storage rules and guidelines, film handling and care	Must Know	2
Chapter 3	Intensifying screens and cassettes Size, construction and function, types of intensifying 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	Must Know	2
Chapter 4	Image Processing Image formation, latent image, processing: manual processing,automatic processing.	Must Know	4
	Developer, fixer, rinser components, replenisher.		2
	Manual technique of developing film		2
	Automatic film processor		2
	Common errors in processing		2
Chapter 5	Factors affecting image quality 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	Desirable to Know	5
Chapter 6	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	Must Know	5
Chapter 7	DICOM Introduction, advantages, disadvantages	Must Know	1
Chapter 8	Digital Radiography & Computed Radiography Introduction, advantages, disadvantages	Must Know	2
Chapter 9	PACS Introduction, advantages, disadvantages (Functions with HIS/RIS)	Must Know	4
Chapter 10	Teleradiology Introduction, advantages, disadvantages	Must Know	1

PRACTICAL
IMAGE ACQUISITION, PROCESSING & ARCHIVING

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

BRIT 1st Year

Semester – 1

FUNDAMENTALS OF COMPUTER SCIENCE-I

Total Marks 60 **Paper Code-** **Hours- 40**

1. **Introduction**:
   What are computers, Application areas, Characteristics & limitations, Evolution of computers, Classification& generations of computers, Data representation in computer memory (numbering system)

2. **Computers Architecture /Organization:**
   Basicarchitecture, Functional Block diagram, Types of computers on the basis of purpose, Signal and Portability.

3. **Hardware:**
   CPU their generations and performance parameters, Input, output and storage devices.
   Primary (Main) Memories (RAM, ROM, Types of RAM and ROM, Cache Memory, Registers and types of registers, Storage Evaluation Criteria, Memory Capacity),
   Secondary Storage Devices: (Magnetic Disk, Floppy and Hard Disk, USBs, Optical Disks CD-ROMs)

4. **Software:**
   Types: System Software (Machine Level Languages, Operating Systems, Device Specific Drivers), Higher Level Languages, and Applications.

BRIT 1st Year

Semester – 1

Communication Skills and Personality Development

Total Marks- 60 **Paper code -** **Hours- 30**

Sl. No	TOPICS TO BE COVERED	Domain	Teaching Hours
Unit-I	Listening Comprehension • Speeches • Interviews • audio-video clippings followed by exercises • Introduction to Communication • Importance of Communication • Barriers to Communication and ways to overcome them	Desirable to know Must Know Nice to know	10 hours
Unit-II	Conversation Skills • Greetings and Introducing oneself • Framing questions and answers • Role play • Buying: asking details etc • Word formation strategies • Vocabulary building: Antonyms, Synonyms, Affixation, Suffixation, One word substitution	Must Know Desirable to know	8 Hours
Unit-III	Reading Comprehension • Simple narration and Stories • Newspaper and articles clippings • Sentence types • Note Making • Paragraph Writing • Comprehension • Report Writing: types, characteristics	Must Know	12 Hours

BRIT 1st Year
Semester – 2
Anatomy - II

Total Marks-60 **Paper code -** **Hours- 40**

Chapter 1	**Urinary system (with relevant applied anatomy)** Parts of urinary system Salient gross features of kidney, urinary bladder, ureter and urethra.	6	Must Know
Chapter 2	**Reproductive system** Parts of male and female reproductive system with salient gross features of testis & uterus, ovary and fallopian tube	8	Must Know
Chapter 3	**Endocrine glands** List of the endocrine glands, their position and salient gross features Hormones produced by each endocrine glands	6	Must Know
Chapter 4	**Nervous system** Classification of the nervous system, Definitions of central, peripheral and autonomic nervous system Neuron- structure and classification, neuroglia Names of lobes of Cerebrum and cerebellum, Parts of brainstem (salient features only) .Cerebrospinal fluid and its circulation, names of cranial nerves, spinal nerve, meninges, ventricles (salient features only)	8	Nice to know Desirable to know
Chapter 5	**Sensory organs** Skin: Its appendages and functions Eye: Parts of eye and its structure Ear: Parts of ear- external, middle and inner ear and contents**..**	6	Must Know
Chapter 6	**Embryology** Spermatogenesis & oogenesis Ovulation,fertilization, Placenta, Fetalcirculation.	6	Must Know

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 - II

Total Marks- 60 Paper code - Hours- 40

Chapter 1	**Renal System** Physiology of kidney and urine formation Glomerular filtration rate, clearance, Tubular function	Must Know	6
Chapter 2	**Physiology of urinary bladder and urethra** Ureter, bladder, urethra	Must Know	6
Chapter 3	**Digestive System** Digestion & absorption of nutrients, Gastrointestinal secretions & their regulation Functions of Liver & Stomach	Must Know	8
Chapter 4	**Endocrinology** Physiology of the endocrine glands – Hormones secreted by these glands	Desirable to Know	2
	Their classifications and functions.		2
	Adrenal, Gonads		2
	Thymus, Pancreas.	Nice to know	2
	Pituitary,		2
	Pineal Body,		2
	Thyroid, Parathyroid		2
Chapter 5	**Male & female reproductive system** Male -Functions of testes, pubertal changes in males,	Must Know	2
	Testosterone -action & regulations of secretion.		2
	Female -Functions of ovaries and uterus, pubertal changes, Menstrual cycle, estrogens and progestron -action and regulation		2

BRIT 1st Year
Semester – 2
Radiation Physics

Total Marks- 60 **Paper code -** **Hours- 40**

Chapter 1-	**Exposure switches and Timer / AEC** Exposure switches and relays timers and its radiographic application.		4
	Beam limiting devices, Absorption co-efficient, grids, cones and filter.	Must Know	2
	Electronic Timers; Automatic Exposure Control Timers, Phototimer		2
Chapter 2-	**X-Ray Tubes** Fixed and rotating anode, faults in X-Ray tubes, Grid Controlled X-Ray Tube, Mammography X-Ray Tube.		4
	Heavy Duty X-Ray Tube, Micro-Focus X-Ray Tube; Tube Rating and Tube Support- Tube heat Ratings	Must Know	4
	Line Focus principle		2
	Anode Cooling chart		2
	Type of X-Ray Tube Stands.		2
	Tube overload indication, X-Ray Tube over Load Protection Circuits		2
Chapter 3-	**Image Intensifier** Fluoroscopic equipment	Must Know	4
	Digital Fluoroscopic		2
	Dental radiographic equipment		2
	Portable and Non- Portable equipments		2
Chapter 4-	Care and maintenance Maintenance and care of all X-Ray equipment and accessories	Must Know	6

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

Total Marks- **Paper code -** **Hours-40**

Chapter 1	**Role of Radiographer in Hospital practice and Patient care** Appearance of radiographer behaviour of radiographer, professional conduct, code of ethics	Must Know	2
Chapter 2	**All View and techniques Chest** **Chest** ROUTINE • PA, • Lateral, SPECIAL • AP supine or semierect, • Lateral decubitus, • AP lordotic, • Anterior oblique, • Posterior oblique,	Must Know	2
	Upper Airway ROUTINE • Lateral, • AP,	Must Know	1
	Sternum ROUTINE • RAO, • Lateral,	Must Know	1
	Sternoclavicular Joints ROUTINE • PA, • oblique,	Must Know	1
	Ribs ROUTINE • Posterior ribs (AP) or anterior ribs (PA)— bilateral study, • unilateral rib (AP/PA) study, • axillary ribs (anterior or posterior oblique) • PA chest	Must Know	2
Chapter 3	**All Views and techniques of Upper Limb** **Fingers** ROUTINE •PA, • PA oblique, • Lateral	Must Know	2
	Thumb ROUTINE • AP,	Must Know	2

	• PA oblique, • Lateral, SPECIAL • AP, Modified Robert's method, • PA stress (Folio method) projection		
	Hand, ROUTINE • PA, • PA oblique, • Lateral (fan), • Lateral (extension and flexion), SPECIAL • AP oblique bilateral (Norgaard method),	Must Know	2
	Wrist ROUTINE • PA (AP), • PA oblique, • Lateral SPECIAL • Scaphoid views • CR angle, ulnar deviation, • Modified Skecher method, • Radial deviation, • Carpal canal inferosuperior, • Carpal bridge, Ball catcher view,	Must Know	2
	Forearm, ROUTINE • AP, • Lateral	Must Know	1
	Elbow Joint ROUTINE • AP • Fully extended, • Partially flexed, • AP obliques • Lateral (external) rotation, • Medial (internal) rotation, • Lateral, SPECIAL • Acute flexion (Jones method), • Trauma axial laterals (Coyle method), • Radial head laterals,	Must Know	2
	Humerus, ROUTINE • AP, • Rotational lateral, • Horizontal beam lateral	Must Know	1
	HUMERUS & SHOULDER GIRDLE Humerus (Nontrauma Routine)	Must Know	2

	ROUTINE • AP, • AP rotational lateral, • Horizontal beam lateral, SPECIAL • Transthoracic lateral, Shoulder (Non trauma Routine) ROUTINE • AP external rotation (AP), • AP internal rotation (lateral), SPECIAL • inferosuperior axial (lawrence method), • PAtransaxillary (Hobbs modification), • inferosuperior axial (Clements modification), • Posterior oblique— glenoid cavity (Grashey method), • Tangential projection— intertubercular groove (Fisk modification)		
	Shoulder (Trauma Routine) ROUTINE • AP neutral rotation (AP), • Transthoracic lateral (lawrence method), • Scapular Y lateral, SPECIAL • Tangential projection— supraspinatus outlet (neer method), • AP apical oblique axial (Garth method),	Must Know	2
	Clavicle ROUTINE • AP AP axial,	Must Know	1
	AC Joints ROUTINE • AP bilateral with weights AP bilateral without weights,	Must Know	1
	Scapula ROUTINE • AP, • lateral, • erect, • Recumbent	Must Know	2
Chapter 4	**All Views and techniques of Lower Limb** **Toes** ROUTINE • AP, • oblique, • Lateral, SPECIAL • Sesamoids (tangential)	Must Know	2
	Foot ROUTINE • AP, • oblique,	Must Know	2

	• Lateral, SPECIAL • AP and lateral weight-bearing,		
	Calcaneus ROUTINE • Plantodorsal (axial), • Lateral,	Must Know	1
	Ankle ROUTINE • AP, • AP mortise (15°), • Lateral, SPECIAL • oblique (45°), • AP stress,	Must Know	2
	Leg ROUTINE • AP, • Lateral, Knee ROUTINE • AP, • oblique, • Lateral, SPECIAL • AP (PA) weightbearing, • PA axial weightbearing (Rosenberg method)	Must Know	2
	Knee—Intercondylar Fossa ROUTINE • PA axial (Camp Coventry and Holmblad methods with variations), SPECIAL •AP axial,	Must Know	1
	Patella and Femoro-Patellar Joint ROUTINE • PA, • Lateral, • Tangential (Merchant method), • Tangential (inferosuperiorprojection; Hughston, Settegast, and superoinferior sitting tangential methods-Hobbs)	Must Know	2

PRACTICAL
GENERAL RADIOGRAPHY

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 View and techniques Chest: lung fields and heart, diaphragm, Sternum,

BRIT 1st Year
Semester – 2
FUNDAMENTALS OF COMPUTER SCIENCE-II
Total Marks- 60 Paper code - Hours- 40

1. Languages: Machine Language, Assembly Languages, Programming Languages. Use of Compilers, Assemblers, Linkers, Loaders and interpreters in programming languages
2. Operating System: Booting/Start Up Procedure of machines, Introduction to Operating System, Functions and Classification of Operating Systems, Basic introduction to DOS, UNIX/LINUX OS, Windows
3. HTML, Use of Multimedia, Computer aided teaching and testing

Application Software MS office (Word, Excel and Powerpoint)

4. **Basic Introduction to Computer Networks:**

Data Communication, Network devices (Hub, Switches, Modems, and Routers etc), LAN, LAN topologies, WAN, MAN, Internet: Introduction, Basics of E-mail, Web browsers (IE, Google Chrome, and Mozilla Firefox),

5. Structure of Universal Resource Locator, Domains (.com, .in, .country specific, .org and rationale behind them), IP address, Backbone network, Network connecting devices, HTTP, DNS, Network Security and Search Engine.

BRIT 1st Year

Semester – 2

Communication Skills and Personality Development

Total Marks- 60 Paper code - Hours- 30

Sl. No	TOPICS TO BE COVERED	Domain	Teaching Hours
Unit-IV	Pronunciation • Pronunciation • Syllable and Stress • Intonation and Modulation	Must Know	10 Hours
Unit-V	Writing Comprehension • Letters: types, format, style • Précis Writing • Paragraph: Order, Topic sentence, consistency, coherence • Report and Proposal • Project Writing: Features, Structure	Must Know	20 Hours

BRIT 2nd Year
Semester-3
General Radiography-II

Total Marks- **Paper code -** **Hours- 40**

Chapter 1	**All Views of Hip and Pelvis** **Pelvis and/or Bilateral Hips** ROUTINE Mid- and distal femur: • APprojection • lateral projection, • APpelvis or bilateral hips, • AP bilateral frog-leg, (modified cleaves method) SPECIAL • AP axial outlet projections, (Taylor method) • AP axial inlet projection, • Posterior oblique acetabulum,(Judet method) •Posterior axial oblique acetabulum, (Teufel method)	Must Know	4
	Hip and Proximal Femur ROUTINE • AP unilateral hip, TRAUMA LATERAL • axiolateralinferosuperior (Danelius-Miller method), SPECIAL NONTRAUMA LATERAL • unilateral frog-leg (modified cleaves method), SPECIAL TRAUMA LATERAL • Modified axiolateral (clements-nakayama method)	Must Know	2
Chapter 2	**All Views and techniques of Skull** **Skull Series** ROUTINE • AP axial (Towne method), • lateral, • PA axial 15° (Caldwell method) or PA axial 25° to 30°, • PA 0°, SPECIAL • submentovertex (SMV), • PA axial (Haas method),	Must Know	2
	Facial Bones (Orbits) ROUTINE • lateral, • Parietoacanthial (Waters method), • PA axial (Caldwell method), SPECIAL • modified Parietoacanthial (modified Waters method),	Must Know	1
	Nasal Bones ROUTINE • lateral, • Parietoacanthial (Waters method), SPECIAL • superoinferior (axial),	Must Know	2

	Zygomatic Arches ROUTINE • submentovertex (SMV), • oblique inferosuperior (tangential), • AP axial (modified Towne method), • PA parietoacanthial (Waters method),	Must Know	2
	Optic Foramina and Orbits ROUTINE • Parieto-orbital oblique (rhese method), • Parietoacanthial (Waters method), SPECIAL • modified parietoacanthial (modified Waters method),	Must Know	2
	Mandible ROUTINE • axiolateral oblique, • PA 0° and 20° to 25° cephalad, • AP axial (Towne method), SPECIAL • submentovertex (SMV), • Orthopantomography (panoramic tomography),	Must Know	2
	TMJs ROUTINE • AP axial (modified Towne method), SPECIAL • axiolateral 15° oblique (modified law method), • axiolateral (schuller method),	Must Know	2
	Paranasal Sinuses ROUTINE • lateral, • PA (Caldwell method), • Parietoacanthial (Waters method), SPECIAL • submentovertex (SMV), • Parietoacanthial transoral (open mouth Waters method),	Must Know	2
Chapter 3	**All Views and techniques of Vertebral Column** **Cervical Spine** ROUTINE • AP open mouth (C1 and C2), • AP axial, • oblique, • lateral, • lateral, horizontal beam, SPECIAL • Cervicothoracic lateral (Twining method, swimmer's technique), • lateral hyperflexion and hyperextension,	Must Know	4

	• AP (Fuchs method) and PA (Judd method), • AP "wagging jaw" (ottonello method), • AP axial (pillar),		
	Thoracic Spine ROUTINE • AP, • lateral, SPECIAL • oblique,	Must Know	1
	Lumbar Spine ROUTINE • AP (or PA), • obliques—posterior or anterior, • Lateral, • Lateral L5-S1, SPECIAL • AP axial L5-S1,	Must Know	2
	Scoliosis Series ROUTINE • PA (AP)—erect and/ or recumbent, • erect lateral, SPECIAL • AP (Ferguson method), • AP (PA)—R and L bending,	Must Know	2
	Spinal Fusion Series ROUTINE • AP(PA)—R and L bending (same as for scoliosis series), • Lateral— hyperextension and hyperflexion,	Must Know	1
	Sacrum and Coccyx ROUTINE • AP axial sacrum, • AP axial coccyx, • Lateral sacrum, • Lateral coccyx,	Must Know	2
	Sacroiliac (SI) Joints ROUTINE • AP axial, • Posterior oblique,	Must Know	1
Chapter 4	**All views and techniques Abdomen** **Abdomen (KUB)** ROUTINE • AP supine, SPECIAL • PAprone, • Lateral decubitus (AP), • AP erect, • dorsal decubitus (lateral), • Lateral,	Must Know	2

	Acute Abdomen (Three-Way, with PA Chest) ROUTINE • AP supine, • AP erect, • PA chest erect, SPECIAL • Left lateral decubitus (AP),	Must Know	2
Chapter 9	**Skeletal Survey** All views required for skeletal survey	Must Know	2

PRACTICAL
GENERAL RADIOGRAPHY

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

Total Marks- 60 **Paper code -** **Hours- 40**

Chapter 1	Mammography History of mammography	Must Know	2
	Mammographic equipment Mammographic radiation dose and exposure		4
	Dedicated mammographic unit and its special features Types of mammograph		4
	Routine Mammographic Positioning & Views with additional views and technical considerations Wire localization in mammography BI-RADS Term	Desirable to know	4
	Limitation of mammography Beam limiting Device in mammography Radiation Safety Radiation Hazards in mammography	Nice to know	6
	Film screen mammography,	Nice know	2
	Digital mammography MRI Breast introduction		4
	USG Guided FNAC & Biopsy of Breast's abnormal collection or tissue	Desirable to know	4
Chapter 2	Echocardiography Equipment	Nice to know	4
	Introduction, indication and image formation.	Nice to know	2
	Uses of color Dopplerin echocardiography and equipment description with transducer		4

BRIT 2nd Year
Semester – 3
Ultrasound & Doppler including 4D

Total Marks- 60 **Paper code -** **Hours- 40**

Chapter 1	**Ultrasound** Principle & history of Ultrasound, advantages and disadvantages of ultrasound, Types of Ultrasound, Equipment description	Must Know	2
	Indication and Clinical Application		2
	Physics of ultrasound imaging,		2
	Physics of transducers,		2
	Physics of Doppler,		2
	Ultrasound tissue characterization	Desirable to Know	2
	Potential for three dimensional ultrasound		2
	Artifacts in ultrasound		2
	Comparison of ultrasound equipment Computerization of data, Image recording,	Nice to know	1
	Ultrasound jelly & Safety of ultrasound	Must Know	2
Chapter 2	**Abdomen and pelvis ultrasound** Pathologies and indications, patient preparation, positioning and scanning technique	Desirable to Know	2
Chapter 3	**Orbit, Neck, Sub-mandibular gland, Thorax, Breast, & Scrotum** Pathologies and indications, patient preparation, positioning and scanning technique	Nice to Know	4
Chapter 4	**Color Doppler imaging, The obstetric Ultrasound examination** Method of gynecologic ultrasound examination	Nice to know	5
	Assessment of Normal fetal growth, fetal behavior states, fetal breathing movements, fetal cardiac activity		5
Chapter 5	**USG Contrast Media** Types of Ultrasound Contrast media and its advantages	Must Know	5

PRACTICAL

ULTRASOUND, MAMMOGRAPHY & ECHOCARDIOGRAPHY

PRACTICAL

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

Imaging of mammography, positioning, all views, operation of mammography equipment,types of film and screen in mammography.

Echocardiography: Indication and image formation. Uses of color Doppler inechocardiography and equipment description with transducer

BRIT 2nd Year
Semester – 3
Radiation Hazards & Protection-I

Total Marks- 60 **Paper code -** **Hours- 40**

Chapter 1-	**Radiation protection-** Principles, history & development- National & international agencies, AERB, BARC, ICRP, WHO, IAEA and their role.	Must know	6
	Equivalent dose- effective dose Sievert- rem.		2
	Sources of radiation-natural man made & internal exposures		4
Chapter 2-	**Biological effects of radiation** Effects on cell-stochastic & deterministic effects-radiation risk-tissues at risk-genetic, somatic& fetus risk-risk at other industries.	Must Know	6
	Does equivalent limits philosophy-ICRP (60) AERB guidelines		2
Chapter 3-	Planning of radiation installation-protection primary & secondary radiation Leakage and scattered radiation.	Must know	4
	Concepts of workload use factor occupancy factor & distance.		2
	Barrier design barrier materials-concrete, brick & lead. Primary & secondary barrier design calculations. Design of doors.		4
	Control of radiation-effects of time distance and shielding		2
Chapter 4-	Personnel monitoring systems Principle and objective-film badge: guidelines for use thermo-luminescent dosimeter badge-pocket dosimeter.	Must Know	5
	Area monitoring and radiation survey Practical use of survey meter, zone monitors and phantoms. Survey in x-ray, fluoroscopy and CT scan units		5

PRACTICAL
Radiation Hazards & Protection-I

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 1st Year
Semester – 3
ENVIRONMENTAL STUDIES

Total Marks- 60 **Paper code -** **Hours- 60**

Unit 1:

The Multidisciplinary nature of environmental studies

- Definition, scope and importance.
- Need for public awareness.

Natural Resources

Renewable and non-renewable resources: Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
- Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Unit 2:

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.

Biodiversity and its conservation

- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit 3:

Environmental Pollution

Definition, causes, effects and control measures of:-

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution

f. Thermal pollution
g. Nuclear hazards

- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Fireworks, their impacts and hazards
- Pollution case studies.
- Disaster management : floods, earthquake, cyclone and landslides.

Unit 4 :

Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Consumerism and waste products.
- Environmental Legislation (Acts and Laws)
- Issues involved in enforcement of environmental legislation

Human Population and the Environment

- Population growth, variation among nations with case studies
- Population explosion – Family Welfare Programmes and Family Planning Programmes
- Human Rights.
- Value Education.
- Women and Child Welfare.

BRIT 2nd Year

Semester – 4

Hospital practice & Care of Patient

Total Marks- 60 **Paper code -** **Hours- 40**

Chapter 1-	**Introduction to hospital staffing-** Hospital staffing and administration	Must Know	3
	Medical records and documentation- Medical records and documentation		3
Chapter 2-	**Legal issues** Legal issues in radiology department, PNDT Act	Desirable to Know	3
Chapter 3-	**Professional ethics-** Professional ethics and Code of conduct of radiographer	Must Know	3
Chapter 4-	**Handling of patients** Seriously ill and traumatized patients, visually impaired, hearing and speech impaired patients, mentally impaired patients, infectious patients	Must Know	4
Chapter 5-	**Departmental Safety** Safety from hazards due to radiation, electricity etc	Must Know	3
Chapter 6-	**Infection control**Skin care, donning of gowns, gloves, face masks, head caps, shoe covers	Must Know	2
Chapter 7-	**Vitals signs-** Vitals signs. How to measure vital signs	Must Know	2
Chapter 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	Must Know	4
Chapter 9-	**First aid-** Artificial respiration, haemostasis, first aid techniques, ABCD management	Desirable to Know	3
Chapter 10-	**Anesthesia-** Local anesthesia and general anesthesia, uses in hospital	Desirable to Know	4
	Facilities regarding general Anesthesia in the X-ray department		2
Chapter 11-	Adverse reactions- Management of adverse reactions to contrast media	Must Know	4

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

Total Marks- 60 Paper code - Hours- 40

Chapter 1-	**C.T. Scan** Basic principle of CT scan	Must Know	2
	History of CT Scan		2
	EMI		2
	Advantages and disadvantages		2
	Equipment description		2
Chapter 2-	**Computed Tomography** Scanning principle	Must Know	2
	Image acquisition		2
	Image reconstruction		2
	Image manipulation		2
	Image display and documentation Scanning parameters		2
Chapter 3	**Generation of CT Scanner** Advantages and disadvantages	Must Know	2
Chapter 4	**MRI** History of MRI,	Must Know	2
	Magnetism,		2
	Basic Principle,		2
	Instrumentation		2
Chapter 5	**Contrast media** Types of Contrast agents used in MRI	Desirable to Know	2
Chapter 6	**Basic pulse sequences** Spin Echo,	Must Know	2
	Inversion Recovery		2
	Gradient Echo		2
Chapter 7	**MRI, CT, USG** Imaging techniques related pathology including cross sectional anatomy	Desirable to Know	2

BRIT 2nd Year
Semester – 4
Special Investigations & Pathology

Total Marks- 60 **Paper code -** **Hours- 40**

Chapter 1	**Patient preparation for Special procedure and related contrast Media** Contrast media,	Must Know	2
	Types of contrast media,		
	Contra indications for contrast media		2
	Reactions to contrast		
	Anaphylactic shock		
	Myocardial Infarction.	Desirable to know	2
	Emergency in Radiology Department		
	Emergency drugs and its dose		
Chapter 2	**Excretory System** Introduction, pathology of urinary system, indications, apparatus, procedure and patient care.	Must Know	2
	Intravenous pyelography/Intravenous Urography		2
	Retrograde Urethrography		2
	Micturation Cysto-Urethrography		2
	Percutaneous nephorostomy		2
Chapter 3	**Special Procedures** Introduction, pathology of biliary tree, indications, apparatus, procedure and patient care.	Must Know	2
	Oral Cholecystography		1
	Percutaneous Transhepatic Cholangiography		
	T-Tube Cholangiography	Desirable to	
	Bronchography	Know	1
	Arthrograpgy		1
	Myelography		1
	Dacrocystography (DCG)		1
	Endoscopic Retrograde Cholangio Pancreatography		1
	Sialography		1
Chapter 4	**G.I.Tract** Introduction, pathology of GI tract, indications, apparatus, procedure and patient care.	Must Know	2
	Barium Swallow	Desirable to know	2
	Barium Meal Study		
	Small bowel Enema		
	Barium meal Follow Through		
	Barium Enema		
	Double Contrast Studies		
	Gastro-graffin study		
Chapter 5	Introduction, Indications, Contraindications, Apparatus, Procedure technique and Patient Care-	Must Know	2

	Hysterosalpingography (HSG), High K.V Technique, Soft tissue Radiography, Air gap technique,	Must Know	2
	Forensic Radiography		2
	Foreign bodies Radiography		1
	Theatre Radiography		1
	Radiography in Emergency Room		1
	Macroradiography		1
	Conventional Tomography		1

PRACTICAL

SPECIAL INVESTIGATIONS & PATHOLOGY

Topic
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 & Protection-II

Total Marks- 60 Paper code - Hours- 40

Chapter 1	**AERB safety code and ethics** Built in safety specifications for diagnostic x-ray, Fluoroscopy and CT units	Must Know	4
	Specifications for radiation protection devices-room layout.		4
	Operational safety-Radiation protection programme		4
	Personnel requirements and responsibilities-regulatory controls		4
Chapter 2	Patient protection-Safe work practice in diagnostic radiology	Must Know	4
	Radiation absorbed dose from general dental fluoroscopy	Desirable to Know	4
	Radiation absorbed dose in X-Ray and CT examinations		4
	X-ray examinations during pregnancy		4
	X-ray examinations associated with illness, not associated with illness-medico-legal or insurance purpose x-ray examination-medical research x-ray avoidance of unnecessary radiation dose	Must Know	4
Chapter 3	Radiation emergencies- situation handling	Must know	2
	Safety and prevention-legal requirements recent developments in radiation safety related topics	Desirable to Know	2

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

Magnetic Resonance Imaging- Basic principle and techniques

Total Marks- 60 Paper code - Hours- 40

Chapter 1	**MRI** History of MRI, Magnetism, Basic Principle, hardware etc	Must Know	4
Chapter 2	**Contrast media** Types of Contrast agents used in MRI	Must Know	2
Chapter 3	**Imaging Instrumentation** Physical and physiological basis of magnetic relaxation,Image contrast and noise	Must Know	2
Chapter 4	**Basic pulse sequences** Spin Echo, Inversion Recovery, Gradient Echo	Must Know	4
Chapter 5	**Bio-effects and safety in MRI** Hazards, Bio-effects and safety in MRI	Must Know	4
Chapter 6	**MRI (Plain & Contrast)** Brain	Desirable to Know	2
	Face & Sinuses,		2
	Neck		2
	Mastoids		2
	Pituitary & Salivary gland		2
	IAC		2
	Thorax		2
	Abdomen, Pelvis		2
	Whole Spine Extremities: Indications. Contraindications, Patient preparation, Protocols and patient care		4
Chapter 7	Artefacts Artefacts in MRI and their correction	Must Know	4

PRACTICAL

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

Computed Tomography -Basic principle and techniques

Total Marks-60 Paper code - Hours- 40

Chapter 1-	**C.T. Scan** Basic principle of CT scan history of CT Scan	Must Know	2
	EMI		2
	Advantages and disadvantages		2
	Equipment description		2
Chapter 2-	**Computed Tomography** Scanning principle	Must Know	2
	Image acquisition		2
	Image reconstruction		1
	Image manipulation		1
	Image display and documentation		2
	Scanning parameters		2
Chapter 3	**Generation of CT Scanner** Advantages and disadvantages	Must Know	1
Chapter 4	**NCCT & CECT** Brain, Face, Sinuses, Mastoid	Must Know	2
	Neck, Temporal Bone (HRCT),		2
	Pituitary, IAC		1
	Thorax (Routine & HRCT)		2
	Abdomen, Pelvis,		2
	Extremities: Indications. Contraindications, Patient preparation, Protocols and patient care		2
Chapter 5	**Artefacts** CT Scanner artefactsand their correction	Must Know	2
Chapter 6	**Contrast media used in CT** Dose, indications, contra indications and adverse effects.	Must Know	2
	Emergency drugs stored in CT scan room		1
Chapter 7	**Quality assurance and quality control** Purpose	Desirable to Know	2
	Benefit		1
	Record maintaining or QA & QC		2

CT-BASIC PRINCIPLE AND TECHNIQUES

PRACTICAL

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
Total Marks- 60 Paper code - Hours- 40

Chapter 1-	**Nuclear Medicine** Applications and Apparatus for nuclear medicine	Must Know	3
Chapter 2-	**Gamma Camera** Application, Function and instrumentation	Must Know	6
Chapter 3-	**SPECT** Definition	Desirable to	2
	Applications	Know	3
	Clinical uses, advantages & disadvantages		2
Chapter 4-	**PET CT & PET MRI** Benefits vs risk	Desirable to Know	2
	PET-CT		3
	PET-MRI		3
Chapter 5-	**Radionuclides** Characteristics and half-life of Radionuclides.	Must Know	4
	Commonly used Radionuclides		2
Chapter 6-	**Protocols-** Routine protocols	Must Know	2
	Indication, contraindications of PET Scans- Indication and contraindications of PET		4
	Patient Preparation- Patient preparation technique in PET Scan		2

NUCLEAR MEDICINE & PET SCAN

PRACTICAL

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

BRIT 3rd Year

Semester – 5

Research Methodology & Biostatistics

Total Marks- 60 Paper code - Hours-

Chapter 1-	**Introduction-** Definition and characteristics of statistics Importance of the study of statistics	Must Know	2
	Branches of Statistics		2
	Statistics of and health sciences including nursing		2
	Parameters and estimates		2
	Descriptive and inferential statistics	Desirable to Know	2
	Variables and their types Measurement scales		
Chapter 2-	**Tabulation of Data** Raw Data, the array, frequency distribution	Must Know	2
	Basic principles of graphical representation		
	Types of diagrams – histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, normal probability curve	Desirable to Know	2
Chapter 3-	**Measures of Central Tendency** Introduction: Uses, applications and practical approach	Must Know	2
	Definition and calculation of mean for ungrouped and grouped data Meaning, interpretation and calculation of ungrouped and grouped data		2
	Meaning and calculation of mode		2
	Comparison of mean and mode	Nice to know	2
	Guidelines for the use of various measures of central tendency	Must Know	2
Chapter 4-	**Measures of Variability** Introduction: Uses, applications and practical approach	Must Know	2
	The range, average deviation or mean deviation		2
	The variance and standard variation	Desirable to know	2
	Calculation of Variance and standard variation for ungrouped and grouped data		2
	Properties and uses of variance and standard deviation	Nice to know	2
Chapter 5-	**Sampling Techniques** Introduction: Uses, applications and practical approach Criteria for good samples	Must Know	2
	Application of Sampling in Community		2
	Sampling Methods, Sampling and Non- Sampling errors Sampling variation and tests of significance	Nice to know	2

BRIT 3rd Year
Semester – 6
Advances in CT Scan

Total Marks- 60 Paper code - Hours- 40

Chapter 1-	**Advancement in CT** Spiral CT, Preparation of Patient Contrast Media, Indications and Contraindications Technical Aspects of various procedures in CT	Must Know	6
Chapter 2-	**Cardiac multislice CT** Prospective ECG Triggering Retrospective ECG Gating	Desirable to Know	6
Chapter 3-	**CT Fluoroscopy** Principle and Image Reconstruction Technique, Radiation Safety	Must Know	6
Chapter 4-	**CT Urography** Principle and Image Reconstruction Technique Radiation Safety	Must Know	6
Chapter 5-	**CT Enterography** Principle and Image Reconstruction Technique Radiation Safety	Desirable to Know	4
Chapter 6-	**CT Angiography** Principle and Image Reconstruction Technique Radiation Safety	Must Know	6
Chapter 7-	**CT guided Biopsy** Principle and Image Reconstruction Technique Radiation Safety	Desirable to Know	4
Chapter -	**Virtual CT – Bronchoscopy, Endoscopy**	Desirable to Know	2

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

Total Marks- 60 Paper code - Hours-

Chapter 1	**Advances in MRI** To know the patient preparation Filling of MRI consent form	Must Know	6
Chapter 2	**Fast pulse sequences** Should know the principle of the sequences	Must Know	6
Chapter 3-	MRCP		4
	Spectroscopy		4
	MR Urography		4
	MR Enterography		2
	MR Angiography		4
	Functional MRI		3
	CSF Flow Study		2
	Diffusion Tensor Imaging		2
	MR guided Biopsy	Desirable to Know	3

PRACTICAL
ADVANCES IN MRI-PRACTICAL

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

Interventional in Diagnostic Radiology

Total Marks- 60 Paper code - Hours-

Chapter 1-	**Interventional Radiology** Definition	Must Know	2
	Indication		2
	Clinical Application		2
	Advantages, disadvantages & risks		2
Chapter 2-	**Name of different type of Procedures and description** All MRI Angiography	Must Know	2
	All C.T. Angiography		2
	All Biopsy, FNAC, MRI Guided.		2
	All Biopsy, FNAC, USG Guided.		2
	All Biopsy, FNAC CT Scan Guided		2
	USG, CT Scan Guided Tapping		2
	Nerve Blocks.	Desirable to know	2
	Radiofrequency Ablation		2
	Stereotactic Brain Biopsy	Nice to know	2
Chapter 3-	DSA- Introduction	Must Know	2
	Its application		2
	Instrumentation		2
	All DSA procedures		2
	Its advantages, disadvantages		2
	Risks vs benefits ratio		2
	Patient's preparation for DSA procedures		2

BRIT 3rd Year

Semester – 6

Interventional in Diagnostic Radiology

Total Marks- 60 Paper code - Hours-

Research Project