SYLLABUS POST REVISION
FOR
BACHELOR OF SCIENCE
(RADIOLOGICAL IMAGING TECHNIQUES)

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

BAREILLY INTERNATIONAL UNIVERSIRTY [BIU]

PILIBHIT BYPASS ROAD BAREILLY [243006]

UTTAR PRADESH

SYLLABUS

BACHELOR 0F SCIENCES IN RADIOLOGICAL IMAGING TECHNIQUES



EFFECTIVE FROM THE SESSION: 2022-23

BACHELOR OF SCIENCE IN RADIOLOGICAL IMAGING TECHNIQUES

SYLLABUS: B.Sc. (RIT)

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SEMESTER I

HUMAN ANATOMY -I

PAPER CODE: 14187

Total: 36 hours

Unit- 1

Introduction Human body as a whole:

1. Definition of anatomy and its divisions, Terms of location, positions and planes.

2. Cell - cell structure comprising of nucleus, organelles, cytoplasm, cell membrane.

3. Epithelium-definition, classification, describe with examples, functions.

4. Glands- classification, describe serous & mucous glands with examples.

5. Basic tissues – classification with examples.

Unit- 2

Locomotion and Support:

1.Cartilage- types with example & histology.

2. Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of bones, vertebral column, inter vertebral disc,

3. Joints – Classification of joints with examples, synovial joint (in detail for radiology).

4. Muscular system- Classification of muscular tissue & histology, Names of muscles of the body.

Unit- 3

Cardiovascular System:

Heart - size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior venacava, portal vein, Great saphenous vein, Histology of lymphatic tissues, Names of regional lymphatics, axillary and ing[illegible] nodes in brief.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Person, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Unit- 4

Gastro-intestinal System:

Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, Spleen, Radiographs of abdomen.

Respiratory System: Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Peritoneum, Histology of trachea, lungs and pleura, Names of para-nasal air sinuses.

Unit- 5

Radiological anatomy

1. Radiographs of upper limb & lower limb: shoulder, elbow, wrist joint, hand, hip, knee, ankle joint & foot

2. X-ray of abdomen, X-ray of thorax, X-ray of skull, X-rays of neck**.**

Text Books:

1.Chourasia's Text Book of Anatomy

2. P.R. Ashalatha and G. Deepa's A Text Book of Anatomy & Physiology

3. Ranganathan, T.S., A Text Book of Human Anatomy

Reference Books:

1. B.D. Chaurasia's Handbook of General Anatomy

2.William Davis, Understanding Human Anatomy and Physiology, McGraw Hill

3. Fattana, Human Anatomy, (Description and Applied), Saunder's & C P Prism Publishers, Bangalore

4. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P.Lippin Cott.

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICALS
HUMAN ANATOMY -I
PAPER CODE: 14756

Demonstration of:

- Identification and description of all anatomical structures.
- Demonstration of dissected parts
- Study of Human Skeleton parts with skeletal models
- Study with charts and models of all organ systems mentioned above
- Demonstration of skeleton- articulated and disarticulated.
- Surface anatomy of surface land mark-bony, muscular and ligamentous. Surface anatomy of major nerves, arteries of the limbs.
- Points of palpation of nerves and arteries.
- Microscopic slides examination of elementary human tissues, cells
- Major organs through models and permanent slides
- Parts of circulatory system from models
- Parts of respiratory system from models

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

HUMAN PHYSIOLOGY -I

PAPER CODE: 14188

Total: 36 hours

Unit -1

Cell: Morphology, Structure and functions of cell organelles, Structure of cell membrane, Transport across cell membrane, Intercellular communication Homeostasis.

Blood: composition & function of blood, Haemopoiesis, Haemostasis, Blood cells, hemoglobin.

Plasma: composition, formation & functions, Plasma proteins; Types & functions, Blood groups, Coagulation factors, Blood transfusion, Anemia.

Resistance & Immunity: innate immunity, Acquired immunity, Humoral & cell immunity.

Unit -2

Muscular System: Muscles of the body – Types & their functions, Properties of Skelton muscle, Cardiac muscle & Smooth muscle.

Cardiovascular System: Heart & blood vessels: Systemic circulation pulmonary circulation, Heart rate, Cardiac cycle; definition & Phases of cardiac cycle, Cardiac output; definition, normal value. ECG, Blood pressure; definition & normal values, Factors affecting blood pressure, Shock- definition, classification, Causes & features Hypertension, Radial pulse.

Unit -3

Lymphatic System: Lymph glands and its function, Spleen Structure and functions, Lymphatic tissue & organs Tonsil, Thymus.

Unit -4

Respiratory System: Physiology of Respiratory System, Gas exchange in lungs, Transport of gases between lungs to tissue, Pulmonary circulation, Ventilation, Functions, Lung's volume and capacities, Hypoxia, Hypercapnoea, Hypocapnoea, Artificial respiration, Disorders of respiration: dyspnoea, orthopnoea, hyperpnoea, hyperventilation, apnoea, tachypnoea, Regulation of respiration.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Unit -5

Gastrointestinal System: Process of digestion in various parts, Functions of oral cavity, Pharynx, salivary glands, oesophagus, Stomach, Small intestine, large intestine, Liver, Gall bladder, Pancreas.

Text Books:

1. N. Geeta's Textbool of Physiology
2. P.R. Ashalatha and G. Deepa's A Text Book of Anatomy & Physiology

Reference Books:

1. K. Sembulingam & Prema Sembulingam's Essentials of medical Physiology
2. C.C. Chatterjee's Human Physiology
3. C.C. Chatterjee's Practical Physiology for paramedical Courses
4. R.K. Maurya's Medical Physiology.

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

HUMAN PHYSIOLOGY-I

PAPER CODE: 14757

Demonstration & Observation

Blood Tests:

- Microscope
- Haemocytometer
- Blood
- RBC count
- Hemoglobin
- WBC count
- Differential count
- ESR
- Determination of Blood Group & Rh type
- Bleeding & Clotting time

Cardiovascular System:

- Measurement of blood pressure & Pulse rate
- Effect of exercise on blood pressure & Pulse rate
- Demonstration of ECG

Respiratory System:

- Clinical Examination of Respiratory System
- Spirometry
- Breath holding test
- Measurement of Vital capacity

Digestive System:

- Transport of Food through esophagus
- Bile juice secretion and execration

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

BASIC PHYSICS INCLUDING RADIOLOGICAL PHYSICS- I

PAPER CODE: 14189

Total:40hours.

Unit- 1

Basic concepts: Units & Measurements, Basic concepts of power, work, force, energy - Einstein's formula, temperature and heat-SI units of above parameters, atomic structure, atomic model, Nucleus, Atomic Number, Mass Number, electron orbit and energy levels, Periodic table, Isotopes, Isobars, Ionization and excitation, Electron binding energy, nuclear binding energy, Electron Volt.

Unit- 2

Electricity and Magnetism: Electric charges, Coulomb's law, Unit of charge, Electric potential, unit of potential, Electric induction, capacitance and Capacitors, Electrical energy and power, Sources of electrical energy, Electric current, unit, Types, Alternating currents: Peak and RMS values and current and voltage resistance, Ohm's law, circuit laws, heating effect of current, Ammeter, Voltmeter, Galvanometer. Magnets and Magnetic field, EMF, Magnetic effect of an electric current, applications of magnetic field, Electro-magnetic induction, laws of mutual induction and self-induction, Electromagnet, & Solenoid.

Unit- 3

Electromagnetic waves: Introduction, Maxwell's equation, energy density and intensity, momentum, electromagnetic spectrum and radiation in Atmosphere. Electromagnetic radiation – Quantum Nature of radiation, Mass energy equivalence, Fluorescence, Electromagnetic Spectrum.

Sound - The nature and propagation of sound wave (the characteristics of sound, wave theory), speed of sound in a material medium, intensity of sound, the decibel, Interference of sound waves, beats, diffraction. Doppler's effect.

Unit- 4

Heat-Definition of heat, temperature, Heat capacity, specific heat capacity, Heat transfer conduction, convection, radiation, thermal conductivity, equation for thermal conductivity (k), the value of k of various material of interest in radiology, thermal expansion, Newton's law of cooling,

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Unit- 5

Electronics – Semiconductors: Conduction in crystals, Energy bands. Intrinsic and Extrinsic semiconductors n-type and p-type semiconductors, majority and minority carriers. Semiconductor diodes: p-n junction-properties forward and reverse bias, characteristics of p-n junction.

Rectifiers: Half-wave and full wave, ripple factor, Efficiency of HW and FW rectifiers. Filter circuits; Zener diode, regulated power supply.

Transistors: Symbols, Transistor connections and characteristics, Transistor as an amplifier, load line analysis, operating point, types of amplifiers-voltage and power amplifiers. Feedback - negative feedback in amplifiers.

Text Books:

1. K. Thalayan, Textbook of Radiological Safety
2. Satish k. Bhargava, Sumeet Bhargava's Textbook of Radiology

Reference Books:

1. Christensen's Physics of Diagnostic Radiology by Thomas S. Curry & James F. Dowday
2. K. Thalayan, Basic of Radiological Physics
3. Rehani, Advance Medical Physics

* Latest editions of all the suggested books are recommended.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICAL

BASIC PHYSICS INCLUDING RADIOLOGICAL PHYSICS- I

PAPER CODE:

All practical on theory based.

1. Study with charts, models & power point presentations involving students to present and discuss.

2. Atomic Structures, Atomic Models, Circuits, Conductors, Semiconductors, Transistors, Amplifiers demonstration by charts, models & power point presentations.

3. Electrostatic demonstration by charts, models & power point presentations.

4. Magnetics demonstration by charts, models & power point presentations.

5. Sound & Heat demonstration by charts, models & power point presentations.

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

RADIOGRAPHIC AND IMAGING PROCESSING TECHNIQUES

PAPER CODE:14190

Total: 40 hours.

Appreciation and application of all the factors listed below will enable the student/technologist to produce X-ray films of good quality and diagnostic value. The lectures to be linked with practical demonstration to illustrate the importance of all that goes to make up correct exposure conditions.

Unit:1

Radiographic Film: Structure of film emulsion, film characteristics (speed, base + fog, gamma, latitude), effect of grain size on film response to exposure, interpretation of characteristics curve, Grain Technology, Gelatin-Basic film types, Film formats and packing, Direct exposure duplitised films, Single coated emulsions, Films for specialized use-manufacturing process. Structure, properties of different parts, handling, film wrappings. Handling of exposed and unexposed films. Types, applications, advantages/limitations of different types, safe light requirements.

Sensitometer: Photographic density-characteristic curve-information from the characteristic curve-speed Vs definition. Storage of X-ray film.

Control of scattered radiation: Methods of minimizing formation of scatter radiation, effectiveness of grids-grid ratio-preventing scattered radiation, use of cones, diaphragm light beam devices and effectiveness of collimation in reducing effects of scatter. Effects of scatter radiation on radiograph image quality, patient dose and occupational exposure.

Unit:2

Intensifying screens: Structure and functions, common phosphors used, types, screen mounting, care and maintenance of film screen contact. Intensifying factor-speed and detail-crossover effect-resolution-mottle-reciprocity-screen asymmetry, cleaning. New phosphor technology-influence of kilo voltage. Photo-stimulable phosphor Imaging.

Cassettes: Structure and function, Types-single, gridded, film holder-Design features and consideration with loading/unloading, Care and maintenance (cleaning).

Unit:3

Photochemistry: Principles: Acidity, alkalinity, pH, the processing cycle, development, developer solution. Fixing, fixer solution, washing, drying replenishment, checking and adjusting-latent image formation--nature of development-constitution of developer development time-factors in the use of developer. Fixers-constitution of fixing solution factors affecting the fixer-replenishment of fixer-silver conservation-Drying-developer and fixer for automatic film processor-rinsing-washing and drying. Replenishment rates in manual and automatic processing-silver recovery-Auto and manual chemicals.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Film Processing: manual processing-care of processing equipment-automatic process or manual VS automatic processing-principles and typical equipment Microprocessor controlled-Cine Processing-Daylight Systems-Processing faults-maintenance.

Automatic Film Processor - Functions of various components. Film roller transport-transport time, film feed system. Importance and relation to temp, fixed and variable time cycles. Care and maintenance (cleaning routine and methods of cleaning).

Unit:4

Radiographic image-components of image quality, Unsharpness in radiographic image contrast of the radiographic image-distinctness of the radiographic image-size, shape and spatial relationships.

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.

Presentation of radiographs-opaque letters and markers-Identification of dental films preparation of stereo radiographs-viewing conditions.

Unit:5

Monitor Images-Characteristics of the video image-television camera-imaging camera. Laser-light and laser-laser imaging-laser imagers-imaging plates-Dry cameras.

Processing room: location of the dark room-dark room illumination-equipment and layout-X-ray viewing room-Day light processing-Daylight handling-daylight systems with cassettes-without cassettes.

Dark Room

a. The processing area.
b. Dark room design, construction, illumination, entrance safe lighting-types.
c. Room storage, shelving of films.
d. Cleaning and maintenance. Dark Room Planning: For A Small Hospital, for A Large Hospital, Location of Dark Room and construction of Dark Room.
e. Ventilation, Wall Protection Entrance to Dark Room - Single Door, Double Door, Labyrinth.
f. Instruction to Staff, Dry Bench, Drawer, Cupboard.
g. Loading and Unloading Cassettes.
h. Hangers, Types of Hangers and Storage of Hangers
i. Wet Bench Cleanliness, Control of Dust, Dark Room Sink, Hatches and Drier, Safe Lights, Direct and Indirect, Uses, Factors Affecting Safelight Performance, Safelight Tests. Viewing Room, Film Dispensing.

Text Book & Reference Books:

1. Textbook of Radiology for Residents & Technicians- S.K. Bhargava & Sumeet Bhargava.
2. Darkroom procedure - MO & Chesney.
3. Radiographic Imaging by DN & MO Chesney 4th edition.
4. Manual of Darkroom Technique by WHO.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

RADIOGRAPHIC AND IMAGING PROCESSING TECHNIQUES

PAPER CODE: ……..

PRACTICALS

1. X-ray tubes general features and mobile equipment.

2. Care and maintenance of X-ray equipment and image intensifier

3. To study effects of Kilo Voltage Peak (KVP) and Milli Ampere Second (MAS)

4. Test to check the x-ray films and screen contact in the cassette

5. Test to check light leakage in the cassette.

6. Test to check the safety of dark room.

7. Test to check the speed of intensifying screen.

8. Test to check the developing time and function.

9. To prepare a characteristic curve of a radiographic film.

10. To check the effect of safe light on exposed as well as unexposed x-ray film.

11. Silver recovery method

12. Image Processing

13. Processing Room

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

BIOCHEMISTRY
PAPER CODE: 14191

Total: 40hours.

Unit-1

Nutrition: Introduction, Composition of food, RDA, BMR, SDA, caloric requirement and Importance of nutrition Calorific values, Respiratory quotient, Physical activities (Energy expenditure), Role of carbohydrates, lipids and proteins in diet. Balanced diet and nutritional disorders.

Carbohydrates: Definition, classification, chemistry with examples, Structures, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides. Glycosaminoglycan (mucopolysaccharides) metabolism (Glycogenesis, Glycogenolysis, Gluconeogenesis, Cori cycle), T.C.A cycle, glycolysis.

Lipids: Definition, classifications and general functions. Essential fatty acids and their importance, Metabolism- Oxidation of fatty acids, metabolism, oxidation of fatty acids, lipoproteins, Phospholipids, Cholesterol, lipolysis, lipogenesis, ketosis and ketone bodies metabolism.

Unit- 2

Amino Acids: Definition, classification, essential and non-essential amino acids, metabolism (fate of ammonia) and urea cycle. Biological important peptides, functions of proteins and amino acids. Enzymes: Definition, classification with examples, cofactors, Factors affecting enzyme action, isoenzyme and co-enzyme, Clinical importance of enzymes.

Biochemistry of connective tissue: Introduction, various connective tissue proteins: collagen, glycoproteins and proteoglycans, elastin- structure and associated disorders.

Vitamins: Definition, classification and functions, deficiency disorders, sources, RDA, digestion, absorption, transport and toxicity of individual vitamins.

Unit- 3

Clinical Biochemistry: Relevance of blood and urine levels of Glucose, Urea, Uric acid, Calcium, Phosphates, Liver function tests, Renal function tests. Creatinine, pH and Bicarbonate. Lipid Profile-Tri - Glyceride, Cholesterol/HDL/LDL/ALDL Etc.; Protein & Aggression, Glycosuria.

Nucleic acid: Function of DNA and RNA, chemistry, structure of DNA ((Watson and Crick model), Structure and functions of tRNA, rRNA, mRNA. Nucleotides and nucleosides.

Muscle Contraction: Contractile elements in muscle. Energy for muscle c

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Unit- 4

Biochemical hormones: Definition, Classification, Receptors, signal transduction, second messengers. Mechanism of Hormone action, effect of Insulin, Glucagon, Catecholamines, Thyroxine, Mineralocorticoids and Glucocorticoids. Diabetes mellitus: definition types & causes.

Biochemical organization of Human Cell: Introduction, cell structure, Cell membrane structure and functions, Types of Absorption of mechanism, organelles and their functions, Cytoskeleton Minerals metabolism- definition, sources, RDA, digestion, absorption, transport, excretion, functions and disorders- Calcium, Phosphate, Iron Magnesium, Fluoride, Selenium, Molybdenum, Copper. Phosphate, Calcium and Iron in detail.

Unit- 5

Acid base balance: Acid, base and buffers, Ph, Buffer System of The Body, Bicarbonate buffer system. Role of Lungs and kidneys in acid base balance, acid base imbalance. Water balance-Body water and its distribution, Regulation of water balance-Role of ADH and Thirst center. Electrolyte Balance-Osmolarity, Role of Aldosterone, Renin-Angiotensin System and ANF.

Text Book & Reference Book:

1. Bishop- Clinical Chemistry.

2. Teitz- Clinical Chemistry.

3. U. Satyanarayn, Medical Biochemistry Chatterjee, Text book of Biochemistry.

4. Varley, Clinical Chemistry

5. Vasudevan DM & Sreekumari S, Text book of Biochemistry for medical students.

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICAL
BIOCHEMISTRY
PAPER CODE: 14758

1. Preparation of buffers
2. Collection of specimens: Urine, blood, gastric juice, ascetic fluid
3. Tests for Carbohydrates (qualitative tests).
4. Tests for amino acids and Proteins (qualitative tests)
5. Precipitation reactions of proteins.
6. Tests for lipids.
7. Study of enzyme activity
8. Urine analysis-test for normal and abnormal constituents
9. Centrifugation: Principle, types, & applications.
10. Colorimetry and spectrophotometer-Principle and demonstration.
11. Estimation of blood/serum glucose, creatine, urea, cholesterol, total protein, bilirubin

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SUBSIDIARY SUBJECT

BASIC COMPUTERS AND INFORMATION SCIENCE

PAPER CODE: 14192

Unit-1

Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.

Input output devices: Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).

Unit-2

Processor and memory: The Central Processing Unit (CPU), main memory.

Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

Unit-3

Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

Unit-4

Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Introduction of Operating System: introduction, operating system concepts, types of operating system.

Unit-5

Computer networks: introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet. Application of Computers in clinical settings.

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SEMESTER –II

HUMAN ANATOMY -II

PAPER CODE: 14193

Total: 35 hours.

Unit -1

Endocrine glands

Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal glad – (gross & histology).

Urinary system

Kidneys, ureters, urinary bladder, male and female urethra, Juxtaglomerular Appratus,

Histology of kidney, ureter and urinary bladder

Unit -2

Reproductive system

Parts of male reproductive system, Panis, Scrotum, testes, vas deferens, epididymis, prostate gland (gross & histology)

Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)

Mammary gland – gross.

Unit -3

Nervous system

Neuron

Classification of NS: Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology)

Meninges, Ventricles & cerebrospinal fluid

Names of basal nuclei

Blood supply of brain

Cranial nerves

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Sympathetic trunk & names of parasympathetic ganglia

Unit -4

Sensory organs:

Skin: Skin-histology

Appendages of skin

Eye: Parts of eye & lacrimal apparatus

Extra-ocular muscles & nerve supply

Ear: parts of ear- external, middle and inner ear and contents

Unit -5

Embryology

Spermatogenesis & oogenesis

Ovulation, fertilization

Fatal circulation

Placenta

Cross-sectional anatomy related to Ultrasound, CT and MRI techniques.

Text Books:

1. Chourasia's Text Book of Anatomy

2. Ranganathan, T.S., A Text Book of Human Anatomy

Reference Books:

1.William Davis, Understanding Human Anatomy and Physiology, McGraw Hill
2. Fattana, Human Anatomy, (Description and Applied), Saunder's & C P Prism Publishers, Bangalore
3. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations, J.P.Lippin Cott.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICAL

HUMAN ANATOMY-II

PAPER CODE:14760

Demonstration of:

1. Identification and description of all anatomical structures.
2. The learning of Anatomy is by demonstration only through dissected parts, slides, models, charts, etc.
3. Nervous system from models.
4. Structure of eye and ear
5. Structural differences between skeletal, smooth and cardiac muscles.
6. Various bones
7. Various joints
8. Points of palpation of nerves and arteries
9. Various parts of male & female reproductive system from models
10. Surface anatomy: -surface land mark-bony, muscular and ligament us. -surface anatomy of major nerves, arteries of the limbs.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

HUMAN PHYSIOLOGY-II

PAPER CODE:14194

Total: 35 hours.

Unit-1

Endocrinology: Hormones- Their secretion and functions (in brief), Mechanism of actions of hormones, List of endocrine glands, Functions of pituitary gland, Pineal body, Thyroid gland, parathyroid glands, Adrenal glands, Gonads, Thymus, Pancreas.

Excretion System: Physiology of Kidney, Structure of nephron, Urine formation, Glomerular filtration rate, Ureters, Bladder, Urethra.

Unit-2

Reproductive System: Functions of male & female reproductive organs, Function of testes, testosterone Action & Regulation of Secretion, Functions of Ovaries and Uterus, Pubertal Changes, Estrogens & Progesterone- Action & Regulation, Menstruation, puberty, menopause, fertilization & development of fertilized ovum, placenta & its function.

Unit-3

Nerve Muscle Physiology: Muscles – Classifications, structure, & Properties, Muscle Tension, Muscle tone, Excitation Contraction Coupling, Motor unit, EMG, fatigue, Reflexes.
Nerve- structure, functions of neurons, classification & Properties, Resting membrane Potential, Action Potential Their ionic Basis.

Skin: Structure and functions**.**

Unit-4

Nervous system: Introduction & functions of nervous System.

Central Nervous System: Parts, Sliding filament theory, Neuro muscular junction, Wallerian degeneration Synapses, Motor Nervous System- Upper & lower motor neuron system, Sensory nervous system, sympathetic & Parasympathetic nervous system.

Unit-5

Special senses: Structure & function of eye and ear, mouth, common diseases of eye and ear (in brief).

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

HUMAN PHYSIOLOGY -II(LAB)

PAPER CODE: 14761

Demonstration of:

1. NCV
2. EMG
3. Renal System
4. Male & female Reproductive system
5. Reflexes
6. Skin & Layers of Skin
7. Special Senses: Eye, Ear, Nose

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

BASIC PHYSICS INCLUDING RADIOLOGICAL PHYSICS –II
PAPER CODE:14195

Unit- 1

X-Rays: Introduction, discovery, X-ray production and properties: Bremsstrahlung Radiations, Characteristics X-Rays, spectra of x-rays, quality and intensity of x-rays, interaction of electrons with target, applied voltage affecting quality and intensity, Characteristics X-Rays, heel effect, soft and hard x-rays.

Interaction of ionizing radiation with matter-Types of interactions of X-and gamma radiation, Photoelectric & Compton, Pair production, annihilation radiation.

Unit- 2

Interaction of X and gamma rays: Transmission through matter, law of exponential attenuation, half value layer, and linear attenuation coefficient, coherent scattering, photonuclear disintegration, Particle interactions. Interactions of X rays and Gamma rays in the body; fat-soft tissue, bone, contrast media, total attenuation coefficient, relative clinical importance.

Unit- 3

Exponential attenuation (linear/mass attenuation coefficients), Half Value Thickness (HVT), Tenth Value Thickness (TVT), dependence on energy and atomic number. Radiation intensity and exposure, photon flux and energy flux density. LET, range of energy relationship for alpha, beta particles with X-Rays.

Unit- 4

X-ray tube: historical aspects, construction of X-ray tubes, requirements for X-ray production (Electron source, target and anode material), tube voltage, current, space charge, early X-ray tubes (Coolidge tubes, tube envelop and housing) cathode assembly, X-ray production efficiency, advances in X-ray tubes, line focus principle, space charge effect, tube cooling, Modern X-ray tubes, stationary anode, rotating anode, grid-controlled X-ray tubes, off focus radiation, tube insert and housing. , focal spot size, radiation leakage and scattered radiation).

Unit- 5

Interlocking and X-ray tube overload protection.

Heat dissipation methods, tube rating, heat units, operating conditions and maintenance and Q.A procedures.

Filament current and voltage, X-ray circuits (primary circuit, auto transformer, types of exposure switch and timers, principle of automatic exposure control, practical operation, filament circuit, high voltage circuits, half wave, full wave rectification, three phase

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D703F2703FC9D687F06B89F4196B9525326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

circuits. Types of generators, 3 phase, 6 and 12 pulse circuits-high frequency generators-falling load generators, Capacitor's discharge and grid control systems.

Text Books:

1. K. Thalayan, Textbook of Radiological Safety
2. Satish k. Bhargava, Sumeet Bhargava's Textbook of Radiology

Reference Books:

1. Christensen's Physics of Diagnostic Radiology by Thomas S. Curry & James F. Dowday
2. K. Thalayan, Basic of Radiological Physics
3. Rehani, Advance Medical Physics

* Latest editions of all the suggested books are recommended.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICALS

BASIC PHYSICS INCLUDING RADIOLOGICAL PHYSICS –II(LAB)
COURSE CODE:

1. Study with charts, models & power point presentations involving students to present and discuss.

2. Study with charts, models & power point presentations Atomic structure, X-ray tubes, X-ray circuits, Interaction of radiation with matter involving students to present and discuss

2. Congruence of Radiation and Optical field and beam.

3. Determination of focal spot size of diagnostic X-ray tube.

4. K.V. and Exposure time testing.

5. Linearity testing of the Timer.

6. Consistency of M.A. loading.

7. Consistency of Radiation Output.

8. Evaluation of Total filtration of the tube.

9. Film screen contact testing.

10. Consistency of Radiation Output.

11. Evaluation of Total filtration of the tube.

12. Film screen contact testing.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

CONVENTIONAL RADIOGRAPHY AND EQUIPMENT
PAPER CODE: 14196

Total: 35 hours.

Unit-1

Production of x-rays: X-ray tube, gas filled x-ray tube, construction working and limitations; stationary anode x - ray tube; construction, working, methods of cooling the anode, rating chart and cooling chart; rotating anode x - ray tube: construction, working rating chart, speed of anode rotation, angle of anode inclination, dual focus and practical consideration in choice of focus, anode heel effect, grid controlled x - ray tube; effect of variation of anode voltage and filament temperature; continuous and characteristics spectrum of x - rays, inherent filter and added filter, their effect on quality of the spectrum.

High tension circuits: H.T. generator for x-ray machines, three phase rectifier circuits, three phase six rectifier circuit, three phase 12 rectifier circuit, high and medium frequency circuits; capacitance filter control and stabilizing equipment; mains voltage compensator, mains resistance compensator, compensation for frequency variation, control of tube voltage, kV compensator; high tension selector switch, filament circuit, control of tube current, space charge compensation.

Unit-2

Meters and exposure timers: Moving coil galvanometer: construction and working/conversion to millimeter, ammeter and voltmeter, meters commonly used in diagnostic x-ray machines, pre reading kV meter and millimeter, digital panel meters. Clockwork timers, synchronous motor timer, electronic timers, photo metric timers (fluorescent and photoelectric effect as applied in timers), ion chamber-based timers, integrated timer.

Interlocking circuits: Relays: description and working, use of relays in diagnostic machines for over load protection, circuit diagram; simplified circuit and block diagrams illustrating sequence of events from mains supply to controlled emission of x-rays.

Unit-3

Control of scattered radiation: Beam limiting devices: cones, diaphragms, light beam collimator, beam centering device, methods to verify beam centering and field alignment; grids; design and control of scattered radiation, grid ratio, grid cut-off, parallel grid, focused grid, crossed grid, grided cassettes, stationary and moving grid potter bucky diaphragms, various types of grid movements; single stroke movement, oscillatory, lovel movement.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Unit-4

Fluoroscopy: Fluorescence and phosphorescence - description, fluorescent materials used in fluoroscopic screens, construction of fluoroscopic screen and related accessories, tilting table, dark adaptation. Image intensifier - Construction and working, advantages over fluoroscopic device, principles and methods of visualising intensified image, basic principles of closed-circuit television camera and picture tube. Vidicon camera, CCD. Automatic brightness control, automatic exposure control, chamber selection during fluoroscopy. Serial radiography: Manual cassette changer, rapid automatic film changer, basic principles of cine fluoroscopy and angiography use of grid-controlled x-ray tube.

Unit-5

Care and Maintenance of X-ray equipment- General care; functional tests; testing the performance of exposure timers, assessing the MA settings, testing the available KV, measurement of focal spot of an x-ray tube, testing the light beam diaphragm, practical precautions pertaining to Brakes and locks, H.T. cables, meters and controls, tube stands and tracks as well as accessory equipment.

Text Books:

1. Textbook of Radiology for residents & Technicians- SK Bhargava.
2. K. Thalayan- Basic of Radiological Physics
3. Rehani- Advance Medical Physics

Reference Books:

1. Christensen's Physics of Diagnostic Radiology by Thomas S. Curry & James F. Dowday.

* Latest editions of all the suggested books are recommended.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

CLINICAL RADIOGRAPHY POSITIONING – I
PAPER CODE: 14197

Total: 35 hours.

Unit -1
Skeletal System

Upper limb: Technique for hand, fingers, thumb, wrist joint carpal bones, forearm, elbow joint, radio ulnar joints and humerus supplementary techniques for the above. e.g. Carpal tunnel view, ulnar groove, head of the radius, supracondylar projections.

Lower limb: Technique for foot, toes, great toe, tarsal bones, calcaneum, ankle joint, lower leg, knee, patella & femur. Supplementary techniques: Stress view for torn ligaments, Subtalar joint and talocalcaneal joint, Inter condylar projection of the knee, Tibial tubercle, Length measurement technique

Unit -2

Shoulder girdle and thorax: Technique for shoulder joint, scapular, clavicle, acromioclavicular joints, sternum, ribs, sterno-clavicular joint. Supplementary projections and techniques. Recurrent dislocation of shoulder, Traumatic dislocation of shoulder, Cervical ribs.

Vertebral column: Technique for atlanto-occipital joint, cervical spine, cervicothoracic spine, thoracic spine, thoraco- lumber spine, lumbosacral spine, sacrum and coccyx. Supplementary techniques to demonstrate: Scoliosis, Kyphosis, Spondylolisthesis, disc lesion, Union of spinal graft.

Unit -3

Pelvic girdle and hip region: Technique for whole pelvis. Ilium, ischium, pubic bones, sacroiliac joint, symphysis pubis, hip joint, acetabulum neck of femur, greater and lesser trochanter. Supplementary techniques- Congenital dislocation of hips, Epiphysis of femur, Lateral projections for hip joints to show femoral head and neck relationship.

Unit -4

Skull: Basic projections for cranium, facial bones, nasal bones and mandible. Technique for- Petrous temporal for mastoids. Internal auditory canal - Accessory nasal sinuses. Tempero mandibular joint. Orbits and optic foramen - Zygomatic arches. Styloid process. Pituitary fossa, Jugular foramen, Paranasal sinuses Radiography.

Unit -5

Chest Radiography –Basic views (PA & AP) - inspiratory & expiratory films- special chest views & their significance – larynx- trachea- thoracic inlet -Sternum - Ribs – Heart and great vessels – mediastinum -Diaphram – double exposure technique.

Textbooks:

1. Textbook of radiographic positioning & related Anatomy-Kenneth L. Bontrager, John P. Lampignano.

Reference Books:

1. Clark's Positioning in Radiology by Stewart Whittey
2. Radiographic Positioning- Garkal

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICALS
CLINICAL RADIOGRAPHY POSITIONING – I
COURSE CODE:

Regional Radiography

1. Radiographic positioning of all parts of the body.
2. All views & techniques of Upper Limb with related radiological pathology.
3. All views & techniques of Lower Limb with related radiological pathology.
4. All views & Techniques of Vertebral column: Cervical, thoracic, Lumber, Sacrum, Coccyx. Related radiological pathology.
5. All Views of Hip & Pelvis: Sacroiliac joint, Pelvis bone, Acetabulum. Rrelated radiological pathology.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SUBSIDIARY SUBJECT

ENGLISH COMMUNICATION AND SOFT SKILLS

PAPER CODE: 14198

Unit-1

Basic Language Skills: Grammar and Usage. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.

Unit-2

Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization. Basic concepts & principles of good communication.

Unit-3

Special characteristics of health communication**,** Types & process of communication verbal, non-verbal and written communication. Upward, downward and lateral communication.

Unit-4

Therapeutic communication: empathy versus sympathy.

Unit-5

Communication methods for teaching and learning. Communication methods for patient education. Barriers of communication & how to overcome.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SEMESTER III
RADIATION SAFETY IN DIAGNOSTIC RADIOLOGY -I
PAPER CODE:14199

Total: 30 hours.

Unit-1

Radiation Quantities and Units: Radiation- Radioactivity- Sources of radiation - natural radioactive sources, cosmic rays, terrestrial radiation, man-made radiation sources. Units of radiation, Quality factor, Flux, Fluence, Kerma, Exposure, absorbed dose, Equivalent Dose, RBE, LET, Weighting Factors, Effective Dose, Occupational Exposure Limits, dose limits to public.

Unit-2

Biological Effects of radiation: Ionization, excitation and free radical formation, hydrolysis of water, action of radiation on cell-Chromosomal aberration and its application for the biological dosimetry- Effects of whole body and acute irradiation, dose fractionation, effects of ionizing radiation on each of major organ system including fetus.

Unit-3

Somatic effects and hereditary effects- stochastic and deterministic effects, Acute exposure and chronic exposure-LD50 - factors affecting radio sensitivity.

Unit-4

Biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields.

Unit-5

National & International Guidelines for Radiation Protection: AERB, ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection.

Text Books:

1. K. Thalayan, Textbook of Radiological Safety
2. Satish k. Bhargava, Sumeet Bhargava's Textbook of Radiology

Reference Books:

1. Christensen's Physics of Diagnostic Radiology by Thomas S. Curry & James F. Dowday
2. K. Thalayan, Basic of Radiological Physics
3. Rehani, Advance Medical Physics
4. Radiation protection in Diagnostic X-Ray by Euilid Seeram
5. Basic radiation protection technology by Daniel A Gollnicle
6. The physics of Radiology & Imaging by k. Thayalan

* Latest editions of all the suggested books are recommended.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

RADIATION SAFETY IN DIAGNOSTIC RADIOLOGY -I
PAPER CODE:14763

All practical on theory based.

1. Radiation Quantities and Units
2. Knowledge of all hazards of radiation, Education of general public by posters & seminars.
3. Biological Effects of Radiation: Effects of Ionizing Radiation on Cell.
4. Somatic effects and hereditary effects.
5. Stochastic and deterministic effects.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PATHOLOGY

PAPER CODE: 14200

Total: 40 hours

Unit-1

Cell injuries – **Reversible cell injury:** Types, Sequential changes, Cellular swellings, vacuolation, Hyaline changes.

Irreversible cell injury: Types of Necrosis &Gangrene. Difference between Reversible & Irreversible cell injury.

Pathologic calcification: Dystrophic and Metastatic. Intracellular Accumulations - Fatty changes. Amyloidosis - Classification, Pathogenesis, Pathology including special stains.

Unit-2

Inflammation and Repair – **Acute inflammation:** features, causes, vascular and cellular events. Inflammatory cells and Mediators.

Chronic inflammation: Causes, Types, Classification nonspecific and granulomatous with examples. Repair, Wound healing by primary and secondary union, factors promoting and delaying the process. Healing in specific site including bone healing.

Unit-3

Hypersensitivity: type and examples, HIV infection, AIDS- Aetiology, Modes of transmission, Diagnostic procedures, handling of infected material and health education.
Infectious diseases.

Mycobacterial diseases: Tuberculosis, Syphilis.

Unit-4

Viral diseases: Poliomyelitis, Herpes, Opportunistic infections.

Parasitic diseases: Malaria, Filaria, Amoebiasis, Kala-azar, Hydatid cyst.

Circulatory Disturbances –Hyperemia/Ischemia and Haemorrhage.

Oedema: Pathogenesis and types. Chronic venous congestion: Lung, Liver, Spleen, **Systemic Pathology Thrombosis and Embolism:** Formation, Fate and Effects.

Infarction: Types, Common sites. Shock: Pathogenesis, types, morphologic changes.

Unit-5

Growth Disturbances and Neoplasia: Definition, classification. **Malignant Neoplasia:** Local& Distant spread. Atrophy, Hypertrophy, Hyperplasia, Metaplasia. Benign and Malignant tumor.

Carcinogenesis: Environmental carcinogens, chemical, viral, occupational. Benign & Malignant epithelial tumours e.g., Squamous cell carcinoma, Benign & Malignant mesenchymal tumours e.g., Fibroma, Lipoma, Neurofibroma. Nutritional Disorders –Protein energy malnutrition. Vitamin deficiency disorders, classification with specific examples. Genetic Disorders –Turner Syndrome, Down Syndrome, Klinefelter Syndrome.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

CONTRAST & SPECIAL RADIOGRAPHY PROCEDURES
PAPER CODE:14201

Total: 45 hours.

Note: For each of the examination the points listed below should be included:

- Review the anatomy of the area.
- State the clinical indication for the examination.
- State contra indication if any for the examination.
- Describe the preparation of the patient including the pre medication if appropriate.
- Specify the type and quantity of contrast agent used.
- Describe the method of introduction of the contrast agent.
- Describe the series of projections taken during the examination.
- Indicate the timings of the radiographs in relation to the administration of contrast agent.
- Outline the practical problems and the way in which they may be overcome.
- Explain the choice of exposure factor.
- Detail the measures that should be taken for radiation protection.
- Explain the after care of the patient.

UNIT- 1

Special radiographic procedures

Responsibility of Radiographer during Radiological Procedures, Preparation of Patient for Different Procedures, Contrast Media - Positive and Negative, Ionic & Non – Ionic Adverse Reactions to Contrast Media and Patient Management, Emergency Drugs in the Radiology Department, Emergency Equipments in the Radiology Department, Aseptic technique, Indications, contraindications, basic techniques and relationship to other techniques of the following special procedures:

a) **Gastrointestinal Tract:** Fluoroscopy, general considerations, responsibility of radiographers

Barium swallow, pharynx and oesophagus, Barium meal and follow through, Hypotonic duodenography, small bowel enema, Barium Enema routine projections for colon and rectum, colonic activators; double contrast studies; colostomy. Special techniques for specific disease to be examined, Water soluble contrast media - eg. g

b. **Salivary glands:** Routine technique, procedure – sialography.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

c. **Respiratory system:** Bronchography: Awareness.

UNIT- 2

a. **Biliary system:** Plain film radiography, Intravenous cholangiography, Percutaneous cholangiography, Endoscopic retrograde cholangio-pancreatography (ERCP), Operative cholangiography, post-Operative cholangiography (T - tube Cholangiography).

b. **Mammography:** Mammography: Basic views, special views, wire localization. Ductography.

c. **Urinary system:** Intravenous urography, Retrograde pyelography, Antegrade pyelography Cystography and micturating cystourethrography, Urethrography (ascending), Renal puncture.

UNIT- 3

a. **Female reproductive system:** Hysterosalpingography.

b. **Sinusography:** Routine technique and procedure.

c. **Myelogram-** indications and contraindications, patient preparation, positioning, patient care during the study-post procedural patient care-types of contrast media used, techniques for radiographic projections - radiographic appearances– radiation protection.

UNIT- 4

a. **Tomography:** General principles. Estimation, selection of depth of layer. Layer thickness required for different examination. Spacing of layers. Types and advantages of various movements. Choice of tomographic movement- exposure factor. Sequential, horizontal and multi section tomography. Application of tomography to specific regions.

b. **Macro radiography:** General principles, Requirement, Equipment, Technique.

c. **Soft Tissue Radiography:** High and low kilo voltage technique; differential filtration. Non - screen technique - simultaneous screen and non -screen technique. Multiple radiography. Uses of soft tissue radiography.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

UNIT- 5

a. **High kV Radiography:** General principles, Relation to patient dose, Change in radiographic contrast. Scatter elimination; beam collimation; grid ratio. Speed and type of grid movement. Radiographic factor; application and uses.

b. **Dental radiography**-Types of equipments –techniques, indications, films, dental radiography in trauma patient.

c. **Localization of foreign bodies:** General location principles. Ingested; inhaled; inserted; embedded foreign bodies. Foreign bodies in eye. Preparation of the area to be investigated. Appropriate projection for all. Techniques to locate non-opaque foreign body.

Textbooks & Reference books:

1. Textbook of Radiology for Residents & Technicians- S. K. Bhargava.
2. Radiological Procedures: A Guideline – Dr. Bhushan N. Lakhkar.
3. A guide to radiological procedures by Aitchison, F
4. Chapman & Nakielny's Guide to Radiological Procedure by Watson

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICAL
CONTRAST & SPECIAL RADIOGRAPHY PROCEDURES
COURSE CODE:

1.Positioning and imaging of all kinds of contrast & special radiographic procedures.

2. Patient preparation for all special radiographic procedures related contrast media.

3. Radiography in various positions for all the special radiographic procedures including contrast media.

4. Identification of various films for all the special radiographic procedures using contrast media & related pathologies.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

CLINICAL RADIOGRAPHY POSITIONING – II
PAPER CODE: 14202

Total: 30 hours.

Unit-1

Dental Radiography- Technique for intra oral full mouth - Occlusal projections- Extra oral projections including orthopantomography- Supplementary techniques.

Upper respiratory system- Technique for post nasal airways, larynx, trachea, thoracic inlet, Valsalva manoeuvre - Phonation.

Lungs and Mediastinum: Technique for routine projections- Supplementary projections: Antero-posterior, obliques, lordotic, apical projection, use of penetrated postero-anterior projection. - Expiration technique. - Technique for pleural fluid levels and adhesions.

Unit-2

Abdominal viscera- Technique for plain film examination. - Projection for acute abdomen patients. - Technique to demonstrate: Foreign bodies, Imperforate anus.

Unit-3

Paediatric Imaging:

Special needs of patient and radiographer- use of dedicated equipment and accessories-modified technical considerations - selection of exposure factors-image quality considerations-radiation protection of the patient - special techniques in children for contrast studies.

Geriatric radiography:

Equipment and accessories – exposure factor considerations in special care. Elderly patients' profile - difficulties during radiography – technical considerations-projections with unconventional special positioning.

Unit-4

Trauma/Emergency Radiography:

Selection of suitable X-Ray equipment – patient position -radiographic projections and sequence for each patient – modification of routine positioning– radiation protection – patient care.

Operation theatre radiography:

O.T Procedures-Operative cholangiography – orthopaedic procedures –maintenance of asepsis – preparation of radiographer and equipment/accessories – careful safe use of mobile and fluoroscopic equipment – radiation protection – patient care – rapid availability of radiographic image-cooperation with OT staff-type of studies done -clinical

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

applications- per operative radiographs- preoperative fluoroscopy studies -patient care-radiation protection of all staff.

Unit-5

Radiography using mobile X-ray equipment: Radiography in the ward: Radiography in the specialized unit, such as: Intensive care unit, Coronary care, Neonatal unit, Radiography in the operating theatre.

Textbooks:

1. Textbook of radiographic positioning & related Anatomy-Kenneth L. Bontrager, John P. Lampignano.
2. Textbook of Radiology for Residents & Technicians- S. K. Bhargava.

Reference Books:

1. Clark's Positioning in Radiology by Stewart Whittey.
2. Radiographic Positioning- Garkal.
3. Radiological Procedures: A Guideline – Dr. Bhushan N. Lakhkar.
4. A guide to radiological procedures by Aitchison, F
5. Chapman & Nakielny's Guide to Radiological Procedure by Watson

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICAL
CLINICAL RADIOGRAPHY POSITIONING – II
PAPER CODE:

1. Radiographic positioning of all parts of the body.
2. All views & techniques of chest.
3. All Views & Techniques of Abdomen: Gastrointestinal tract, Urinary tract. Related radiological pathology.
4. Skeletal survey.
5. Paediatric Radiography: Special Positioning Views for all the X-Rays.
6. Geriatric Radiography: Special Positioning Views for all the X-Rays.
7. Dental radiography: All views & techniques.
8. C-Arm.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

MODERN RADIOLOGICAL & IMAGING EQUIPMENT INCLUDING PHYSICS

PAPER CODE:14203

TOTAL: 30 HOURS.

Unit-1

Mammography: History of Mammography, Mammographic equipment, Mammographic Radiation Dose & Exposure, Mammographic Unit & Its Special Features, Types of Mammograph, Routine Mammographic Positioning & Views with Additional Considerations, Wire Localization in Mammography.

Unit-2

Special radiological equipment: Portable and mobile x-ray units, dental x-ray machine, skull table mammographic device - Technical aspects of Mammography; High Tension Generators, x-ray tubes-their types and advancements; Accessories; Resolution; Quality control; Application and role in medicine. digital radiography equipment, digital subtraction techniques. **Tomography:** Body section radiography, basic principle and equipment, multi section tomography, various types of tomographic movements, Tomosynthesis, Stich radiography.

Dual energy x-ray absorptionometry (DEXA) scan.

Unit-3

Computed radiography: its principle, physics & equipment. Digital Radiography. Flat panel digital fluoroscopy and radiography system, Direct and indirect digital radiography and fluoroscopy systems. Digital radiography and Computed radiography its advantages, disadvantages and applications.

Unit-4

Vascular Imaging Equipment: Introduction, historical developments, Principle, scanned projection radiography, digital subtraction angiography, applications and definition of terms.

Unit-5

Picture archiving and communication system (PACS): Introduction, advantages, disadvantages (Functions with HIS/RIS).

Textbook & Reference Book:

1. Clark's Radiography- Clark.
2.Textbook of Radiology for Residents & Technicians- S.K. Bhargava
3. Radiology Special Investigations- Chapman
4. Radiographic Positioning- Garkal

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

5. Textbook of radiographic positioning & related Anatomy-Kenneth L. Bontrager, John P. Lampignano

PRACTICAL

MODERN RADIOLOGICAL & IMAGING EQUIPMENT INCLUDING PHYSICS

PAPER CODE:

All practical on theory based.

Demonstration of basic procedures in all modern modalities.

X-ray tube accessories, general features.

Image intensifier & Its features.

Mammography x-ray tube

OPG

CR & DR

CT fluoroscopy

DSA

Mobile & Portable X-ray Equipment

PACS (HIS & RIS)

DEXA Scan

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SUBSIDIARY SUBJECT
RESEARCH METHODOLOGY AND BIOSTATISTICS
PAPER CODE:14204

Total: 30 hours

Unit-1

Research Methodology - Introduction to research methods, identifying research problem. Ethical issues in research, Research design.

Unit-2

Types of Data- Research tools and Data collection methods. Sampling methods, developing a research proposal.

Unit-3

Biostatistics - Basics of Biostatistics, Introduction of Biostatistics, Measures of Morality, Sampling, Statistical significance, Correlation, Sample size determination.

Unit-4

Statistics –Collection of Data - presentation including classification and diagrammatic representation –frequency distribution.

Unit-5

Measures of central tendency- measures of dispersion, Theoretical distributions, Binomial, Normal, Sampling –necessity of methods and techniques. Chi. Square test (2 x 2). Hospital Statistics, Use of computerized software for statistics.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

IV SEMESTER

RADIATION SAFETY IN DIAGNOSTIC RADIOLOGY -II

PAPER CODE:14205

Total: 35 hours.

Unit-1

Radiation detection and Measurements: Ionization of gases- Fluorescence and Phosphorescence -Effects on photographic emulsion. Ionization Chambers – proportional counters- G.M counters- scintillation detectors – liquid semiconductor detectors – Gamma ray spectrometer.

Unit-2

Measuring systems – free air ionization chamber – thimble ion chamber – condenser chamber – Secondary standard dosimeters – film dosimeter – chemical dosimeter - Thermoluminescent Dosimeter, Pocket Dosimeter-Radiation survey meter- wide range survey meter -zone monitor-contamination monitor -their principles function and uses. Advantages & disadvantages of various detectors & its appropriateness of different detectors for different type of radiation measurement.

Unit-3

Dose and Dosimetry, CT Dose Index (CTDI, etc.), Multiple Scan Average Dose (MSAD), Dose Length Product (DLP), Dose Profile, Effective Dose, Phantom Measurement Methods, Dose for Different Application Protocols, Technique Optimization. Dose area product in fluoroscopy and angiography systems, AGD in mammography.

Unit-4

Radiation protection: Radiation protection of self and patient- Principles of radiation protection, time - distance and shielding, shielding - calculation and radiation survey –ALARA-personnel dosimeters (TLD and film batches) - occupational exposure.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Unit-5

Radiation Hazard evaluation and control: Philosophy of Radiation protection, effects of time, Distance & Shielding. Calculation of Work load, weekly calculated dose to radiation worker & General public good work practice in Diagnostic Radiology. Planning consideration for radiology, including Use factor, occupancy factors, and different shielding material.

Text Book & Reference Books:

1. Radiation protection in Diagnostic X-Ray by Euilid Seeram
2. Basic radiation protection technology by Daniel A Gollnicle
3. The physics of Radiology & Imaging by k. Thayalan
4.Textbook of Radiology for Residents & Technicians- S. K. Bhargava.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PRACTICAL

RADIATION SAFETY IN DIAGNOSTIC RADIOLOGY -II

PAPER CODE:

1. Knowledge of all radiation hazards, Education of general public by postures & seminars.
2. ALARA.
3. Principles & methods of radiation protection.
4. Personnel dosimeters film badge & TLD how to use them
5. Shielding.
6. Radiation Safety of women & children, pregnant women, safety of patient's attendants, radiation workers & hospital staffs, checking lead aprons, checking leakage radiation from x-ray tube head, radiation Survey in around X-ray Installation.
7. G.M. counter, Scintillation detectors, Liquid Scintillator, Pocket dosimeters, & use of protective devices etc.
8. Safety measure of radiology department for patient.
9. Time, Dose, Shielding, Measurement of HVT & TVT.
10. Familiarization of Radiation Survey meters and their functional performance checks
11. Radiological Protection Survey of diagnostic x-Ray installation.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

NEWER IMAGING TECHNIQUES INCLUDING PATIENT CARE-I

PAPER CODE:14206

Total: 45 hours.

Unit-1

Interventional Radiography, Basic angiography and DSA: History, technique, patient care Percutaneous catherisation, catheterization sites, Asepsis, Guidewire, catheters, pressure injectors, accessories, Use of digital subtraction- single plane and bi-plane. All forms of diagnostic procedures including angiography, angioplasty, bilary examination, renal evaluation and drainage procedure.

Central Nervous System: Myelography, Cerebral studies, Ventriculography

Unit-2

Arthrography: Shoulder, Hip, Knee, Elbow

Angiography: Carotid Angiography (4 Vessel angiography), Thoracic and Arch Aortography, Selective studies: Renal, SMA, Coeliac axis, Vertebral angiography, Femoral arteriography, Angiocardiography

Unit-3

Venography: Peripheral venography, Cerebral venography, Inferior and superior venocavography, Relevant visceral phlebography

Unit-4

Cardiac catheterization procedures: PTCA, BMV, CAG, Pacemaker, Electrophysiology.

Unit-5

Microbiology-Introduction and morphology - Introduction of microbiology, Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria. Growth and nutrition -nutrition, culture media, types of medium with example and uses of culture media in diagnostic bacteriology, antimicrobial sensitivity test, Sterilization and disinfection - principles and use of equipments of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, anti-septic and disinfectants. Introduction to immunology, bacteriology, parasitology, mycology.

Textbook & Reference Book:

1. Clark's Radiography- Clark.

2.Textbook of Radiology for Residents & Technicians- S. K. Bhargava.

3. Radiology Special Investigations- Chapman

4. Radiographic Positioning- Garkal

5. Textbook of radiographic positioning & related Anatomy-Kenneth Lampignano

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PHYSICS OF NEWER IMAGING MODALITIES

PAPER CODE:14207

Total: 30 hours.

Unit-1

Computed Tomography: Basic principles, History of CT Scan EMI, various generations and advancements, Advantages & Disadvantages, CT scan Components.

Scanning Principle Image Acquisition, Image Reconstruction, Image Manipulation, CT image display & documentation, Scanning parameters.

Unit-2

Magnetic Resonance Imaging: History of MRI, Magnetism, Basic principle of MRI, MRI Hardware. Types of Contrast agents used in MRI, Physical & physiological basis of magnetic relaxation, Image Contrast, Noise, Spin Echo, Gradient Echo, Inversion recovery. advancements and applications.

Unit-3

Ultrasonography, Color Doppler- its principle, advancements and applications.

Digital Radiography and Digital subtraction angiography equipment- principle, advancements and applications.

Unit-4

Nuclear Medicine: Application, Apparatus, Function & Instrumentation, commonly used Radionuclides Characteristic & Half-life of Radionuclides.

PET Scan: Indications & Contraindications, Patient's prepration Technique in PET Scan. Fusion Imaging including PET-CT & PET- MRI: Definition, Applications, Advantages & Dis advantages, Clinical Uses, Benefits, & Risk of PET-CT & PET-MRI.

Unit-5

Digital Mammography, DEXA equipment- principle, advancements and applications.

Tele radiology HIS, RIS and PACS.

Image processing in digital radiography systems: Post processing techniques in console using CR, DR and flat panel fluoroscopy system.

Textbook & Reference Book:

1. Clark's Radiography- Clark.

2.Textbook of Radiology for Residents & Technicians- S. K. Bhargava.

3. Radiology Special Investigations- Chapman

4. Radiographic Positioning- Garkal

5. CT Made Easy

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

QUALITY CONTROL IN RADIOLOGY AND RADIATION SAFETY -I
PAPER CODE:14208

Total: 35 hours.

Unit-1

Objectives of quality Control: Improve the quality of imaging thereby increasing the diagnostic value; to reduce the radiation exposure; Reduction of film wastage and repeat examination; to maintain the various diagnostic and imaging units at their optimal performance.

Unit-2

Quality assurance activities: Equipment selection phase; Equipment installation and acceptance phase; Operational phase; Preventive maintenance.

Unit-3

Quality assurance programme at the radiological faculty level: Responsibility; Purchase; Specifications; Acceptance; Routine testing; Evaluation of results of routine testing; Quality assurance practical exercise in the X ray generator and tube; Image receptors from processing; Radiographic equipment; Fluoroscopic equipment; Mammographic equipment; Conventional tomography; Computed tomography; Film processing, manual and automatic; Consideration for storage of film and chemicals; Faults tracing; Accuracy of imaging- image distortion for digital imaging devices. LASER printer calibration**.**

Unit-4

Quality assurance programme tests: General principles and preventive maintenance for routine, daily, weekly, monthly, quarterly, annually – machine calibration.

Unit-5

Basic concepts of quality assurance – LASER printer - Light beam alignment; X-ray out-put and beam quality check; KVp check; Focal spot size and angle measurement; Timer check; mAs test; Grid alignment test; High and low contrast resolutions; Mechanical and electrical checks; Cassette leak check; Proper screen-film contact test; Safe light test; Radiation proof test; Field alignment test for fluoroscopic device; Resolution test; Phantom measurements - CT, US and MRI.

Textbook & Reference book:

1. Textbook of radiology for residents & technicians- S.K. Bhargava
2. Quality Assurance & Control in Diagnostic Radiology & Imaging- S.K. Bhargava
3. Quality Assurance in Diagnostic Radiology- McLemore, J.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

QUALITY CONTROL IN RADIOLOGY AND RADIATION SAFETY -I
PAPER CODE:14764

PRACTICAL

1. Knowledge of all radiation hazards, Education of general public by postures & seminars.
2. Radiation Safety of women & children, pregnant women, safety of patient's attendants, radiation workers & hospital staffs, checking lead aprons, checking leakage radiation from x-ray tube head, radiation Survey in around X-ray Installation.
3. Use of x-ray film badges, G.M. counter, Scintillation detectors, Liquid Scintillator, Pocket dosimeters, & use of protective devices etc.
4. Keeping of dose records of radiation workers, Step after high exposure report & investigations.
5. Biological effects of radiation-The cell effect of ionizing radiation on cell.
6. Somatic effects & hereditary effects, Stochastic & Deterministic effects.
7. Quality control of all radiographic machine.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SUBSIDIARY SUBJECT

INTRODUCTION TO QUALITY AND PATIENT SAFETY

PAPER CODE: 14209

Total: 20 hours.

1. **Quality assurance and management** - The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Quality Improvement Tools, Introduction to NABH guidelines.

2. **Basics of emergency care and life support skills** - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows: Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR, using an AED (Automated external defibrillator)., Managing an emergency including moving a patient**.** At the end of this topic, focus should be to teach the students to perform the maneuvers in simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above-mentioned modalities

3. **Bio medical waste management and environment safety**- The aim of this section will be to help prevent harm to workers, property, the environment and the general public. Topics to be covered under the subject are as follows: Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices).

4. **Infection prevention and control** - The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include – Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)], Prevention & control of common healthcare associated infections, Components of an effective infection control program, and Guidelines (NABH and JCI) for Hospital Infection Control.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

5. **Antibiotic Resistance-** History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance, Antimicrobial Stewardship- Barriers and opportunities, Tools and models in hospitals.
6. **Disaster preparedness and management**- The objective of this section will be to provide knowledge on the principles of on-site disaster management. Concepts to be taught should include- Fundamentals of emergency management, psychological impact management, Resource management, Preparedness and risk reduction, Key response functions (including public health, logistics and governance, recovery, rehabilitation and reconstruction), information management, incident command and institutional mechanisms.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

ENVIRONMENTAL SCIENCES

PAPER CODE: 14210

1. **General-**Biotic and a biotic environment**,** Adverse effects of Environment Pollution**,** Control strategies
2. **Water Pollution:** Water Quality standards for potable water**,** Impurities in water and their removal**,** Defluoridation**,** Self-purification of streams
3. **Air pollution-**Source of air contaminants**,** Adverse effects on human health, Measures to check air pollution**,** Greenhouse effect**,** Acid Rain**,** Ozone depletion
4. **Biomedical Waste Management-** Introduction to Bio-medical waste, Types of bio-medical waste, Collection of bio-medical waste**,** Treatment and disposal of bio-medical waste
5. **Solid waste Management -** Introduction to solid waste**,** Its collection and disposal**,** Sanitary land-filling**,** Vermin-composting**,** Hazardous waste management
6. **Land Pollution -** Soil conservation**,** Land erosion
7. **Ecology -** Busies of species**,** Biodiversity**,** Population dynamics**,** Energy flow**,** Ecosystems

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SEMESTER-V

PHYSICS OF ADVANCED IMAGING TECHNOLOGY -1
PAPER CODE:14211

Total: 35hours.

Unit-1

Basic Computed Tomography- Basic principles of CT, generations of CT, CT instrumentation, image formation in CT, CT image reconstruction, Hounsfield unit, CT image quality, CT image display.

Advanced Computed Tomography - Helical CT scan: Slip ring technology, advantages, multi detector array helical CT, cone – beam geometry, reconstruction of helical CT images, CT artifact, CT angiography, CT fluoroscopy, HRCT.

Unit-2

Post Processing Techniques: MPR, MIP, Min IP, 3D rendering: SSD and VR, CT Dose, patient preparation, Imaging techniques and protocols for various parts of body, CT contrast enhanced protocols – CT angiography – (Aortogram, selective angiogram head, neck and peripheral) image documentation and Filing, maintenance of equipment and accessories.

Unit-3

Advanced technique & instrumentation of MRI: Basic Principles: Spin, precession, relaxation time, pulse cycle, T1 weighted image, T2 weighted image, proton density image. Pulse sequence: Spin echo pulse sequence, turbo spin echo pulse sequence, Gradient echo sequence, Turbo gradient echo pulse sequence, Inversion recovery sequence STIR sequence, SPIR sequence, FLAIR sequence, Echo planar imaging, Advanced pulse sequences.

Unit-4

MR Instrumentation: Types of magnets, RF transmitter, RF receiver, Gradient coils, shim coils, RF shielding, computers.

Image formation: 2D Fourier transformation method, K-space representation, 3D Fourier imaging, MIP.

Unit-5

MR contrast media, MR angiography, TOF & PCA, MR Spectroscopy, functional MRI.

Text Books:

1. K. Thalayan, Textbook of Radiological Safety
2. Satish k. Bhargava, Sumeet Bhargava's Textbook of Radiology

Reference Books:

1. Christensen's Physics of Diagnostic Radiology by Thomas S. Curry & C
2. K. Thalayan, Basic of Radiological Physics
3. Rehani, Advance Medical Physics

* Latest editions of all the suggested books are recommended.

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PHYSICS OF ADVANCED IMAGING TECHNOLOGY -1

PAPER CODE:14765

PRACTCALS

All practical on theory based.

1. Physics Scanning Principle & Image formation.
2. Identification of different parts of CT Scanner.
3. Identification of different parts of MR Scanner.
4. Application of various procedures in well-equipped hospitals & diagnostic centers.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

RADIOGRAPHIC TECHNIQUES IN ADVANCED IMAGING TECHNOLOGY –I
PAPER CODE:14212

Total: 30 hours.

Unit-1

Ultrasonography/ Doppler studies: Techniques of sonography-selection- Preparations - instructions and positioning of patient for TAS, TVS, TRUS, neck USG and extremities- patient care and maintenance protocols clinical applications display methods –quality image reproducible extend – biopsy procedures, assurance to patients.

Unit-2

CT scan studies acquisition/ protocols /techniques: CT of head and neck – thorax – abdomen – pelvis – muscular skeletal system – spine – PNS. Anatomy – clinical indications and contraindications – patient preparation – technique – contrast media-types, dose, injection technique; timing, sequence - image display – patient care – utilization of available techniques & image processing facilities to guide the clinician- CT anatomy and pathology of different organ systems.

Unit-3

MRI Scanners: Methods of MRI imaging methods – Head and Neck ,Thorax, Abdomen, Musculoskeletal System imaging - Clinical indications and contraindications- types of common sequences effects of sequence on imaging - Protocols for various studies- slice section- patient preparation-positioning of the patient -patient care-calibration - paramagnetic agents and dose, additional techniques and recent advances in MRI - image acquisition-modification of procedures in an unconscious or un co-operative patient - plain studies- contrast studies -special procedures- reconstructions- 3D images- MRS blood flow imaging, diffusion/perfusion scans - strength and limitations of MRI- role of radiographer.

Textbook & Reference books:

1. Textbook of Radiology for Residents & Technicians- S.K. Bhargava
2. Step by step MRI- J. Jagan Mohan Reddy & V. Prasad.
3. CT made easy
4. MRI made easy

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

RADIOGRAPHIC TECHNIQUES IN ADVANCED IMAGING TECHNOLOGY –I
PAPER CODE:14766

PRACTICALS

All practical on theory based.

1. Physics scanning principle & image formation in CT, USG, MRI.
2. Identification of different parts of CT, USG, MRI Scanner.
3. Quality control of CT, USG, MRI.
4. Application of various procedures in well-equipped hospitals & diagnostic centers.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

HOSPITAL PRACTICE AND CARE OF PATIENT – I
PAPER CODE:14213

Total: 30 hours.

Unit-1

Hospital staffing and administration, records, professional, ethics, co-operation with other staff and departments, Departmental organizations.

Unit-2

Handling of the patients, seriously ill and traumatized patients, visually impaired, speech and hearing impaired, mentally impaired, drug addicts and non-English speaking patients. Understanding patient needs - patient dignity of inpatient and out patients. Interaction with the patient's relatives and visitors.

Unit-3

Methods of effective communication - verbal skills, body language, professional appearance, visual contact etc. Elementary personal and departmental hygiene, dealing with receptacles, bed pans and urinal etc. General preliminaries to the exam.

Unit-4

Moving chair and stretcher, patient. Unconscious patient, general comfort and reassurance for the patient.

Unit-5

Vital signs and oxygen - patient's Haemeatasis status. Body temp, respiratory rate, pulse, blood pressure, oxygen therapy, oxygen devices, Chest tubes and lines.

Reference Books:

1. Patient Care in Radiography: with an introduction to medical imaging- Ruth Ann Ehrlich, Johan A. Daly.
2. Care of the Patient in Diagnostic Radiology by D. Nareen Chesney

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

NEWER IMAGING TECHNIQUES INCLUDING PATIENT CARE-II

PAPER CODE:14214

Total: 45 hours.

Patient care in Medical Imaging Department:

Patient management is based on team work, it is essential that the student should appreciate the technologist's role and that the importance of co-operation with wards and other departments. The students should be attached to wards or the accident and emergency department for a definite training period.

Unit-1

Hospital procedure - Hospital staffing and organization; records relating to patients and departmental statistics; professional attitude of the technologist to patients and other members of the staff; medico- legal aspects; accidents in the departments, appointments, organization; minimizing waiting time; out-patient and follow-up clinics; stock-taking and stock keeping.

Unit-2

Care of the patient - FIRST contact with patients in the department; management of chair and stretcher patients and aids for this, management of the unconscious patient; elementary hygiene; personal cleanliness; hygiene in relation to patients (for example clean linen and receptacles , nursing care; temperature pulse and respiration; essential care of the patient who has a tracheotomy; essential care of the patient who has a colostomy; bedpans and urinals; simple application of a sterile dressing.

Unit-3

First aid - Aims and objectives of first aid; wounds and bleeding, dressing and bandages; pressure and splints, supports etc. Shock; insensibility; asphyxia; convulsions; resuscitation, use of suction apparatus, drug reactions; prophylactic measures; administration of oxygen; electric shock; burns; scalds; hemorrhage; pressure points; compression band. Fractures; splints, bandaging; dressing, foreign bodies; poisons.

Unit-4

Infection - Bacteria, their nature and appearance; spread of infections; auto-infection or cross-infection; the inflammatory process; local tissue reaction, general body reaction; ulceration; asepsis and antisepsis. Universal precautions, hospital acquired infections- HIV, Hepatitis B, C, and MRSA etc.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

Unit-5

Principles of asepsis - Sterilization - methods of sterilization; use of central sterile supply department; care of identification of instruments, surgical dressings in common use, including filament swabs, elementary operating theatre procedure; setting of trays and trolleys in the radio imaging department (for study by radio imaging students only)

Unit-6

Departmental procedures including Drugs in the department - Department staffing and organizations; records relating to patients and departmental statistics; professional attitudes of the technologist to patients and other members of the staff, medico-legal aspects accidents in the department; appointments, organizations, minimizing waiting time, out-patient and follow-up clinics, stock taking and stock keeping. Classification, labeling and checking, regulations regarding dangerous and other drugs; units of measurement, special drugs, anti-depressive, anti-hypertensive etc.

Reference book & Textbook:

1. Textbook of Radiology for Residents & Technicians- S.K. Bhargava.

2. Radiological Procedures "A Guideline"- Dr. Bhushan N Lakhkar.

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

QUALITY CONTROL IN RADIOLOGY AND RADIATION SAFETY -II
PAPER CODE:14215

Total: 35 hours.

Unit-1

Quality assurance of film and image recording devices: Sensitometry, Characteristic curve, Film latitude, Film contrast, Film speed Resolution, Distortion, Artifacts of films and image recording, Monitor calibration, SMPTE pattern.

Unit-2

Maintenance and care of equipment: Safe operation of equipment; Routine cleaning of equipment and instruments, Cassette, screen maintenance; Maintenance of automatic processor and manual processing units; Routine maintenance of equipments; Record keeping and log book maintenance; Reject analysis and objectives of reject analysis programme.

Unit-3

Care and maintenance of diagnostic equipment: General principles and preventive maintenance for routine - daily, Weekly, monthly, quarterly, annually: care in use, special care of mobile equipment.

Unit-4

Quality Assurance and quality control of Modern Radiological and Imaging Equipment which includes Digital Radiography, Computed Radiography, CT scan, MRI Scan, Ultrasonography and PACS related.

Unit-5

Image artifacts: Different types, causes and remedies, Newer Radiation safety protocols and recent advances in radiation safety including AERB guidelines.

Textbook & Reference book:

1. Textbook of radiology for residents & technicians- S.K. Bhargava
2. Quality Assurance & Control in Diagnostic Radiology & Imaging- S.K. Bhargava
3. Quality Assurance in Diagnostic Radiology- McLemore, J.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SUBSIDIARY SUBJECT
MEDICAL TERMINOLOGIES AND RECORD KEEPING
PAPER CODE:14216

Total: 20 hours.

Unit-1

Derivation of medical terms.

Define word roots, prefixes, and suffixes.

Unit-2

Conventions for combined morphemes and the formation of plurals.

Basic medical terms.

Unit-3

Form medical terms utilizing roots, suffixes, prefixes, and combining roots.

Interpret basic medical abbreviations/symbols.

Unit-4

Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.

Unit-5

Interpret medical orders/reports.

Data entry and management on electronic health record system.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

VI SEMESTER

PHYSICS OF ADVANCED IMAGING TECHNOLOGY -II
PAPER CODE:14217

Total: 30 hours.

Unit:1

Ultrasonography - Basic Acoustics, Ultrasound terminologies: acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity.

Unit:2

Interaction of US with matter: reflection, transmission, scattering, refraction and absorption, attenuation and attenuation coefficients, US machine controls, US focusing.

Unit:3

Production of ultrasound: Piezoelectricity, Medical ultrasound transducer: Principle, construction and working, characteristics of US beam.

Unit:4

Ultrasound display modes: A, B, M. Real-time ultrasound: Line density and frame rate, Real-time ultrasound transducers: mechanical and electronic arrays, ultrasound artifacts, ultrasound recording devices, and Distance, area & volume measurements. Techniques for imaging different anatomic areas, ultrasound artifacts, biological effects and safety.

Unit:5

Doppler Ultrasound: Patient preparation for Doppler, Doppler artifacts, vascular sonography.

Reference book & Textbook:

1. Textbook of Radiology for Residents & Technicians- S.K. Bhargava.

2. Radiological Procedures “A Guideline”- Dr. Bhushan N Lakhkar.

3. Ultrasonography in Obstetrics & Gyneacology by Callen, Peter W.

4. Clinical Ultrasound by Allan, Paul

SUSHIL KUMAR THAKUR

Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

PHYSICS OF ADVANCED IMAGING TECHNOLOGY -II
PAPER CODE:14767

PRACTICALS
All practical on theory based.

Demonstration of:

1. Physics, Imaging Principle & image formation of USG.
2. Indications, Technique, Patient's Preparation.
3. Identification of different parts US Scanner.
4. Applications of various procedure in well equipped hospitals & diagnostic centers.
5. Instrumentation.
6. Doppler.
7. USG Contrast Media.
8. Ultrasound Imaging artifacts

Scanning Techniques of:

1. Abdomen
2. Abdominal Aorta
3. Inferior Vena Cava
4. Liver
5. Gall Bladder and Biliary Duct
6. Pancreas
7. Spleen
8. Peritoneal Cavity and Gastrointestinal Tract
9. Scrotum and Testis
10. Urinary Bladder
11. Kidneys and Ureter
12. Neonates
13. Neck.
14. Ultrasound Guided Needle Puncture

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

REGULATORY REQUIREMENTS IN DIAGNOSTIC RADIOLOGY
PAPER CODE:14218

Total: 30 hours.

Unit-1

1. Regulatory Bodies & regulatory Requirements: International Commission on Radiation Protection (ICRP) / National Regularity body (AERB - Atomic Energy Regulatory Board) - Responsibilities, organization, Safety Standard, Codes and Guides, Responsibilities of licenses, registrants & employers and Enforcement of Regulatory requirements.

Unit-2

Role of Radiographer in Planning, QA & Radiation Protection: Role of technologist in radiology department - Personnel and area monitoring., Setting up of a new X-Ray unit, staff requirement, AERB specifications for site planning and mandatory guidelines – Planning of X-ray rooms, dark rooms.

Unit-3

Inspection of X-Ray installations - Registration of X-Ray equipment installation- Certification - Evaluation of workload versus radiation factors – Occupational exposure and protection Tools/devices.

Unit-4

ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection. NABH guidelines, AERB guidelines, PNDT Act and guidelines.

Text Book & Reference Book:

1. Textbook of Radiology for Residents & Technicians- SK Bhargava.
2. AERB Guidelines: www.aerbgov.in

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

HOSPITAL PRACTICE AND CARE OF PATIENT –II
PAPER CODE:14219

Total: 30 hours.

Unit-1

First aid - shock, electrical shock, haemorrhage, burns, Asphyxia, fractures, loss of consciousness. Emergency treatment to the collapsed patient.

Unit-2

Artificial respiration and resuscitation. Preparation of patient for general and special radiological examinations. Supervision of patients undergoing special examination.

Unit-3

Administration of drugs and contrast media. Aseptic and sterile procedures. Handling of infections patients in the department or in the ward.

Unit-4

Regulation of dangerous drugs. Trolley set up for special x-ray examinations, Radiation hazardous and protective measures.

Reference Book:

1. Patient Care in Radiography: with an introduction to medical imaging- Ruth Ann Ehrlich, Johan A. Daly.
2. Care of the Patient in Diagnostic Radiology by D. Noreen Chesney

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

RADIOGRAPHIC TECHNIQUES IN ADVANCED IMAGING TECHNOLOGY –II
PAPER CODE:14220

Total: 30 hours.

Unit-1

MRI Scanners: Methods of MRI imaging methods – Head and Neck, Thorax, Abdomen, Musculoskeletal System imaging.

Unit-2

Clinical indications and contraindications- types of common sequences effects of sequence on imaging - Protocols for various studies- slice section- patient preparation-positioning of the patient -patient care-calibration - paramagnetic agents and dose.

Unit-3

Additional techniques and recent advances in MRI - image acquisition-modification of procedures in an unconscious or un co-operative patient - plain studies- contrast studies -special procedures - reconstructions- 3D images.

Unit-4

MRS blood flow imaging, diffusion/perfusion scans - strength and limitations of MRI- role of radiographer.

Text Book & Reference Book:

1. Textbook of Radiology for Residents & technicians- S. K. Bhargava.
2. Radiographic Procedures – Bhushan N. Lakhkar.
3. MRI made easy Govind B, Chavn

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

RADIOGRAPHIC TECHNIQUES IN ADVANCED IMAGING TECHNOLOGY –II
PAPER CODE:14768

PRACTICALS

All practical on theory based.

Demonstration Of:

1. MRI Basic Principle
2. MRI Components
3. Signal to Noise Ratio (SNR)
4. Contrast to Noise Ratio (CNR)
5. Spatial Resolution,
6. MRI of Head and Neck
7. MRI of Body
8. MRI of Extremities
9. Vascular and Cardiac Imaging
10. Functional Imaging Techniques
11. Contrast Agents in MRI
12. Various Post Processing Techniques and Evaluation of Image Quality and ClinicalFindings.
13. Post Procedural Care of The Patient
14. Advancement in MRI

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0

SUBSIDIARY SUBJECT

MEDICAL LAW AND ETHICS

PAPER CODE:14221

Total: 25 hours.

Unit-1

Medical ethics - Definition - Goal – Scope.

Introduction to Code of conduct.

Basic principles of medical ethics – Confidentiality.

Unit-2

Malpractice and negligence - Rational and irrational drug therapy.

Autonomy and informed consent - Right of patients.

Unit-3

Care of the terminally ill- Euthanasia.

Organ transplantation.

Unit-4

Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.

Professional Indemnity insurance policy.

Unit-5

Development of standardized protocol to avoid near miss or sentinel events.

Obtaining an informed consent.

SUSHIL KUMAR THAKUR
Digitally signed by SUSHIL KUMAR THAKUR
DN: C=IN, O=Personal, PostalCode=302033, S=Rajasthan, SERIALNUMBER=C973379113FC8D793F2708FC9D687F06B89F4196B9325326C00EECB6FEC22CC0, CN=SUSHIL KUMAR THAKUR
Reason: your signing reason here
Location: your signing location here
Date: 2024.09.19 17:37:31+05'30'
Foxit PDF Editor Version: 2024.1.0