FUNDAMENTALS OF HUMAN ANATOMY & PHYSIOLOGY (THEORY)
Course Code: ANA/PHY.101T
Credit Hours: 3
Semester: I

SECTION I: HUMAN ANATOMY

UNIT-I : Structure & function of human body (2 Lectures)

- Definitions, Subdivisions of Anatomy, Terms of location and position, Fundamental Planes, organization of human body. Cell (structure & function). Tissues (Epithelium, Connective, Muscular, Nervous)

UNIT- II : Locomotion and support (2 Lectures)

- *Skeletal system:* Types of bones, Bones and their parts, Divisions of skeleton
- *Joints:* classification, types of movements with examples.

UNIT- III : Nervous system (2 Lectures)

- *Central nervous system*: Spinal Cord (anatomy, functions), reflex- arc, meninges.
- *Brain:* Hind Brain, Midbrain, Forebrain.

UNIT-IV : Sensory System (2 Lectures)

- Anatomical introduction to skin & Sense organs: Eye, Ear ,Nose

UNIT-V : Circulatory system (2 Lectures)

- *Heart:* size, location, coverings, chambers, blood supply, the blood vessels. General plan of circulation, pulmonary circulation. Names of arteries and veins and their positions.

UNIT- VI : Respiratory system (2 Lectures)

- Organs of Respiratory System. Brief knowledge of parts and position
- *Conducting portion:* Nose, nasal cavity, Para nasal air sinuses, Larynx, trachea, bronchial tree.
- *Respiratory portion:* Pleura and lungs.

UNIT- VII: Digestive system (2 Lectures)

- Components of Digestive system, Anatomy of organs of digestive system, mouth, tongue, teeth,
- salivary glands, liver, biliary apparatus, pancreas.

UNIT- VIII: Excretory system (2 Lectures)

- *Kidneys:* location, gross structure, excretory ducts, ureters, Urinary bladder, Urethra.

UNIT- IX: Reproductive system (2 Lectures)

- *Male Reproductive System:* Testis, Duct system.
- *Female Reproductive System:* Ovaries, Duct system

UNIT- X : Endocrine system (2 Lectures)

- *Endocrine glands:* Positions, Hormones secreted and their functions- Pituitary, Thyroid parathyroid, Adrenal glands, Gonads & Islets of pancreas

SECTION II: HUMAN PHYSIOLOGY

Unit I – Cell **(1 Lecture)**

Cell membrane& cytoplasmic organelles- Functions

Unit II – Blood **(4 Lecture)**

Composition and function of blood

Blood Cells- Types, structure and functions

Blood group- ABO Blood group & Rh factor, Blood groups and uses of blood grouping. Rh incompatibility

Blood Clotting: Definition, Mechanism of haemostasis, Physiology of clotting mechanism.

Anemia- Definition, Types and Clinical features of anemia.

Unit III – Cardiovascular System **(3 Lecture)**

Functions of heart and blood vessels

Heart rate :- Definition and factors affecting it

Cardiac cycle: Definition and events in the cardiac cycle, Heart sounds

Unit IV - Respiratory System **(2 Lecture)**

Functions of Respiratory organs

Mechanism of Respiration: Inspiration & expiration, Muscles of Inspiration & Muscles of expiration, Accessory muscles of Respiration

Lung Volumes and Capacities: Vital Capacity, Tidal Volume, Residual Volume

Unit V – Gastrointestinal system **(3 Lecture)**

Functions of various parts of GIT

Digestion & absorption of carbohydrates, fats, protein in various parts of GIT

Functions of Saliva, Gastric Juice, Bile, Pancreatic Juice

Functions of Liver , Gall Bladder and Pancreas

Movements of Small Intestine and large Intestine

Unit VI - Excretory System **(4 Lecture)**

Functions of kidney, ureters, urinary bladder and urethra

Nephron & Function of various parts

Mechanism of Urine Formation

Unit VII – CNS **(4 Lecture)**

Introduction: Organization and function of the nervous system

Central Nervous System: General Description- Cerebral hemisphere (cerebrum); Basal ganglia, Thalamus; Hypothalamus, Brain stem: Medulla; Pons, Mid Brain; Reticular formation, Cerebellum, Spinal Cord: Structure and function; Ascending (sensory) tracts; Descending (motor) tracts, Cerebrospinal fluid (CSF)

Peripheral nervous System: Somatic nervous system: Spinal nerves; Reflexes: Mono and Polysynaptic reflex; Cranial nerves

Autonomic nervous system (ANS): Sympathetic, parasympathetic

Unit VIII - Muscular System **(4 Lecture)**

Structure & Functions of skeletal muscle, smooth muscle & Cardiac muscle

Skeletal Muscle: -Action Potential, Excitation contraction coupling, Muscle tone, Neuro- Muscular Junction

Unit IX – Endocrine System **(5 Lecture)**

Hormones: GH, Thyroid Hormones, Parathyroid Hormones, Insulin, Glucocorticoids, Mineralocorticoids, ADH, oxytocin, Testosterone – their source & actions

FUNDAMENTALS OF HUMAN ANATOMY & PHYSIOLOGY (PRACTICAL)
Course Code: ANA/PHY.101P
Credit Hours: 1.5

- Identification and description of all anatomical structures.
- Demonstration through slides, models, charts etc..
- Measurement of pulse, blood pressure
- Identification/counting of blood cells by study of peripheral blood smear
- Determination of blood groups, bleeding/clotting times. Estimation of Hb

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1^{st} ,2^{nd} Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

CONCEPTUAL MICROBIOLOGY & PATHOLOGY (THEORY)
Course Code: MIC/PAT.102T
Credit Hours: 3
Semester: I
SECTION I : MICROBIOLOGY

UNIT- I: Origin and Evolution of Microbiology (3 Lectures)

- Introduction, History & scope of Microbiology
- General characteristics of Microorganisms: Bacteria, viruses, fungi.

UNIT - II: Study of Common Lab Instruments (3 Lectures)

- Microscope: Types , principles & uses
- Autoclave, Hot air oven, Incubator, Laminar air flow, Colony counter : Principles & uses

UNIT III: Morphology of Bacteria & Viruses (3 Lectures)

- *Bacterial anatomy:* Cell wall, Cell membrane, Capsule, Flagella, Nucleoid, Bacterial Spore.
- Structure of viruses, Concepts of replication & cultivation
- Study of bacteria: Preparation of Stains, various Staining techniques (Simple staining, Gram staining, Acid-fast staining, Negative staining & Albert staining).

UNIT- IV: **Growth & Nutrition of bacteria: (3 Lectures)**

- Culture media and Culture methods
- *Bacterial Growth:* Growth Curve, Generation Time, Environmental factors affecting growth.
- Bacterial nutrition: Nutritional groups, Common Nutritional requirements

UNIT- V: Control of Microbial Growth (3 Lectures)

- Sterilization and disinfection

UNIT-VI: Immunity & Infection (3 Lectures)

- *Immunity:* Types of immunity, Antigens & Antibodies, Prophylactic Immunization
- *Infection:* Types, Various routes & modes of transmission, Nosocomial Infections

UNIT-VII: Biomedical Waste & Management (2 Lectures)

- Waste categories, Waste treatment & disposal

SECTION II : PATHOLOGY

UNIT-I: Introduction (1 Lectures)

- Definition, important terminology, different branches

UNIT-II: Cell Injury and Cellular Adaptations (4 Lectures)

- *Cell Injury:* types of cell injury, etiology of cell injury, morphology of cell injury, cellular swelling.
- *Cell Death:* types- Autolysis, Necrosis, Apoptosis & Gangrene.
- *Cellular Adaptations*: Atrophy, Hypertrophy, Hyperplasia & Dysplasia.

UNIT-III: Inflammation (3 Lectures)

- Acute inflammation - vascular event, cellular event, inflammatory cells.
- Chronic Inflammation - general features

UNIT-IV: Hemodynamic Disorders (3 Lectures)

- Edema, hyperemia, congestion, hemorrhage, thrombosis, ischemia & infarction.

UNIT-V: Neoplasia (2 Lectures)

- Definition, difference between benign tumor and malignant tumor.

UNIT-VI: Healing (2 Lectures)

- Definition, different phases of healing, factors influencing wound healing.

CONCEPTUAL MICROBIOLOGY & PATHOLOGY (PRACTICAL)
Course Code: MIC/PAT.102P
Credit Hours: 1.5

Microbiology

- Handling and maintenance of instruments required for routine lab work.
- *Various staining Techniques:* Gram stain, Acid-fast stain, Negative stain, Albert Stain.
- Various culture techniques
- Demonstration of Sterilization methods
- Preparation of commonly used culture media: Nutrient agar, Blood/chocolate agar, MacConkey agar, Sabouraud dextrose agar.

Pathology

- Components & setting of the Compound microscope.
- Focusing of object.
- Use of low & high-power objectives of microscope.
- Use of oil immersion lens.
- Care and Maintenance of the microscope.
- Different types microscopy

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1^{st} ,2^{nd} Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

CONCEPTUAL BIOCHEMISTRY (THEORY)
Course Code: BIO.103T
Credit Hours: 2
Semester: I

UNIT -I: Introduction to Biochemistry (2 Lectures)

- Important definitions (Diffusion, Osmosis, Surface Tension, Adsorption , Absorption) & scope of biochemistry

UNIT -II: Carbohydrate (3 Lectures)

- Classification with structures
- Importance of Carbohydrates

UNIT -III: Lipids (3 Lectures)

- Classification
- Importance of Lipids

UNIT -IV: Proteins (4 Lectures)

- Amino Acid: Classification and general Properties
- Importance of Proteins
- Classification of Protein (in brief)

UNIT -V: Nucleotides (4 Lectures)

- Nucleoside & Nucleotide
- General structures of Purine and pyrimidine
- Brief discussion of DNA & RNA
- Structure of DNA

UNIT -VI: Electrolytes (3 Lectures)

- Source, function & deficiency symptoms of Sodium, Potassium, Calcium, phosphorus, Iron, Zinc & Chloride in human body.

UNIT - VII: Analytical Chemistry (5 Lectures)

Concepts of : Percent, Morality, Molality, Normality

- *SI Units:* Deci, Centi, Milli, Micro, Nano, Pico, Kilo, Mega, Giga & Angstrom
- **Normal Values & Interpretations:**
  - *Electrolytes:* Sodium, Potassium, Calcium, Iron, Chloride
  - *Renal Function Test*: Urea, Creatinine, Uric Acid, Glucose
  - *Urine Analysis:* Composition, Colour, Volume, pH, Specific Gravity, Turbidity
  - *Liver Function Test :* SGOT, SGPT, Bilirubin, Albumin, Globulin & Alkaline Phosphatase
  - *Carbohydrates:* Fasting , Random, GTT
  - *Lipid Profile :* Cholesterol, Triglycerides, HDL,LDL, VLDL

UNIT -VIII: Acids & Bases (2 Lectures)

- Definition, Classification of acids and bases.
- Physical and chemical properties with examples.
- Arrhenius concept of acids and bases.
- Classification of acids and bases.
- pH, Buffer Solutions

CONCEPTUAL BIOCHEMISTRY (PRACTICAL)
Course Code: BIO.103P
Credit Hours: 1.5

- Preparation of common lab reagents.
- General description of equipment's used in Biochemistry Lab.
- *Working & Uses of:* Spectrophotometer, Water bath, Centrifuges, Analytical Balances, pH meter, Colorimeter.

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

HUMAN VALUES & PROFESSIONAL ETHICS
Course Code: PMS.104T
Credit Hours: 2
Semester : I

UNIT-I: Need, Basic Guidelines, Content and Process for Value Education (10 Lectures)

- Understanding the need, basic guidelines, content and process for Value Education
- Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT-II: Understanding Harmony in the Human Being - Harmony in Myself! (10 Lectures)

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT-III: Understanding Harmony in the Family and Society (10 Lectures)

- Understanding harmony in the Family- the basic unit of human interaction
- Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

PHYSICS OF RADIOGRAPHIC EQUIPMENTS (THEORY)
Course Code: RAD.105T
Credit Hours: 3
Semester: I

UNIT-I: Main Electric Supply and Distribution /Diagnostic X-ray Circuits & Generators (8 Lectures)

- Filament current and voltage X-Ray circuits (primary circuit, auto transformer), types of exposure switch and timers, principle of automatic exposure control (AEC) and practical operation, filament circuit, high voltage circuits, half wave, full wave rectification, three phase circuits.
- Types of generators, 3 phase, 6 and 12 pulse circuits, falling load generators, capacitors discharge and grid control systems. Advantages of the 3-phase over single phase, Radiographic advantages of 3 phase X-Ray generators over single phase, 12 pulse circuit

UNIT- II: Exposure Timers /AEC (4 Lectures)

- The electronic timer, Automatic exposure control – photo timer, X-Ray tube overload protection circuits, Load, percentage tube overload indication.

UNIT- III: Specialized X-Ray Generators (4 Lectures)

- High Frequency, Shared generators

UNIT- IV: Cassettes, Grid & Filters (8 Lectures)

- Structure and function, Types - single, gridded, film holder, Design features and consideration with loading/unloading, Care and maintenance (cleaning)
  *Grid***:** Purpose and function, effect on radiation exposure, use of grid, structure and materials.
- Types: stationary, parallel, focused, cross-hatch Moving grids. Purpose/advantages/disadvantages.

UNIT- VI: Intensifying Screens (4 Lectures)

- Structure and functions, common phosphors used for determination of relative speeds, types, screen mounting, care and maintenance of film screen contact.

UNIT- VII: Radiographic Film (5 Lectures)

- Structure, properties of different parts, handling, film wrappings. Handling of exposed and unexposed films, Types, applications, advantages/limitations of different types

UNIT- VIII: Diagnostic X-ray tubes (5 Lectures)

- Advances in X-Ray tubes, anode angulation and rotating tubes. Common factors affecting thermionic emission, specialized types (metallic, biangular, fluoro, CT) focal spot size, speed of anode rotation, target angle, inherent filtration, Interlocking and X-Ray tube overload protection. Heat dissipation methods, tube rating, heat units, operating conditions, maintenance

UNIT- IX: Control of Scattered Radiation and Grids/Bucky (5 Lectures)

- Methods of minimizing formation of scatter radiation, effectiveness of grids [types (moving grids), composition and grid ratio) in preventing scattered radiation, use of cones, diaphragm light beam devices and effectiveness of collimation in reducing effects of scatter.

UNIT- X: Radiation Units Dosimetry and Detection of Ionizing Radiation (5 Lectures)

- Units of radiation, ICRU definition of absorbed dose, Quality factor, dose equivalent. Basic principles of ionization chambers, proportional counters, G.M counters and scintillation detectors, thermoluminescent dosimeters, film batches.

UNIT- XI: Equipment for Mobile Radiography (4 Lectures)

- Portable X-Ray unit, Capacitor discharge unit, Cordless mobiles, Mobile image intensifier, imitations.

UNIT - XII: Equipment for MMR (Mass Miniature Radiography) (3 Lectures)

- Design and construction and function, Film loading, care.

UNIT - XIII: Equipment for Dental Radiography (5 Lectures)

Intra oral radiography unit, the orthopantomograph unit (OPG), the cephalostat.

PHYSICS OF RADIOGRAPHIC EQUIPMENTS (PRACTICAL)
Course Code: RAD.105P
Credit Hours: 1.5

- Demonstration of equipments & their working

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

ENGLISH FOR PROFESSIONALS
Course Code: PMS.106T
Credit Hours: 2
Semester: I

UNIT-I: Grammar (10 Lectures)

- Narration.
- Voice change (Use of passive voice particularly in scientific and official writing).
- Use of articles and preposition.
- The language of Doctor and Patient.
- General description and Medical description.
- Medical terminology – roots.
- Prefixes and suffixes.
- Medical abbreviations.
- Punctuation
- Common errors in English.

UNIT-II: Writing Skills (10 Lectures)

- Precis writing.
- Report writing (with special stress on scientific/technical reports, preparing field/observation report).
- Letter writing/application writing (Social, business letter, applying for a job, for higher studies, Preparing curriculum vitae, subscribing to a journal, letters to the Editor).
- Essay writing

UNIT-III: Spoken English (10 Lectures)

- Advertisements/Posters
- Telegrams & short post cards
- Note & notice
- Front Desk management, Fixing appointments, getting information – Managing medical representatives, able to answer FAQs, lab reports writing, telephoning in a hospital: the object is to practice influent conversation.

SCHEME OF EXAMINATION

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (Each Question)	Subtotal
SEC -A (Grammar)	25	20	1	20
SEC -B (Essay writing)	3	1	10	10
SEC-C(Precis writing)	1	1	5	10
SEC-D(Letter writing)	2	1	5	10
			TOTAL MARKS	**50**

COMMUNICATION AND SOFT SKILLS
Course Code: PMS.107T
Credit Hours: 2
Semester: I

UNIT-I: Introduction to Communication **(5 Lectures)**

- Purpose of Communication
- Process of Communication
- Importance of Communication in Business
- Barriers to Communication
- Measures to Overcome the Barriers to Communication.

UNIT-II: Types of Communication **(5 Lectures)**

- Verbal Communication: Importance of verbal communication and Advantages of verbal communication
- Non Verbal Communication: Importance of written communication and Significance of Non-verbal Communication

UNIT-III: Communication Network **(5 Lectures)**

- Scope and Types of Communication Network
- Formal and Informal Communication Network
- Upward Communication
- Downward Communication
- Horizontal Communication
- Diagonal Communication.

UNIT-IV: Letter and Resume Writing **(5 Lectures)**

- Types of Letter – Formal/Informal
- Importance and function of Letter Writing
- Business Letters / Elements of Structure
- Resume and Covering Letter
- Guidelines for making a Result – Oriented Resume/ Helpful Hints

UNIT-IV: Interview preparation **(5 Lectures)**

- Types of Interview
- Preparing for an Interview
- Attending an Interview
- Employers Expectation
- General Etiquette

UNIT-IV: Group Discussion and Presentation **(5 Lectures)**

- Process of Group Discussion
- Guidelines
- Helpful Expressions
- Evaluation

UNIT-VI: Presentation Skills **(5 Lectures)**

- Importance of Presentation skills
- Organizing Contents/ Structural Elements of a Presentation Concerning Data
- Visual Aids and Voice & Picture Integration
- Guidelines to make Presentation Interesting
- Body Language

(Note: Every student shall be given 15 minutes of presentation time)

SCHEME OF EXAMINATION

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (Each Question)	Subtotal
SEC -A (Fill ups)	10	10	1	10
SEC -B (Short Essay)	6	5	4	20
SEC-C (Long Essay)	3	2	5	10
SEC-D (Letter writing)	2	1	10	10
			TOTAL MARKS	**50**

ENVIRONMENTAL STUDIES
Course Code: PMS.108T
Credit Hours: 2
Semester: II

UNIT-I : Natural Resources (10 Lectures)

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

UNIT-II : Ecosystems (4 Lectures)

- Concept of ecosystems, Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- *Introduction, types, characteristic features, structure and function of the following ecosystem:* Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-III: Biodiversity and its Conservation (3 Lectures)

- Introduction – Definition: genetic, species and ecosystem diversity.
- *Threats to biodiversity:* habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- *Conservation of biodiversity:* In-situ and Ex-situ conservation of biodiversity.

UNIT-IV: Environmental Pollution (7 Lectures)

- *Definition, Cause, effects and control measures of :* Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution
- Role of an individual in prevention of pollution.
- *Disaster management:* floods, earthquake, cyclone and landslides.

UNIT-V : Social Issues and the Environment (4 Lectures)

- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust
- *ACTS:* Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act

UNIT-VI : Human Population and the Environment **(2 Lectures)**

- Population explosion – Family Welfare Programme.
- Human Rights & Value Education.
- Women and Child Welfare.

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

INTRODUCTION TO RADIOLOGY & DARK ROOM TECHNOLOGY (THEORY)
Course Code: RAD.109T
Credit Hours: 3
Semester: II

UNIT- I : Dark Room: The processing area (7 Lectures)

- Dark room design: construction & illumination
- Entrance safe lighting: types. Storage, Shelving of films, Cleaning and maintenance

UNIT- II : **X-Ray film (8 Lectures)**

- Composition of single and double coated radiographic films
- Structure of emulsion, film characteristics (speed, base + fog, gamma, latitude)
- Latent image formation
  - Image intensifiers and cassettes (structure and function)
  - types of image intensifiers and relative advantage
  - loading and unloading of cassettes and their care/maintenance
- Effects of kV and mA on variation of emitted radiation intensity
- Determination of relative speeds
- Film contrast
- Film screen contact.
- Film storage, handling.

UNIT- III : Film Processing (8 Lectures)

- Principles: Acidity, Alkalinity, pH, The processing cycle, development, developer solution, Fixing, fixer solution, washing, drying replenishment, checking and adjusting
- Replenishment rates, manual and automatic processing
- Silver recovery
- Auto and manual chemicals

UNIT- IV : Equipment for Film Processing (8 Lectures)

- 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- V: **Factors affecting Image Quality (7 Lectures)**

- Meaning of radiographic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur.
- Radiographic illuminators and viewing conditions, visual acuity and resolution.
- Quality assurance of the related equipment and its benefits w.r.t visual assessment.

UNIT- VI : Portables and Mobiles (7 Lectures)

- Types of mobile units
- mobile image intensifiers
- advantages and limitations
- radiation protection.

INTRODUCTION TO RADIOLOGY & DARK ROOM TECHNOLOGY (PRACTICAL)
Course Code: RAD.109P
Credit Hours: 1.5

-Demonstration of various techniques as per theory syllabus

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1^{st} ,2^{nd} Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

FUNDAMENTALS OF RADIO IMAGING & TECHNOLOGY (THEORY)
Course Code: RAD.110T
Credit Hours: 4
Semester: II

UNIT - I **(10 Lectures)**

- Properties of Light,
- Uses of Light in Medicine, Lasers and Holography,
- Doppler's effect, Use of principle of Doppler's effect in Diagnostic radiology (e.g. Echo, blood flow measurement).
- Ultrasonic wave, production of ultrasonic wave (piezo-electric effect) in ultrasonography.

UNIT - II : Diagnostic X-ray tubes **(25 Lectures)**

- Introduction to X-Rays
- Properties of X- Rays
- X-Ray production
- Bremstrauhlung phenomenon
- factors affecting X-Ray emission spectra
- X-Ray quality and quantity
- HVL measurements, filtration, reflection and transmission targets
- 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,

- **Interaction with matter** grids & bucky tables etc (except biological interactions)
- **X-Ray Tubes**- Historical aspects ,Construction of various types of X-Ray Tubes & their functioning (The stationary anode X-Ray tube, rotating anode X-Ray tube , Heavy duty X-Ray tube, The grid controlled X-Ray tube, Mammography X-Ray tube, Micro focus X-Ray tube, Super rotalix ceramic X-Ray tube etc) The insert/filament/anode rotation/anode/anode speed, X-Ray tube inherent and added filtration

UNIT- III **(10 Lectures)**

- Physical quantity, its unit and measurement- Fundamental and derived quantity,
- SI unit,
- various physical/radiation quantity used in diagnostic radiology and its unit (for example, KvP, mA, mAS, Heat unit (HU), Radiation exposure, Absorbed dose, Equivalent dose, etc.).

UNIT- IV **(15 Lectures)**

- *Radioactivity :* Structure and property of nucleus
- Nuclear forces
- Binding energy
- Radioactive decay,
- law of radioactive decay (decay equation, half-life, mean life)
- excitation & ionization
- characteristic X-Ray

- charts of radionuclides: alpha, beta, positron, gamma emissions, Modes of decay, isomeric transitions, internal conversion
- Naturally occurring radio-nuclides

FUNDAMENTALS OF RADIO IMAGING & TECHNOLOGY (PRACTICAL)
Course Code: RAD.110P
Credit Hours: 2

-Demonstration of various techniques as per theory syllabus

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

GENERAL RADIOLOGY – POSITIONING (THEORY)
Course Code: RAD.111T
Credit Hours: 3
Semester: II

POSITIONING- (BASIC VIEWS)

UNIT- I **(3 Lectures)**
Upper extremity - basic views
UNIT- II **(3 Lectures)**
Lower extremity (including pelvis) - basic views
UNIT– III **(3 Lectures)**
Chest including thoracic age and sternum
UNIT– IV **(3 Lectures)**
Spine - Cervical, dorsal, lumbar, lumbo-sacral (including functional views).
UNIT– V **(4 Lectures)**
Skull – including trauma cases
UNIT– VI **(4 Lectures)**
Facial bones (nasal bones, zygomatic, orbits, maxilla)
UNIT– VII **(4 Lectures)**
Mandible, Temporo-Mandibular Joints, Mastoids, petrous temporal bones
UNIT – VIII **(4 Lectures)**
Abdomen - erect, supine, lateral decubitus
UNIT – IX **(4 Lectures)**
Soft tissue radiography : Larynx, pharynx, nasopharynx, thoracic inlet
UNIT– X **(3 Lectures)**
Dental radiography
UNIT – XI **(4 Lectures)**
General Pediatric Radiography
UNIT– XII **(3 Lectures)**
High kV technique
UNIT– XIII **(3 Lectures)**
Macro radiography

GENERAL RADIOLOGY – POSITIONING (PRACTICAL)
Course Code: RAD.111P
Credit Hours: 1.5

-Demonstration of various techniques as per theory syllabus

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

RADIOGRAPHIC ANATOMY (MUSCULO-SKELETAL SYSTEM) - THEORY
Course Code: RAD.112T
Credit Hours: 4
Semester: II

UNIT - I **(10 Lectures)**
Introduction to Anatomy: Structure cell and elementary tissues of body
UNIT - II **(10 Lectures)**
Tissues: Macroscopic and microscopic studies of cartilaginous tissue, bone tissue, muscle tissue.
UNIT- III **(10 Lectures)**
Muscular System: Skeletal Muscles: Major skeletal muscles of the head, neck, thorax, abdomen and upper and lower limbs, Structure &Types of muscle in human body
UNIT- IV **(20 Lectures)**
General Osteology: General morphology of bones; structural classification of bones; identification and naming of individual bones of the skeleton; development and growth of skeletal tissue and bones, Types of bones, Major Important Bones , bones of lower and upper extremities, Pelvic girdle, Thoracic cage
UNIT- V **(10 Lectures)**
General Arthrology: Structural and functional classification of joints; general morphology of a synovial joint and associated structures; movements made available by synovial joints.

RADIOGRAPHIC ANATOMY (MUSCULO-SKELETAL SYSTEM)-PRACTICAL
Course Code: RAD.112P
Credit Hours: 2

- Identification of Bones of Cranium and face
- Identification of bones of Upper and Lower limb
- Identification of Bones of thorax and vertebrae

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

BIOSTATISTICS & COMPUTER APPLICATIONS
Course Code: PMS.201T
Credit Hours: 2
Semester: III

SECTION-I: BIOSTATISTICS (15 Lectures)

- Introduction to data and statistics
- Presentation of data:
  - Bar diagram
  - Histogram
  - Frequency polygon
  - Frequency curve, Cumulative frequency curve.
- Measure of central tendency:
  - Mean
  - Median
  - mode (individual, discrete and continuous data).
- Measure of variability:
  - Range
  - Standard deviation
  - Variance and coefficient of variation

SECTION-II: COMPUTER APPLICATIONS (15 Lectures)

- Computer: General Introduction, History of computer development and respective generation: Need to use computers, Applications in Laboratory and in general.
- Input and Output Device
- Memory
- Personal Computer
- Data Representation and Number System
- Software
- Data Communication
- Internet, Cyber etiquette
- Microsoft Office: PowerPoint Presentations, Microsoft word, excel sheet

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

EQUIPMENTS OF MODERN IMAGING TECHNOLOGY (THEORY)
Course Code: RAD.202T
Credit Hours: 3
Semester: III

UNIT- I **(7 Lectures)**
C.R : Principle, Equipment & Imaging
UNIT- II **(7 Lectures)**
Digital Radiography: Principle, Equipment & Imaging
UNIT- III **(7 Lectures)**
Mammography: Basic principle, Equipment & Image acquisition
UNIT- IV **(9 Lectures)**
CT - Basic physics – Tomography principle - basics of plain studies, contrast studies, Special Procedures.
UNIT- V **(5 Lectures)**
MRI -basic principle – imaging methods - slice section plain & contrast studies –coils in use – image contrast - Factors affecting image quality
- HELIUM / SUPERCONDUCTION & 1.5 TESLA,3 TESLA 8 TESLA MRI
UNIT- VI **(5 Lectures)**
USG -Basic acoustics - ultrasound terminologies – Interaction of US with matter –Ultrasound display modes
UNIT-VII: Positron Emission Tomography: **(5 Lectures)**
Methodology of positron emission tomography and fusion technology.

- PET, PET/CT, and/or SPECT/CT scan for oncology, cardiac and/or brain imaging .

EQUIPMENTS OF MODERN IMAGING TECHNOLOGY (PRACTICAL)
Course Code: RAD.202P
Credit Hours: 1.5

-Demonstration of various techniques as per theory syllabus

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

RADIATION PHYSICS (THEORY)
Course Code: RAD.203T
Semester: III
Credit Hours: 4

- Radiation **(40 Lecture)**
- Types of radiation
- X-Ray Generators
- Production of x-ray
- Heel effect
- Line focus principle
- Crookes tube
- Coolidge tube
- Stationary tube
- Rotating anode tube
- Interaction of x-ray with matter
- Attenuation
- Filters
- Photographic characteristic of x-ray
- Image quality
- Linear energy transfer
- Relative biological effectiveness
- X-Ray Beam Restrictors
- Luminescent Screens

Quality Assurances **(20 Lectures)**

- Sensitometer
- Densitometer
- Radiation survey meter
- Beam alignment test tool
- Grid alignment test tool
- Focal spot test tool
- Collimator test tool

RADIATION PHYSICS (PRACTICAL)
Course Code: RAD.203P
Credit Hours: 2

-Demonstration of various techniques as per theory syllabus

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1^{st} ,2^{nd} Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

PATIENT CARE & MANAGEMENT IN DIAGNOSTIC RADIOLOGY (THEORY)
Course Code: RAD.204T
Credit Hours: 3
Semester: III

Unit I **(10 Lectures)**

- Introduction to patient care
- Responsibilities of healthcare facility
- Responsibilities of the imaging technologist

Unit II **(10 Lectures)**

- General patient care
- Patient transfer technique
- Restraint techniques
- Aspects of patient comport
- Security of patient's property
- Obtaining vital signs
- Laying up a sterile trolley

Unit III **(10 Lectures)**

- Infection control
- Isolation technique
- Infection sources
- Psychological consideration
- Sterilization and sterile techniques

Unit IV **(10 Lectures)**

- Patient education
- Communication
- Explanation of examination
- Radiation safety /protection
- Informed consent

Unit V **(20 Lectures)**

- Hospital structure and organization
- Radiography as a profession- professionalism, projecting professional image, professional and personal qualities of radiographer.
- Communication and relation skills- development of appropriate communication skills with patient, verbal and non-verbal communication, appearances and behaviour of radiographer.
- Moving and lifting patient- rules of correct lifting, transfer from chair or trolley to couch and vice-versa, safety of both lifter and lifted must be emphasized. Highlight of handling geriatric, paediatric and trauma patients.
- Patient vital signs – temperature, pulse, respiration and blood pressure, normal values and methods of taking and recording them.
- Communicable diseases- cross infection and prevention, patient hygiene, personal hygiene, handling of infectious patients in department, applications of asepsis, inflammation and infection process.

- Medico-legal consideration (MLC)- technologists ethical, legal and clinical responsibilities, misconduct and malpractice, handling pregnant patient.

PATIENT CARE & MANAGEMENT IN DIAGNOSTIC RADIOLOGY (PRACTICAL)
Course Code: RAD.204P
Credit Hours: 1.5

-Demonstration of various techniques as per theory syllabus.

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1^{st} ,2^{nd} Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

RADIATION SAFETY & HAZARDS (THEORY)
Course Code: RAD.205T
Credit Hours: 4
Semester: III

UNIT – I : Radiation protection (22 Lectures)

- Natural and background radiation (cosmic, terrestrial).
- Principles of radiation protection
- Time - distance and shielding, shielding calculation and radiation survey, Personnel dosimeters (TLD and film batches), occupational exposure, radiation protection of self and patient,
- ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection.
- Revision of Somatic & Genetic Radiation effects, Units Detection & measurements Radiation protection Standards, radiation surveys & regulations. Patient Protection

UNIT –II : Biological effects of Ionizing Radiation (23 Lectures)

- Ionization, excitation and free radical formation, hydrolysis of water,
- Action of radiation on cell, DNA, RNA, chromosome, tissue and organ, cytoplasm, cellular membranes, effects of whole body and acute irradiation.
- Dose fractionation. Effects of ionizing radiation on each of major organ system including fetus stochastic and non-stochastic effects. Mean and lethal dose, direct and indirect effects, multi target and multi hit theory,
- Radio sensitivity factors affecting radio sensitivity, RBE, Survival curves

UNIT- III : Biological effects of non-ionizing radiation (5 Lectures)

- Ultrasound, Sound lasers, IR, UV , Magnetic fields

RADIATION SAFETY & HAZARDS (PRACTICAL)
Course Code: RAD.205P
Credit Hours: 2

-Demonstration of various techniques as per theory syllabus

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

PATIENT PREPARATION AND POSITIONING- I (THEORY)
Course Code: MRI.206T
Credit Hours: 4
Semester: IV

Patient Preparation Protocol, Positioning, Risks and Benefits

UNIT- I **(5 Lectures)**
C.T Brain
UNIT- II **(5 Lectures)**
C.T. Neck
UNIT- III **(5 Lectures)**
C.T. P.N.S
UNIT- IV **(5 Lectures)**
C.T. Thorax
UNIT- V **(5 Lectures)**
C.T. Abdomen
UNIT- VI **(5 Lectures)**
C.T. Scan of Spine
UNIT- VII **(5 Lectures)**
C.T. limbs
UNIT- VIII **(5 Lectures)**
C.T. Orbit
UNIT- IX **(5 Lectures)**
HRCT-Temporal bone/ lungs
UNIT- X **(5 Lectures)**
3D RECON WITH MPR
UNIT- XI **(5 Lectures)**
ANGIOGRAPHY
UNIT- XII **(5 Lectures)**
CARDIAC& MULTISLICE CT

PATIENT PREPARATION AND POSITIONING- I (PRACTICAL)
Course Code: MRI.206P
Credit Hours: 2

- Observation & Demonstration of Patient Preparation & Techniques of CT

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

PATIENT PREPARATION AND POSITIONING- II (THEORY)
Course Code: MRI.207T
Credit Hours: 3
Semester: IV

Patient preparation, positioning, procedure and protocols:

UNIT- I **(5 Lectures)**
MRI Brain
UNIT- II **(5 Lectures)**
MRI Neck
UNIT- III **(5 Lectures)**
MRI P.N.S
UNIT- IV **(5 Lectures)**
MRI Thorax
UNIT- V **(5 Lectures)**
MRI Abdomen & MRCP
UNIT- VI **(5 Lectures)**
MRI Spine.
UNIT- VII **(5 Lectures)**
MRI limbs
UNIT- VIII **(5 Lectures)**
MRI Orbit
UNIT - IX **(5 Lectures)**
MRI joints & Musculoskeletal

PATIENT PREPARATION AND POSITIONING- II (PRACTICAL)
Course Code: MRI.207P
Credit Hours: 1.5

Observation & Demonstration of Patient Preparation & Techniques in MRI:

- Paediatric MRI
- Performing Contrast HEAD MRI
- Performing Contrast SPINE MRI
- MRCP
- MR angiography
- Performing contrast body MRI
- Performing musculoskeletal MRI
- Assisting MR spectroscopy

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	**Marks**
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1^{st} ,2^{nd} Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

NUCLEAR MEDICINE IMAGING (THEORY)
Course Code: RAD.208T
Credit Hours: 4
Semester: IV

UNIT I: NUCLEAR MEDICINE IMAGING **(40 Lectures)**

- History
- Isotopes And Radionuclides
- Production Of Radionuclides
- Radio Activity
- Radio Active Transformations
- Specific Activity
- Radiopharmaceuticals And Their Preparation
- Precautions While Handling Radiopharmaceuticals
- Principles Of Tracer Techniques
- Instrumentation- Multihole Collimator,Crystal, Photomultipiier, Computer, Moitor.
- Scanning Technique
- Resolution- Spatial Temporal
- Gamma Camera
- Rectilinear Scanner.

UNIT II: POSITION EMISSION TOMOGRAPHY(PET) **(20 Lectures)**

- Single Photon Emission Computed Tomography(Spect)
- Radio Immuno Assay (RIA)
- Documentation
- Safety Considerations- Radiation Dose
- Quality Assurance.

NUCLEAR MEDICINE IMAGING (PRACTICAL)
Course Code: RAD.208P
Credit Hours: 2

-Demonstration of various techniques as per theory syllabus

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

COMPUTED TOMOGRAPHY (CT) PROCEDURES (THEORY)
Course Code: MRI.209T
Credit Hours: 3
Semester: IV

UNIT- I **(5 Lectures)**
C.T.Myelogram /Cisternogram
UNIT- II **(5 Lectures)**
CT Guided FNAC / biopsy
UNIT- III **(5 Lectures)**
Other Special CT Procedures & common interventions
UNIT- IV **(5 Lectures)**
C.T Enteroclysis/ CT IVP/ dual phase CT
UNIT- V **(5 Lectures)**
CT angiography----mainly brain
UNIT- VI **(5 Lectures)**
CT Clonogrphy
UNIT- VII **(5 Lectures)**
CT Discography
UNIT- VIII **(5 Lectures)**
Dental cone beam CT
UNIT- IX **(5 Lectures)**
Parathyroid 4D CT scan

COMPUTED TOMOGRAPHY (CT) PROCEDURES (PRACTICAL)
Course Code: MRI.209P
Credit Hours: 1.5

Observation & Demonstration of CT Procedures:

- Performing head CT scan
- Performing Paediatric CT scan
- Managing a Case of trauma
- Performing contrast body CT scan
- Performing 3D reconstruction/MPR
- Performing head CT angiography scan
- Contrast reaction management with IV fluid, 02, steroids etc
- HRCT doing with proper algorithm

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	**Marks**
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

COMMUNITY HEALTH
Course Code: PMS.210T
Credit Hours: 2
Semester: IV

- General concepts of health and diseases with reference to natural history of disease with pre-pathogenic and pathogenic phase. The role of socio-economic and cultural environment in health and diseases-Epidemiology and scope. **(3 Lectures)**
- Public health administration-An overall view of the health Administration set up at centre and state level. **(3 Lectures)**
- The National Health Programmes- National Health programmes including tuberculosis, malaria, MCH and HIV/AIDS. **(3 Lectures)**
- Health problems in vulnerable groups-Pregnant and lactating women and infants and school going children-occupational groups, geriatrics. **(3 Lectures)**
- Occupational Health- Definition, scope-Occupational diseases, prevention of occupational diseases and hazards. **(3 Lectures)**
- Social security and other measures for the protection of occupational hazards, accidents and disease. Details of compensation acts. **(3 Lectures)**
- Family planning objectives of National family planning methods. A general idea of advantages and disadvantages of the method. **(3 Lectures)**
- Mental Health- community aspects of mental health; role of physiotherapists, therapists in mental health problems such as mental retardation etc. **(3 Lectures)**
- Communicable disease-An overall view of the communicable disease. Classification according to the principal mode of transmission. Role of insects and their vectors. **(3 Lectures)**
- International health agencies. **(3 Lectures)**

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

NUTRITION
Course Code: PMS.211T
Credit Hours: 2
Semester: IV

- Introduction to science of nutrition
- Food pattern and its relation to health **(2 Lectures)**
- Factors influencing food habits, selection and food stuffs **(3 Lectures)**
- Food selection, storage & preservation **(3 Lectures)**
- Classification of nutrients – macronutrients and micronutrients **(3 Lectures)**
- Proteins – types, sources requirements and deficiencies of proteins **(3 Lectures)**
- Carbohydrates sources, requirements & efficiency **(3 Lectures)**
- Fats – types, sources, requirements, deficiency and excess of fats **(3 Lectures)**
- Water – sources of drinking water, requirements, preservation of water **(2 Lectures)**
- Minerals – types, sources, requirements deficiencies of minerals **(3 Lectures)**
- Vitamins – types, sources, requirements deficiencies of vitamins **(3 Lectures)**
- Planning diets including renal diets **(2 Lectures)**

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

OCCUPATIONAL SAFETY & HEALTH
Course Code: PMS.212T
Credit Hours: 2
Semester: IV

UNIT - I : Safety and Health Management (4 Lectures)

i. Occupational Health Hazards, Promoting Safety, Safety and Health training, Stress and Safety.

ii. Ergonomics - Introduction, Definition, Objectives, Advantages.

Ergonomics Hazards - Musculoskeletal Disorders and Cumulative Trauma Disorders.

- Organizing for safety, Health and Environment.
- Organization: Structure, Function and responsibilities
- Safety Committee: Structure and function

UNIT - II : Radiation and Industrial Hazards (5 Lectures)

i. Types and effects of radiation on human body, Measurement and detection of radiation intensity. Effects of radiation on human body, Measurement – disposal of radioactive waste, Control of radiation

ii. Industrial noise -Sources, and its control, Effects of noise on the auditory system and health, Measurement of noise ,

iii. Different air pollutants in industries, Effect of different gases and particulate matter ,acid fumes , smoke, fog on human health

iv. Vibration - effects, measurement and control measures

v. Industrial Hygiene.

UNIT –III: Electrical Hazards (5 Lectures)

Safe limits of amperages, voltages, distance from lines, etc., Joints and connections, Overload and Short circuit protection, Earthing standards and earth fault protection , Protection against voltage fluctuations, Effects of shock on human body Hazards from Borrowed nutrals, Electrical equipment in hazardous atmosphere, Criteria in their selection, installation, maintenance and use, Control of hazards due to static electricity,

UNIT – IV : Fire and Other Hazards (3 Lectures)

i. General causes and classification of fire, Detection of fire, extinguishing methods, fire fighting installations with and without water.

ii. Machine guards and its types, automation. High pressure hazards, safety, emptying, inspecting, repairing, hydraulic and nondestructive testing, hazards and control in mines.

UNIT –V: Vibration and Noise (3 Lectures)

Activities related to vibrations, its impact on human health, abatement Sources, effects of noise on man, Measurement and evaluation of noise, Silencers, Practical aspects of control of noise

UNIT-VI: Theories & Principles of Accident Causation & Prevention (5 Lectures)

i. The effect of accident, unsafe act, unsafe condition, unpredictable performance, Human factors contributing to accidents - causes for unsafe acts,

ii. Safety and psychology -Theories of motivation and their application to safety. Consequences of accident, accident prevention programmers, Role of safety

Incident, accident, injury, dangerous occurrences, unsafe acts, unsafe conditions, hazards, error, oversight, mistakes, etc.

Accident Prevention : Theories / Models of accident occurrences, Principles of accident prevention, Accident and Financial implications.

UNIT-VII: First Aid (5 Lectures)

i. Body structure and Functions, Position of causality, the unconscious casualty, fracture and dislocation, Injuries in muscles and joints, Bleeding, Burns, Scalds and accidents caused by electricity, Respiratory problems, Rescue and Transport of Casualty. Cardiac massage, poisoning, wounds.

ii. Personal Protective Equipments: Need, selection, supply, use, care and maintenance, Personal protective devices for head, ear, face, eye, foot, knee and body protection, Respiratory personal protective devices.

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

RECENT ADVANCES IN MRI (THEORY)
Course Code: MRI.301T
Credit Hours: 4
Semester: V

UNIT- I **(5 Lectures)**
1.5 TESLA/ 3TESLA / 8 TESLA MRI
UNIT- II **(5 Lectures)**
MR ANGIO / M R C P /DIFFUSION/PERFUSION
UNIT- III **(5 Lectures)**
MR SPECTROSCOPY
UNIT- IV **(5 Lectures)**
MR TRACTOGRAPHY
UNIT- V **(5 Lectures)**
MRI PULSE SEQUENCES
UNIT-VI **(5 Lectures)**
CARDIOVASCULAR IMAGING
UNIT- VII **(10 Lectures)**
FUNDAMENTALS OF MRI
UNIT- VIII **(10 Lectures)**
MRI ARTIFACTS
UNIT- IX **(10 Lectures)**
MRI INSTRUMENTATION

RECENT ADVANCES IN MRI (PRACTICAL)
Course Code: MRI.301P
Credit Hours: 2

- Paediatric MRI
- Performing Contrast HEAD MRI
- Performing Contrast SPINE MRI
- MRCP
- MR angiography
- Performing contrast body MRI
- Performing musculoskeletal MRI
- Assisting MR spectroscopy

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	**Marks**
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

RECENT ADVANCES IN CT (THEORY)
Course Code: MRI.302T
Credit Hours: 4
Semester: V

UNIT- I **(5 Lectures)**
PET CT
UNIT- II **(5 Lectures)**
PERFUSION CT
UNIT- III **(5 Lectures)**
MULTISLICE CT/ MDCT
UNIT- IV **(5 Lectures)**
CARDIAC CT
UNIT- V **(5 Lectures)**
DUAL SOURCE CT
UNIT- VI **(5 Lectures)**
PORTABLE CT
UNIT- VII **(10 Lectures)**
ARTIFICIAL INTELLIGENCE IN CT
UNIT- VIII **(10 Lectures)**
SPECTRAL CT IMAGING
UNIT- IX **(10 Lectures)**
CT RECONSTRUCTION TECHNIQUES

RECENT ADVANCES IN CT (PRACTICAL)
Course Code: MRI.302P
Credit Hours: 2

- Performing head CT scan
- Performing Paediatric CT scan
- MANAGING A Case of trauma
- Performing contrast body CT scan
- Performing 3D reconstruction/MPR
- Performing head CT angiography scan
- Contrast reaction management with IV fluid, 02, steroids etc
- HRCT doing with proper algorithm

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

MAGNETIC RESONANCE IMAGING (MRI) SAFETY (THEORY)
Course Code: MRI.303T
Credit Hours: 4
Semester: V

UNIT- I **(10 Lectures)**
Do's & Don't of MRI
UNIT- II **(10 Lectures)**
Indications and Contraindication of MRI
UNIT- III **(10 Lectures)**
MRI SAFETY
UNIT- IV **(10 Lectures)**
MRI CONTRAST MEDIA
UNIT- V **(5 Lectures)**
MRI SHIELDING
UNIT- VI **(5 Lectures)**
MRI BIOEFFECTS
UNIT- VII **(5 Lectures)**
PATIENT CARE AND SAFETY
UNIT- VIII **(5 Lectures)**
GATING AND RESPIRATORY COMPNSATION TECHNIQUES

MAGNETIC RESONANCE IMAGING (MRI) SAFETY (PRACTICAL)
Course Code: MRI.303P
Credit Hours: 2

- Demonstration of Safety measures of MRI
- Management of contrast reactions

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

SCHEME OF EXAMINATION - PRACTICALS

	Particulars	Marks
INTERNAL	Log Book	10
	Clinical Posting(attendance)	20
	Internal (1st ,2nd Hourly & mid-term)	20
EXTERNAL	Viva-voce	50
	TOTAL MARKS	**100**

HEALTHCARE
Course Code: PMS.305T
Credit Hours: 2
Semester: V

UNIT-I: Introduction to Health (5 Lectures)

- Definition of health, determinants of health, health indicators of India, health team concept.
- National health policy
- National health programmes (Briefly objectives and scope)
- Population of India and family welfare programme in India

UNIT-II: Introduction to Nursing (13 Lectures)

- What is nursing? Nursing principles, inter-personnel relationships.
- *Bandaging:* basic turns, bandaging extremities, triangular bandages and their application.
- Nursing position, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, bed making, rest and sleep.
- *Lifting and transporting patients:* lifting patients up in the bed, transferring from bed to wheel chair, transferring from bed to stretcher.
- Bed side management: giving and taking bed pan, urinal.
- Observation of stools, urine, sputum
- Use and care of catheters, enema giving.
- *Methods of giving nourishment:* feeding, tube feeding, drips, transfusion.
- Recording of body temperature, respiration and pulse.
- Simple aseptic techniques, sterilization and disinfection.
- *Surgical dressing:* observation of dressing procedures.

UNIT-III: First Aid (12 Lectures)

- Physical Exam and SAMPLE History
- Documentation and Legal Considerations
- Sudden Illness, Bleeding
- Caring for Shock, Burns, Injuries to muscles, bones, and joints, Splints, Bites and Stings
- Administering Epinephrine
- Assisting with bronchodilators (inhalers)
- Heat/Cold Related Emergencies
- In-line stabilization for head, neck and back injuries
- First Aid Kits, Fire & safety

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**

DIETARY MANAGEMENT OF COMMON DISEASES
Course Code: PMS.306T
Credit Hours: 2
Semester: V

UNIT – I **(10 Lectures)**

- Diet Therapy: Routine hospital diet, Regular diet, Light diet, Soft Diet, Full liquid diet.
- Diet in fevers and infections – Typhoid, Malaria and Tuberculosis.
- Diet in gastro intestinal disorders: Diarrhoea, Constipation, Peptic ulcer

UNIT – II **(20 Lectures)**

- Diet in Diabetes mellitus – Classification, predisposing factors, Diagnosis, Dietary management.
- Diet in Cardiovascular diseases – Dietary management in atherosclerosis and hypertension.
- Diet in diseases of liver and gall bladder.
- Diet in Renal diseases
- Dietary Management in glomerulonephritis
- Dietary Management in Acute and chronic renal failure.

SCHEME OF EXAMINATION - THEORY

Types of Questions	Total No. of Questions	No. of Questions to be attempted	Marks Assigned	Subtotal
SEC -A: MCQ'S	10	10	1	10
SEC -B: Very Short Answer Questions	7	5	2	10
SEC -C: Short Answer Questions	6	4	5	20
SEC -D: Long Answer Questions	2	1	10	10
			TOTAL MARKS	**50**