B. Voc. (Medical Imaging Technology)
SEMESTER- I

S. No.	Component	Title of The Paper	Paper Code	Credits	Marks (Theory)		Marks (Practical)		Total
					External Assessment	Internal Assessment	External Assessment	Internal Assessment	
1.	Skill Paper - 1	Human Anatomy & Physiology Part-I (Theory)	BVMI111SET	04	70	30	---	---	100
		Human Anatomy & Physiology Part-I (Lab)	BVMI111CCP	02	---	---	35	15	50
2.	Skill Paper - 2	Introduction to Radiation & Imaging Techniques (Theory)	BVMI112CCT	04	70	30	---	---	100
		Introduction to Radiation & Imaging Techniques(Lab)	BVMI112CCP	02	---	---	35	15	50
3.	Skill Paper - 3	Conventional Radiography & Equipment (Theory)	BVMI113CCT	04	70	30	---	---	100
		Conventional Radiography & Equipment (Lab)	BVMI113CCP	02	---	---	35	15	50
4.	Non-Skill Paper - 4	English Communication Skills (Theory)	BVEN111SET	04	70	30	---	---	100
5.	Non-Skill Paper - 5	Basic Physics & Radiology (Theory)	BVMI114PET	03	35	15	---	---	50
		Basic Physics & Radiology (Lab)	BVMI114PEP	01	---	---	35	15	50
6.	Non-Skill Paper - 6	Basic Computers and Information Science (Theory)	BVCS111SET	03	35	15	---	---	50
		Basic Computers and Information Science (Lab)	BVCS111SEP	01	---	---	35	15	50
		Total		**30**					**750**
Mandatory Non CGPA Courses									
7.	Non-Skill Paper - 7	Islamiat (Theory)	UGIS101NCT	02	35	15	---	---	50
		Total		**02**					**50**

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SEMESTER-I

(Skill Paper - 1) Human Anatomy & Physiology Part-II (Theory)

Credits – 04

Human Anatomy

Unit I) :

Introduction to anatomical terms and organization of the human body. Tissues, Definitions, types, characteristics, clarification, location, functions, and formation. Musculoskeletal system : Bones- types, structures, Axial, and appendicular skeleton. Bone formation, and growth, joint, classification and structures, types and structures of muscles. Movements at the joints, and muscles producing movements.

Unit II) :

Anatomy of gastrointestinal tract, components of G I tracts, Oral cavity, Tonsils, Pharynx, Alimentary canal, Salivary glands.Anatomy of Digestive system, Stomach, Small & Large intestine, Liver, Gall bladder, Pancreas, Spleen, Biliary apparatus.

Unit III) :

Anatomy of Cardiovascular system, Circulatory system, structure of Heart, Location, Chambers, Blood Vessels- Arterial & Venous system, Systemic and pulmonary circulation, names of Arteries, Veins, & their positions, gross and microscopic structure of Lymphatic tissues.

Unit IV) :

Anatomy of respiratory system, Detailed study of Organs of Respiratory system, Nasal cavity, Larynx,Trachea, Lungs, Bronchial tree, Diaphragm-Detailed study of all organs.

PHYSIOLOGY

UNIT I) :

Blood-Plasma & Cellular components, RBC, WBC & Platelets, (morphological features, and functions) Haemoglobin (Structures, and functions) Homeostasis, & blood coagulation, Clotting factors, Mechanism of clotting, Disorders of clotting factors, Blood grouping system, by ABO & RH Typing, Cross matching, Rh Factor & Rh incompatibility, Blood Transfusion.

UNIT II) :

GIT, functions of Alimentary canal, Digestive glands, pancreas, Liver, Diglutition, composition, functions & Secretion of Saliva, Gastric Juices, Pancreatic Juice & Bile, Functions of Liver, Gall bladder, Pancreas, Spleen, Small & Large Intestines.

Unit III) :

Physiology of Heart, Properties of Cardiac muscle, Cardiac cycle, Cardiac output, Conduction system of heart, Areas of auscultation blood pressure. (Definition of normal value,clinical measurements of BP, regulation of BP, Hyper tension, Hypo tension, Regulation of Heart Rate, Pulse-Jugular, Radial pulses, ECG: definition, Documentation, & Significance.

Unit IV) :

Respiratory System: Functions of Respiratory System, stages of Respiration, Transport of respiratory gases, Respiratory regulation, Hypoxia, Cyanosis, Asphyxia, dead space, Uneven ventilation, Artificial Ventilation, Lungs Volumes (TV, IRV.ERV,Vital capacities, FEV I, FEV II, FEV III) , Oxygen dissociation Curve, Co2 Dissociation Curve.

B. Voc. (Medical Laboratory Technology)

SEMESTER-I

(Skill Paper - 1) Human Anatomy & Physiology Part-II (Lab/Practical)

Credits – 02

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1. Introduction of human body parts.
2. Skeletal system.
3. Different types of Bones.
4. Components of GI tracket
5. Different types body organs (Brain, Heart, Liver, Lungs, Kidneys, Pancreas, spleen etc.
6. Cardiovascular system.
7. Respiratory system.

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Skill Paper - 2) Introduction to Radiation & Imaging Techniques (Theory)

Credits – 04

Unit I-

X-Ray production and properties Characteristics X-Rays, factors affecting X-Ray emission spectra, X-Ray quality and quantity, HVL measurements, heel effect, soft and hard X-Rays, added and inherent filtration, reflection and transmission targets.
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,

Unit II-

Early X-Ray tubes (coolidge tubes, tube envelop and housing) cathode assembly, X-Ray production efficiency, advances in X-Ray tubes, anode angulation and rotating tubes. Common factors affecting thermionic emission, specialized types (metallic, biangular, fluoro, CT) grid controlled and high speed tubes, focal spot size, speed of anode rotation, target angle, inherent filtration, radiation leakage and scattered radiation). Interlocking and X-Ray tube overload protection. Heat dissipation methods, tube rating, heat units, operating conditions, maintenance and Q.A procedures.

Unit III-

X-Ray generators and circuits 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.

Unit IV-

Control of scattered radiation and grids/Bucky 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. Effects of scatter radiation on radiograph image quality, patient dose and occupational exposure. Radiation units Dosimetry and Detection of ionizing radiation Units of radiation, ICRU definition of absorbed dose, KERMA exposure, Quality factor, dose equivalent, relationship between absorbed dose and equivalent dose. Basic principles of ionization chambers, proportional counters, G.M counters and scintillation detectors, thermoluminiscent dosimeters, film batches.

Unit V-

Biological effects of radiation Ionization, excitation and free radical formation, hydrolysis of water, action of radiation on cell, DNA, RNA, chromosome, tissue and organ radio sensitivity, 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, factors affecting radio-sensitivity, RBE, survival curves, LD50 and oxygen enhancement ratio. Biological effects of non-ionizing radiation (ultrasound, sound lasers, IR, UV and magnetic fields)

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Skill Paper - 2) Introduction to Radiation & Imaging Techniques

(Lab/Practical)

Credits – 02

Radiological Checks Like:-

1. KVp Accuracy
2. Timer Accuracy
3. Optical Radiation field congruence
4. Beam alignment test
5. Focal spot size
6. Target angle
7. Evaluation of total filtration
8. Constancy of X-ray output

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Skill Paper - 3) Conventional Radiography & Equipment (Theory)

Credits – 04

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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 affection quality of the spectrum

2. 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.

3. 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 timer station chamber based timers, integrated timer.

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

5. Control of scattered radiation. Beam limiting device cones diaphragms light beam collimator, beam centering device, methods to verify beam centering and field alignment; design and control of scattered radiation, grid ration 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 movement and reciprocatory movement.

6. 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, principals and methods of visualizing 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.

7. Care and Maintenance of X-ray equipment.

8. 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.

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SEMESTER-I

(Skill Paper - 3) Conventional Radiography & Equipment (Lab/Practical)

Credits – 02

Radiological Checks like:-

1. **mA linearity**
2. **Timer linearity**
3. **Relative speed of Screen**
4. **Test on automatic processor**
5. **Radiological protection servay**

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Skill Paper - 1) English Communication Skills (Theory)

Credits – 04

Course Title: **English Communication Skills**

Scheme of Instruction
Total Duration: 60 hrs.
Periods / Week: 4
Credits: 4
Instruction Mode: Lecture

Scheme of Examination
Maximum Marks: 100
Internal Evaluation: 30
End Semester: 70
Exam Duration: 3 hrs.

Course Outcomes: Upon the completion of the course, the students are expected to have enhanced their communication skills in English.

Course Objectives: The course aims at the following objectives:
1. Students will be familiar with the basic Grammar concepts and common medical vocabulary.
2. Students will be able to demonstrate effective reading and listening skills.
3. Students will be able to demonstrate effective speaking and writing skills.

Unit	Course Content	Instruction Hours
I	**Language Mechanics** 1. Articles, Parts of Speech 2. Tenses: Types of Past, Present, & Future Tenses 3. Subject-Verb Agreement, Capitalization & Punctuation 4. Medical Vocabulary: Words commonly used in the medical field	15
II	**Listening and Reading Skills** 1. Types of Listening Skills: Listening for specific information, gist, prediction, & inference 2. Listening Comprehension Practice: Listening to conversations, interviews, news, & speeches 3. Types of Reading Skills: Skimming, scanning, intensive reading, and extensive reading 4. Reading Comprehension Practice: Read newspapers, information brochures, and books	15
III	**Speaking Skills** 1. Errors in Pronunciation: Common mistakes in pronouncing difficult words 2. Pronunciation Practice: Producing correct sounds in English and clarity in pronunciation 3. Conversation Skills: Spoken English and day-to-day interaction 4. Speaking Practice: Discussion and giving a speech	15
IV	**Writing Skills** 1. Paragraph construction: Topic sentence, supporting details, and closing sentence 2. Letter Writing: Drafting formal and informal letters and emails 3. Report Writing: Drafting official reports 4. Essay Writing: Introduction, thesis statement, body paragraphs, conclusion	15

Recommended Readings:

1. Doff, A. (2014). *B1 plus intermediate coursebook English unlimited*, special edition. Cambridge

University Press.
2. Ludlow, R. & Panton, F. (1995). *The essence of effective communication*. Prentice Hall of India Pvt. Ltd.

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Non-Skill Paper-5) Basic Physics & Radiology (Theory)

Credits – 03

Unit I-

Basic concepts: Units and measurements-Force, work, power and energy-Temperature and heat-SI units of above parameters. Atomic structure-atom model-Nucleus-electronic configuration-periodic table-Isotopes-Ionization-excitation-Binding energy-electron volt Electromagnetic radiation-Quantum nature of radiation-mass energy equivalence Fluorescence-electromagnetic spectrum.

Unit II-

Electricity and magnetism: Electric charges, Coulomb's law-Unit of charge-Electric potential, unit of potential-Electric induction, capacitance and Capacitors, series and parallel connection-electric current, unit, resistance, ohm's law, electric power, Joule's law. Varying currents-Growth and decay of current in LR circuit time constant, charge and discharge of a Capacitor through a resistance and inductance. Oscillations in an LC circuit. Alternating currents: Peak and RMS values and current and voltage, circuit containing LR, CR and LCR-Power factor, series and parallel LCR circuits, DC circuit, Ohm's law, resistivity, series and parallel combination, EMF, Kirchhoff's law, heating effect of current.

Unit III-

Electromagnetic waves: Introduction, Maxwell's equation, electromagnetic waves, energy density and intensity, momentum, electromagnetic spectrum and radiation in Atmosphere. Sound.

a. 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.

b. Doppler's effect, Ultrasonic wave, production of ultrasonic waves (piezo-electric effect) in ultrasonography.

c. Use of principle of Doppler's effect in Diagnostic Radiology (e.g. Echo, blood flow measurement).

Unit IV-

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, Heat radiation, perfect black body, Stefan law,

application in Diagnostic Radiology (Heat dissipation in both stationary and rotating X-ray tubes).

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Non-Skill Paper-5) Basic Physics & Radiology (Lab/Practical)

Credits – 01

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1. Series and parallel connection-electric current
2. Series and parallel LCR circuits
3. Circuit containing LR, CR and LCR-Power factor
4. Series and parallel combination

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Non-Skill Paper - 6) Basic Computers and Information Technology (Theory)

Credits – 03

Objective- To Develop a basic understanding of computes and their role in the practice of modern medicine.

Unit 1) Jhon Von Neumann Architecture, different types of computer Hardware, CPU, Input Devices, Out put devices, Storage Devices, Communication Devices, Configuration of hardware devices and their application, convert decimal to binary and vice versa.

Unit 2): Networking- Basic idea of local Area Network (LAN), MAN wide area network (WAN) E-mail, browsers and servers, multimedia, operating system: software needs, application software, programming language, artificial intelligence, windows, print, control panel, paint, calculator, desktop, find, run, snipping tool, sticky note, word pad, notepad, gadgets, windows defender, firewall.

Unit 3) Microsoft- word commands, formatting text and documents, sorting and tables, background images, hyper links, Mail merge, Graphics, columns, smart art, spelling & grammar, Thesaurus, Translate, watermarks, borders, Drop Cap.

Unit 4) Microsoft Excel-Conditional formatting, Formulas, Functions, Fill features, Sort& Filter, Wrap text, Merge & Center.Insert - Tables, Illustration, charts, Links, Text, Background, Remove duplicates.Microsoft power point- Designs, slid transition, Smart Art, animation hyper links, automatic slide advance, background images.

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Non-Skill Paper - 6) Basic Computers and Information Technology (Lab/Practical)

Credits – 01

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1. Microsoft Word
2. Microsoft power point
3. Microsoft Excel
4. Microsoft Access.

B. Voc. (Medical Imaging Technology)

SEMESTER-I

(Non-Skill Paper - 7) ISLAMIYAT (Theory)

Credits – 02
