DIPLOMA IN RADIOLOGY & IMAGING TECHNOLOGY

SCHEME OF EXAMINATION

Syllabus

Subject code	Title of the Course	Hours	Passing Minimum
Semester I			
Subject 1	Anatomy	3	40/100
Subject 2	Radiographic Physics	3	40/100
Subject 3	Radiographic Techniques	3	40/100
Subject 4	Communicative English	3	40/100
Subject 5	Practical I- Radiographic Techniques	3	40/100
Semester II			
Subject 1	Darkroom Techniques & Radiographic Photography	3	40/100
Subject 2	Digital Radiography	3	40/100
Subject 3	Life skill	3	40/100
Subject 4	Radiation Hazards & Safety Measures	3	40/100
Subject 5	Field visit and Practical II- Darkroom Techniques	3	40/100

Eligibility for admission: Pass in 12 th std. examination conducted by the Govt. of Tamil Nadu Board of Secondary Education, Government of Tamil Nadu or any other equivalent examination.

Examination: Passing Minimum for each Course is 40%. Classification will be done on the basis of percentage marks of the total marks obtained in all the Courses and as given below:

40 % but less than 50 % - Third class
50 % but less than 60 % - Second class
60 % and above - First class

Theory Paper

Internal Marks-25
External Marks-75

Syllabus

First Semester:-

Course I - Anatomy
Course II - Radiographic Physics
Course III - Radiography Techniques
Course IV - Communicative English
Course V - Practical I-Radiographic Techniques

Second Semester:-

Course VI - Darkroom Techniques & Radiographic Photography
Course VII - Digital Radiography
Course VIII - Life Skill
Course IX - Radiation Hazards & Safety Measures
Course X - Field visit and Practical II-Darkroom Techniques

Preamble of the Program:

Radio- Imaging Technology is a specialty in medicine where trained professionals work on diagnosing pathologies through medical imaging using ionizing radiation. It involves understanding of radiation physics, role of radiation in diagnostic radiology and imaging, hazards of radiation and protection of self, other personnel, patient and public from radiation. It provides hands on training of X-ray unit, DEXA, ultrasound, mammography, DSA, CT and MRI. Radio-Diagnostic Imaging is a critical component for patient's treatment. Almost all departments rely on the radiological examinations for the diagnosis of pathologies and conditions. All the patients coming to radiology department have the right to receive optimum quality image with minimum radiation exposure consistent with good patient care. The purpose of this program is to standardize the Radio-Imaging technology at graduate levels throughout the country so that it will benefit in achieving uniformity work as a practitioner as well as resultantly relating component radiographers working with appropriate expertise. Presently, very few universities are generating health professionals specialized in Radio-Imaging domains. This Diploma program introduced by Directorate of Vocational Education, Manonmaniam Sundaranr University prepares healthcare professionals having extensive and practical knowledge in the fields of Radiology and Nuclear medicine on Local, National, and International fronts. The primary goal of the Radio-Imaging Technology Diploma program is to train radiographers with the knowledge, skills and competency to provide optimum quality professional services in a wide variety of settings including academic, governmental, corporate, and military and community based organizations.

Semester-I

Subject **I**

ANATOMY

OBJECTIVES:

It is the study of structure of human body in all its totality. Understanding the organs, their structures & correlating it with their physiology leads to a truly holistic approach which can help the clinicians to understand the intricacies of disease, their presentations and mode of treatment.

Unit I **18 Hrs**

Skeleton Systems: General anatomical terms, Regions of body, Bones of upper and lower Extermities, Spines, Pelvis, Skull, Bones of hands and foot, Bones of face.

Respiratory Systems: Accessories nasal sinuses, laryns, Bronchus, lunge pleura.

Unit II **18 Hrs**

Circulatory Systems: Thorax, heart and Vessels, Mediastinum Names of main arteries and veins. Diphragm.

Unit III **18 Hrs**

Alimentary Systems: Mouth, Tongue, Salivary gland, Pharyox, Oesophagus, Stomach, Duodenum, Small Intestines, large intestine, Liver, Gall bladder, Billiary tract, Spleen, Pancreas.

Urogenital Systems: Kidneys, Ureters, Bladder Prostate, Testes and Urethra.

Unit IV **18 Hrs**

Reproductive Systems: Male and Female genital tract, Uterus, Fallopion tubes, Overies, Mamary gland.

Unit V **18 Hrs**

Nervous Systems: Bones of skull, Names and position of bones, base of skull, Different parts of brain. Spinal cord.

Subject **II**

RADIOGRAPHIC PHYSICS

OBJECTIVES:

A basic understanding of radiological physics will allow the radiographer to make the best use of the equipment available. To understanding the basic physics behinds the equipment.

Unit I **18 Hrs**

Basic ideas of measurement and units, Transformer-step up, Step down and auto A.C., D.C., current.

Unit II **18 Hrs**

Inverse Square Law, Rectifier Valve, X-ray tube and constructions, H.T. circuits, Half wave, Full wave, Three phase, Single phase.

Unit III **18 Hrs**

voltmeters, Ammeters, Millammeter, Focal Spot, M.A.S. meter Mains compensator, Exposure timer, Interlock and safety devices.

Unit IV **18 Hrs**

Grid, Grid ratio, Potter Bucky diagphragm, Stationery grid, Focus grid, cones, diaphragms, filters, Scattered radiation, control of scattered radiation.

Unit V **18 Hrs**

Mobile units, portable units, Image intensifier, Tele – radiography, Spot film devices, fluorescent effect, photographic effect.

Subject **III**

RADIOGRAPHIC TECHNIQUES

OBJECTIVES:

- To understand the basic radiographic equipment
- To study about basic theory and usage of radiographic equipment.

Unit I **18 Hrs**

Routine radiography of upper and lower limbs, shoulder girdle, Pelvic girdle, Hip joints

Unit II **18 Hrs**

Thorax, Vertebral column, Teeth, Mastoids, T.M. joints mandible, Sinuses

Unit III **18 Hrs**

Chest, Abdomen, Skull.

Unit IV **18 Hrs**

Special Radiological Investigations:

Barium Meal, G.I. Tract. Barium Meel Heocaecal region and Appear, Barium Swallow, heart and Oesophagus. Barium enema-Oral cholecystogram, I.V. Cholangiogram. T. Tube cholangiogram. Percutaneous – Cholangiogram-Intravenous Pyelogram. Retrograde Pyelogram. Cysto Urethrogram (Micturating and Retrograde), Hystero – salpinogram, Pelvic Pneumogram, Presacral Pneumogram. Bronchogram. Spelenoportal venogram, Sialogram, Sinogram, Renal angiogram Formal angiogram, venogram, Lymphangiogram, cardio angiogram.

Unit V **18 Hrs**

Preparation of patients, use of contrast media. Soft tissue radiography, Dental and Portable X-ray in operation theatre and bed side.

Subject **IV**

Communicative English

OBJECTIVES:

To expose students to the fundamentals of academic and professional communication in order to develop professionals who can effectively apply communication Skills, theories and best practices to meet their academic, professional and career communication need

1. **Basic Grammar**:
   a. Review of grammar
   b. Remedial study of grammar
   c. Simple sentence
   d. Word passive voice etc.
2. **Bubbling Vocabulary**:
   a. Synonyms
   b. Antonyms
   c. One – work Institution
3. **Reading and Understanding English**
   a. Comprehension passage
   b. Précis – writing
   c. Developing a story from hints.
4. **Writing English**
   a. Writing Business letters.
   b. Paragraph writing
   c. Essay writing
   d. Dialogue writing
5. **Speaking English**
   a. Expressions used under different circumstances
   b. Phonetics

Subject **V**

Practical I

Radiography Techniques

OBJECTIVES:

This course helps the students to impart the practical knowledge of the electrical & Electronics components includes basic logic gates, diode characteristics, operational amplifier, characteristics of LED, Transistor input and transfer characteristics

Semester-II

COURSE VI

DARKROOM TECHNIQUES & RADIOGRAPHIC PHOTOGRAPHY

OBJECTIVES:

To study about Accessories of Darkroom, Types of Developer and Fixer, Powder and Liquid, Exhaustion of Developer, Replenishers and Operation Theatre Techniques.

Unit I **18 Hrs**

Accessories of Darkroom, Darkroom Temp. X-ray materials, Type of Imulsion, X-ray tilms, Intensigying Screen, Screen & Nonscreen films, cleaning and general care of screen and cassettes.

Unit II **18 Hrs**

Chemicals: Developer & fixer, Properties of chemicals, life of solution – Types of Developer and Fixer.

Unit III **18 Hrs**

Powder and Liquid, Exhaustion of Developer, Replenishers. Fixing Agents, Acid and Preservative in Fixer, inclusion of hardner, time of fixation, Silver recovery. Rinsing of films and washing.

Unit IV **18 Hrs**

Operation Theatre Techniques – Tray units, chemical reduction. Drying cabinate,

Unit V **18 Hrs**

Emergency preparation of solutions, Darkroom fault.

Subject **VII**

DIGITAL RADIOGRAPHY

OBJECTIVES:

To learn about Digital Radiographic System components, Digital Image Processor Artificial and Biological Safety, Tomography components and fundamentals of MRI scan.

Unit I **18 Hrs**

Components of a Digital Radiographic System, Digital Fluoroscopy System, X-ray Generator and X-ray Tube, Image Intensifier, Television Scan Modes.

Unit II **18 Hrs**

Digital Image Processor, Analog-to-Digital Converter, Digital Substraction Techniques (DSA), Digital Image Processing.

Unit III **18 Hrs**

Ultrasound Principles, Instrumentation, Artifacts and Biological Safety:

Interactions between Ultrasound and Matter, Types of Reflectors, Quarter – Wave Matching, Imaging Principles, Resolution, Ultrasound Instrumentation, Piezoelectricity (Pressure Electricity), Types of Real Time Transducers, Special purpose Scanners, 3D-US Scanning, Artifacts, Biological Effects and Safety Mechanisms.

Unit IV **18 Hrs**

Compound Tomography (CT): Physical Principle, CT Generations, Electron Beam CT (EBCT), Reconstruction Technique, CT Numbers, CT Dose Index, Spiral CT, Collimators, CT Anatomy, Dual Energy CT, Portable CT Scanner, Real Time CT Fluoroscopy, Cone Beam Computed Tomography, 4D Computed Tomography (4D – CT).

Unit V **18 Hrs**

Magnetic Resonance Imaging (MRI) : Physical Principle, Fundamentals of MRI, Spin Echo (SE), Multislice Imaging, MRI System, Single – Voxel Spectroscopy (SVS), Magnetic Resonance Spectroscopy Imaging (MRSI), Thyroid and Parathyroid Glands, Breast, Heart, Myocardium, Right Ventricle, Esophagus, liver and Biliary system, Pancreas, Gall Bladder, Spleen, Adrenal Gland, Kidneys, Uterus, Cervix, Vagina, Ovaries, Male Pelvis, Urinary Bladder, Female Urethrae, Scrotum and Tests.

Subject **VIII**

LIFE SKILL

OBJECTIVES:

To educate about Life skills includes on Life Coping or adjustment, Attitude, Problem solving and basic computer Knowledge with internets

I Life Coping or adjustment

(a) External and internal influence in one's life
(b) Process of coping or adjustment
(c) Coping with physical change and sexuality
(d) Coping with stress, shyness, fear, anger far live and criticism.

II Attitude

(a) Attitude
(b) Self acceptance, self – esteem and self actualization
(c) Positive thinking

III Problem Solving

(a) Goal Setting
(b) Decision Making
(c) Time Management and stress Management.

IV Computers

(a) Introduction to Computers
(b) M.S.Office
(c) Power Point

V Internet

(a) Introduction to internet
(b) E – mail
(c) Browsing

Subject **IX**

RADIATION HAZARDS & SAFETY MEASURES

OBJECTIVES:

This syllabus about safety measures from radiation hazards like production from ionizing radiation, personal monitoring and percussions from radiation hazards

Unit I **18 Hrs**

Radiation Protection: Code of practice for the protection of persons against ionizing radiation, protective materials, Lead, Lead equivalent. Building material.

Unit II **18 Hrs**

Personnel monitoring, International recommendations against hazards of ionizing radiation (which will be available from general recommendation of Bhava Atomic energy, Trombay)

Unit III **18 Hrs**

First Aid & Hospital Practice: Socks, convulsion, asphyxia, Artificial respiration. Administration of Oxygen.

Unit IV **18 Hrs**

Burns and Scalds, Electric shock and burns. Would, Haemorrhage. Pressure points. Tourniquet, dying of bones, joints, muscles, Dressing of Bandages, Plaster of Paris technique. Splints, Drug reaction. Poisons, Emergency Drug in Dept.

Unit V **18 Hrs**

Medical Ethics. Nursing & Handling of patients. Sterilisation. Drug Allergy, Elementary Hygiene.

Subject **X**

Practical II

Field visit and Practical II-Darkroom Techniques

OBJECTIVES:

This practical to help the students to impart the practical knowledge of Dark Room techniques includes usage of accessories of darkroom and operation theatre procedure.