

**ANDHRA PRADESH PARA MEDICAL
BOARD**

HYDERABAD

**(Established Under the Andhra Pradesh Para Medical Board Act,
2006)**

(A.P. Act No.38 of 2006)

Syllabus for

**DIPLOMA IN MEDICAL IMAGIOLOGY TECHNICIAN
COURSE
(TWO YEARS COURSE)**

**B.N.S. Kumar
Secretary**

In view of representation from the Faculty the Syllabus for the 1st year in all Para medical courses is modified accordingly and kept on website.

**DIPLOMA IN MEDICAL IMAGIOLOGY TECHNICIAN COURSE
(TWO YEARS COURSE)**

Syllabus for First Year

Paper-I	<p><u>BASIC HUMAN SCIENCES</u></p> <ul style="list-style-type: none">A) Basics of AnatomyB) Basics of PhysiologyC) Basics of BiochemistryD) Basics of Bio-statistics
Paper-II	<ul style="list-style-type: none">A) Basics of PathologyB) Basics of Blood BankingC) Basics of MicrobiologyD) Basics of Central Sterilization Services.
Paper-III	<ul style="list-style-type: none">A) Hospital AwarenessB) Familiarization of different tables/tubes in surgical department, Surgical Awareness, preparation of patient for surgery.C) Patient related services.D) Computer and Communication Skills, Audio & Visual Aids.

**DIPLOMA IN MEDICAL IMAGIOLOGY TECHNICIAN COURSE
(TWO YEARS COURSE)**

Syllabus for Second Year

Paper-I	<p>A) Dark Room - Radiographic Techniques, Role of Radiographer.</p> <p>B) Electrostatics, magnetism & Electricity, OHMS law Definition, Capacitance, Resistance, Electromagnetic radiation, Electrical circuits Semi conductors, Types.</p> <p>C) Clinical radiation generators, Radioactive Isotopes.</p> <p>D) Radioactivity and systems of dosimetry calculations.</p>
Paper-II	<p>A) Ultra Sonography, Color Doppler, Conventional & Spiral CT Techniques, Modalities of Basic Principles of CT Scans, Equipment disruption, Image Quality in Radiology, Radiographic Films, X and Gama Rays, production of X-Rays, quality of X-Ray beams. Absorption of X and Gamma Rays. X-ray tubes, X-ray equipments, components & controls in X-ray, Modified X-ray - equipment for special purpose. Fundamentals of X-Ray, GAMA Rays, X-Ray Beam, Physics of Radiography, Dark Room Procedures & Techniques, Accessories Construction,</p> <p>B) Regional Radiography in General and Special.</p> <p>C) Radiography procedures, Employing Contrast, contrast Medical, Excretory system,</p> <p>D) Perchtaneous Transepic, Oral Choleostography, Percutaneous Transepic Cholecotography.</p>
Paper-III	<p>A) MRI Techniques and Nuclear Medicine Technology</p> <p>B) Radiation, Radiation Hazards, Measures for protection from radiation.</p> <p>C) Preventive Maintenance, General Care of the Patient Emergencies in Radiology Department, Life Saving Accessories in Radiology Department, Quality Assurance in Radiotherapy, Regulatory requirement , Imaging Equipment, Accessories, maintenance & Quality Assurance, circuit procedure for Fluoroscopic Radiography. Digital Radiography Unit, General Features and Mobile equipments.</p> <p>D) Instrumentation Study, Instrument Measurement & Critical Care equipment.</p>

1st YEAR

PAPER-I

Basics of Anatomy & Physiology

Basics of Anatomy

1. Introduction to Human Anatomy
2. Cell- Tissues Properties, Different Tissues
3. Digestive System & Hepatobiliary System
4. Respiratory System
5. Cardio Vascular System
6. Lymphatic System
7. Bones and Joints
8. Nervous System
9. Endocrine System
10. Sense Organs
11. Excretory System
12. Reproductive System

Basics of Physiology

1. Introduction to Human Physiology
2. Blood
3. Cardio Vascular System
4. Lymphoid System
5. Digestive System
6. Respiratory System
7. Nervous System
8. Endocrine System
9. Excretory System
10. Reproductive System
11. Sense Organs

Basics of Bio – Chemistry

1. Introduction to Basics of Bio-chemistry including code of ethics for Medical Lab Technicians and Medical Lab Organization.
2. Reception, Registration and bio-chemical parameters investigated.
3. Glassware and plastic ware used in a bio-chemical laboratory.
 - a. **Glassware:**
 - 1) Types of glass and composition.
 - 2) Types of glassware used, their identification, application & uses.
 - 3) Cleaning, drying, maintenance and storage of glassware.
 - b. **Plastic ware: Brief outline**
4. Instrumental methods of Bio-chemical analysis.
 - a. **Colorimetry :**

Visual and photoelectric methods, instrumentation, principle & laws involved construction, operation, care and maintenance, applications.
 - b. **Spectrophotometry**

Principle and theory, types, construction, & applications
5. Basic lab operations like
 - a. **Separation of solids from liquids**
 1. Centrifugation: Principle, Different types of centrifuges care and maintenance, applications.
 2. Filtration using funnel.
 3. Weighing : Different types of balances used, care and maintenance.
 4. Evaporation
 5. Distillation
 6. Refluxing
 7. Drying different salts and dessicotion.

6. Water Chemicals and related substances
 - a. Purity of chemicals
 - b. Corrosives
 - c. Hygroscopic Substance
7. Prevention, Safety and first aid in lab accidents.
8. Collection of Specimens
 - a. **Blood:** Types of Specimens, Collection, Precautions during collection processing and preservation.
 - b. **Urine:** Types of Specimens, Collection, Precautions during collection, Processing and Preservation.
9. Urine biochemical parameters.
10. Units of measurements
11. **Solutions** : Types based on solute and solvent, Types based on method of expressing concentration, calculations.
12. **Carbohydrates:** Definitions, Biological importance, Acid value, iodine value, saponification value.
13. Amino acids and Proteins Definition, Biological importance, Classification, Qualitative tests.
14. **Diagnostic tests** : Blood sugar, Glucose tolerance test, Blood urea, Serum uric acid, Serum creatinine.
15. **Vitamins and Minerals**
 - a. **Vitamins:**
Water Soluble vitamins, Fat Soluble vitamins, Sources, Daily requirements, Deficiency diseases.
 - b. **Minerals :**
Sources, Daily requirements, Deficiency diseases.

Paper-II

Basics of Pathology

Introduction to Pathology in brief

1. Urine – Analysis – Physical Examination – specific gravity PH, reaction, colour.
Chemical Examination – Sugar Albumin, bile salts, bile Pigments etc.
Microscopic, Sediment for RBC, WBC, Epitheleal cells, casts, crystals, parasites.
Preparation of Reagents, procedure and principle of tests.
2. **Sputum Analysis** – Physical Examination, Preparation and staining smear for Microscopic Examination.
3. **Semen Analysis** – Physical Examination Microscopy – counting, motility, staining, Morphology, abnormal and normal forms.
4. **Body Fluids** – Differential count of Peritoneal, pericardial, pleural fluids and CSF, charging chamber, Identifying and counting the cells.

Basics of Microbiology

I. Introduction to Microbiology in brief

Definition,
History

II. Microscopy

- a) Principle working and maintenance of compound Microscope.
- b) Principle of Fluorescent microscope, Electron Microscope, Dark Ground Microscope.

History

Types of Microscope: (a) Light Microscope, (b) DGI, (c) Fluorescent, (d) Phase contrast.

(e) Electron Microscope : a). Transmission, b) Scanning, Principles of operational mechanisms of various types of Microscopes.

III. Sterilization and disinfection – classification and Methods of sterilization.

Sterilization: Definition, types and principles of sterilization methods:

(a) Heat (dry heat, moist heat with special reference to autoclave, (b) Radiation, (c) Filtration, efficiency testing to various sterilizers.

Antiseptics and Disinfectants :

Definition, types and properties, mode of action, uses of various disinfectants, precautions while using the disinfectants, qualities of a good disinfectants, testing efficiency of various disinfectants.

- 1) Principle and Methods of sterilization by heat
 - a) By Dry Heat, flaming, Red Heat, Hot air oven, incineration.
 - b) By Moist Heat-pasteurization, Inspissation, tyndalisation, autoclave.

2) Filtration Methods

- 3) Ionising Radiation – Disinfection, Mode of action and uses of important chemical disinfectants – Phenol and Phenolic compounds, alcohols, halogens, dyes and acids and alkalies.

4) Gaseous Methods of sterilization.

- IV. Cleaning, drying & Sterilization of Glassware disposal of contaminated material i.e. clinical infective material inoculated culture media. Handling and Disposal of Biomedical waste.
- V. **Biomedical waste management in a Microbiology Laboratory** : types of the waste generated, segregation, treatment, disposal.
- VI. Morphology and classification of Bacteria Sp. of cell, capsule, flagella, spore, Anaerobic Methods of cultivation of Bacteria.

Paper-III

A. Hospital Awareness

A brief idea of hospital as an organization management different units of a hospital effective communication skills, communication channel

Maintenance of records
Effective leadership
General patient care
Medical terminologies
Vital signs
Unit preparation
Transporting & Transferring patients
Sterilization Techniques
Control of infection
Medication – Oral & parenteral
Admission – Discharge procedure
Bandages

Practicals : Posted in ward & taught clinically

A. Surgical Department

Familiarization of different tubes

1. Drainage tube
2. Post Operative Exercises
3. Post OP Management of Patient
4. Shock of Management
5. Changing Surgical Dressing.

1. Preoperative preparation of patient
2. Preanesthetic preparation
3. Assisting in operation
4. Anaesthesia
5. CSSD
 1. Recovery room
 2. Movement of papers
 3. Scheduling of theaters
 4. Supplying of articles
 5. Specific area practices
 - a. As scrubnurse
 - b. As circulating nurse

D).Communication and Computer Skills, Audio & Visual Aids.

COMMUNICATION

Process
Types of communication
Strategies for effective Communication
Barriers of communication

SOFT SKILLS

Presentation with the use of visual aids such as power point
Conversation
Extempore speech, usage of effective language for communication of health work.
Case studies and situational analysis
Survey and Reporting

COMPUTER

Computer basic
MS – Office
MS – Word
MS – Excel
MS – Power Point

INTERNET CONCEPTS

Browsing
Down- Loading
Use of Slide Projector

2nd Year

Paper-1

A. Physics of Radiography:

Fundamentals of electricity.

Static/Current electricity.

Conductors & Insulators.

The current.

Electrical potential difference.

Resistance.

Units of measurements; volt, ohm, ampere

Resistances in electrical circuits.

Resistors.

Specific resistance.

Power measurements.

Magnetism.

Magnetic induction.

Generator and dynamo.

Alternating current generator.

Direct current generator.

Motor

Induction coil.

Transformers.

Auto transformer

Rectification

Capacitors & Conductors

Principles electrical circuits

Electrical circuits.

Constant potential circuits.

Electrical measuring instruments.

X-Rays

Fluorescent screens

Structure of atom

Characteristic radiation.

Inverse square law

Interaction of X-Rays on matter

Absorption coefficient

Half value layer

Filter & filtration's

Measurements of X-Rays.

GM counters.

Ionisation chamber measurements

Measuring device in use presently, Radioactivity,

B. Regional Radiography.

General

Head& neck

Spine

Chest

Abdomen

Pelvis

Upper limbs

Lower limbs

Special

Macro-radiography

Xero-radiography

Mammography

Dental radiography

Orthopantomogram

High KV technique

Subtraction technique

Special diagnostic procedures.

GUT - IVP, RGP, RGU, MEUG, Cystography, AGP HSG,

GIT - Sialography, Barium swallow, BM Study, BMFT, SB enema, Ba enema, SPVG

Biliary system - PTC, T tube cholangiogram, OCG.

Respiration - Bronchography.

Vascular - Angiography of limbs, aorta, carotid vessels. Contrast media - Type, reaction, treatment.

Paper-II

Dark Room Construction

List of darkroom accessories.
Radiographic film.
Handling of X-Ray films, types of films.
Processing of X-Ray films.
Methods of processing.
Mixing of processing solutions.
Chemistry of processing solutions.
Maintenance of processing solutions.
Safe light.
The radiographic image.
Film Density.
Film contrast.
The characteristic curve.
Control of radiographic image definition.
Latitude of exposure.
Variation of exposure time
Intensifying screens/fluorescent screens.
Cassettes.
Faults in Radiography.
CR. Computer Radiography
DR. Digital Radiography.
Pass box.

. Fundamentals of X-Ray Equipments:

Fundamentals of X-Ray Equipments:

X-Ray equipment's and power mains

Control of Kilo-voltage

Mains voltage compensator

Components & Controls in X-Ray circuit

HT generators

HT generator circuit

Constant potential circuits

Filament circuit

Fuses

Swiches & circuit breakers

Inter locking circuits

Exposure switches & timers

Timer systems

Timer x ray tube

Fixed anode x-ray tube

Rotating anode-duai focus x-ray tube

X ray tube glass envelop & vacuum

Tube shield

Shock proofing

H.T. Cables

Cooling mechanism

Filtration in x ray tube

Limitation of fixed anode x ray tube

Rotary anode x ray tube mechanism

Faults in x ray tubes

New Developments in x ray tube

Details of x ray beam

Anode heel effect

Filtered radiation

Scattered radiation

Control of secondary radiation

Grids

Tube stand, ceiling-tube support

Tube stand parts

Tube brakes

Tube suspension and counter-weight

Ceiling tube hanging

Tube movements & Their controls

Multipurpose tables for radiography /fluoroscopy

General features of radiographic tables

Table-drive and table movements

Fluoroscopic screen holder on assembly

Serial sport-film device

Structure of fluoroscopic screen

Remote controls on fluoroscopic assembly

Procedure for fluoroscopic radiography

Indications for fluoroscopy examination

The bucky assembly

The bucky circuitary

Resiprocating & oscillating grids

A. Modified X-ray equipment's for special purpose

Portable & Mobile x ray equipment for OY & and bed side radiography.

Special skull radiography unit

Tomographic equipment

Mammography equipment

Mass miniature radiography (MMR) unit

Dental radiography unit

Orthopantomography dental unit (OPG)

X ray image intensifier/radiography unit

C-ARM image intensifier/radiography unit

Cine fluoroscopic -radiography unit & video recorder

AOT rapid film changer for serial radiography

Digital radiography unit

Paper-III

A. Radiation hazards and protections.

During radiography
During fluoroscopy
Effects of radiation on human tissues
Permissible doses
Measurement of radiation doses

Dosages in diagnostic radiology
Protective gadgets in RD Department

R. safety duties of radiologist, radiographer & patient.

Preventive maintenance.

General care
Maintenance of log book
Practical precautions
Brakes & locks
HT cables care
Care of meters & controls
Care of tube stands & tracks
Care of accessory equipments
Functional tests for any faults
Failure of x ray tubes
Failure of FIT cables
Common trouble - shooting & remedies.

B. General Care

Emergencies in Radiology Department
Resuscitation of patients, emergency drugs
Anesthesia in Radiology Department
Life saving accessories for RD departments

C. Newer Imaging Modalities

Computed tomography (CT) n,
Multi Detector CT.
Magnetic resonance imaging (MRI)
Radionuclide imaging
Digital subtraction angiography.
Mammography

PRACTICALS

1. Monitoring of vital signs, Spo₂
2. ABG analysis
3. Types of Anesthesia required for different types of surgeries
4. A regular check of cannula and drains
5. Maintain records and reports
6. Transportation of patient to SICU
7. Suctioning of Endotracheal tube / Tracheostomy tube
8. After care of equipment
9. Mechanical ventilation – Settings and modes