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**

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| Paper-II | A) Basics of Pathology |
|          | B) Basics of Blood Banking |
|          | C) Basics of Microbiology |
|          | D) Basics of Central Sterilization Services. |

| Paper-III | A) Hospital Awareness |
|           | B) Familiarization of different tables/tubes in surgical department, Surgical Awareness, preparation of patient for surgery. |
|           | C) Patient related services. |
# DIPLOMA IN MEDICAL IMAGIOLOGY TECHNICIAN COURSE (TWO YEARS COURSE)

## Syllabus for Second Year

| Paper-I | A) Dark Room - Radiographic Techniques, Role of Radiographer.  
B) Electrostatics, magnetism & Electricity, OHMS law Definition, Capacitance, Resistance, Electromagnetic radiation, Electrical circuits Semi conductors, Types.  
C) Clinical radiation generators, Radioactive Isotopes.  
D) Radioactivity and systems of dosimetry calculations. |
| --- | --- |
B) Regional Radiography in General and Special.  
C) Radiography procedures, Employing Contrast, contrast Medical, Excretory system,  
D) Perchtaneous Transepic, Oral Choleostography, Percutaneous Transepic Cholecotography. |
| Paper-III | A) MRI Techniques and Nuclear Medicine Technology  
B) Radiation, Radiation Hazards, Measures for protection from radiation.  
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.  
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 dessication.
6. Water Chemicals and related substances
   a. Purity of chemicals
   b. Corrosives
   c. Hygroscopic Subsatance

7. Prevention, Safety and first aid in lab accidents.

8. Collection of Specimens
   a. Blood: Types of Spencimens, Collection, Precations during collection processing and preservation.
   b. Urine: Types of Specimens, Collection, Precautions during collection, Processing and Preservation.


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.


15. Vitamins and Minerals
   a. Vitamins:
      Water Soluble vitamins, Fat Soluble vitamins, Sources, Daily requirements, Deficiency diseases.
   b. Minerals:
      Sources, Daily requirements, Deficiency diseases.
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,
   Epithelial 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) Fluroscent, (d) Phase contrast.


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 Merit Heat-pasteurization, Inspissation, tyndalisation, autoclave.

2) Filtration Methods

3) Ionising Radiation – Disinfection, Mode of action and uses of important chemical disinfections – 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.
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 scrub nurse
   b. As circulating nurse

COMMUNICATION
Process
Types of communication
Strategies for effective Communication
Barriers of communication

SOFTWARE
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

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

INTERNET CONCEPTS
Browsing
Down- Loading
Use of Slide Projector
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
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