

- m) Proteus,
  - n) Pseudomonas,
  - o) Vibrio
  - p) Spirochaetes.
4. Molecular techniques in diagnostic microbiology -PCR, DNA hybridization Mycology
- a) Morphology and Structure of fungi
  - b) Classification of fungi
  - c) Nutrition and cultivation of fungus
  - d) Cutaneous, Subcutaneous and Systemic Mycosis
  - e) Lab diagnosis of fungal Infections
  - f) Opportunistic fungal infections

### **Virology**

- 1. General characters of viruses
- 2. Classification of viruses
- 3. Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses
- 4. Lab diagnosis of viral infections
- 5. Cultivation of viruses
- 6. Bacteriophages.
- 7. Retro viruses - HIV, Hepatitis virus, Pox virus
- 8. Picorna virus - Polio
- 9. Orthomyxo virus - Influenza
- 10. Arbo virus - Chikungunya, Dengue
- 11. Herpes and Adeno virus

## **Syllabus for X-Ray Technician**

### **1. Human Anatomy & Physiology**

Scope of Anatomy and Physiology - Definitions and Terms in Anatomy and Physiology- Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation of blood.

- (i) Cardio Vascular System (Structure and functions of various parts of the heart, arterial and venous system, brief account on common cardiovascular disorders).
- (ii) Respiratory System (various parts of respiratory system and their functions,

Physiology of Respiration).

- (iii) Digestive System (names and various parts of digestive system-Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.- physiology of digestion and absorption)
- (iv) Urinary System (various parts of urinary system and its function-structure and function of kidneys-physiology of urine formation - pathophysiology of renal disease and edema.)
- (v) Reproductive System (physiology and anatomy of Male & Female reproductive system-Prostate & Uterus& Ovaries etc.)
- (vi) Musculoskeletal System (Classification of bones & joints, structure of skeleton – structure of skeletal muscle –physiology of muscle contraction)
- (vii) Nervous System (various parts of nervous system- Brain and its parts – functions of nervous system - SpinalCord & Nerves).
- (viii) Ear, Nose, Throat and Eye (Elementary knowledge of structure and functions of organs of taste, smell,hearing, vision.)
- (ix) Endocrine System ( Endocrine glands ,their hormones and functions-Thyroid, Parathyroid, Suprarenal,Pituitary, pituitary and Thymus)
- (x) Haemopoietic and Lymphatic System (Name of the blood vessels & lymph gland locations).
- (xi) Surface Anatomy & Surface Markings of Human Body.

## **2. Radiology Physics, Radiation Physics & Physics of Diagnostic Radiology -**

Basic concepts of power, work, force, energy, electricity, magnetism and their units and measurements- einstein's formula – electromagnetic induction – Atomic structure – radioactivity- ionization and excitation - electromagnetic waves – X-rays production and properties – X-ray tube - quality of x-rays – factors affecting quality and intensity of x-rays. X-ray circuits - interaction of X and gamma rays - X-radiation measurements etc. Principles of Radiation detection and measurements – TLD, Pocket Dosimeter, Radiation Survey meter and radiation zone monitor. Study with charts, models & power point presentations Atomic structure, X-ray tubes, X-ray circuits involving students to present and discuss.

## **3. X-Ray Machines & Accessories and their Maintenance**

X-ray machines – Anode & Cathode - Thermionic diode – X-ray valves and tubes – principle and practical aspects – semiconductors – triode valves – cathode ray oscilloscopes – X-ray circuits – self rectifying circuits – half wave pulsating voltage circuits – full valve pulsating voltage circuits - measurement of high voltage – control of kV circuit – mA circuit. X-ray beam quality

#### **4. X-ray Film / Image processing Techniques**

X-ray Films- X-ray cassettes - Intensifying screens X-ray films types – basic film structure & quality – choosing films for different studies - basics on hard copies of radiographic images – dry & wet processing – Fixer –Developer –film processing methods - manual and automatic processing – conventional & modern image processing rooms – image processing equipments – types & maintenance – day light systems advantages & disadvantages – processing faults – glossy prints, paper prints etc – production of best quality images. Intensifying screen-Fluorescence -structure of Intensifying screens – Casette types – screen unsharpness etc.

#### **5. Clinical Radiography - Positioning**

Radiological Equipments – X-ray machine - transformers, x-ray units, fluoroscopy, grids and filters - Positional Radiography - Radiographic views of different parts of the body – Chest, Abdomen, Upper Limb, Cervical & Thoracic Spine, Lumbar Spine, Sacrum & Coccyx, Bony thorax - Sternum & Ribs, Skull and cranial bones, facial bones, paranasal sinuses, Mastoids & Temporal bones etc. Upper & Lower GIT, Gall Bladder & Biliary duct, GUT etc.

#### **6. Equipments, basic Techniques of modern Imaging Modalities**

C.R (principle, equipment & imaging)

Digital Radiography (principle, equipment & imaging)

Mammography (basic principle, equipment & image acquisition)

CT (Basic physics – Tomography principle - basics of plain studies, contrast studies, special procedures)

MRI (basic principle – imaging methods - slice section- plain & contrast studies – image contrast – factors affecting image quality)

USG (Basic acoustics - ultrasound terminologies – Interaction of US with matter – Ultrasound display modes etc) Demonstration of basic procedures in all modern modalities.

#### **7. Contrast & Special Radiography procedures.**

Barium swallow - barium meal - barium enema (single and double contrast), Enteroclysis PTBD, Sinograms, Fistulograms, IVU, AUG, MCU, HSG, Sialogram, T-tube Cholangiogra –Fluoroscopy, Image intensifiers - Tomography basics, etc

#### **8. Quality Control in Radiology & Radiation Safety**

Quality control procedure in Radiology as per NABH.

Biological effects of Radiation – Radiation dose –Effects of time, distance and shielding – personnel and area monitoring – Planning of X-ray rooms, dark rooms – Evaluation of workload versus radiation factors – Radiation safety instruments - ICRP / AERB recommendations.