



५. वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत पुरा अङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ। तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन।
६. द्वितीय पत्रको विषयगत प्रश्नका लागि तोकिएका १० अङ्कका प्रश्नहरूको हकमा १० अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ।
७. यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरू परीक्षाको मिति भन्दा ३ (तीन) महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ।
८. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ।
९. अन्तर्वार्ताको अंकभार सम्बन्धमा प्रहरी सेवाको पदमा नियुक्ति र बहुवा गर्दा अपनाउनु पर्ने सामान्य सिद्धान्त, २०६९ को अनुसूची-१९ मा व्यवस्था भए बमोजिम हुनेछ।
१०. पाठ्यक्रम लागू मिति :-

नेपाल प्रहरी प्राविधिक सेवा, रेडियोग्राफी समूह  
प्रहरी निरीक्षक (रेडियोग्राफी) को प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

## **Subject Details**

### **Section I 6%**

#### **Human Anatomy**

- Unit I: Introduction of Anatomy of Human Body as whole
- Unit II: Musculo-skeletal system
- Unit III: Nervous System
- Unit IV: Cardiovascular System
- Unit V: The Lymphatic System
- Unit VI: The Respiratory system
- Unit VII: The Digestive System
- Unit VIII: The Urinary System
- Unit IX: The Reproductive System
- Unit X: Special Senses
- Unit XI: The Endocrine system
- Unit XII: Practical-identification of major bones, muscles, central and peripheral nervous system, organs of respiratory system, heart and vessels, organs of GIT, organs of reproductive and endocrine system, organs of urinary system

### **Section II 6%**

#### **Human Physiology**

- Unit I: General Physiology
- Unit II: Cardiovascular system and Blood, Applied-Shock, CPR, Hypertension, Anemia
- Unit III: Respiratory system, applied-cyanosis, hypoxia, dyspnoea, hyperventilation, respiratory failure, COPD
- Unit IV: Digestive System, applied-ulcer, diarrhea, constipation, vomiting, malabsorption syndrome, pancreatitis and jaundice
- Unit V: The Musculoskeletal system, applied-exercise, atrophy, hypertrophy of muscle, fasciculation and fibrillation
- Unit VI: The Nervous System/Special senses, applied-paralysis, convulsion, refractive errors, pupillary reaction in life and death, upper and lower motor neuron lesion, Babinski's sign and ataxia and tuning fork hearing tests
- Unit VII: The Urinary system, applied-renal stones, ureteric stones and bladder stones, renal function, acidosis, alkalosis and renal failure
- Unit VIII: The endocrine and reproductive System,

### **Section III 8%**

#### **Basic Radiation Physics**

- Unit I: Electricity - Current, Voltage, Faradays' laws, Linz's laws, mutual induction phenomena
- Unit II: Transformer - Different types of transformer (step down and step up transformer, central tapped transformer, Auto transformer and variacter transformer)
- Unit III: Thermionic Emission, semiconductor and Rectifiers - phenomena of thermionic emission and Richardson, formation of P and N type semiconductor
- Unit IV: Atomic Structure and Electromagnetic Radiation - Different electron shell Bohr's theory of hydrogen atom, phenomenon of excitation and ionization and their corresponding potential
- Unit V: Measure of Electromagnetic Radiation and other Particles - measurement of radiation and particles
- Unit VI: X-Rays - X-ray production (gas filled tube and Coolidge tube) and the properties and uses of it.
- Unit VII: Radioactivity - Discovery of Nucleus and its constituents (Proton, Neutron), mass number, atomic mass, atomic mass unit and isotopes.
- Unit VIII: Interaction of Radiation with Matter - Radiation passes through the body, difference between homogeneous and heterogeneous beam.
- Unit IX: Ultrasound - longitudinal wave and high frequency sound wave, generation and reception of ultrasound, intensity, power and field of ultrasound.

### **Section IV 8%**

#### **Radiographic Equipment**

- Unit I: X-ray Tubes - X-ray tube tubes and its development, basic design of stationary and rotating anode x-ray tube.
- Unit II: Radiographic Couches, Stands and Tube Supports - Classify X-ray tube supports, various types of Radiographic couches.
- Unit III: Exposure Timers - Different type of timers ( photoelectric timer and ionization chamber timer)
- Unit IV: Beam Centering and beam Limiting Devices - Functioning of Coins and cylinders, Aperture diaphragms, Lighting beam diaphragms, positive beam limitation
- Unit V: Portable and Mobile Radiographic Equipments -
- Unit VI: Control of Scattered Radiation - Significance of scattered radiation, methods of controlling scattered radiation, and techniques of reducing the amount of scattered radiation produced.
- Unit VII: Fluoroscopic Equipment - Conventional fluoroscopy, fluoroscopy screen and fluoroscopic image, features of fluoroscopic X-ray table.

- Unit VIII: Radiation protection - Radiation sensitivity, factors influencing radio-sensitivity.
- Unit IX: Tomography - Principle of Tomography, features of tomography equipment.
- Unit X: Equipment for dental Radiography
- Unit XII: Mammographic Equipment -Differentiate Mammography x- ray tube and ordinary x-ray tube.
- Unit XIII : Photofluorography - design photofluorography system (cut film and roll film type )

## **Section V 8%**

### **Radiographic photography**

- Unit I: Radiographic Photography Principles - Photographic effect, photosensitive materials, photographic emulsion, gelatin and function of the gelatin binder.
- Unit II: X-ray Films - background of X-ray film and its construction, duplitzed x-ray film.
- Unit III: Image Characteristics - real and mental image, reflected, transmitted and emitted light image.
- Unit IV: X-ray Film Processing - development of hand processing to automatic processing, processing cycles, constituent of developing solutions and developer replenisher solution.
- Unit V: Storage & Archiving of Film - Storage areas, storage condition.
- Unit VI: Intensifying screens - luminescence, fluorescence and phosphorescence, quantum detection efficiency.
- Unit VII: Design and Construction of Darkroom - Layout of a well-equipped ideal darkroom, darkroom location, size, radiation protection, floor.
- Unit VIII: Presentation and viewing of Radiographs - Types of information: essential, technical and miscellaneous, methods of recording information: opaque letters and legends, actinic marking and perforating device.
- Unit IX: Estimation of Exposure Factors - Kilo voltage (kV) and its effect in radiographic image, Milliampere second (mAs) and its effect in radiographic image.

## **Section VI 8%**

### **Radiographic Technique**

- Unit I: Introduction to Radiographic Technique- Identity some abbreviation and common medical terms, radiographic positioning terminology.
- Unit II: Skeletal System
- Unit III: Upper Limb - Process of all routine radiographic examination of upper limb including fingers thumb, hand, wrist joint, radio-ulnar joint, lower two third of radius and Ulna.

- Unit IV: Shoulder Girdle and Thorax - View of head humerus, shoulder joints; shoulder outlet view, acromio-calvicular joint, view of scapula.
- Unit V: Lower Limb - radiographic examination of the lower limb including foot, toes, great toe, tarsus calcaneum, talo- calaneum.
- Unit VI: Vertebral Column - Radiographic examination of the spines cranio- vertebral joint, atlanto-occipital joint.
- Unit VII: Pelvic Girdle and HIP Regions - Radiographic examination for whole pelvis, ileum, ischium, and pubic bones.
- Unit VIII: Skull - Process of routine examination of the bones of skull face, cranium, mandible, zygomatic arches, nasal bone.
- Unit IX: Thoracic Cage and Abdomen - Radiographic examination of the thoracic cage including lungs, trachea, bronchi, mediastinal structure, hart and sternum, ribs.
- Unit X: Pelvimetry - Radiation hazard.
- Unit XI: Ward and Domiciliary Radiography -
- Unit XII: Use of Portable/mobile x-ray in ward and operation theatre - Main function and supply of apparatus, procedure in collaboration with theatre staffs.
- Unit XIII: Mammography - Principle and routine of radiography views of mammography.
- Unit XIV: Macro-Radiography - Principles and its application.
- Unit XV: Tomography - Practical application of tomography of the chest, kidney, gall bladder, skeletal system.
- Unit XVI: Registration Process - Steps of registration of patient
- Unit XVII: Dental Radiography

## **Section VII      5%**

### **Hospital Practice & Patient Care**

- Unit I: Communication Skills - Initiate the interaction, identify the reason for examination, and deal with people from different social background.
- Unit II: The Hospital, the patient & the radiographer
- Unit III: Features of General Patient Care - General preliminaries to the examination, moving chair and stretcher with patient.
- Unit IV: Sterilization and sterile Techniques - Methods of sterilization.
- Unit V: The Infectious Patient
- Unit VI: Nursing Procedures - Laying up a sterile trolley, injection technique, process of oxygen therapy and resuscitation
- Unit VII: First aid in X-ray department, shock, hemorrhage, burns, loss of consciousness
- Unit VIII: General First Aid
- Unit IX: Maternal and Child health
- Unit X: Medico-legal aspects of the Radiographers' work

## **Section VIII 3%**

### **Basic Health Sciences-III**

- Unit I: Pharmacology-pharmacokinetics, pharmacodynamics, Iodine, Barrium, Muscle relaxant and sedative hypnotics
- Unit II: Microbiology-Eukyarotypes, prokyrotypes, viruses, bacteria, fungus, parasites
- Unit III: General Pathology-Musculoskeletal system, respiratory system, cardiovascular system, endocrine system, hemopoetic system
- Unit IV: Biochemestry-carbohydrate, protein, fat, enzymes, pH, buffer system

## **Section IX 8%**

### **Radiological Procedures:**

- Unit I: First Aid and Emergency Care
- Unit II: Contrast medias -Types, methods of introduction, reactions, emergency equipments and drugs to cope the reaction
- Unit III: Radiographic investigations of gastro-intestinal tract using contrast medias- indications, contraindications and preparation
- Unit IV: Investigations of urinary tract and hysteron-salphingography- indications, contraindications and preparation of contrast media and radiographic techniques
- Unit V: Radiographic procedure of biliary tract-OCG, IVC, PTC and PTC D
- Unit VI: Vascular and neurological examinations- carotid and vertebral, femoral aortogram, phlebogram, enecephlaogram, ventriculogram, myelogram
- Unit VII: Special Examinations-Arthrogram, Dacrocystogram, sinogram, Fistulogram, Siologram, Bronchogram, Mammogram, Lymphangiogram, Thermogram, Micro radiography, Soft tissue radiography
- Unit VIII: Paediatric Radiography-Paediatric radiology

## **Section X 6%**

### **Radiological and Cross-Sectional Anatomy**

- Unit I: Head and Neck
- Unit II: Thorax
- Unit III: Abdomen and Pelvis
- Unit IV: Shoulder, Elbow and Wrist Joints
- Unit V: Hip, Knee and Ankle Joints

## **Section XI 10%**

### **Physics of Modern Medical Imaging Technology**

- Unit I: Dental Imaging
- Unit II: Computed Tomography (CT)
- Unit III: Magnetic Resonance Imaging (MRI)
- Unit IV: Ultrasonography

- Unit V: Nuclear Medicine

**Section XII      4%**

**Bio-statistics and Research Methodology**

- Unit I: Biostatistics -Scope functions, limitations and usefulness, frequency distribution, central tendency, probability, Correlation and correlation coefficient, regression analysis etc
- Unit II: Basic Epidemiology-Definition, aims, descriptive epidemiology, analytical epidemiology, etc
- Unit III: Research Methodology
- Unit IV: Development of project proposal

**Section XIII      8%**

**Special Imaging Techniques**

- Unit I: Computed Tomography (CT)-over view, application and perform of various kinds of CT in the Human body, helical spiral multislice CT scanning and 3D reconstruction
- Unit II: MRI-over view, application, perform MRI on various parts of the human body

**Section XIV      5%**

**Quality Assurance in Radio diagnosis**

Quality, light beam, developer, fixer activity, processing chemicals, screen film, grid movement test, collimator test, safe light test, radiation output reproducibility, consistency of radiation output, accuracy of timer test and KVP test, alignment of X-ray beam to X-ray table test, reject film analysis, focal spot size measurement test

**Section XV      2%**

**Information Technology**

- Unit I: Basic concept of computer application
- Unit II: Information technology basic
- Unit III: Making digital image
- Unit IV: Image capture techniques and dicom (digital imaging and communication in medicine)
- Unit V: Data compression
- Unit VI: Local area networks
- Unit VII: PACS Picture archiving and communication system
- Unit VIII: Legal and Financial issues in Tele radiology



**Section XVI      3%**

**Health Care Management**

- Unit I: Introduction
- Unit II: Personal and Interpersonal Skills
- Unit III: Health and Management Planning
- Unit IV: Organizing Function of Management
- Unit V: Human Resource Management
- Unit VI: Logistic Management
- Unit VII: Health Information Management
- Unit VIII: Financial Management
- Unit IX : Management Research

**Section XVII      2%**

**Basic X-ray Engineering**

- Unit I: Basic items for Electric and Electronic Circuit
- Unit II: The Components and the electronic circuits for X-ray unit
- Unit III: Dark Room electrical and Mechanical Component

## **Model Questions:**

### **Group A:**

1. How do you perform I.V.U. in patient with B/L Hydronephrosis?
2. How do you perform an M.C.V. patient with folley's catheter?
3. What do you mean by mortise view waters view?
4. What is Thoracic cage and what are its bony parts?
5. What preparation do you need to give to a patient going under barium series?
6. Do you need to give a preparation to the patient for K.U.B.
7. Write shortly on Renal function.
8. What do you know about mastoid view?
9. How do you perform an examination to a patient with bullet in abdominal cavity?
10. Write down the views of fore arm?
11. What view do you perform for Sellaturcia?
12. What do you mean by "T" Tube Cholangiogram?

### **Group B:**

1. Write the indications for C.T. Routine Thorax
2. Describe about generation and principle of CT Scan
3. What is pitch?
4. What do you mean by H.R.C.T.?
5. Write down the indications for CT Enteroclysis.
6. Write down indication for CT Angiography of the abdomen.
7. Write down indication for CT Colonoscopy.
8. Write down indication for contrast enhanced cerebrum sequences.
9. Write down indication for CT Angiography for the circle of willis.