

**पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवा आयोग**  
 प्राविधिक सेवा, रेडियोलोजी समूह, रेडियोलोजी टेक्नोलोजिष्ट पद, तह ७ को  
 खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम  
 एवं परीक्षा योजना

१. प्रथम चरण : – लिखित परीक्षा						पूर्णाङ्क :- २००	
पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	Technical Subject, General Knowledge and Related Legislation	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न	५० प्रश्न x २ अङ्क	४५ मिनेट
द्वितीय		१००	४०	विषयगत	छोटो उत्तर लामो उत्तर	४ प्रश्न X ५ अङ्क ५ प्रश्न X १० अङ्क	३ घण्टा
					समस्या समाधान	२ प्रश्न x १५ अङ्क	
२. द्वितीय चरण : – अन्तर्वार्ता							
विषय		पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		समय	
अन्तर्वार्ता		३०	-	मौखिक			

**द्रष्टव्य :**

- यो परीक्षा योजनालाई प्रथम चरण (लिखित परीक्षा) र द्वितीय चरण (अन्तर्वार्ता) गरी दुई चरणमा विभाजन गरिएको छ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरू सोधिनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको 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 ।
- विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति :- २०८१/१२/०४

**नोट: प्रथम पत्र र द्वितीय पत्रको विषयवस्तु एउटै हुनेछ ।**

पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवा आयोग  
प्राविधिक सेवा, रेडियोलोजी समूह, रेडियोलोजी टेक्नोलोजिष्ट पद, तह ७ को  
खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

प्रथम तथा द्वितीय पत्र :-

प्राविधिक विषय, सामान्य ज्ञान र सम्बन्धित कानूनहरु  
(Technical Subject, General Knowledge and Related Legislation)

**खण्ड (A): 80 Marks**

## **Technical Subject**

### **1. ANATOMY & PHYSIOLOGY**

#### **1.1. INTRODUCTION**

- 1.1.1 General anatomical terms
- 1.1.2 Human cell structure and function
- 1.1.3 The tissues

#### **1.2. MUSCULO-SKELETAL SYSTEM**

- 1.2.1 Formation, growth and development of bones
- 1.2.2 Function of bone according to the size and shape of bone
- 1.2.3 Classification of bone
- 1.2.4 Classification of joints and their function
- 1.2.5 Different groups of muscle responsible for joint movement

#### **1.3. NERVOUS SYSTEM**

- 1.3.1 Neuron and nerve cells
- 1.3.2 Central nervous system and brain
- 1.3.3 Parts of ventricles of the brain and their extent
- 1.3.4 The cerebrospinal fluid
- 1.3.5 Midbrain and brain stem
- 1.3.6 Peripheral nervous system
- 1.3.7 Autonomic nervous system
- 1.3.8 Cranial nerves, spinal nerves

#### **1.4. CARDIO-VASCULAR SYSTEM**

- 1.4.1 Blood vessels- arteries, veins, and capillaries
- 1.4.2 Different parts of heart and its function
- 1.4.3 Cardiac cycle
- 1.4.4 Systemic circulation
- 1.4.5 Pulmonary circulation
- 1.4.6 Coronary circulation
- 1.4.7 Aorta
- 1.4.8 Inferior venacava (IVC) & Superior venacava (SVC)

#### **1.5. THE LYMPHATIC SYSTEM**

- 1.5.1 Lymphatic System
- 1.5.2 Lymph nodes
- 1.5.3 Spleen
- 1.5.4 Thymus gland

#### **1.6. THE RESPIRATORY SYSTEM**

- 1.6.1 Respiration, Alveolar respiration
- 1.6.2 Lungs and Pleura
- 1.6.3 Organs of the respiratory system, Respiratory passages (Nose, Pharynx, Larynx, Trachea, Bronchioles, Alveoli)

**1.7. THE DIGESTIVE SYSTEM**

- 1.7.1 Organs of the digestive system, Mouth, Pharynx, Esophagus, Stomach, Small intestine, large intestine, rectum and anal canal Salivary glands
- 1.7.2 Function of alimentary tract
- 1.7.3 Pancreas, Liver, biliary tract and their function
- 1.7.4 Metabolism of Carbohydrates, Protein and fat

**1.8. THE URINARY SYSTEM**

- 1.8.1 Organs of urinary system: Kidneys, ureters, bladder, and urethra
- 1.8.2 Kidneys-position, gross structure, cortex, medulla pelvis
- 1.8.3 Functional unit of kidney: nephron, function of kidneys
- 1.8.4 Formation of urine, water-electrolyte balances in body
- 1.8.5 Ureters: Position structure and function
- 1.8.6 Micturation-reflex control
- 1.8.7 Structure and function of the urinary bladder and urethra
- 1.8.8 Supra-renal glands, prostate gland

**1.9. THE REPRODUCTIVE SYSTEM**

- 1.9.1 Female Reproductive System & Breast
  - 1.9.1.1 External genitalia, Uterus, Ovaries: Position, structure functions
  - 1.9.1.2 Menstrual cycle, Reproduction & menopause
  - 1.9.1.3 Breast-Position, structure and its functions
  - 1.9.1.4 Puberty
- 1.9.2 Male Reproductive System:
  - 1.9.2.1 Position structure and functions of scrotum, testes, epididymis, deferent ducts, seminal vesicles, ejaculatory ducts and penis
  - 1.9.2.2 Puberty

**1.10. SPECIAL SENSES**

- 1.10.1 Skin- structure and function
- 1.10.2 The ear (external, middle & internal ear)-structure and function
- 1.10.3 The Eyes- structure & functions.
- 1.10.4 Nose- structure and functions
- 1.10.5 Tongue-structure, functions
- 1.10.6 Taste buds and Sense of taste

**1.11. THE ENDOCRINE SYSTEM**

- 1.11.1 Endocrine glands - pituitary gland, thyroid gland, parathyroid glands, adrenal gland, islets of langerhans, pineal gland, testis, ovaries, thymus
- 1.11.2 Endocrine glands - Position, structure, functions and hormone secretion

**2. BASIC RADIATION PHYSICS**

**2.1 REVIEW OF ELECTRICITY**

- 2.1.1 Electromagnetic induction and its laws
- 2.1.2 Self and mutual induction
- 2.1.3 A.C generator, Peak and effective values of AC
- 2.1.4 Concept of Reactance, Impedance & phase angle

**2.2 TRANSFORMER**

- 2.2.1 Theory, construction, Losses & Efficiency, Transformer ratings
- 2.2.2 Filament transformer
- 2.2.3 High-tension transformer
- 2.2.4 Autotransformer or variac transformer

- 2.3 THERMIONIC EMISSION AND RECTIFIERS
  - 2.3.1 Diode - construction, principle & characteristics
  - 2.3.2 Rectifiers: Self-rectification, Half-wave, Full-wave (two valves and four valves) and constant voltage rectifiers
  - 2.3.3 The cold cathode gas filled diode and its use
- 2.4 ATOMIC STRUCTURE AND ELECTROMAGNETIC RADIATION
  - 2.4.1 Electron, proton, neutron, mass number, and atomic number
  - 2.4.2 Isotopes, isobars and isomers
  - 2.4.3 Electron shells & energy levels
  - 2.4.4 Excitation and ionization
  - 2.4.5 Emission of electromagnetic waves, spectra
  - 2.4.6 Properties of electromagnetic waves
  - 2.4.7 Concept of photon and quanta
  - 2.4.8 Photoelectric effect, photocell
- 2.5 RADIOACTIVITY
  - 2.5.1 Radioactive elements, radioactive disintegration
  - 2.5.2 Properties of radioactive particles
  - 2.5.3 Radioactive decay law, half-life, mean life
  - 2.5.4 Artificial radioactivity: Radioactivity induced by neutron bombardment and proton bombardment
  - 2.5.5 Nuclear binding energy, nuclear stability
  - 2.5.6 Alpha, beta and gamma disintegration
  - 2.5.7 Introduction to fission and fusion
- 2.6 X-RAYS
  - 2.6.1 Historical background
  - 2.6.2 X-ray tube
  - 2.6.3 Mechanism of x-ray production
  - 2.6.4 Properties of x-rays, intensity & quality of x-rays, continuous and characteristic spectra
  - 2.6.5 Effects of variation of tube current and voltage, Brag's law for wavelength determination
  - 2.6.6 X-ray control and indicating equipment: simple circuit diagram as illustration of sequence from mains supply to exposure control
  - 2.6.7 Mains voltage circuit
  - 2.6.8 Mains cables, Switches and fuses
  - 2.6.9 Mains voltage compensation, earthing, insulation, voltage drops in cables
  - 2.6.10 X-ray tube voltage control and indication
  - 2.6.11 Exposure controls. Contactors and timers
  - 2.6.12 X-ray tube current control and filament supply, mA compensation, Generator regulation
- 2.7 INTERACTION OF RADIATION WITH MATTER
  - 2.7.1 Thompson scattering
  - 2.7.2 Photoelectric interaction
  - 2.7.3 Compton scattering
  - 2.7.4 Pair production
  - 2.7.5 Transmission of a homogenous and heterogeneous x-ray beam through matter
  - 2.7.6 Effects of filtration

- 2.7.7 Relative amount of scatter from an x-ray beam during the passage through matter
- 2.7.8 Effects of collimation
- 2.8 RADIATION DETECTION AND MEASUREMENT
  - 2.8.1 Principle of measurement
  - 2.8.2 Ionization chamber, Electrometer
  - 2.8.3 Scintillation counter
  - 2.8.4 Gieger-muller counter
  - 2.8.5 Thimble chamber
  - 2.8.6 Condenser chamber
- 2.9 RADIATION PROTECTION
  - 2.9.1 Objective and principle of radiation protection
  - 2.9.2 Radiation and Radiation units
  - 2.9.3 Personnel monitoring
  - 2.9.4 Protective materials
  - 2.9.5 ICRP recommendations on dose limits
- 2.10 ULTRASOUND
  - 2.10.1 Longitudinal waves
  - 2.10.2 Principles of ultrasound, intensity, power and fields
  - 2.10.3 Transmission of ultrasound
  - 2.10.4 Velocity of ultrasound in different media
  - 2.10.5 Ultrasonic interactions, absorption and scattering mechanism in tissue, refraction and reflection of ultrasound
  - 2.10.6 Damping of ultrasound in media
  - 2.10.7 Doppler effect
- 3. **RADIOGRAPHIC TECHNIQUE**
  - 3.1 UPPER LIMB
    - 3.1.1 Technique for whole hand, fingers, thumb, wrist joint, Radio ulnar joints
    - 3.1.2 Supplementary technique: carpal tunnel, scaphoid, ulnar groove, head of radius
    - 3.1.3 Supplementary views of elbow, humerus & Supra-condylar projection
  - 3.2 SHOULDER GIRDLE AND THORAX
    - 3.2.1 Technique for shoulder joint, acromio-clavicular joint, and scapula
    - 3.2.2 Supplementary views: projection to show recurrent dislocation of shoulder, infero-superior projection of clavicle, sterno-clavicular joint, sternum, ribs
  - 3.3 LOWER LIMB
    - 3.3.1 Technique for whole foot, toes, great toe, calcaneum, talo-calcaneal joint, ankle joint, lower leg with ankle joint
    - 3.3.2 Knee joint, patella, tibio-fibular joints
    - 3.3.3 Supplementary technique for torn ligaments, flat feet, axial view of calcaneum, skyline view of patella, intercondylar notch view
  - 3.4 VERTEBRAL COLUMN
    - 3.4.1 Technique for cranio-vertebral joint, atlanto-occipital joint, first three cervical vertebra, odontoid peg view
    - 3.4.2 Cervical spine for intervertebral joints and foramina, cervico thoracic vertebrae
    - 3.4.3 Thoracic spine, thoraco-lumbar vertebrae

- 3.4.4 Lumbar spine, intervertebral joints and foramina, lumbo-sacral joint, sacrum, coccyx
- 3.4.5 Supplementary techniques, to demonstrate scoliosis, kyphosis, spondylolisthesis
- 3.5 PELVIC GIRDLE AND HIP REGION
  - 3.5.1 Technique for whole pelvis, ileum, ischium and pubic bones
  - 3.5.2 Sacroiliac joints, symphysis pubis, hip joints, acetabulum, neck of femur
  - 3.5.3 Supplementary projections: acetabulum view, judet view, Von-Rosen view and frog leg view for hip joint (CDH)
- 3.6 SKULL
  - 3.6.1 Routine views of Skull, Towne's view, SMV, Emergency Skull radiography
  - 3.6.2 Technique for mastoids, styloid process, IAM
  - 3.6.3 Routine views for facial bones, mandible, zygomatic arches, nasal bone, maxilla, temporo-mandibular joints
  - 3.6.4 Optic foramina, macroradiography for optic foramina
  - 3.6.5 Routine and special views for Paranasal sinuses
- 3.7 CHEST RADIOGRAPHY
  - 3.7.1 Routine radiography of chest, High kV technique for Chest
  - 3.7.2 Supplementary views: apicogram, lordotic and oblique views, lateral decubitus, diaphragmatic excursions double exposure technique
- 3.8 WARD AND OPERATION THEATRE RADIOGRAPHY
  - 3.8.1 Knowledge of Electrical supply, radiation protection
  - 3.8.2 Radiography of bed-ridden patients
  - 3.8.3 Radiography in operation theatre
- 3.9 MAMMOGRAPHY
  - 3.9.1 Soft tissue radiography
  - 3.9.2 Principle and technique of mammography
- 3.10 MACRO-RADIOGRAPHY
  - 3.10.1 Definition, principles and its applications
  - 3.10.2 Magnification factors and uses of magnification radiography
- 4. **SPECIAL RADIOLOGICAL PROCEDURES**
  - 4.1 **FIRST AIDS AND EMERGENCY CARE**
    - 4.1.1 Introduction to Shock, emergency treatment, Cardio-Pulmonary resuscitation (CPR)
    - 4.1.2 Introduction to Haemorrhage, primary management of haemorrhage
  - 4.2 **CONTRAST MEDIA**
    - 4.2.1 Introduction to contrast media
    - 4.2.2 Definition, types and uses of contrast media
    - 4.2.3 Properties of contrast media
    - 4.2.4 Adverse effects of contrast media and their management
    - 4.2.5 Emergency trolley setting
    - 4.2.6 Life saving drugs and emergency trays
  - 4.3 **ALIMENTARY TRACT**
    - 4.3.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming & post procedure care for following investigations:
      - 4.3.1.1 Barium swallow
      - 4.3.1.2 Barium meal

- 4.3.1.3 Barium follow -through
- 4.3.1.4 Small bowel enema
- 4.3.1.5 Barium enema -single contrast, -double contrast
- 4.3.1.6 Loopogram

#### 4.4 BILIARY TRACT

4.4.1 Definition, indications, contraindications, equipment required contrast media, preparation of the patient, technique / procedure, filming, post procedure care for following investigations:

- 4.4.1.1 Percutaneous transhepatic cholangiography (PTC)
- 4.4.1.2 Endoscopic retrograde cholangio-pancreatography (ERCP)
- 4.4.1.3 Per operative cholangiography (POC)
- 4.4.1.4 T-tube cholangiography

#### 4.5 URINARY TRACT

4.5.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming, post procedure care for following investigations:

- 4.5.1.1 Intravenous urography (IVU), Modification of IVU and additional techniques
- 4.5.1.2 Percutaneous nephrostomy (PCN)
- 4.5.1.3 Retrograde pyelography (RGP)
- 4.5.1.4 Micturating cysto-urethrography

#### 4.6 REPRODUCTIVE SYSTEM

4.6.1 Definition, indications, contraindications, equipment required contrast media, preparation of the patient, technique/procedure, filming, post procedure care for Hysterosalpingography

#### 4.7 CARDIO-VASCULAR SYSTEM

4.7.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming, post procedure care for following investigations:

- 4.7.1.1 Carotid angiography
- 4.7.1.2 Abdominal aortography
- 4.7.1.3 Portal venography
- 4.7.1.4 Peripheral and lower limb venography

#### 4.8 MYELOGRAPHY

4.8.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming, post procedure care for following investigations:

- 4.8.1.1 Lumbar, Thoracic and Cervical Myelography
- 4.8.1.2 Post Myelo-CT (CT Myelography)

#### 4.9 ARTHROGRAPHY

4.9.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming, post procedure care for following investigations:

- 4.9.1.1 Knee Arthrography
- 4.9.1.2 Hip Arthrography

#### 4.10 SINOGRAPHY

- 4.10.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique /procedure, filming, post procedure care for Sinography
- 4.11 SIALOGRAPHY
- 4.11.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming, post procedure care for following investigations:
- 4.11.1.1 Parotid sialography
- 4.11.1.2 Sub-mandibular sialography
- 4.12 DACRYOCYSTOGRAPHY
- 4.12.1 Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming, post procedure care for Dacryocystography.
5. **EQUIPMENT FOR DIAGNOSTIC RADIOLOGY**
- 5.1 X-RAY TUBES
- 5.1.1 Overview of production of x-rays, Historical background
- 5.1.2 Components of an x-ray tube: Cathode assembly, Anode assembly
- 5.1.3 Stationary and rotating anodes
- 5.1.4 Line focus principle, anode heel effect, Off-focus radiation
- 5.1.5 Glass envelope, tube shielding, care of x-ray tubes
- 5.1.6 X-ray tube faults
- 5.1.7 Modification and recent advances in x-ray tube
- 5.2 RADIOGRAPHIC COUCHES, STANDS AND TUBE SUPPORTS
- 5.2.1 X-ray tube supports
- 5.2.2 Radiographic couches
- 5.2.3 Chest stands and vertical bucky
- 5.2.4 Modern basic radiographic units
- 5.3 EXPOSURE TIMERS
- 5.3.1 Clockwork timer, synchronous motor and impulse timers
- 5.3.2 Electronic timers
- 5.3.3 Autotimers (photoelectric timer and ionization chamber timer)
- 5.4 BEAM CENTERING & BEAM LIMITING DEVICES
- 5.4.1 Cones and cylinders, Aperture diaphragms
- 5.4.2 Light beam diaphragms, Positive beam limitation
- 5.5 PORTABLE AND MOBILE RADIOGRAPHIC EQUIPMENTS
- 5.5.1 Main features of portable and mobile equipment
- 5.5.2 Mains dependent mobile equipment
- 5.5.3 Capacitor discharge equipment
- 5.5.4 Battery powered generators
- 5.6 CONTROL OF SCATTERED RADIATION
- 5.6.1 Significance of scattered radiation
- 5.6.2 Reduction in the amount of scatter radiation produced (field size, use of appropriate exposure factors, compression band)
- 5.6.3 Reduction in the amount of scatter radiation reaching to the film (metal backing of cassettes, filters, air-gap technique, cones and diaphragms, Grids)
- 5.6.4 Grid: construction, function, grid characteristics, grid types and patterns. Grid movement
- 5.6.5 Reduction in the effect of scatter (use of intensifying screens)

- 5.7 FLUOROSCOPIC EQUIPMENT
  - 5.7.1 Conventional fluoroscopy
  - 5.7.2 Mobile and specialised fluoroscopic units
  - 5.7.3 Image intensified fluoroscopy
  - 5.7.4 Image intensifier- construction and working principle
  - 5.7.5 TV camera and TV monitor
  - 5.7.6 Digital fluoroscopy
- 5.8 EQUIPMENT FOR DENTAL RADIOGRAPHY
  - 5.8.1 A simple dental radiographic unit, Orthopantomography (OPG)
- 5.9 VASCULAR IMAGING EQUIPMENT
  - 5.9.1 Generators and x-ray tubes
  - 5.9.2 C-Arm/U-Arm assembly
  - 5.9.3 Angiographic tables
  - 5.9.4 Automatic pressure injectors
  - 5.9.5 Digital subtraction Angiography
- 5.10 MAMMOGRAPHIC EQUIPMENT
  - 5.10.1 Mammography x-ray tube
  - 5.10.2 Image receptors in mammography
  - 5.10.3 Apparatus for magnification radiography in mammography
  - 5.10.4 Digital mammography/ Digital Breast tomosynthesis
- 5.11 DIGITAL IMAGING
  - 5.11.1 Introduction to digital imaging concepts and advantages of image digitization
  - 5.11.2 Digital image structure
  - 5.11.3 Digital radiography: Scanned projection radiography (SPR), Computed radiography (CR), Direct digital radiography (DR)
- 5.12 COMPUTED TOMOGRAPHY (CT)
  - 5.12.1 Basic principles of CT
  - 5.12.2 Generations of CT/ MDCT/Newer advances in CT
  - 5.12.3 System components
  - 5.12.4 Image characteristics & Image quality in CT
  - 5.12.5 Artifacts in CT.
- 5.13 MAGNETIC RESONANCE IMAGING (MRI)
  - 5.13.1 Fundamental concepts: magnetic moments, precession, resonance, nuclear magnetic resonance (NMR)
  - 5.13.2 Introduction to MR Scanners: imaging magnets, RF transmitter and receiver coils, shim coils and gradient coils
  - 5.13.3 Principal parameters of MRI: spin density, T1 relaxation time, T2 relaxation time
  - 5.13.4 Basic principles of MR imaging and related parameters
  - 5.13.5 Spin echo pulse sequence
  - 5.13.6 Gradient echo pulse sequence
  - 5.13.7 Artifacts in MRI
  - 5.13.8 Advances in MR technology.
- 5.14 CT AND MRI TECHNIQUE
  - 5.14.1 Technique for Brain
  - 5.14.2 Technique for Head, Chest, Abdomen and other body parts
  - 5.14.3 Technique for CTA and MRA

5.14.4 Technique for Spine and Joint

6. **RADIOGRAPHIC PHOTOGRAPHY**

6.1 **PHOTOGRAPHIC PRINCIPLE**

- 6.1.1 Photographic effect
- 6.1.2 Photosensitive materials
- 6.1.3 Photographic emulsion
- 6.1.4 Characteristic curve
- 6.1.5 Spectral sensitivity
- 6.1.6 Direct exposure film (x-ray sensitive)
- 6.1.7 Gurney-Mott theory of latent image formation

6.2 **FILM MATERIALS**

- 6.2.1 Construction of x-ray film
- 6.2.2 Film for medical imaging
- 6.2.3 Comparison between single coated and double coated x-ray films

6.3 **FILM STORAGE**

- 6.3.1 Different storage areas
- 6.3.2 Ideal storage condition
- 6.3.3 Stock control and film ordering methods

6.4 **INTENSIFYING SCREENS**

- 6.4.1 Luminescence: fluorescence and phosphorescence
- 6.4.2 Construction of Intensifying screen and their types
- 6.4.3 Types of phosphors: calcium tungsten, rare earth and their comparison
- 6.4.4 Detective Quantum efficiency (DQE)
- 6.4.5 Quantum mottle
- 6.4.6 Care, monitoring and cleaning of IF screen
- 6.4.7 X-ray film cassettes
- 6.4.8 Cassette function, construction, materials used, types and care of cassettes

6.5 **RADIOGRAPHIC PROCESSING**

- 6.5.1 Manual and Automatic processing
- 6.5.2 Processing cycles
- 6.5.3 Processing chemical
- 6.5.4 Care and maintenance of automatic processors
- 6.5.5 The principle of dry silver imager
- 6.5.6 Silver recovery
- 6.5.7 Daylight processing

6.6 **DESIGN AND CONSTRUCTION OF DARKROOM**

- 6.6.1 The layout of an ideal darkroom
- 6.6.2 Darkroom location, size, radiation protection, floor, walls / ceiling, ventilation and heating, entrance, white lighting and safe light and its test, film hoppers loading bench and wet bench

6.7 **THE RADIOGRAPHIC IMAGE**

- 6.7.1 Radiographic image quality
- 6.7.2 Factors affecting radiographic image quality
- 6.7.3 Image artifacts

6.8 **IDENTIFICATION AND VIEWING OF RADIOGRAPHS**

- 6.8.1 Methods of film

6.9 **Quality assurance in radiography**

**पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवा आयोग**  
प्राविधिक सेवा, रेडियोलोजी समूह, रेडियोलोजी टेक्नोलोजिस्ट पद, तह ७ को  
खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

**खण्ड (B): 20 Marks**

7. सामान्य ज्ञान तथा ऐन, नियमहरू **General Knowledge and Related Legislation**
- 7.1 नेपालको भौगोलिक, ऐतिहासिक, आर्थिक, सामाजिक, सांस्कृतिक र राजनैतिक अवस्था सम्बन्धी सामान्य जानकारी ।
- 7.2 राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामयिक घटनाहरू : राजनैतिक, आर्थिक, वैज्ञानिक, खेलकूद, सूचना प्रविधि, पुरस्कार, स्वास्थ्य
- 7.3 पाटन स्वास्थ्य विज्ञान प्रतिष्ठान ऐन, २०६४
- 7.4 पाटन स्वास्थ्य विज्ञान प्रतिष्ठानको कर्मचारी सेवाका शर्त र सुविधा सम्बन्धी नियमावली, २०६७
- 7.5 पाटन स्वास्थ्य विज्ञान प्रतिष्ठान आर्थिक प्रशासन नियमावली, २०६७
- 7.6 पाटन अस्पताल संचालन विनियमावली, २०६७
- 7.7 नेपाल स्वास्थ्य सेवा ऐन, २०५३ र स्वास्थ्य सेवा नियमावली, २०५५
- 7.8 नेपाल मेडिकल काउन्सिल ऐन, २०२० र नियमावली
- 7.9 नेपाल नर्सिङ परिषद् ऐन, २०५२
- 7.10 नेपाल स्वास्थ्य व्यवसायी परिषद् ऐन, २०५३

प्रथम तथा द्वितीय पत्रमा यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

प्रथम पत्र			
खण्ड	अङ्कभार	प्रश्न संख्या	
		वस्तुगत बहुवैकल्पिक प्रश्न	विषयगत
A	८०	४० प्रश्न X २ अङ्क = ८०	-
B	२०	१० प्रश्न X २ अङ्क = २०	-
जम्मा		५० प्रश्न X २ अङ्क = १००	-
द्वितीय पत्र			
खण्ड	अङ्कभार	प्रश्न संख्या	
		विषयगत	समस्या समाधान
A	१००	छोटो उत्तर ४ प्रश्न X ५ अङ्क = १० लामो उत्तर ५ प्रश्न X १० अङ्क = ५०	२ प्रश्न x १५ अङ्क = ३०
B	-	-	-
जम्मा		४ प्रश्न X ५ अङ्क = १० ५ प्रश्न X १० अङ्क = ५०	२ प्रश्न x १५ अङ्क = ३०

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