

पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवा आयोग
 प्राविधिक सेवा, रेडियोलोजि समूह, रेडियोलोजी टेक्निसियन पद, ५ तहको
 आन्तरिक र खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
एवं परीक्षा योजना

१. प्रथम चरण : – लिखित परीक्षा						पूर्णाङ्क :- २००	
पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	प्राविधिक विषय, र सम्बन्धित कानूनहरू	100	40	वस्तुगत	बहुवैकल्पिक प्रश्न	५० प्रश्न x २ अङ्क	४५ मिनेट
द्वितीय		100	40	विषयगत	प्रश्नोत्तर	१० प्रश्न X १०अङ्क	३ घण्टा
२. द्वितीय चरण : – अन्तर्वार्ता							
विषय		पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली			समय
अन्तर्वार्ता		30	-	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 ।
- 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 जेसुकै 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 सम्भन्नु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति :- २०८१/०२/३१

नोट: प्रथम पत्र र द्वितीय पत्रको विषयवस्तु एउटै हुनेछ ।

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पत्र/विषय :-

प्राविधिक विषय र सम्बन्धित कानूनहरू
(Technical Subject and Related Legislation)

खण्ड (A): 80 Marks

1. Anatomy and Physiology

- 1.1 General introduction
 - 1.1.1 The cell
 - 1.1.2 Reproduction of the individual
- 1.2 The tissues
 - 1.2.1 Epithelial, Connective, Skeletal, Muscular and Nervous tissue
- 1.3 General pathology
 - 1.3.1 Bacteria
 - 1.3.2 Viruses
 - 1.3.3 Tumours
- 1.4 Surface and regional anatomy
 - 1.4.1 The anatomical position
 - 1.4.2 Head, Neck, Thorax, Abdomen and Pelvic cavity
- 1.5 The skeleton
 - 1.5.1 The structure of bone
 - 1.5.2 Function of bone
 - 1.5.3 The development and growth of bones
 - 1.5.4 The healing of fractures
- 1.6 The skull
 - 1.6.1 The skull viewed from the above and the below
 - 1.6.2 The skull viewed from the side and the front
 - 1.6.3 The interior of the skullcap
 - 1.6.4 The interior of the base of the skull
 - 1.6.5 The nasal cavity
 - 1.6.6 The accessory nasal sinuses
 - 1.6.7 The individual bones of the skull
- 1.7 The vertebral column, ribs and sternum
 - 1.7.1 The vertebral column
 - 1.7.2 The ribs
 - 1.7.3 The sternum
- 1.8 The bones of the upper limb
 - 1.8.1 The clavicle
 - 1.8.2 The scapula
 - 1.8.3 The humerus
 - 1.8.4 The radius
 - 1.8.5 The ulna
 - 1.8.6 The carpal bones
 - 1.8.7 The metacarpal bones
 - 1.8.8 The phalanges
 - 1.8.9 Arteries and nerves related to the bones of the upper limb
 - 1.8.10 Ossification of the bones of the upper limb
- 1.9 The bones of the lower limb

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- 1.9.1 The hipbone
- 1.9.2 The pelvis
- 1.9.3 The femur
- 1.9.4 The patella
- 1.9.5 The tibia
- 1.9.6 The fibula
- 1.9.7 The tarsal bones
- 1.9.8 The metatarsal bones
- 1.9.9 The phalanges
- 1.9.10 The arches of the foot
- 1.9.11 Arteries and nerves related to the bone of the lower limb
- 1.9.12 Ossification of the bones of the lower limb
- 1.10 The joints of the bones of the lower limb
 - 1.10.1 Types of joints
 - 1.10.2 The muscles and joints of the head
 - 1.10.3 The joints and muscles of the neck and trunk
 - 1.10.4 The joints and muscles of the upper limb
 - 1.10.5 The joint and muscles of the lower limb
- 1.11 The circulatory system
 - 1.11.1 The blood
 - 1.11.2 The blood vessels
 - 1.11.3 The heart
 - 1.11.4 The pulmonary circulation
 - 1.11.5 The systemic circulation
 - 1.11.6 The veins
- 1.12 The lymphatic system
 - 1.12.1 Lymph
 - 1.12.2 The lymphatic vessels
 - 1.12.3 The lymph nodes
 - 1.12.4 The lymphatic drainage of the body
 - 1.12.5 Lymphatic tissue
 - 1.12.6 The spleen
- 1.13 The respiratory system
 - 1.13.1 The nose
 - 1.13.2 The pharynx
 - 1.13.3 The larynx
 - 1.13.4 The trachea
 - 1.13.5 The bronchi
 - 1.13.6 The lungs
 - 1.13.7 The physiology of respiration
- 1.14 The digestive system
 - 1.14.1 The mouth
 - 1.14.2 The salivary glands
 - 1.14.3 The pharynx
 - 1.14.4 The oesophagus
 - 1.14.5 The stomach
 - 1.14.6 The small intestine
 - 1.14.7 The large intestine
 - 1.14.8 The pancreas

- 1.14.9 The liver
- 1.14.10 The biliary apparatus
- 1.14.11 The function of the alimentary system
- 1.15 The urinary system
 - 1.15.1 The kidneys
 - 1.15.2 The ureters
 - 1.15.3 The urinary bladder
 - 1.15.4 The urethra
 - 1.15.5 The functions of kidneys
 - 1.15.6 The control of micturition
- 1.16 The nervous system
 - 1.16.1 Nervous tissue
 - 1.16.2 The central nervous system
 - 1.16.3 The brain
 - 1.16.4 The spinal cord
 - 1.16.5 The peripheral nervous system
 - 1.16.6 The autonomic nervous system
- 1.17 The endocrine system
 - 1.17.1 The pituitary gland
 - 1.17.2 The thyroid gland
 - 1.17.3 The parathyroid gland
 - 1.17.4 The adrenal glands
- 1.18 The reproductive system
 - 1.18.1 The male reproductive system
 - 1.18.2 The female reproductive system
- 1.19 The skin and the organs of special sense
 - 1.19.1 The skin
 - 1.19.2 The eye
 - 1.19.3 The ear
 - 1.19.4 The nose
 - 1.19.5 The tongue
- 2. Radiation Physics**
 - 2.1 Atomic structure
 - 2.1.1 The Nucleus
 - 2.1.2 Electron orbits and energy levels
 - 2.2 Production of x-ray, properties of x-rays
 - 2.2.1 General radiation (Bremsstrahlung)
 - 2.2.2 Characteristic Radiation
 - 2.2.3 Intensity of x-rays beams
 - 2.2.4 Target material
 - 2.2.5 Voltage (kVp) applied
 - 2.3 Basic interactions between x-rays and matter
 - 2.3.1 Coherent scattering
 - 2.3.2 Photoelectric effect
 - 2.3.3 Compton scattering
 - 2.3.4 Pair production
 - 2.3.5 Photodisintegration

- 2.4 Radiation measurement and units
 - 2.4.1 Construction & working of the free air ionization chamber
 - 2.4.2 Thimble ionization chamber & condenser ionization chamber
 - 2.5 Radiation protection
 - 2.5.1 Historical introduction or why the protection is necessary against the radiation
 - 2.5.2 Maximum permissible dose
 - 2.5.3 Tabulation of the recommended maximum permissible doses for the different parts of the body
 - 2.5.4 Following the code of practice
 - 2.5.5 Identifying the protective materials
 - 2.6 Personnel monitoring
 - 2.6.1 The necessity of personnel monitoring & monitoring instruments (film badge, ionization chamber & thermoluminescent dosimeter)
 - 2.7 Safety requirements for operating X-ray unit
- 3. Patient Care and Management**
- 3.1 The hospital, the patient and the radiographer
 - 3.1.1 Clinical responsibility
 - 3.1.2 Legal responsibility
 - 3.1.3 The radiographer and the hospital
 - 3.2 Features of general patient care
 - 3.2.1 General preliminaries to the examination
 - 3.2.2 Moving chair and stretcher patients
 - 3.2.3 The anaesthetized patient
 - 3.2.4 Hygiene in the x-ray department
 - 3.2.5 General comfort and reassurance for the patient
 - 3.3 Drugs in the x-ray department
 - 3.3.1 Poisons and dangerous drugs
 - 3.3.2 Units of measurement
 - 3.3.3 Drugs used in preparation of the patient
 - 3.3.4 Contrast agents used in x-ray examinations
 - 3.3.5 Drugs used in resuscitation
 - 3.3.6 Labeling and issuing
 - 3.4 Sterilization and sterile techniques
 - 3.4.1 Methods of sterilization
 - 3.4.2 Central sterile supply
 - 3.4.3 Preparation of the hands for aseptic procedures
 - 3.5 Preparation of the patient
 - 3.5.1 General abdominal preparation
 - 3.5.2 Clothing of the patient
 - 3.6 First aid in the x-ray department
 - 3.6.1 Radiological emergencies
 - 3.6.2 Shock
 - 3.6.3 Hemorrhage
 - 3.6.4 Burns, scalds
 - 3.6.5 Loss of consciousness
 - 3.6.6 Asphyxia
 - 3.6.7 Fractures

- 3.6.8 Electric shock
- 3.7 Medico-legal aspects of the radiographer's work
 - 3.7.1 Breach of professional confidence
 - 3.7.2 Negligence
 - 3.7.3 Procedure in the event of an accident
 - 3.7.4 The importance of records
- 4. **Radiographic Photography**
 - 4.1 Film
 - 4.1.1 Construction and composition of x-ray film
 - 4.1.2 Types of x-ray film
 - 4.1.3 Characteristic curve, special sensitivity & role of dyeing
 - 4.1.4 Film speed, density, contrast, sensitometry
 - 4.1.5 Artifacts and its causes
 - 4.2 Intensifying screen
 - 4.2.1 Construction and composition of I.S.
 - 4.2.2 Screen speed, sharpness, coating weight
 - 4.2.3 Fluorescent material and phosphorescence
 - 4.2.4 Fluorescent material, new phosphors
 - 4.3 Image
 - 4.3.1 Production of radiographic image
 - 4.3.2 Component of radiographic image
 - 4.3.2.1 Contrast, sharpness, resolution
 - 4.3.2.2 Exposure factors
 - 4.3.2.3 Absorption coefficient
 - 4.4 Film processing
 - 4.4.1 Manual film processing
 - 4.4.1.1 The processing cycle
 - 4.4.1.2 Tanks and containers for processing chemical, processing units
 - 4.4.1.3 Mixing chemicals
 - 4.4.1.4 Storage of chemicals
 - 4.4.1.5 Film hangers
 - 4.4.2 Automatic processor
 - 4.4.2.1 Basic principle & it's functioning
 - 4.5 Dark room planning
 - 4.5.1 Location, layout, radiation protection, safelight filter & sensitivity range
 - 4.6 Identification
 - 4.6.1 Methods
 - 4.6.2 Importance
 - 4.7 Silver recovery
 - 4.7.1 General introduction
- 5. **Radiographic equipment**
 - 5.1 Historical background of x-ray and its production
 - 5.5.1 X-ray tube construction
 - 5.5.2 Stationary and rotating x-ray tube
 - 5.5.3 Recent advancement of an x-ray tube

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- 5.5.4 Tube rating cooling and care of x-ray tube and its faults
 - 5.2 Control panel, x-ray table and tube column
 - 5.2.1 Type of x-ray table
 - 5.2.2 Different metering equipment
 - 5.2.3 X-ray tube support
 - 5.3 Fluoroscopic equipment
 - 5.3.1 Conventional fluoroscopy, image intensifier tube and Digital fluoroscopy
 - 5.4 Control of scatter radiation & beam restricting devices
 - 5.4.1 Secondary radiation grids
 - 5.4.2 Air gap technique
 - 5.5 Portable and mobile x-ray units
 - 5.5.1 Capacitor discharge and c-arm
 - 5.6 Computed and Direct Digital Radiography
 - 5.7 Introduction to modern modalities (CT, MRI, mammography)
- 6. Radiographic Technique**
- 6.1 **General radiography**
 - 6.1.1 Routine Radiography Technique for upper limb
(Fingers, thumb, hand, wrist forearm, elbow, humerus, shoulder, scapula, clavicle)
 - 6.1.2 Routine Radiography Technique for the lower limb,
(Toes, foot, calcaneum, ankle, tibia, fibula, knee, femur, hip joint, neck of femur, pelvis)
 - 6.1.3 Routine Radiographic technique for thoracic cage and its contents
(Chest, heart, ribs and sternum)
 - 6.1.4 Routine technique for the abdomen
Routine technique of plain & erect abdomen x-ray
 - 6.1.5 Routine technique for the spine
(Cervical, thoracic, lumbar, sacrum and coccyx, sacro-illac joint)
 - 6.1.6 Routine technique for the skull
 - 2.1.6.1 The radiograph anatomical landmarks of the skull
 - 2.1.6.2 The process of routine examination of the bones of skull (cranium, facial bone and mandible)
 - 6.1.7 To locate the following by x-rays (scaphoid, foreign body in the hand, head of humerues & axial Shoulder, acromio-calvicular joints, sterno-calvicular joints, foreign body in the foot, lateral foot weight bearing, skyline view of patella, tibial Tuberosity)
 - 6.1.8 a) The supplementary views of the chest and abdomen (Apical views, lordotic view & decubitus, oblique views for heart size & lateral with barium swallow, thoracic inlet, diaphragm exursion, inhaled or swallowed foreign body, imperforated anus)
b) The purposes of these views
 - 6.1.9 The supplementary views for the spine and pelvis (soft tissue)
(Neck, odontoid peg (open-mouth), vertebral foramina of cervical spine, upper thoracic spine oblique lumbar spine, lumbosacral junction, oblique sacro-illac joints, illum, acetabulum, pelvimetry, skeleton survey)

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6.1.10 The supplementary views for the skull (towne's view, submento vertical, sella turcica, temporo-mandibular joint, nasal bones, paranasal sinuses, mastoids, orbits, optic foramina, foreign body in the eye, dental radiography)

6.1.11 Registration process

- a) The steps of registration of patients
- b) The importance of a monthly and annual record, filling system and preparing the Performa invoices
- c) Filling of radiographs and reports (x-ray No, hospital number, patient's name, cross reference bill, with patient's name)

6.2 Radiographic examination with contrast media

Special examination with contrast media

6.2.1 Contrast media

- 6.2.1.1 Definition of the contrast media
- 6.2.1.2 Types of contrast media
- 6.2.1.3 Methods of introducing the contrast media
- 6.2.1.4 Reactions of contrast media
- 6.2.1.5 Name of the emergency equipments and drugs needed to cope with reactions

6.2.2 Radiographic investigation of Gastro-intestinal tract using contrast media

- 6.2.2.1 Barium swallow
- 6.2.2.2 Barium meal
- 6.2.2.3 Barium follow through
- 6.2.2.4 Examination of GI tract
- 6.2.2.5 Ba-enema
- 6.2.2.6 Small bowel enema
- 6.2.2.7 Loopogram
- 6.2.2.8 State the role of a radiographer during fluoroscopy

6.2.3 Investigation of urinary tract and hystero salpinogram

- 6.2.3.1 Intravenous Urogram (IVU)
- 6.2.3.2 Cystogram
- 6.2.3.3 Micturating cystogram
- 6.2.3.4 Urethrogram
- 6.2.3.5 Retrograde pyelogram
- 6.2.3.6 Hystero salpinogram (HSG)

6.2.4 Radiographic procedure of the Biliary tract

- 6.2.4.1 Percutaneous transhepatic cholangiography and drainage (PTC and PTCD)
- 6.2.4.2 Endoscopic retrograde cholangio pancreatography (ERCP)
- 6.2.4.3 Operative cholangiography
- 6.2.4.4 T. Tube cholangiography

6.2.5 Use of portable/mobile x-ray in ward and operation theatre

- 6.2.5.1 The uses of mobile machine
- 6.2.5.2 The technique of using ward radiography
- 6.2.5.3 The technique of using operating theatre radiography
- 6.2.5.4 Technique to help in Hip pinning
- 6.2.5.5 The technique of operative-cholangiography

6.2.6 Vascular and Neurological examinations

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- 6.2.6.1 Carotid and vertebral angiogram
- 6.2.6.2 Femoral angiogram
- 6.2.6.3 Aortogram
- 6.2.6.4 Phlebogram
- 6.2.6.5 Myelogram
- 6.2.7 Special examinations
 - 6.2.7.1 Arthrogram
 - 6.2.7.2 Dacryccystogram
 - 6.2.7.3 Sinogram/Fistulogram
 - 6.2.7.4 Sailogram
 - 6.2.7.5 Mammogram
 - 6.2.7.6 Macro-radiography
 - 6.2.7.7 Soft tissue radiography

खण्ड (B): 20 Marks

7. **ऐन नियमहरू**

- 7.1 पाटन स्वास्थ्य विज्ञान प्रतिष्ठान ऐन, २०६४
- 7.2 पाटन स्वास्थ्य विज्ञान प्रतिष्ठानको कर्मचारी सेवाका शर्त र सुविधा सम्बन्धी नियमावली, २०६७
- 7.3 पाटन स्वास्थ्य विज्ञान प्रतिष्ठान आर्थिक प्रशासन नियमावली, २०६७
- 7.4 पाटन अस्पताल संचालन विनियमावली, २०६७
- 7.5 नेपाल स्वास्थ्य सेवा ऐन, २०५३ र स्वास्थ्य सेवा नियमावली, २०५५
- 7.6 नेपाल मेडिकल काउन्सिल ऐन, २०२० र नियमावली
- 7.7 नेपाल नर्सिङ परिषद् ऐन, २०५२
- 7.8 नेपाल स्वास्थ्य व्यवसायी परिषद् ऐन, २०५३
- 7.9 Computer and its applications: Windows basic, Word processing, Electronic spreadsheets, Presentation system, Multimedia, E-mail and Internet बारे जानकारी

प्रथम तथा द्वितीय पत्रमा यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

प्रथम पत्र			
खण्ड	अङ्कभार	प्रश्न संख्या	
		वस्तुगत	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	
		वस्तुगत	विषयगत प्रश्नोत्तर
A	१००	-	१० प्रश्न x १० अङ्क = १००
B	-	-	-
जम्मा			१० प्रश्न x १० अङ्क = १००

-----X-----