

नेपाल सरकार
गृह मन्त्रालय
नेपाल प्रहरी प्रधान कार्यालय
(मानवश्रोत विकास विभाग, भर्ना छनौट शाखा)
नक्साल, काठमाण्डौ ।

प्राविधिक प्रहरी नायव निरीक्षक (रेडियोग्राफर) पदको खुला प्रतियोगितात्मक
परीक्षाको पाठ्यक्रम

सेवा: नेपाल प्रहरी
उपसमूह: स्वास्थ्य

समूह: प्राविधिक प्रहरी
श्रेणी: राजपत्र अनङ्कित प्रथम

परीक्षा योजना (Examination Scheme)

क्र.सं.	परीक्षा चरण	विवरण	पूर्णाङ्क
१.	प्रथम चरण	प्रारम्भिक तथा विस्तृत स्वास्थ्य परीक्षण	-
२.	द्वितीय चरण	लिखित परीक्षा	२००
३.	तृतीय चरण	विशेष स्वास्थ्य परीक्षण	-
४.	चतुर्थ चरण	अन्तरवार्ता	३०

प्रथम चरण:- प्रारम्भिक तथा विस्तृत स्वास्थ्य परीक्षण

- प्रहरी सेवाको पदमा नियुक्ति र बढुवा गर्दा अपनाउनु पर्ने सामान्य सिद्धान्त, २०६९ को अनुसूची-६ र ८ बमोजिम हुने ।

द्वितीयचरण:- लिखित परीक्षा योजना (Written Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या अङ्कभार	समय
प्रथम	Professional and Service Specific Test (PSST)	१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (Multiple Choice)	५० प्रश्न×२ अंक = १००	४५ मिनेट
द्वितीय		१००	४०	विषयगत (Subjective)	<u>छोटो उत्तर</u> ८ प्रश्न×५ अंक = ४० <u>लामो उत्तर</u> ६ प्रश्न ×१० अंक = ६०	२ घण्टा ३० मिनेट

तृतीय चरण:- विशेष स्वास्थ्य परीक्षण

- प्रहरी सेवाको पदमा नियुक्ति र बढुवा गर्दा अपनाउनु पर्ने सामान्य सिद्धान्त, २०६९ को अनुसूची-९ बमोजिम हुने ।

चतुर्थ चरण:- अन्तरवार्ता (Interview)

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तरवार्ता	३०	मौखिक

१. यो पाठ्यक्रमको योजना अनुसार दुई पत्रको लिखित परीक्षा हुनेछ ।
२. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
३. पाठ्यक्रमको प्रथम र द्वितीय पत्रको विषयवस्तु एउटै हुनेछ ।
४. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
५. लिखित परीक्षाको प्रथम तथा द्वितीय पत्रको पाठ्यक्रमका इकाइहरूको प्रश्नहरूको संख्या निम्नानुसार हुनेछ ।

प्रथम पत्रका एकाइ	१	२	३	४	५	६	७	८
प्रथम पत्रका प्रश्न संख्या	९	१०	४	७	८	४	३	५
द्वितीय पत्रका खण्ड	खण्ड-क (A)			खण्ड-ख (B)			खण्ड-ग (C)	
द्वितीय पत्रका एकाइ	१	२	३	४	५	६	७	८
द्वितीय पत्रका प्रश्न	छोटो	३		३			२	
संख्या	लामो	३		३			-	

६. यस पाठ्यक्रममा जे सुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन नियमहरू तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्छ ।
७. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत २ (दुई) अंक दिईने छ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २०% अंक कट्टा गरिने छ । तर उत्तर नदिएमा त्यस बापत अंक दिईने छैन र अंक कट्टा पनि गरिने छैन ।
८. 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 सकिनेछ ।
९. द्वितीय पत्रको पाठ्यक्रमलाई ३ वटा खण्डमा विभाजन गरिएको छ । ३ वटा खण्डको लागि ३ वटै उत्तरपुस्तिका दिईनेछ र परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
१०. यस भन्दा अगाडि लागू भएको माथि उल्लेखित समूहको पाठ्यक्रम खारेज गरिएको छ ।

पाठ्यक्रम लागू मिति:- २०७९/१०/१९ गते ।

लिखित परीक्षा (Written Examination)

प्रथम र द्वितीय पत्र :-Professional and Service Specific Test (PSST)

खण्ड “क” (Section-A)

1. Anatomy and Physiology

1.1 General introduction

1.1.1 Cell; Reproduction of the individual

1.2 Tissues: Epithelial, Connective, Skeletal, Muscular and Nervous tissues

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, pelvic cavity

1.5 Skeleton

1.5.1 Structure and function of bones

1.5.2 Development and growth of bones

1.5.3 The healing of fractures

1.6 Skull

1.6.1 The skull viewed from above

1.6.2 The skull viewed from the front

1.6.3 The skull viewed from the side

1.6.4 The skull viewed from the below

1.6.5 The interior of the skullcap

1.6.6 The interior of the base of the skull

1.6.7 The nasal cavity

1.6.8 The accessory nasal sinuses

1.6.9 The individual bones of the skull

1.7 Vertebral column, ribs and sternum

1.7.1 The vertebral column

1.7.2 The ribs

1.7.3 The sternum

1.8 Bones of the upper limb

1.8.1 Clavicle, scapula, humerus, radius, ulna, carpal bones, metacarpal bones, phalanges

1.8.2 Arteries and nerves related to the bones of the upper limb

1.8.3 Ossification of the bones of the upper limb

1.9 Bones of the lower limb

1.9.1 Hipbone, pelvis, femur, patella, tibia, fibula, tarsal bones, metatarsal bones, phalanges

1.9.2 The arches of the foot

1.9.3 Arteries and nerves related to the bone of the lower limb

1.9.4 Ossification of the bones of the lower limb

1.10 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 Radiographic Technique

2.1 General radiography

- 2.1.1 Routine Radiography Technique for upper limb (Fingers, thumb, hand, wrist forearm, elbow, humerus, shoulder, scapula, clavicle)
- 2.1.2 Routine Radiography Technique for the lower limb (Toes, foot, calcaneum, ankle, tibia, fibula, knee, femur, hip joint, neck of femur, pelvis)
- 2.1.3 Routine Radiographic technique for thoracic cage and its contents (Chest, heart, ribs and sternum)
- 2.1.4 Routine technique for the abdomen: Routine technique of plain & erect abdomen x-ray
- 2.1.5 Routine technique for the spine (Cervical, thoracic, lumbar, sacrum and coccyx, sacro-illac joint)
- 2.1.6 Routine technique for the skull: radiograph anatomical landmarks of the skull; process of routine examination of the bones of skull (cranium, facial bone and mandible)
- 2.1.7 To locate the following by x-rays (scaphoid, foreign body in the hand, head of humerus & axial Shoulder, acromio-calvicular joints, sterno-calvicular joints, foreign body in the foot, lateral foot weight bearing, skyline view of patella, tibial Tuberosity)
- 2.1.8 Supplementary views of the chest and abdomen (Apical views, lordotic view & decubitus, oblique views for heart size & lateral with barium swallow, thoracic inlet, diaphragm excursion, inhaled or swallowed foreign body, imperforated anus); The purposes of these views

- 2.1.9 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)
- 2.1.10 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)
- 2.1.11 Tomography: Basic principle of tomogram; Practical application of Tomography for the chest, kidney, gall bladder and skeletal system
- 2.1.12 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)

2.2 Radiographic examination with contrast media

Special examination with contrast media

2.2.1 Contrast media

2.2.1.1 Definition of the contrast media

2.2.1.2 Types of contrast media

2.2.1.3 Methods of introducing the contrast media

2.2.1.4 Reactions of contrast media

2.2.1.5 Name of the emergency equipments and drugs needed to cope with reactions

2.2.2 Radiographic investigation of Gastro-intestinal tract using contrast media

2.2.2.1 Barium swallow

2.2.2.2 Barium meal

2.2.2.3 Barium follow through

2.2.2.4 Examination of GI tract

2.2.2.5 Ba-enema

2.2.2.6 Small bowel enema

2.2.2.7 Loopogram

2.2.2.8 State the role of a radiographer during fluoroscopy

2.2.3 Investigation of urinary tract and hystero salpinogram

2.2.3.1 Intravenous Urogram (IVU)

2.2.3.2 Cystogram

2.2.3.3 Micturating cystogram

2.2.3.4 Urethrogram

2.2.3.5 Retrograde pyelogram

2.2.3.6 Hystero salpinogram (HSG)

2.2.4 Radiographic procedure of the Biliary tract

2.2.4.1 Oral cholecystography (OCG)

2.2.4.2 Intravenous cholangiography (IVC)

2.2.4.3 Percutaneous transhepatic cholangiography and drainage (PTC and PTCD)

2.2.4.4 Endoscopic retrograde cholangio pancreatography (ERCP)

- 2.2.4.5 Operative cholangiography
- 2.2.4.6 T. Tube cholangiography
- 2.2.5 Use of portable/mobile x-ray in ward and operation theatre
 - 2.2.5.1 The uses of mobile machine
 - 2.2.5.2 The technique of using ward radiography
 - 2.2.5.3 The technique of using operating theatre radiography
 - 2.2.5.4 Technique to help in hip pinning
 - 2.2.5.5 The technique of operative-cholangiography
- 2.2.6 Vascular and Neurological examinations
 - 2.2.6.1 Carotid and vertebral angiogram
 - 2.2.6.2 Femoral angiogram
 - 2.2.6.3 Aortogram
 - 2.2.6.4 Phlebogram
 - 2.2.6.5 Encephalogram
 - 2.2.6.6 Ventriculogram
 - 2.2.6.7 Myelogram
- 2.2.7 Special examinations
 - 2.2.7.1 Arthrogram
 - 2.2.7.2 Dacryocystogram
 - 2.2.7.3 Sinogram/Fistulogram
 - 2.2.7.4 Sialogram
 - 2.2.7.5 Mammogram
 - 2.2.7.6 Macro-radiography
 - 2.2.7.7 Soft tissue radiography

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

खण्ड “ख” (Section-B)

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 Computed Radiography and digital radiography, Computed Radiography Principles, CR Equipments, Image formation in CR System and DR Radiography Equipment

4.4.1.1 The processing cycle

4.4.1.1.1 Development-constituents of developer, factors affecting control of development, developer replenishes maintenance of activity & level of developer

4.4.1.1.2 Rinsing

4.4.1.1.3 Fixation-constituents of fixer, factors affecting fixation and regeneration of the Fixer

4.4.1.1.4 Washing processing

- 4.4.1.1.5 Drying process
- 4.4.1.1.6 Tanks and containers for processing chemical, processing units
- 4.4.1.1.7 Mixing chemicals
- 4.4.1.1.8 storage of chemicals
- 4.4.1.1.9 Film hangers

4.4.2 Automatic processor : Basic principle & it's functioning

4.5 Dark room planning: Location, layout, radiation protection, safelight filter & sensitivity range

4.6 Identification: Methods and importance

4.7 Silver recovery: 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
- 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 and image intensifier tube

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 Conventional tomography

5.7 Introduction to modern modalities (CT, MRI, mammography)

6. Radiation Physics

6.1 Atomic structure

- 6.1.1 The Nucleus
- 6.1.2 Electron orbits and energy levels

6.2 Production of x-ray, properties of x-rays

- 6.2.1 General radiation (Bremsstrahlung),
- 6.2.2 Characteristic Radiation
- 6.2.3 Intensity of x-rays beams
- 6.2.4 Target material
- 6.2.5 Voltage (kVp) applied

6.3 Basic interactions between x-rays and matter

- 6.3.1 Coherent scattering
- 6.3.2 Photoelectric effect
- 6.3.3 Compton scattering
- 6.3.4 Pair production
- 6.3.5 Photodisintegration

6.4 Radiation measurement and units

- 6.4.1 Construction & working of the free air ionization chamber
- 6.4.2 Thimble ionization chamber & condenser ionization chamber

6.5 Radiation protection

- 6.5.1 Historical introduction or why the protection is necessary against the radiation
- 6.5.2 Maximum permissible dose

6.5.3 Tabulation of the recommended maximum permissible doses for the different parts of the body

6.5.4 Following the code of practice

6.5.5 Identifying the protective materials

6.6 Personnel monitoring

6.6.1 The necessity of personnel monitoring & monitoring instruments (film badge, ionization chamber & thermoluminescent dosimeter)

6.7 Safety requirements for operating X-ray unit

7. Policies, laws and regulations

7.1 Nepal Health Sector Programme

7.2 Nepal Health Service Act, 2053 and Regulation, 2055

7.3 Nepal Health Professional Council

खण्ड “ग” (Section-C)

८. सामान्य ज्ञान तथा नेपाल प्रहरी सेवा सम्बन्धी

- क. नेपालको भूगोल सम्बन्धी सामान्य जानकारी (भौगोलिक अवस्था, स्वरूप, किसिम र विशेषताहरू, हावापानीको किसिम र विशेषता, जल सम्पदा: स्थिति र महत्व, वन सम्पदा: अवस्था र महत्व, नेपालका प्रमुख हिमशिखरहरू, तालतलैया, झरना, भञ्ज्याङ।
- ख. इतिहास र संस्कृति सम्बन्धी सामान्य जानकारी (आधुनिक नेपालको इतिहास (पृथ्वीनारायण शाह देखी हालसम्म), नेपालको सांस्कृतिक, धार्मिक एवं मौलिक परम्परा, जातजाति, भाषाभाषी, कला र साहित्य सम्बन्धी सामान्य जानकारी।
- ग. नेपालको वर्तमान संविधान २०७२ (भाग १, ३, ४, ५, २८ र अनुसूचीहरू)
- घ. जनसंख्या र वातावरण सम्बन्धी सामान्य जानकारी (जनसंख्या, शहरीकरण, बसोवास (बँसाईसराई), जैविक विविधता, जलवायु परिवर्तन, वातावरण तथा प्रदूषण)
- ङ. समसामयिक घटना तथा नविनतम् विषयवस्तुहरू: (राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वका राजनैतिक, सामाजिक, आर्थिक, वैज्ञानिक, सांस्कृतिक, खेलकूद, पुरस्कार, कला, साहित्य, संगीत सम्बन्धी)
- च. नेपाल प्रहरीको पृष्ठभूमि (वि.स. २००७ साल देखि हालसम्म) र वर्तमान अवस्था।
- छ. प्रहरी ऐन, २०१२ र प्रहरी नियमावली, २०७१ (संशोधन सहित) का मुख्य-मुख्य व्यवस्थाहरू (संगठनात्मक स्वरूप, सेवाको प्रकार, दर्ज्यानी चिन्ह, पद तथा श्रेणी सेवा, शर्त र सुविधा, प्रहरी आचरण, नियुक्ति र अवकाश सम्बन्धी व्यवस्था)
- ज. विविध:- नेपाल प्रहरी र अन्य सुरक्षा निकायहरू (नेपाली सेना, सशस्त्र प्रहरी बल नेपाल र राष्ट्रिय अनुसन्धान विभाग) संगको सम्बन्ध, सार्क, संयुक्त राष्ट्रसंघ र इन्टरपोल सम्बन्धी जानकारी।

लिखित परीक्षाको नमूना प्रश्नपत्र

वस्तुगत बहुवैकल्पिक प्रश्न (Multiple Choice Question)

1. Water soluble contrast media used for myelography is
 - a) metrizamide
 - b) dianosil
 - c) conray
 - d) iohexol
2. Superior orbital fissure best view is
 - a) a. plain AP view
 - b) b. cladwell view
 - c) c. townes view
 - d) d. basal view
3. Best position for chest X-ray to detect left pleural effusion is
 - a) a. left lateral
 - b) b. supine
 - c) c. left lateral decubitus
 - d) d. right lateral decubitus
4. Through which part the urethra passes through penis
 - a) a. corpora cavernosa
 - b) b. corpora spongiosum
 - c) c. tunica albuginea
 - d) d. prepuce
5. Which of the given options is the part of hindbrain?
 - a) a. cerebellum
 - b) b. corpus callosum
 - c) c. spinal cord
 - d) d. hypothalamus

छोटो प्रश्न (Short Question)

1. What are X-rays and how are they produced? Explain

लामो प्रश्न (Long Question)

1. What are three basic radiation safety principles? What are the factors influencing radio sensitivity?

-समाप्त-