प्रदेश लोक सेवा आयोग, कर्णाली प्रदेश

प्रदेश निजामती सेवा र स्थानीय सेवाको स्वास्थ्य सेवा, रेडियोग्राफी समूह, सहायकस्तर पाँचौं तह, रेडियोग्राफर वा सो सरह पदको खुला, अन्तर तह र आन्तरिक अन्तर समूह प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम र परीक्षा योजना

पाठ्यक्रमको रुपरेखाः यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ।

परीक्षाको चरण	परीक्षाको किसिम	पूर्णाङ्क
प्रथम चरण	लिखित परीक्षा (Written Examination)	२००
अन्तिम चरण	कम्प्युटर सीप परीक्षण (Computer Skill Test)	१०
	अन्तर्वार्ता (Interview)	३०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरणः लिखित परीक्षा (Written Examination) पूर्णाङ्कः २००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्याxअङ्क	समय
प्रथम	सामान्य ज्ञान र सार्वजनिक व्यवस्थापन (General awareness & Public management)	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	२०x२=४०	४५ मिनेट
	सेवा सम्बन्धी ज्ञान (Service Based knowledge)					३०x२=६०	
द्वितीय	प्राविधिक विषय (Technical Subject)	१००	४०	विषयगत (Subjective)	छोटो उत्तर लामो उत्तर	१२x५=६० ४x१०=४०	२ घण्टा १५ मिनेट

२. अन्तिम चरणः कम्प्युटर सीप परीक्षण र अन्तर्वार्ता पूर्णाङ्कः ४०

पत्र/विषय	पूर्णाङ्क	परीक्षा प्रणाली
कम्प्युटर सीप परीक्षण (Computer Skill test)	१०	प्रयोगात्मक (Practical)
अन्तर्वार्ता (Interview)	३०	मौखिक (Oral)

द्रष्टव्यः

१. यस पाठ्यक्रम योजनालाई प्रथम चरण र अन्तिम चरण गरी दुई चरणमा विभाजन गरिएको छ।

२. प्रश्नपत्रको भाषा नेपाली वा अङ्ग्रेजी वा नेपाली र अङ्ग्रेजी दुवै हुन सक्नेछ।

३. परीक्षाको भाषा नेपाली वा अङ्ग्रेजी अथवा नेपाली र अङ्ग्रेजी दुवै हुन सक्नेछ।

४. खुला र समावेशी समूहको एउटै प्रश्नपत्रबाट परीक्षा सञ्चालन हुनेछ।

५. प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ। दुवैपत्रको परीक्षा एकैदिनमा वा छुट्टाछुट्टै दिनमा लिन सकिनेछ।

६. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको 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।

७. बहुवैकल्पिक प्रश्नहरु हुने परीक्षामा मोवाईल फोन, स्मार्ट वाच, क्याल्कुलेटर जस्ता सामग्रीहरु प्रयोग गर्न पाइने छैन।

८. विषयगत प्रश्नहरुको हकमा तोकिएको अङ्कमा 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 टिप्पणीहरु (Short notes) सोध्न सकिनेछ।

९. परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र/विषयमा दिईए अनुसार हुनेछ।

१०. विषयगत प्रश्न हुने पत्र/विषयका प्रत्येक भाग/खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन्। परीक्षार्थीले प्रत्येक भाग/खण्डका प्रश्नहरुको उत्तर सोही भाग/खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ।

११. यस पाठ्यक्रम अनुसारका पत्र/विषयका विषयवस्तुमा जुनसुकै कुरा लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगावै संशोधन भई कायम रहेका विषयवस्तुलाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ।

१२. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र अन्तिम चरणको कम्प्युटर सीप परीक्षण र अन्तर्वार्तामा सम्मिलित गराइनेछ।

१३. प्रथम चरणको लिखित परीक्षाको प्राप्ताङ्क, अन्तिम चरणको कम्प्युटर सीप परीक्षण र अन्तर्वार्ताको प्राप्ताङ्कको आधारमा अन्तिम परीक्षाफल प्रकाशित गरिनेछ।

१४. यस भन्दा अगाडि लागू गरिएको माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ।

१५. पाठ्यक्रम लागू हुने मितिः २०८१।०९।२३

प्रदेश लोक सेवा आयोग, कर्णाली प्रदेश

प्रदेश निजामती सेवा र स्थानीय सेवाको स्वास्थ्य सेवा, रेडियोग्राफी समूह, सहायकस्तर पाँचौं तह, रेडियोग्राफर वा सो सरह पदको खुला, अन्तर तह र आन्तरिक अन्तर समूह प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

प्रथम पत्र (Paper I): सामान्य ज्ञान र सार्वजनिक व्यवस्थापन तथा सेवा सम्बन्धी ज्ञान

भाग (Part I):

सामान्य ज्ञान र सार्वजनिक व्यवस्थापन

(General awareness & Public management)

(Section-A) (१० प्रश्न × २अङ्क= २० अङ्क)

१. सामान्य ज्ञान (General Awareness)

१.१. नेपालको भौगोलिक अवस्था, प्राकृतिक स्रोत र साधनहरु

१.२. कर्णाली प्रदेशको ऐतिहासिक, सांस्कृतिक र सामाजिक अवस्था सम्बन्धी जानकारी

१.३. कर्णाली प्रदेशको आर्थिक अवस्था र चालु आवधिक योजना सम्बन्धी जानकारी

१.४. मानव जीवनमा प्रत्यक्ष प्रभाव पार्ने विज्ञान र प्रविधिका महत्त्वपूर्ण उपलब्धिहरु

१.५. जैविक विविधता, दिगो विकास, वातावरण प्रदुषण, जलवायु परिवर्तन र जनसङ्ख्या व्यवस्थापन

१.६. नेपालको संविधान (भाग १ देखि भाग ५ सम्म र अनुसूचीहरु)

१.७. संघ, प्रदेश र स्थानीय तहको शासन व्यवस्था सम्बन्धी जानकारी

१.८. संयुक्त राष्ट्र संघ, सार्क, बिमस्टेक सम्बन्धी जानकारी

१.९. राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्त्वका समसामयिक गतिविधिहरु

(Section–B) (१०प्रश्न×२ अङ्क= २०अङ्क)

२. सार्वजनिक व्यवस्थापन (Public management)

२.१. कार्यालय व्यवस्थापन

२.१.१ कार्यालयः परिचय, महत्त्व, कार्य र प्रकार

२.१.२ सहायक कर्मचारीका कार्य र गुणहरु

२.१.३ कार्यालय स्रोत साधनः परिचय र प्रकार

२.१.४ कार्यालयमा सञ्चारको महत्त्व, किसिम र साधन

२.१.५ कार्यालय कार्यविधिः पत्र व्यवहार, दर्ता र चलानी, फाइलिङ, परिपत्र, तोक आदेश, टिप्पणी लेखन

२.१.६ अभिलेख व्यवस्थापन

२.२. प्रदेश निजामती सेवा ऐन र स्थानीय सेवा ऐनमा भएका व्यवस्थाहरु

२.२.१ निजामती सेवाको गठन, संगठन संरचना, पदपूर्ति गर्ने तरिका र प्रक्रियाहरु

२.२.२ कर्मचारीको नियुक्ति, सरुवा, वढुवा, बिदा, विभागीय सजाय र अवकाश

२.२.३ कर्मचारीले पालना गर्नुपर्ने आचरण, नैतिक दायित्त्व र कर्तव्यहरु

२.३. सार्वजनिक सेवा प्रवाहको अर्थ, सेवा प्रवाह गर्ने निकाय, तरिका र माध्यमहरु

२.४. मानव अधिकार, सुशासन र सूचनाको हक सम्बन्धी सामान्य जानकारी

२.५. सार्वजनिक वडापत्र

२.६. कानूनी शासन र कर्मचारीतन्त्र

भाग (Part II):

सेवा सम्बन्धी ज्ञान (Service Based Knowledge) (३० प्रश्न×२ अङ्क= ६०अङ्क)

1. Anatomy and Physiology
   - 1.1. General introduction of cell and its reproduction
   - 1.2. Tissues: Epithelial, Connective, Skeletal, Muscular and Nervous tissue
   - 1.3. General pathology
     - 1.3.1. Bacteria
     - 1.3.2. Viruses
     - 1.3.3. Tumors
   - 1.4. Surface and regional anatomy: anatomical position, head, neck, thorax, abdomen and pelvic cavity
   - 1.5. Skeleton
     - 1.5.1. Structure, function, development and growth of bone
     - 1.5.2. Fracture and healing of fracture
   - 1.6. Skull
     - 1.6.1. Skull viewed from above, front, side and below
     - 1.6.2. Interior of the skullcap
     - 1.6.3. Interior of the base of the skull
     - 1.6.4. Nasal cavity
     - 1.6.5. Accessory nasal sinuses
     - 1.6.6. Individual bones of the skull
   - 1.7. Vertebral column, ribs and sternum
   - 1.8. The bones of the upper limb
     - 1.8.1. Clavicle, scapula, humerus, radius, ulna, carpal bones, metacarpal bones and 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 and phalanges
     - 1.9.2. 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 human body
     - 1.10.1. Types of joints
     - 1.10.2. Joints and muscles of the head, neck, trunk, upper limb and lower limb
   - 1.11. Circulatory system
     - 1.11.1. Blood
     - 1.11.2. Blood vessels
     - 1.11.3. Heart
     - 1.11.4. Pulmonary circulation
     - 1.11.5. Systemic circulation
     - 1.11.6. Veins
   - 1.12. Lymphatic system
     - 1.12.1. Lymph
     - 1.12.2. Lymphatic vessels
     - 1.12.3. Lymph nodes
     - 1.12.4. Lymphatic drainage of the body
     - 1.12.5. Lymphatic tissue
     - 1.12.6. Spleen

1.13. Respiratory system
    1.13.1. Organs: nose, pharynx, larynx, trachea, bronchi, lungs
    1.13.2. Physiology of respiration
1.14. Digestive system
    1.14.1. Organs: mouth, salivary glands, pharynx, oesphagus, stomach, small intestine, large intestine, pancreas, liver and biliary apparatus
    1.14.2. Function of the alimentary system
1.15. Urinary system
    1.15.1. Organs: kidneys, ureters, urinary bladder and urethra
    1.15.2. Functions of kidney
    1.15.3. Control of micturation
1.16. Nervous system
    1.16.1. Nervous tissue
    1.16.2. Central nervous system (brain and spinal cord)
    1.16.3. Peripheral nervous system
    1.16.4. Autonomic nervous system
1.17. Endocrine system: pituitary gland, thyroid gland, parathyroid glands, adrenal glands and pancreas
1.18. Reproductive system
    1.18.1. Male reproductive system
    1.18.2. Female reproductive system
1.19. The skin and organs of special sense
    1.19.1. Skin
    1.19.2. Organs of special sense: eye, ear, nose, tongue

2. Radiographic Techniques

2.1. General radiography
    2.1.1. Registration process
        2.1.1.1. The steps of registration of patient
        2.1.1.2. The importance of a monthly and annual record, filing system and preparing performa invoices
        2.1.1.3. Filling of radiographic form and reports (X-ray number, hospital number, patient's name, cross reference bill with patient's name)
    2.1.2. Routine radiographic techniques for upper limb (fingers, thumb, hand, wrist, forearm, elbow, humerus, shoulder, scapula, clavicle)
    2.1.3. Routine radiographic techniques for the lower limb (toes, foot, calcaneum, ankle, tibia, fibula, knee, femur, hip joint, neck of femur, pelvis)
    2.1.4. Routine radiographic techniques for thoracic cage and its contents (chest, heart, ribs and sternum)
    2.1.5. Routine radiographic technique for the abdomen
    2.1.6. Routine radiographic technique for the spine (cervical, thoracic, lumbar, sacrum and coccyx, sacro-illac joint)
    2.1.7. Routine radiographic techniques for the skull
        2.1.7.1. The radiographic anatomical landmarks of the skull
        2.1.7.2. The process of routine examination of the bones of skull (cranium, facial bones and mandible)
    2.1.8. To identify in X-ray
        2.1.8.1. Foreign body in the hand and foot
        2.1.8.2. Scaphoid, head of humerus and axial shoulder, acromio-calvicular joints, sterno-calvicular joints, patella and tibial tuberosity.

2.1.9. Purposes and overview of these supplementary views of the chest and abdomen (apical, lordotic and decubitus, oblique, lateral, thoracic inlet, diaphragm excursion, inhaled or swallowed foreign body)
2.1.10. 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-iliac joints, ilium, acetabulum, pelvimetry, skeleton survey
2.1.11. Supplementary views for the skull (Towne's, submento-vertical, sella turcica, temporo-mandibular joint, nasal bones, paranasal sinuses, mastoids, orbits, optic foramina), foreign body in the eye and dental radiography
2.1.12. Bone age study: Bones radiographed for bone age estimation
2.1.13. Bone densitometry
2.1.14. Trauma radiography

2.2. Radiographic examination with contrast media
2.2.1. Contrast media
2.2.1.1. Definition and types of contrast media
2.2.1.2. Methods of introducing contrast media
2.2.1.3. Reactions of contrast media
2.2.1.4. Emergency equipment 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, barium meal, barium follow through, barium enema, small bowel enema, loopogram
2.2.2.2. Role of a radiographer during fluoroscopy
2.2.3. Investigation of urinary tract and hysterosalpingogram: intravenous urogram (IVU), cystogram, micturating cystourethrogram (MCUG), urethrogram, retrograde pyelogram, hysterosalpingogram (HSG)
2.2.4. Radiographic procedure of the billary tract: oral cholecystography (OCG), intravenous cholangiography (IVC), percutaneous transhepatic cholangiography and drainage (PTC and PTCD), endoscopic retrograde cholangio pancreatography (ERCP), operative cholangiography, 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 operation 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: carotid and vertebral angiogram, femoral angiogram, aortogram, phlebogram, encephalogram, ventriculogram, myelogram
2.2.7. Special examinations: arthrogram, dacrocystogram, sinogram/fistulogram, sialogram, mammogram, macro radiography, 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

3.2. 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. Units of measurement
    3.3.2. Drugs used in preparation of the patient
    3.3.3. Drugs used in resuscitation
    3.3.4. 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: radiological emergencies, shock, hemorrhage, burns, scalds, loss of consciousness, asphyxia, fractures, 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 and 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 Intensifying screen
    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 cycle
        4.4.1.1. Development: Constituents of developer, factors affecting control of development, developer replenishes maintenance of activity and level of developer
        4.4.1.2. Rinsing
        4.4.1.3. Fixation: Constituents of fixer, factors affecting fixation and regeneration of the fixer
        4.4.1.4. Washing and processing
        4.4.1.5. Drying process
        4.4.1.6. Tanks and containers for processing chemical, processing units
        4.4.1.7. Mixing chemicals
        4.4.1.8. Storage of chemicals

4.4.1.9. Film hangers
4.4.2. Basic principle and functioning of automatic processor
4.5. Dark room planning: location, layout, radiation protection, safelight filter and sensitivity range
4.6. Methods and importance of identification
4.7. General introduction of silver recovery

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5.1. Historical background of X-ray and its production
5.1.1. X-ray tube construction
5.1.2. Stationary and rotating X-ray tube
5.1.3. Recent advancement of X-ray tube
5.1.4. 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
5.3.2. Digital subtraction fluoroscopy
5.4. Control of scatter radiation and beam restricting devices
5.4.1. Secondary radiation grids
5.4.2. Air gap technique
5.5. Portable and mobile X-ray units: Capacitor discharge and C-arm
5.6. Computed radiography and digital radiography
5.7. Introduction and operational process to modern modalities (CT, MRI, Mammography)
5.8. Role of artificial intelligence (AI) in radiography

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6.1. Atomic structure
6.1.1. Nucleus
6.1.2. Electron orbits and energy levels
6.2. Production of X-ray and it's properties
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: coherent scattering, photoelectric effect, compton scattering, pair production, photodisintegration
6.4. Radiation measurement and units
6.4.1. Construction and working of the free air ionization chamber
6.4.2. Thimble ionization chamber and condenser ionization chamber
6.5. Radiation protection
6.5.1. Historical introduction
6.5.2. Maximum permissible dose
6.5.3. Tabulation of the recommended maximum permissible doses for the different parts of the body - ICRP, NCRP etc.
6.5.4. Following the code of practice
6.5.5. Type of protective materials used

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7.3. Health Professional Council Act, 2053 and Regulation, 2056

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7.5. Province Health Service Act, 2078 and Regulations, 2080

7.6. Karnali Province Civil Service Act, 2080 and Regulations, 2080

7.7. Local Services (Formulation and Operation) Act, 2081 and Regulations, 2081

7.8. Local Government Operation Act, 2074 (health related)

प्रथमपत्रको प्रश्नसंख्या तालिका

प्रथम पत्रबाट यथासम्भव निम्नानुसार प्रश्नहरु सोधिनेछ।

भाग	खण्ड	विषयबस्तु	परीक्षा प्रणाली	अङ्कभार	प्रश्नसंख्या×अङ्क
I	A	सामान्यज्ञान	बस्तुगत बहुवैकल्पिक प्रश्न	२०	१०प्रश्न×२अङ्क =२०अङ्क
	B	सार्वजनिक व्यवस्थापन		२०	१०प्रश्न×२अङ्क =२०अङ्क
II		सेवा सम्बन्धी ज्ञान		६०	३०प्रश्न×२अङ्क =६०अङ्क

प्रथम पत्रको भाग (Part II) सेवा सम्बन्धी ज्ञान विषयका एकाईवाट यथासम्भव निम्नानुसार प्रश्नहरु सोधिनेछ।

एकाई	१	२	३	४	५	६	७
वस्तुगत प्रश्नसंख्या	४	६	४	५	४	५	२

प्रदेश लोक सेवा आयोग, कर्णाली प्रदेश

प्रदेश निजामती सेवा र स्थानीय सेवाको स्वास्थ्य सेवा, रेडियोग्राफी समूह, सहायकस्तर पाँचौं तह, रेडियोग्राफर वा सो सरह पदको खुला, अन्तर तह र आन्तरिक अन्तर समूह प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र (Paper II): प्राविधिक विषय

(Section-A) 50 Marks

1. Anatomy and Physiology
   - 1.1. General introduction of cell and its reproduction
   - 1.2. Tissues: Epithelial, Connective, Skeletal, Muscular and Nervous tissue
   - 1.3. General pathology
     - 1.3.1. Bacteria
     - 1.3.2. Viruses
     - 1.3.3. Tumors
   - 1.4. Surface and regional anatomy: anatomical position, head, neck, thorax, abdomen and pelvic cavity
   - 1.5. Skeleton
     - 1.5.1. Structure, function, development and growth of bone
     - 1.5.2. Fracture and healing of fracture
   - 1.6. Skull
     - 1.6.1. Skull viewed from above, front, side and below
     - 1.6.2. Interior of the skullcap
     - 1.6.3. Interior of the base of the skull
     - 1.6.4. Nasal cavity
     - 1.6.5. Accessory nasal sinuses
     - 1.6.6. Individual bones of the skull
   - 1.7. Vertebral column, ribs and sternum
   - 1.8. The bones of the upper limb
     - 1.8.1. Clavicle, scapula, humerus, radius, ulna, carpal bones, metacarpal bones and 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 and phalanges
     - 1.9.2. 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 human body
     - 1.10.1. Types of joints
     - 1.10.2. Joints and muscles of the head, neck, trunk, upper limb and lower limb
   - 1.11. Circulatory system
     - 1.11.1. Blood
     - 1.11.2. Blood vessels
     - 1.11.3. Heart
     - 1.11.4. Pulmonary circulation
     - 1.11.5. Systemic circulation
     - 1.11.6. Veins
   - 1.12. Lymphatic system
     - 1.12.1. Lymph
     - 1.12.2. Lymphatic vessels
     - 1.12.3. Lymph nodes

1.12.4. Lymphatic drainage of the body
1.12.5. Lymphatic tissue
1.12.6. Spleen
1.13. Respiratory system
1.13.1. Organs: nose, pharynx, larynx, trachea, bronchi, lungs
1.13.2. Physiology of respiration
1.14. Digestive system
1.14.1. Organs: mouth, salivary glands, pharynx, oesphagus, stomach, small intestine, large intestine, pancreas, liver and biliary apparatus
1.14.2. Function of the alimentary system
1.15. Urinary system
1.15.1. Organs: kidneys, ureters, urinary bladder and urethra
1.15.2. Functions of kidney
1.15.3. Control of micturation
1.16. Nervous system
1.16.1. Nervous tissue
1.16.2. Central nervous system (brain and spinal cord)
1.16.3. Peripheral nervous system
1.16.4. Autonomic nervous system
1.17. Endocrine system: pituitary gland, thyroid gland, parathyroid glands, adrenal glands and pancreas
1.18. Reproductive system
1.18.1. Male reproductive system
1.18.2. Female reproductive system
1.19. The skin and organs of special sense
1.19.1. Skin
1.19.2. Organs of special sense: eye, ear, nose, tongue

2. Radiographic Techniques

2.1. General radiography
2.1.1. Registration process
2.1.1.1. The steps of registration of patient
2.1.1.2. The importance of a monthly and annual record, filing system and preparing performa invoices
2.1.1.3. Filling of radiographic form and reports (X-ray number, hospital number, patient's name, cross reference bill with patient's name)
2.1.2. Routine radiographic techniques for upper limb (fingers, thumb, hand, wrist, forearm, elbow, humerus, shoulder, scapula, clavicle)
2.1.3. Routine radiographic techniques for the lower limb (toes, foot, calcaneum, ankle, tibia, fibula, knee, femur, hip joint, neck of femur, pelvis)
2.1.4. Routine radiographic techniques for thoracic cage and its contents (chest, heart, ribs and sternum)
2.1.5. Routine radiographic technique for the abdomen
2.1.6. Routine radiographic technique for the spine (cervical, thoracic, lumbar, sacrum and coccyx, sacro-illac joint)
2.1.7. Routine radiographic techniques for the skull
2.1.7.1. The radiographic anatomical landmarks of the skull
2.1.7.2. The process of routine examination of the bones of skull (cranium, facial bones and mandible)
2.1.8. To identify in X-ray
2.1.8.1. Foreign body in the hand and foot

2.1.8.2. Scaphoid, head of humerus and axial shoulder, acromio-calvicular joints, sterno-calvicular joints, patella and tibial tuberosity.

2.1.9. Purposes and overview of these supplementary views of the chest and abdomen (apical, lordotic and decubitus, oblique, lateral, thoracic inlet, diaphragm excursion, inhaled or swallowed foreign body)

2.1.10. 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-iliac joints, ilium, acetabulum, pelvimetry, skeleton survey

2.1.11. Supplementary views for the skull (Towne's, submento-vertical, sella turcica, temporo-mandibular joint, nasal bones, paranasal sinuses, mastoids, orbits, optic foramina), foreign body in the eye and dental radiography

2.1.12. Bone age study: Bones radiographed for bone age estimation

2.1.13. Bone densitometry

2.1.14. Trauma radiography

2.2. Radiographic examination with contrast media

2.2.1. Contrast media

2.2.1.1. Definition and types of contrast media

2.2.1.2. Methods of introducing contrast media

2.2.1.3. Reactions of contrast media

2.2.1.4. Emergency equipment 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, barium meal, barium follow through, barium enema, small bowel enema, loopogram

2.2.2.2. Role of a radiographer during fluoroscopy

2.2.3. Investigation of urinary tract and hysterosalpingogram: intravenous urogram (IVU), cystogram, micturating cystourethrogram (MCUG), urethrogram, retrograde pyelogram, hysterosalpingogram (HSG)

2.2.4. Radiographic procedure of the billary tract: oral cholecystography (OCG), intravenous cholangiography (IVC), percutaneous transhepatic cholangiography and drainage (PTC and PTCD), endoscopic retrograde cholangio pancreatography (ERCP), operative cholangiography, 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 operation 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: carotid and vertebral angiogram, femoral angiogram, aortogram, phlebogram, encephalogram, ventriculogram, myelogram

2.2.7. Special examinations: arthrogram, dacrocystogram, sinogram/fistulogram, sialogram, mammogram, macro radiography, 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

3.2. 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. Units of measurement
3.3.2. Drugs used in preparation of the patient
3.3.3. Drugs used in resuscitation
3.3.4. 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: radiological emergencies, shock, hemorrhage, burns, scalds, loss of consciousness, asphyxia, fractures, 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

(Section-B) 50 Marks

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 and 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 Intensifying screen
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 cycle
4.4.1.1. Development: Constituents of developer, factors affecting control of development, developer replenishes maintenance of activity and level of developer
4.4.1.2. Rinsing
4.4.1.3. Fixation: Constituents of fixer, factors affecting fixation and regeneration of the fixer
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4.4.1.5. Drying process

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द्वितीय पत्रको प्रश्नसंख्या तालिका

द्वितीय पत्रको एकाईहरुबाट यथासम्भव निम्नानुसार विषयगत प्रश्नहरु सोधिनेछ।

खण्ड	Section-A			Section-B			
एकाई	१	२	३	४	५	६	७
छोटो प्रश्न	२	२	२	१	२	२	१
लामो प्रश्न	१	१	-	१	१		-

२. कम्प्युटर सीप परीक्षण (Computer Skill Test)

विषयः कम्प्युटर सीप परीक्षण (Computer Skill Test)

विषय	पूर्णाङ्क	विषयवस्तु शीर्षक	अङ्क	समय
कम्प्युटर सीप परीक्षण (Computer Skill Test)	१०	Nepali Typing	२ अङ्क	५ मिनेट
		English Typing	२ अङ्क	५ मिनेट
		Ms word	२ अङ्क	१० मिनेट
		Electronic Spreadsheet	२ अङ्क	
		Presentation System	१ अङ्क	
		Windows basic, Email and Internet	१ अङ्क	
जम्मा			१० अङ्क	२० मिनेट

Contents

1. Ms word (0.5×2=1 Marks and 1×1=1 Mark)
   a. Creating, saving and opening documents
   b. Typing in Nepali and English
   c. Text formatting (Font, Size, Color, Underline, Italic, Bold, etc.) and paragraph formatting (alignment, indentation, spacing)
   d. Inserting Header, Footer, Page Number, Table, Pictures, Shapes, Hyperlink, Bookmark, Text Box and Symbol
   e. Page Formatting
   f. Security Techniques of Document
   g. Mail merge
2. Electronic Spreadsheet (0.5×2=1 Marks and 1×1=1 Mark)
   a. Organization of Electronic Spreadsheet applications (Cells, Rows, Columns, Worksheet, Workbook and Workspace)
   b. Creating, Opening and Saving Work Book
   c. Editing, Copying, Moving, Deleting Cell Contents
   d. Formatting Cells (Font, Border, Pattern, Alignment, Number, Protection, Margins and text wrap)
   e. Formatting Rows, Column and Sheets
   f. Using Formula with Relative and Absolute Cell Reference
   g. Using Basic Functions (SUM, MAX, MIN, AVERAGE)
3. Presentation System (0.5×2=1 Marks)
   a. Introduction to presentation application
   b. Creating, Opening & Saving Slides
   c. Formatting Slides, Slide design, Inserting header & footer
   d. Slide Show, hyper link
   e. Animation
   f. Inserting Built-in picture, Picture, Table, Chart, Graphs, and Organization Chart etc.
4. Windows basic, Email and Internet (0.5×2=1 Marks)
   a. Introduction to Graphical User Interface
   b. Starting and shutting down Windows
   c. Basic Windows elements: Desktop, Taskbar, My Computer, Recycle Bin etc.
   d. Concept of file, folder, menu, toolbar
   e. Searching files and folders
   f. Internet browsing & searching content in the web
   g. Creating Email ID, Using email and mail client tools

अंग्रेजी र नेपाली Typing Skill Test को लागि निर्देशन

१. नेपाली typing skill test को लागि १५० शब्दको एउटा text दिइनेछ र देहाय अनुसार अङ्क प्रदान गरिनेछ।

शुद्ध शब्द प्रतिमिनेट (Correct words/minute)	पाउने अङ्क
४ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	० अङ्क
४ वा सो भन्दा बढी र ७ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	०.२५ अङ्क
७ वा सो भन्दा बढी र १० भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	०.५० अङ्क
१० वा सो भन्दा बढी र १३ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	०.७५ अङ्क
१३ वा सो भन्दा बढी र १६ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	१.०० अङ्क
१६ वा सो भन्दा बढी र १९ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	१.२५ अङ्क
१९ वा सो भन्दा बढी र २२ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	१.५० अङ्क
२२ वा सो भन्दा बढी र २५ भन्दा कम शुद्धशब्द प्रतिमिनेट वापत	१.७५ अङ्क
२५ वा सो भन्दा बढी शुद्ध शब्द प्रतिमिनेट वापत	२.०० अङ्क

२. English typing skill test को लागि २०० शब्दको एउटा text दिइनेछ र देहायअनुसार अङ्क प्रदान गरिनेछ।

शुद्ध शब्द प्रतिमिनेट (Correct words/minute)	पाउने अङ्क
४ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	० अङ्क
४ वा सो भन्दा बढी र ८ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	०.२५ अङ्क
८ वा सो भन्दा बढी र १२ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	०.५० अङ्क
१२ वा सो भन्दा बढी र १६ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	०.७५ अङ्क
१६ वा सो भन्दा बढी र २० भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	१.०० अङ्क
२० वा सो भन्दा बढी र २४ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	१.२५ अङ्क
२४ वा सो भन्दा बढी र २८ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	१.५० अङ्क
२८ वा सो भन्दा बढी र ३२ भन्दा कम शुद्ध शब्द प्रतिमिनेट वापत	१.७५ अङ्क
३२ वा सो भन्दा बढी शुद्ध शब्द प्रतिमिनेट वापत	२.०० अङ्क

३. नेपालीमा दिइएको text लाई अनिवार्य रुपमा युनिकोड (रोमानाइज्ड वा ट्रेडिसनल) मा टाइप गर्नुपर्नेछ।

४. अंग्रेजी र नेपाली typing मा दिइएको text लाई आधारमानी टाइप गरेको text सँग भिडाई परीक्षण गरिनेछ। दिइएको अंग्रेजी वा नेपाली text मा उल्लेखित स्थान बमोजिम परीक्षार्थीहरूले आफ्नो text मा punctuation टाइप नगरेको पाइएमा त्यसको शब्दमा गणना गरिनेछैन। तत्पश्चात, निम्न formula प्रयोग गरी शुद्ध शब्द प्रतिमिनेट (correct words/minute) निकालिनेछ।

Formula: शुद्ध शब्द प्रतिमिनेट (Correct words/minute) = $\frac{(\text{Total words typed} - \text{Wrong words})}{5}$