यस पाठचक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :- लिखित परीक्षा (Written Examination) पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता (Interview) पूर्णाङ्ग :- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण : लिखित परीक्षा (Written Examination) पूर्णाङ्क :- २००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्ग	परीक्षा प्रणाली		प्रश्नसंख्या ×अङ्क	समय
प्रथम	भाग : १ सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण (Part-I: General Awareness & General Aptitude Test)	100	40	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	२५ प्रश्न × २ अङ्क	४५ मिनेट
	भागः २ सेवा सम्बन्धित कार्य-ज्ञान (Part-II: Job related functional knowledge)					२५ प्रश्न ×२ अङ्ग	
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge)	100	40	विषयगत (Subjective)	छोटो उत्तर (Short Answer) लामो उत्तर (Long Answer)	9२ प्रश्न x ५ अङ्ग ४ प्रश्न x9० अङ्ग	२ घण्टा १४ मिनेट

द्वितीय चरण : अन्तर्वार्ता (Interview) पूर्णाङ्क :- ३०

पत्र पूर्णाङ्क उत्तीर्णाङ्क		परीक्षा	समय	
अन्तर्वार्ता (Interview)	30		बोर्ड अन्तर्वार्ता (Board Interview)	-

द्रष्टव्य :

- 1. यस पाठचक्रम योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई भागमा विभाजन गरिएको छ।
- 2. लिखित परीक्षाको प्रश्नपत्रको माध्यम भाषा पाठचक्रमको विषयवस्तु जुन भाषामा दिइएको छ सोही भाषाको आधारमा नेपाली वा अङ्ग्रेजी मध्ये कुनै एक मात्र भाषा हुनेछ । तर विषयवस्तुलाई स्पष्ट गर्नुपर्ने अवस्थामा द्वै भाषा समेत प्रयोग गर्न सिकने छ ।
- 3. लिखित परीक्षाको माध्यम भाषा नेपाली वा अङ्ग्रेजी अथवा नेपाली र अङ्ग्रेजी दुवै हुनेछ ।
- 4. प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- ५. प्रथम पत्रको सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge) अन्तर्गतको २५ प्रश्नको पाठचक्रम द्वितीय पत्रको सेवा सम्बन्धी कार्य-ज्ञान (Job related functional knowledge) मा निर्धारण गरिएको पाठचक्रम नै हुनेछ ।
- 6. वस्तुगत बहुवैकित्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रितिशत अङ्क कट्टा गिरनेछ । तर उत्तर निदएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पिन गिरने छैन ।
- 7. वस्तुगत बहुवैकित्पक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अङ्ग्रेजी ठूलो अक्षरहरू (Capital letters): A,

- B, C, D मा लेख्नुपर्नेछ । सानो अक्षरहरू (Small letters): a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ । साथै OMR sheet प्रयोग हुने परीक्षामा परीक्षार्थीलाई दिइएको निर्देशन अनुसारको सङ्केत प्रयोग गर्नु पर्नेछ ।
- 8. बहवैकित्पिक प्रश्नहरू हुने परीक्षामा क्नै प्रकारको क्याल्क्लेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- 9. परीक्षामा परीक्षार्थीले मोबाइल लगायत क्नै प्रकारका विद्युतीय उपकरण परीक्षा हलमा लैजान पाइने छैन ।
- 10. विषयगत प्रश्नहरूको हकमा तोकिएको अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नको 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 सिकने छ।
- 11.विषयगत प्रश्न हुनेको हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डको प्रश्नहरूको उत्तर सोहीखण्डको उत्तरपुस्तिकामा लेब्नुपर्नेछ ।
- 12.परीक्षामा सोधिने प्रश्नसङ्ख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र/विषयमा दिइए अन्सार हुनेछ ।
- 13.यस पाठचक्रम योजना अन्तर्गतका पत्र विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापिन पाठचक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगािड (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भइ) कायम रहेकालाई यस पाठचक्रममा परेको सम्भनु पर्दछ ।
- 14. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- 15.यस भन्दा अगाडि लाग् भएका माथि उल्लेखित सेवा, समूहको पाठचक्रम खारेज गरिएको छ।
- 16.पाठचक्रम लाग् मिति : २०७९/९/१०

प्रथम पत्र (Paper I) :-सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण तथा सेवा सम्बन्धित कार्य-ज्ञान भाग (Part I):

सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण

(General Awareness and General Aptitude Test) (২ু पूश्न × ২ अङ्क= ५० अङ्क)

1. सामान्य ज्ञान (General Awareness)

(**c** × **?** अङ्क =**9**६ अङ्क)

- 1.1 नेपालको भौगोलिक अवस्था, प्राकृतिक स्रोत र साधनहरू
- 1.2 नेपालको ऐतिहासिक, सांस्कृतिक र सामाजिक अवस्था सम्बन्धी जानकारी
- 1.3 नेपालको आर्थिक अवस्था र चाल् आवधिक योजना सम्बन्धी जानकारी
- 1.4 जैविक विविधता, दिगो विकास, वातावरण, प्रदूषण, जलवायु परिवर्तन र जनसंख्या व्यवस्थापन
- 1.5 मानव जीवनमा प्रत्यक्ष प्रभाव पार्ने विज्ञान र प्रविधिका महत्वपूर्ण उपलब्धिहरू
- 1.6 जनस्वास्थ्य, रोग, खाद्य र पोषण सम्बन्धी सामान्य जानकारी
- 1.7 नेपालको संविधान (भाग १ देखि ५ सम्म र अनुसूचीहरू)
- 1.8 संयुक्त राष्ट्रसंघ र यसका विशिष्टीकृत संस्था सम्बन्धी जानकारी
- 1.9 क्षेत्रीय सङ्गठन (सार्क, बिमस्टेक, आसियान र युरोपियन संघ) सम्बन्धी जानकारी
- 1.10 राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामियक गतिविधिहरू

2. सार्वजनिक व्यवस्थापन (Public Management)

(८ × २ अङ्क=१६ अङ्क)

- 2.1 कार्यालय व्यवस्थापन (Office Management)
 - 2.1.1 कार्यालय (Office): परिचय, महत्व, कार्य र प्रकार
 - 2.1.2 सहायक कर्मचारीका कार्य र ग्णहरू
 - 2.1.3 कार्यालय स्रोत साधन (Office Resources): परिचय र प्रकार
 - 2.1.4 कार्यालयमा सञ्चारको महत्व, किसिम र साधन
 - 2.1.5 कार्यालय कार्यविधि (Office Procedure) : पत्र व्यवहार (Correspondence), दर्ता र चलानी (Registration & Dispatch), परिपत्र (Circular), तोक आदेश (Order), टिप्पणी लेखन र टिप्पणी तयार पार्दा ध्यान दिनुपर्ने कुराहरू
 - 2.1.6 अभिलेख व्यवस्थापन (Record Management)
- 2.2 निजामती सेवा ऐन र नियमावलीमा भएका देहायका व्यवस्थाहरू
 - 2.2.1 निजामती सेवाको गठन, सङ्गठन संरचना, पदपति गर्ने तरिका र प्रक्रियाहरू
 - 2.2.2 कर्मचारीको नियक्ति, सरुवा, बढ्वा, बिदा, विभागीय सजाय र अवकाश
 - 2.2.3 कर्मचारीले पालन गर्नुपर्ने आचरण र कर्तव्यहरू
- 2.3 सरकारी बजेट, लेखा र लेखापरीक्षण प्रणाली सम्बन्धी सामान्य जानकारी
- 2.4 सार्वजनिक सेवा प्रवाहको अर्थ, सेवा प्रवाह गर्ने निकाय, तरिका र माध्यमहरू
- 2.5 सार्वजनिक बडापत्र (Public Charter) : महत्व र आवश्यकता
- 2.6 व्यवस्थापनका अवधारणा तथा सार्वजनिक व्यवस्थापनमा निर्देशन, नियन्त्रण, समन्वय, निर्णय प्रिक्रिया, उत्प्रेरणा र नेतृत्व सम्बन्धी जानकारी
- 2.7 मानवीय मूल्य मान्यता (Human Values), नागरिकका कर्तव्य र दायित्व तथा अनुशासन

- 3. सामान्य अभिक्षमता परीक्षण (General Aptitude Test) (५ 🗙 २ अङ्क=१० अङ्क)
 - 3.1 शाब्दिक अभिक्षमता परीक्षण (Verbal Aptitude Test): यस परीक्षणमा शब्दज्ञान, अनुक्रम, समरूपता, वर्गीकरण, कोडिङ-डिकोडिङ, दिशा र दुरी ज्ञान परीक्षण (direction & distance sense test), तर्क विचार सम्बन्धी (logical reasoning), पङ्क्तिक्रम (ranking order) आदि विषयवस्तुबाट प्रश्नहरू समावेश गरिनेछ।
 - 3.2 संख्यात्मक अभिक्षमता परीक्षण (Numerical Aptitude Test) : यस परीक्षणमा अनुक्रम, समरुपता, वर्गीकरण, कोडिङ, मेट्रिक्स, अङ्कर्गणितीय तर्क /िक्रया सम्बन्धी, प्रतिशत, भिन्न, अनुपात, औसत, समय र काम, आदि विषयवस्तुबाट प्रश्नहरू समावेश गरिनेछ।
 - 3.3 अशाब्दिक अभिक्षमता परीक्षण (Non-Verbal/Abstract Aptitude Test) : यस परीक्षणमा अनुक्रम, समरूपता, वर्गीकरण, भेन चित्र, मेट्रिक्स, त्रिभुज र वर्गहरूको रचना, चित्र वा आकृति बनावट र विश्लेषण, आदि विषयवस्तुबाट प्रश्नहरू समावेश गरिनेछ।
 - 3.4 रुजु गर्ने (Verification test) र फाइलिङ अभिरुचि परीक्षण (Filing aptitude test): रुजु गर्ने (Verification test), परीक्षणमा तथ्यांङ्क, सङ्ख्या वा शाब्दिक सूचनालाई जाँच गर्ने वा त्रृटी पत्ता लगाउने अथवा समानता वा भिन्नता पत्ता लगाउने किसिमका प्रश्नहरू समावेश हुनेछन् । फाइलिङ अभिरुचि परीक्षण (Filing aptitude test) मा शाब्दिक र सङ्ख्यात्मक फाइलिङ वस्तु वा प्रिक्रियालाई वर्णमालाक्रम, सङ्ख्यात्मकक्रम वा कालक्रम अनुसार समाधान गर्ने किसिमका प्रश्नहरू समावेश हुनेछन् ।
 - 3.5 निर्देशन अनुसरण गर्ने (Follows the instructions) र विश्लेषणात्मक तार्किकता परीक्षण (Analytical reasoning test): निर्देशन अनुसरण गर्ने (Follows the instructions) परीक्षणमा दिइएका लिखित निर्देशनलाई हुबहु अनुसरण गरी समाधान गर्ने किसिमका प्रश्नहरू समावेश हुनेछन् । विश्लेषणात्मक तार्किकता परीक्षण (Analytical reasoning test) मा शाब्दिक वा सङ्ख्यात्मक वा अशाब्दिक (चित्रात्मक) किसिमका विश्लेषणात्मक तार्किकता सम्बन्धी प्रश्नहरू समावेश हुनेछन् ।

4. नेपाली र अङ्ग्रेजी भाषाः

(४ × २ अङ्क=< अङ्क)

- 4.1 English: Knowledge on writing correct English sentences, letters, and reports according to English grammar based on the following syntactic functions: (२ × ২ অভ্ক=४ অভ্ক)
 - a. Parts of Speech:
 - b. Noun
 - c. Pronoun
 - d. Adjective
 - e. Determiner
 - f. Verb
 - g. Adverb
 - h. Preposition
 - i. Conjunction and
 - i. Interjection
 - k. Infinitives and gerunds, reported speech and tenses
- 4.2 नेपालीः नेपाली भाषामा स्तरीय शुद्ध शब्द, वाक्यांश र वाक्य लेखनको लागि आवश्यक पर्ने इस्व दीर्घ, ब र व, तथा श, ष, स लगायतका व्याकरणगत शुद्ध लेखनशैलीमा केन्द्रित शुद्ध शब्द, वाक्यांश र वाक्य लेखनसिंहतको नेपाली भाषाको शुद्धाशुद्धिको ज्ञान (२ × २ अङ्क=४ अङ्क)

भाग (Part II):-

सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge)

(२५ प्रश्न × २ अङ्क = ५० अङ्क)

1. Anatomy and Physiology

1.1 General introduction

- 1.1.1 Cell & Reproduction of the individual
- 1.2 Tissues
- 1.2.1 Epithelial, Connective, Skeletal, Muscular & Nervous tissues

1.3 General pathology

1.3.1 Bacteria, Viruses & Tumours

1.4 Surface and regional anatomy

- 1.4.1 Anatomical position, head, neck, thorax, abdomen, pelvic cavity
- 1.5 Skeleton
- 1.5.1 Structure and function of bone
- 1.5.2 Development and growth of bones
- 1.5.3 Healing of fractures

1.6 Skull

- 1.6.1 Skull viewed from above, skull viewed from the front, skull viewed from the side, skull viewed from the below
- 1.6.2 Interior of the skullcap, interior of the base of the skull
- 1.6.3 Nasal cavity, accessory nasal sinuses
- 1.6.4 Individual bones of the skull

1.7 Vertebral column, ribs and sternum

1.7.1 Vertebral column, ribs and sternum

1.8 Bones of the upper limb

- 1.8.1 Clavicle, scapula, humerus, radius, ulna
- 1.8.2 Carpal bones, metacarpal bones, phalanges
- 1.8.3 Arteries and nerves related to the bones of the upper limb
- 1.8.4 Ossification of the bones of the upper limb

1.9 Bones of the lower limb

- 1.9.1 Hipbone, pelvis, femur, patella, tibia, fibula
- 1.9.2 Tarsal bones, metarsal bones, phalanges
- 1.9.3 Arches of the foot
- 1.9.4 Arteries and nerves related to the bone of the lower limb
- 1.9.5 Ossification of the bones of the lower limb

1.10 Joints of the bones

- 1.10.1 Types of joints
- 1.10.2 Muscles and joints of the head
- 1.10.3 Joints and muscles of the neck and trunk
- 1.10.4 Joints and muscles of the upper limb
- 1.10.5 Joint and muscles of the lower limb

1.11 Circulatory system

- 1.11.1 Blood and blood vessels
- 1.11.2 Heart, pulmonary circulation, systemic circulation
- 1.11.3 Veins

1.12 Lymphatic system

- 1.12.1 Lymph, lymphatic vessels, lymph nodes, lymphatic drainage of the body
- 1.12.2 Lymphatic tissue
- 1.12.3 Spleen

1.13 Respiratory system

- 1.13.1 Nose, pharynx, larynx, trachea, bronchi, lungs
- 1.13.2 Physiology of respiration

1.14 Digestive system

- 1.14.1 Mouth, salivary glands, pharynx, oesphagus, stomach, small intestine, large intestine, pancreas, liver, biliary apparatus
- 1.14.2 Function of the alimentary system

1.15 Urinary system

- 1.15.1 Kidneys, ureters, urinary bladder, urethra
- 1.15.2 Functions of kidneys
- 1.15.3 Control of micturition

1.16 Nervous system

- 1.16.1 Nervous tissue
- 1.16.2 Central nervous system, brain, spinal cord
- 1.16.3 Peripheral nervous system
- 1.16.4 Autonomic nervous system

1.17 Endocrine system

- 1.17.1 Pituitary gland, thyroid gland, parathyroid gland
- 1.17.2 Adrenal glands

1.18 Reproductive system

- 1.18.1 Male reproductive system
- 1.18.2 Female reproductive system

1.19 Skin and the organs of special senses

1.19.1 Skin, Eye, Ear, Nose, 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 contens (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
 - 2.1.5.1 The radiograph anatomical landmarks of the skull
 - 2.1.5.2 The 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, forign 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)
- 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 exursion, 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, skeletion 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
 - 2.1.11.1 Basic principle of tomogram
 - 2.1.11.2 Practical application of Tomography for the chest, kidney, gall bladder and skeletal system
- 2.1.12 Registration process
 - 2.1.12.1 The steps of registration of patients
 - 2.1.12.2 The importance of a monthly and annual record, filling system and preparing the Performa invoices
 - 2.1.12.3 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 and types of the contrast media
 - 2.2.1.2 Methods of introducing the contrast media
 - 2.2.1.3 Reactions of contrast media
 - 2.2.1.4 Name of the 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
 - 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 Retrogtade pyelogram
 - 2.2.3.6 Hystero salpinogram (HSG)
- 2.2.4 Radiographic procedure of the Bollary 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 Operatice 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 Uses of mobile machine
 - 2.2.5.2 Technique of using ward radiography
 - 2.2.5.3 Technique of using operating theatre radiography
 - 2.2.5.4 Technique to help in Hip pinning
 - 2.2.5.5 Technique of operative-chlangiography
- 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 Dacryccystogram
 - 2.2.7.3 Sinogram/Fistulogram
 - 2.2.7.4 Sailogram
 - 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

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
 - 4.1.1.1 Contrast, sharpness, resolution
 - 4.1.1.2 Exposure factors
 - 4.1.1.3 Absorption coefficient

4.4 Film processing

4.4.1 Manual film processing

- 4.1.1.1 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
 - 4.1.1.2 Basic principle & its 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
 - 5.1.1 X-ray tube construction
 - 5.1.2 Stationary and rotating x-ray tube
 - 5.1.3 Recent advancement of an 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
 - 5.4 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 & thermos luminescent dosimeter)
- 6.7 Safety requirements for operating a 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

प्रथम पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरू सोधिने छ :

भाग	विषयवस्तु	परीक्षा प्रणाली	अङ्कभार	प्रश्न संख्या × अङ्क
I	सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण (General Awareness & General Aptitude Test)	बहुवैकल्पिक प्रश्न (MCQs)	ХO	२५ प्रश्न × २ अङ्क= ५०
II	सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge)		५०	२५ प्रश्न × २ अङ्क= ५०

प्रथम पत्रको <u>भाग (Part II)</u> सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge) को पाठचक्रमको एकाइबाट परीक्षामा यथासम्भव देहाय बमोजिम प्रश्नहरु सोधिने छ :

पाठचक्रमको एकाइ	1	2	3	4	5	6	7
प्रश्न सङ्ख्या	5	6	2	4	5	2	1

द्वितीय पत्र (Paper II) :-सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge) खण्ड (Section) (A) : - ५० अङ्क

1. Anatomy and Physiology

- 1.1 General introduction
 - 1.1.1 Cell & Reproduction of the individual
- 1.2 Tissues
 - 1.2.1 Epithelial, Connective, Skeletal, Muscular & Nervous tissues
- 1.3 General pathology
 - 1.3.1 Bacteria, Viruses & Tumours
- 1.4 Surface and regional anatomy
 - 1.4.1 Anatomical position, head, neck, thorax, abdomen, pelvic cavity
- 1.5 Skeleton
 - 1.5.1 Structure and function of bone
 - 1.5.2 Development and growth of bones
 - 1.5.3 Healing of fractures
- 1.6 **Skull**
 - 1.6.1 Skull viewed from above, skull viewed from the front, skull viewed from the side, skull viewed from the below
 - 1.6.2 Interior of the skullcap, interior of the base of the skull
 - 1.6.3 Nasal cavity, accessory nasal sinuses
 - 1.6.4 Individual bones of the skull

1.7 Vertebral column, ribs and sternum

1.7.1 Vertebral column, ribs and sternum

1.8 Bones of the upper limb

- 1.8.1 Clavicle, scapula, humerus, radius, ulna
- 1.8.2 Carpal bones, metacarpal bones, phalanges
- 1.8.3 Arteries and nerves related to the bones of the upper limb
- 1.8.4 Ossification of the bones of the upper limb

1.9 Bones of the lower limb

- 1.9.1 Hipbone, pelvis, femur, patella, tibia, fibula
- 1.9.2 Tarsal bones, metarsal bones, phalanges
- 1.9.3 Arches of the foot
- 1.9.4 Arteries and nerves related to the bone of the lower limb
- 1.9.5 Ossification of the bones of the lower limb

1.10 Joints of the bones

- 1.10.1 Types of joints
- 1.10.2 Muscles and joints of the head
- 1.10.3 Joints and muscles of the neck and trunk
- 1.10.4 Joints and muscles of the upper limb
- 1.10.5 Joint and muscles of the lower limb

1.11 Circulatory system

- 1.11.1 Blood and blood vessels
- 1.11.2 Heart, pulmonary circulation, systemic circulation
- 1.11.3 Veins

1.12 Lymphatic system

1.12.1 Lymph, lymphatic vessels, lymph nodes, lymphatic drainage of the body

- 1.12.2 Lymphatic tissue
- 1.12.3 Spleen

1.13 Respiratory system

- 1.13.1 Nose, pharynx, larynx, trachea, bronchi, lungs
- 1.13.2 Physiology of respiration

1.14 **Digestive system**

- 1.14.1 Mouth, salivary glands, pharynx, oesphagus, stomach, small intestine, large intestine, pancreas, liver, biliary apparatus
- 1.14.2 Function of the alimentary system

1.15 Urinary system

- 1.15.1 Kidneys, ureters, urinary bladder, urethra
- 1.15.2 Functions of kidneys
- 1.15.3 Control of micturition

1.16 Nervous system

- 1.16.1 Nervous tissue
- 1.16.2 Central nervous system, brain, spinal cord
- 1.16.3 Peripheral nervous system
- 1.16.4 Autonomic nervous system

1.17 Endocrine system

- 1.17.1 Pituitary gland, thyroid gland, parathyroid gland
- 1.17.2 Adrenal glands

1.18 Reproductive system

- 1.18.1 Male reproductive system
- 1.18.2 Female reproductive system

1.19 Skin and the organs of special senses

1.19.1 Skin, Eye, Ear, Nose, 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 contens (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
 - 2.1.5.3 The radiograph anatomical landmarks of the skull
 - 2.1.5.4 The 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, forign 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)

- 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 exursion, 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, skeletion 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
 - 2.1.11.1 Basic principle of tomogram
 - 2.1.11.2 Practical application of Tomography for the chest, kidney, gall bladder and skeletal system
- 2.1.12 Registration process
 - 2.1.12.1 The steps of registration of patients
 - 2.1.12.2 The importance of a monthly and annual record, filling system and preparing the Performa invoices
 - 2.1.12.3 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 and types of the contrast media
 - 2.2.1.2 Methods of introducing the contrast media
 - 2.2.1.3 Reactions of contrast media
 - 2.2.1.4 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 Retrogtade pyelogram
 - 2.2.3.6 Hystero salpinogram (HSG)
- 2.2.4 Radiographic procedure of the Bollary 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 Operatice 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 Uses of mobile machine
 - 2.2.5.2 Technique of using ward radiography
 - 2.2.5.3 Technique of using operating theatre radiography
 - 2.2.5.4 Technique to help in Hip pinning
 - 2.2.5.5 Technique of operative-chlangiography
- 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 Dacryccystogram
 - 2.2.7.3 Sinogram/Fistulogram
 - 2.2.7.4 Sailogram
 - 2.2.7.5 Mammogram
 - 2.2.7.6 Macro-radiography
 - 2.2.7.7 Soft tissue radiography

खण्ड (Section) (B) : - ५० अङ्क

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
 - 4.1.1.1 Contrast, sharpness, resolution
 - 4.1.1.2 Exposure factors
 - 4.1.1.3 Absorption coefficient

4.4 Film processing

- 4.4.1 Manual film processing
 - 4.1.1.1 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
 - 4.1.1.2 Basic principle & its 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
 - 5.1.1 X-ray tube construction
 - 5.1.2 Stationary and rotating x-ray tube
 - 5.1.3 Recent advancement of an 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
- 5.4 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 & thermos luminescent dosemeter)
- 6.7 Safety requirements for operating a 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

द्वितीय पत्रको लागि यथासम्भव निम्नान्सार प्रश्नहरू सोधिनेछ :

द्वितीय पत्र (विषयगत)							
पत्र	विषय	खण्ड	अङ्कभार	छोटो उत्तर	लामो उत्तर		
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job related functional	(A)	χο	६ प्रश्न 🗙 ५ अङ्क = ३०	२ प्रश्न × १० अङ्क = २०		
	Knowledge)	(B)	४०	६ प्रश्न 🗙 ५ अङ्क = ३०	२ प्रश्न × १० अङ्क = २०		