वी.पी. कोइराला मेमोरियल क्यान्सर अस्पताल
प्राविधिक (स्वास्थ्य) सेवा, मेडिकल (एलाइड हेल्थ) समुह, रेडियोडायग्नोसिस तथा इमेजिङ टेक्नोलोजी उपसमुह, सहायक पाँचौं तह, रेडियोग्राफर/डाकरुम टेक्निसियन पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :
प्रथम चरण :– लिखित परीक्षा (Written Examination) पूर्णाङ्क :– २००
द्वितीय चरण :– अन्तर्वार्ता (Interview) पूर्णाङ्क :– ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण (First Phase) : **लिखित परीक्षा**

Paper	Subject	Full Marks	Pass Marks	No. Questions & Weightage	Time Allowed
I	Technical Subject & Organizational Knowledge	100	40	50× 2= 100 (Objective Multiple Choice Questions)	45 minutes
II		100	40	12× 5 = 60 4 × 10 = 40 (Subjective Descriptive Type)	2.30 hrs

द्वितीय चरण (Second Phase)

Subject	Full Marks	Examination
Interview	30	Oral

द्रष्टव्य :

१. यो पाठ्यक्रमको योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई भागमा विभाजन गरिएको छ ।
२. प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।
३. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
४. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
५. 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 ।
६. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
७. बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
८. परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र /विषयमा दिइए अनुसार हुनेछ ।
९. परीक्षामा परीक्षार्थीले मोबाइल वा यस्तै प्रकारका विद्युतीय उपकरण परीक्षा हलमा लैजान पाइने छैन ।
१०. विषयगत प्रश्न हुने पत्रका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्ने छ ।
११. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।
१२. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
१३. पाठ्यक्रम लागू मिति :– २०७८/०१/१८

वी.पी. कोइराला मेमोरियल क्यान्सर अस्पताल

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Paper I & II : - Technical Subject & Organizational Knowledge
Section (A): 45 % Marks

1. **Anatomy and Physiology**
   - 1.1 Cell and Tissues (Epithelial, Connective, Skeletal, Muscular and Nervous)
   - 1.2 General pathology : Bacteria, Viruses, Tumours
   - 1.3 Surface and regional anatomy
     - 1.3.1 The anatomical position
     - 1.3.2 Head, Neck, Thorax, Abdomen and Pelvic cavity
   - 1.4 Skeleton System
     - 1.4.1 Structure and function of bones
     - 1.4.2 Development and growth of bones, and healing of fractures
     - 1.4.3 The skull
       - 1.4.3.1 The skull viewed from the above and the below
       - 1.4.3.2 The skull viewed from the side and the front
       - 1.4.3.3 The interior of the skullcap
       - 1.4.3.4 The interior of the base of the skull
       - 1.4.3.5 The nasal cavity
       - 1.4.3.6 The accessory nasal sinuses
       - 1.4.3.7 The individual bones of the skull
     - 1.4.4 The vertebral column, ribs and sternum
     - 1.4.5 The bones of the upper limb
       - 1.4.5.1 The clavicle
       - 1.4.5.2 The scapula
       - 1.4.5.3 The humerus
       - 1.4.5.4 The radius
       - 1.4.5.5 The ulna
       - 1.4.5.6 The carpal bones
       - 1.4.5.7 The metacarpal bones
       - 1.4.5.8 The phalanges
       - 1.4.5.9 Arteries and nerves related to the bones of the upper limb
       - 1.4.5.10 Ossification of the bones of the upper limb
     - 1.4.6 The bones of the lower limb
       - 1.4.6.1 The hipbone
       - 1.4.6.2 The pelvis
       - 1.4.6.3 The femur
       - 1.4.6.4 The patella
       - 1.4.6.5 The tibia
       - 1.4.6.6 The fibula
       - 1.4.6.7 The tarsal bones
       - 1.4.6.8 The metarsal bones
       - 1.4.6.9 The phalanges
       - 1.4.6.10 The arches of the foot
       - 1.4.6.11 Arteries and nerves related to the bone of the lower limb
       - 1.4.6.12 Ossification of the bones of the lower limb
     - 1.4.7 The joints of the bones of the lower limb
       - 1.4.7.1 Types of joints
       - 1.4.7.2 The muscles and joints of the head
       - 1.4.7.3 The joints and muscles of the neck and trunk

1.4.7.4 The joints and muscles of the upper limb
1.4.7.5 The joint and muscles of the lower limb

1.5 Circulatory System
- 1.5.1 The blood
- 1.5.2 The blood vessels
- 1.5.3 The heart
- 1.5.4 The pulmonary circulation
- 1.5.5 The systemic circulation
- 1.5.6 The veins

1.6 Lymphatic System
- 1.6.1 Lymph
- 1.6.2 The lymphatic vessels
- 1.6.3 The lymph nodes
- 1.6.4 The lymphatic drainage of the body
- 1.6.5 Lymphatic tissue
- 1.6.6 The spleen

1.7 Respiratory System
- 1.7.1 The nose
- 1.7.2 The pharynx
- 1.7.3 The larynx
- 1.7.4 The trachea
- 1.7.5 The bronchi
- 1.7.6 The lungs
- 1.7.7 The physiology of respiration

1.8 Digestive System
- 1.8.1 The mouth
- 1.8.2 The salivary glands
- 1.8.3 The pharynx
- 1.8.4 The oesphagus
- 1.8.5 The stomach
- 1.8.6 The small intestine
- 1.8.7 The large intestine
- 1.8.8 The pancreas
- 1.8.9 The liver
- 1.8.10 The biliary apparatus
- 1.8.11 The function of the alimentary system

1.9 Urinary System
- 1.9.1 The kidneys
- 1.9.2 The ureters
- 1.9.3 The urinary bladder
- 1.9.4 The urethra
- 1.9.5 The functions of kidneys
- 1.9.6 The control of micturition

1.10 Nervous System
- 1.10.1 Nervous tissue
- 1.10.2 Central nervous system, brain and spinal cord
- 1.10.3 Peripheral nervous system
- 1.10.4 Autonomic nervous system

1.11 Endocrine System
- 1.11.1 The pituitary gland
- 1.11.2 The thyroid gland
- 1.11.3 The parathyroid gland
- 1.11.4 The adrenal glands

1.12 Reproductive System : Male and Female

1.13 Skin and the organs of special sense (eye, ear, nose and tongue)

2. **Radiation Physics**

2.1 **X-Rays Gamma rays**
- 2.1.1 Historical background
- 2.1.2 Mechanism of x-ray production
- 2.1.3 Properties of x-rays, intensity & quality of x-rays, continuous and characteristic spectra
- 2.1.4 Effects of variation of tube current and voltage, Brag's law for wavelength determination
- 2.1.5 X-ray control and indicating equipment: simple circuit diagram as illustration of sequence from mains supply to exposure control
- 2.1.6 Mains voltage circuit
- 2.1.7 Mains cables, Switches and fuses
- 2.1.8 Mains voltage compensation, earthing, insulation, voltage drops in cables
- 2.1.9 X-ray tube voltage control and indication
- 2.1.10 Exposure controls. Contactors and timers
- 2.1.11 X-ray tube current control and filament supply, mA compensation, Generator regulation
- 2.1.12 Continuous and characteristic spectra
- 2.1.13 Gamma rays
- 2.1.14 Properties of gamma rays

2.2 **Basic interactions between x-rays and matter**
- 2.2.1 Coherent scattering
- 2.2.2 Photoelectric effect
- 2.2.3 Compton scattering
- 2.2.4 Pair production
- 2.2.5 Photodisintegration

2.3 **Radiation measurement and units**
- 2.3.1 Construction & working of the free air ionization chamber
- 2.3.2 Thimble ionization chamber & condenser ionization chamber

2.4 **Radiation Protection**
- 2.4.1 Objective and principle of radiation protection
- 2.4.2 Radiation and Radiation units
- 2.4.3 Personnel monitoring
- 2.4.4 Protective materials
- 2.4.5 International Commission on Radiation Protection (ICRP) recommendations on dose limits

3. **Clinical Oncology**

3.1 Tumors
- 3.1.1 Tumor definition

3.1.2 Benign tumors and malignant tumors
3.1.3 Spread of tumors

Section (B): 45 % Marks

4. **Radiotherapy Technique**
   - 4.1 Radiography of extremities, skull, spine, abdomen in different views
   - 4.2 IVU, HSG, MCU, Retrograde pyelography, barium meal, barium swallow through, enema, myelography

5. **Radiographic Photography**
   - 5.1 Film
     - 5.1.1 Construction and composition of x-ray film
     - 5.1.2 Types of x-ray film
     - 5.1.3 Characteristic curve, special sensitivity & role of dyeing
     - 5.1.4 Film speed, density, contrast, sensitometry
     - 5.1.5 Artifacts and its causes
   - 5.2 Intensifying screen
     - 5.2.1 Construction and composition of I.S.
     - 5.2.2 Screen speed, sharpness, coating weight
     - 5.2.3 Fluorescent material and phosphorescence
     - 5.2.4 Fluorescent material, new phosphors
   - 5.3 Image
     - 5.3.1 Production of radiographic image
     - 5.3.2 Component of radiographic image
       - 5.3.2.1 Contrast, sharpness, resolution
       - 5.3.2.2 Exposure factors
       - 5.3.2.3 Absorption coefficient
   - 5.4 Film processing
     - 5.4.1 Manual film processing
       - 5.4.1.1 The processing cycle
       - 5.4.1.2 Tanks and containers for processing chemical, processing units
       - 5.4.1.3 Mixing chemicals
       - 5.4.1.4 Storage of chemicals
       - 5.4.1.5 Film hangers
     - 5.4.2 Automatic processor
       - 5.4.2.1 Basic principle and its functioning
   - 5.5 Dark room planning
     - 5.5.1 Location, layout, radiation protection, safelight filter & sensitivity range
   - 5.6 Identification
     - 5.6.1 Methods
     - 5.6.2 Importance
   - 5.7 General introduction silver recovery

6. **Radiographic equipment**
   - 6.1 Historical background of x-ray and its production
     - 6.1.1 X-ray tube construction
     - 6.1.2 Stationary and rotating x-ray tube
     - 6.1.3 Recent advancement of an x-ray tube
     - 6.1.4 Tube rating cooling and care of x-ray tube and its faults

6.1.5 USG
6.1.6 CT
6.1.7 MRI

6.2 Control panel, x-ray table and tube column
6.2.1 Type of x-ray table
6.2.2 Different metering equipment
6.2.3 X-ray tube support

6.3 Fluoroscopic equipment
6.3.1 Conventional fluoroscopy, image intensifier tube and Digital fluoroscopy

6.4 Control of scatter radiation & beam restricting devices
6.4.1 Secondary radiation grids
6.4.2 Air gap technique

6.5 Portable and mobile x-ray units
6.5.1 Capacitor discharge and c-arm

6.6 Computed and Direct Digital Radiography
6.7 Introduction to modern modalities (CT, MRI, mammography)
6.8 Mammography : Indication and techniques

Section (C): 10 % Marks

7. **Organizational Knowledge and General Health Issues**
7.1 B.P.Koirala Memorial Cancer Hospital : History, organizational structure, functions, roles, services, problems and challenges
7.2 National Health Policy
7.3 B.P.Koirala Memorial Cancer Hospital related act and regulations
7.4 Health Service Act, 2053 and Health Service Regulation, 2055
7.5 Professional council related acts and regulations
7.6 NMC and National Health Agencies
7.7 Professional and medical ethics