

बि.पि. कोइराला मेमोरियल क्यान्सर अस्पताल
प्राविधिक (स्वास्थ्य) सेवा, मेडिकल (चिकित्सक) समुह, रेडियोडाईग्नोसिस तथा इमेजिङ्ग उपसमुह, अधिकृत नवौं
तह, रजिष्ट्रार पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
एवं परीक्षा योजना

कुल पूर्णाङ्क : १२०

१. प्रथम चरण : – लिखित परीक्षा				पूर्णाङ्क :- १००	
पत्र / विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्या X अङ्क	समय
General Subject and Technical Subject	१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (MCQs)	१०० प्रश्न x १ अङ्क	१ घण्टा ३० मिनेट

२. द्वितीय चरण : – अन्तर्वार्ता

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	२०	मौखिक

द्रष्टव्य :

१. यो परीक्षा योजनालाई प्रथम चरण (लिखित परीक्षा) र द्वितीय चरण (अन्तर्वार्ता) गरी दुई चरणमा विभाजन गरिएको छ ।
२. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
३. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट देहाय बमोजिम प्रश्नहरु सोधिनेछ ।

खण्ड	अङ्कभार	वस्तुगत प्रश्न संख्या
A	१०	१० प्रश्न X १ अङ्क = १०
B	१०	१० प्रश्न X १ अङ्क = १०

४. 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 ।
५. 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 पाठ्यक्रममा परेको सम्भनु पर्दछ ।
६. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
७. पाठ्यक्रम लागू मिति :- २०७४/११/२९

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पत्र/विषय : **General Subject and Technical Subject**

General Subject

Section (A) – 10 Marks

- 1. B.P.Koirala Memorial Cancer Hospital, Related Legislations and General Health Issues**
 - 1.1. B.P.Koirala Memorial Cancer Hospital : History, organizational structure, functions, roles, services, problems and challenges
 - 1.2. National Health Policy
 - 1.3. B.P.Koirala Memorial Cancer Hospital related act and regulations
 - 1.4. Health Service Act, 2053 and Health Service Regulation, 2055
 - 1.5. Professional council related acts and regulations
 - 1.6. NMC and National Health Agencies
 - 1.7. Professional ethics
 - 1.8. Preventive oncology
- 2. Present Constitution of Nepal (Health and welfare issues)**

Technical Subject

Section (B) – 90 Marks

- 1. Anatomy and Physiology**
 - 1.1 Cell and Tissues (Epithelial, Connective, Skeletal, Muscular and Nervous)
 - 1.2 Respiratory system
 - 1.3 Gastrointestinal system
 - 1.4 Hepatobiliary System
 - 1.5 Genito-urinary system
 - 1.6 Skeleton System
 - 1.7 Nervous System
 - 1.8 Skin and the organs of special sense (eye, ear, nose and tongue)
 - 1.9 Cross sectional anatomy
- 2. Radiation Physics**
 - 2.1 Production and properties of X-ray
 - 2.2 Properties of X-ray film, film processing
 - 2.3 X-ray absorption on the radiographic image
 - 2.4 Principle of Diagnostic ultrasound
 - 2.5 Principle of CT
 - 2.6 Principle of MRI
 - 2.7 Radiation Hazards and its effects
- 3. Radiology**
 - 3.1 Cardiovascular
 - 3.1.1 Normal heart and pericardium
 - 3.1.2 Pulmonary circulation
 - 3.2 Respiratory
 - 3.2.1 Normal Chest
 - 3.2.2 Tumors of the lung
 - 3.2.3 Inflammatory diseases of the lung

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3.2.4 Remaining diseases of lung, pleura and soft tissue and bony thoracic cage of chest

3.3 Gastrointestinal tract and abdomen

3.3.1 Malignant Diseases of Pharynx, esophagus, stomach and duodenum

3.3.2 Malignant Diseases of small bowel and large bowel

3.3.3 Malignant Diseases of biliary tract

3.3.4 Malignant Diseases of Liver, spleen & pancreas

3.4 Urogenital Tracts

3.4.1 Malignant Cystic diseases of the kidney

3.4.2 Tumours of the kidney and ureter

3.4.3 Renal calculi and Nephrocalcinosis

3.4.4 Malignant Diseases of Bladder and prostate

3.4.5 Malignant Gynaecological diseases

3.5 Malignant Diseases related to ENT, Eye and soft tissues

3.6 Central Nervous System

3.6.1 Normal and abnormal skull

3.6.2 Malignant Diseases of brain and spine

3.6.3 Malignant Brain and spinal tumor

3.7 Bones and Joints

3.7.1 Malignant Diseases of bone and joints

3.7.2 Tumors and tumors like conditions of bone

3.8 Endocrine and metabolic diseases

3.8.1 Ultrasound imaging of the whole body

3.8.2 CT Imaging of the whole body

3.8.3 MRI Imaging of the whole body

4. Radiological Procedures

4.1 **First Aids and Emergency Care**

4.1.1 Introduction to Haemorrhage, primary management of haemorrhage

4.2 **Contrast Media**

4.2.1 Introduction, definition, types and uses of contrast media

4.2.2 Properties of contrast media

4.2.3 Adverse effects of contrast media and their management

4.3 **Biliary Tract and Pancreas:**

Definition, indications, contraindications, equipment required contrast media, preparation of the patient, technique / procedure, filming, post procedure care for following investigations:

4.3.1 Intravenous cholelithography (IVC)

4.3.2 Percutaneous transhepatic cholangiography (PTC)

4.3.3 T-tube cholangiography

4.4 **Urinary Tract:**

Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique/procedure, filming, post procedure care for following investigations:

4.4.1 Intravenous urography (IVU)

4.4.2 Modification of IVU and additional techniques

4.4.3 Percutaneous renal puncture (PcRP)

4.4.4 Percutaneous nephrostomy (PCN)

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4.4.5 Retrograde pyelography (RGP)

4.4.6 Micturating cysto-urethrography

4.5 Reproductive System:

Definition, indications, contraindications, equipment required contrast media, preparation of the patient, technique/procedure, filming, post procedure care for:

4.5.1 Hysterosalpingography

4.6 Sinography:

Definition, indications, contraindications, equipment required, contrast media, preparation of the patient, technique /procedure, filming, post procedure care for:

4.6.1 Sinography

4.7 Interventional procedures :

USG guided FNAC, CT guided FNAC/ Biopsy

4.8 Mammography

4.9 Bone Mineral Densitometry

5. Nuclear medicine

5.1 Basics:

5.1.1 Structure of matter- elements - compounds and mixtures, molecules and atoms - atomic and nuclear structures - atomic models - mass energy equivalence - fluorescence - phosphorescence - luminescence - electromagnetic spectrum

5.1.2 Electricity: electric charges-electric induction- Coulomb law -unit of charge-resistance-ohms law-electric power-Joules law

5.1.3 Magnetism - magnetic properties - electromagnetic effect - electrical instruments - Voltmeter, Ammeter and Multimeter

5.2 Radioactivity and Interaction of Radiation:

5.2.1 Radioactivity - Discovery- Natural and Artificial Radioactivity- Isotopes and nuclides – binding forces between nuclear particles –alpha and beta particles – gamma radiation - mechanisms of radioactive decay – half life –

5.2.2 Interaction of electrons, X-rays and α -rays with matter

5.2.3 Radiation intensity and exposure - radiation dose - Radiation quality – law of exponential attenuation – half value layer – linear attenuation coefficient – Scattering – photoelectric effect – Compton-scattering – pair production – particle interactions – total attenuation coefficient- relative clinical importance

5.3 Nuclear Medicine Equipments / Instrumentation and Techniques

5.3.1 Electronic instruments – amplifiers – pulse height analyzer – count rate meters – computer interface – gating system

5.3.2 Principles of radiation detection – detectors – Scintillation Cameras – Scanners – Nuclear Reactors – Cyclotron – Radionuclide Generators – Isotope Calibrators – Well Counters - liquid scintillation counters – Whole body counters

5.3.3 Quality control of Nuclear Medicine Equipments –Collimation of detectors

5.3.4 Physics of Nuclear Medicine Equipments and Instruments used – Collimators and collimation techniques

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- 5.3.5 Physics of PET and Cyclotron: Principles of PET, PET Instrumentations, Annihilation, and its use in cancer detection
- 5.4 **Radiochemistry & Radiopharmacy**
- 5.4.1 Radiopharmaceuticals Production – Nuclear Reactors – Cyclotron – radionuclide Generators – Quality Control – chemical, physical and biological properties – criteria for selection – biological behaviour – mechanisms of localization – radiopharmaceuticals for diagnosis and treatment in humans – PET radiopharmaceuticals – Good manufacturing practices – RIA, IRMA radiopharmaceuticals and kits production
- 5.5 **Clinical Nuclear Medicine**
- 5.5.1 Clinical indications for radionuclide procedures – limitations – patient preparation – In-vivo function studies of all organ systems: Liver Scan – Hepatobiliary Study – Gallium Scan – Bone Scan – Thyroid scan – Brain Scan – Lung Scan, Perfusion, Ventilation –Renal Studies, Renal image, Renal flow (GFR), Renogram
- 5.5.2 ERPF –Cardiac studies – In Vivo procedures – thyroid uptake and calculate data etc. – and all other radionuclide procedures in practice
- 5.5.3 Recent advances in imaging techniques & image processing including fusion techniques – image guiding for radiotherapy & stereo tactic surgeries
- 5.5.4 Recent advanced in radiopharmaceuticals – FDG – Sodium fluoride for bone imaging – Neuro & cardiac radiopharmaceuticals
- 5.5.5 Therapeutic uses of Radionuclide (Patient selection, radionuclide therapy- indications and contraindications, Radionuclide therapeutic procedures - Dose administration - special problems of patient care caused by radionuclide therapeutic procedures - potential early and late adverse reactions, the timing and parameters of anticipated clinical response – follow up care and evaluation)
- 5.5.6 Biological effects of Radiation – induction of radiation injury – somatic and hereditary effects of radiation – normal and abnormal human exposure to radiation – maximum permissible levels
- 5.5.7 Dosimetry – absorbed dose – calculation of absorbed dose – Dosimetry of individuals
- 5.5.8 Quality assurance in Nuclear Medicine – Administrative and technical means of procuring radionuclides – Diagnosis, evaluation and treatment of radiation overexposure –ICRP recommendations – Management of radiation accidents – Radiation protection in different Nuclear isotope therapy procedures – protection of workers, patient relatives
- 5.5.9 Radiation detectors: Construction and Principles of Operation – Ionization Chamber – Isotope calibrator – Proportional Counter – Geiger muller counter – Voltage calibration of a Geiger Mueller tube, optimum operating condition – Dead time correction – Semiconductor detectors
- 5.5.10 Scintillation detector: Thallium activated Sodium Iodide crystal – Photo multiplier tube, electron multiplication, high voltage supply, Shielding, collimators, field of view; Well counter – construction, design of shielding. Signal output, Pre-amplifier – reasons for use – Voltage amplifier – liquid scintillation detector

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5.5.11 Spectrometer: Basic principles of Pulse – height analyzer single channel and Multi – channel analyzers; Optimum operating conditions – Determination of gamma energy spectrum, Integral and differential counting; Spectra of commonly used radio nuclides

6. Clinical Oncology

6.1 Tumors

6.1.1 Tumor definition

6.1.2 Benign and malignant tumors

6.1.3 Spread of tumors

6.1.4 TNM classification of cancers

7. Nuclear Imaging

7.1 T-BI scanning

7.2 Bone scanning

7.3 Renal scanning

8. General Surgical Principles

8.1 Shock

8.2 Surgical infection

8.3 Fluid and electrolyte imbalance

8.4 Preoperative and post operative patient care

8.5 TNM cancer staging

The questions distribution for this paper/subject shall be as follows:

Section	Marks	Multiple Choice Questions
		No. of Questions × Mark
A	10	10 Questions × 1Mark =10 Marks
B	90	90 Questions × 1Mark =90 Marks