निजामती कर्मचारी अस्पताल

प्राविधिक सेवा, प्याथोलोजी समूह, साइटोजेनेटिक्स उपसमूह, रजिष्ट्रार पद, आठौं तहको खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजनगरिएको छ :

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

द्वितीय चरण :– अन्तर्वार्ता (Interview) पूर्णाङ्क :– ३०

१. प्रथम चरण (First Phase): **परीक्षा योजना** (Examination Scheme)

Paper	Subject		Marks	Full Marks	Pass Marks	No. Questions & Weightage	Time
I	General Subject	Part I: Management	50	100	40	6 × 5 = 30 (Short answer) 2 × 10 = 20 (Long answer)	3.00 hrs
		Part II: General Health Issues	50			6 × 5 = 30 (Short answer) 2 × 10 = 20 (Long answer)	
II	Technical Subject			100	40	4 × 15 = 60 (Critical Analysis) 2 × 20 = 40 (Problem Solving)	3.00 hrs

२. द्वितीय चरण (Second Phase)

Subject	Full Marks	Examination System
Interview	30	Oral

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।

२. अस्पतालको प्राविकि सेवा अन्तर्गतका सबै समूह/सबै उपसमूहहरुको लागि प्रथमपत्रको पाठ्यक्रमको विषयवस्तु एउटै हुनेछ । तर द्वितीयपत्र Technical Subject को पाठ्यक्रम समूह/उपसमूह अनुरुप फरक फरक हुनेछ ।

३. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ । परीक्षामा सोधिने **प्रश्नसंख्या र अङ्कभार** यथासम्भव सम्बन्धित पत्र, विषयमा दिईए अनुसार हुनेछ ।

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. 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 ।

६. बहुवैकल्पिक प्रश्नहरु हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

७. विषयगत प्रश्नहरुको हकमा 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 सकिने छ ।

८. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मितिभन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

१०. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

११. पाठ्यक्रम लागु मिति : आ.व. २०७९/०८०

निजामती कर्मचारी अस्पताल
प्राविधिक सेवा, प्याथोलोजी समूह, साइटोजेनेटिक्स उपसमूह, रजिष्ट्रार पद, आठौं तहको खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

Paper I: General Subject
Part I: Management
(6 × 5) + (2 × 10) = 50 Marks

1. **Management**
   - 1.1. Health care management system in Nepal and other parts of the world
   - 1.2. Fundamental principles of healthcare institution and hospital management.
   - 1.3. Effective hospital management principles
   - 1.4. Purpose of medical and non-medical data and records
   - 1.5. Ethics and responsibility of management
   - 1.6. Concept of management and its application in health care including hospital
     - 1.7.1 Management: Concept, principles, functions, scope and role, level and skills of manager
     - 1.7.2 Planning: Concept, principles, nature, types, instruments and steps
     - 1.7.3 Leadership: Concept, function, leadership styles, leadership and management
     - 1.7.4 Coordination: Concept, types, techniques of effective coordination
     - 1.7.5 Communication and counselling: Concept, communication processes and barrier to effective communication, techniques for improving communication
     - 1.7.6 Decision making: Importance, types, rational process of decision making, problem solving techniques, improving decision making
     - 1.7.7 Participative management: Concept, advantage and disadvantage, techniques of participation
     - 1.7.8 Time management: Concept, essential factors and strategies for effective time management
     - 1.7.9 Conflict management: Concept, approaches to conflict, levels of conflict, causes of conflict and strategies for conflict management
     - 1.7.10 Stress management: Concept, causes and sources of stress, techniques of stress management
     - 1.7.11 Change management: Concept, sources of organizational change, resistance to change, management of resistance to change
     - 1.7.12 Appreciative inquiry: Concept, basic principle and management
     - 1.7.13 Human resource management: Concept, functions and different aspects
     - 1.7.14 Health manpower recruitment and development
     - 1.7.15 Financial management: Concept, approaches, budget formulation and implementation, Auditing and topics related to fiscal administration

Part II: General Health Issues
(6 × 5) + (2 × 10) = 50 Marks

2. **General Health Issues**
   - 2.1. Present constitution of federal republic of Nepal (including health and welfare issues)
   - 2.2. Organizational structure of Ministry of Health at national/federal, regional/state, district (if applicable), municipal and village council level
   - 2.3. Professional council and related regulations
   - 2.4. National Health Policy
   - 2.5. Health Service Act and Regulation
   - 2.6. Second Long term health plan
   - 2.7. Health Management Information System, forms, indicators, annual reports
   - 2.8. Human Development Indices, Sustainable Development Goals
   - 2.9. Health volunteers in the national health system, its rationale, use and effectiveness

2.10. Local governance and community participation in health service delivery
2.11. Health Insurance and financing in health care
2.12. Alternative health care system: Ayurveda, homeopathy, Unani, Chinese etc.
2.13. Indigenous and traditional faith health and health practices
2.14. International Health Agencies: Roles and responsibilities of WHO, UNICEF, UNFPA, Inter-agency relationships, Government-agency coordination: Joint Annual Review meeting
2.15. Supervision, types and its usage in health sector
2.16. Monitoring and evaluation system in health sector
2.17. National Health Training Centre
2.18. National and International Disaster Plan, Coordination
2.19. General introduction of Civil Service Hospital and its Bylaws

निजामती कर्मचारी अस्पताल

प्राविधिक सेवा, प्याथोलोजी समूह, साइटोजेनेटिक्स उपसमूह, रजिष्ट्रार पद, आठौं तहको खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

Paper II : Technical Subject

Section (A) – 50 Marks

1. **Cytogenetics**
   - 1.1. Cell division
     - 1.1.1. Mitosis, meiosis
     - 1.1.2. Medical relevance of mitosis and meiosis
   - 1.2. Introduction to embryology and clinical teratology
     - 1.2.1. Human gametogenesis and fertilization
   - 1.3. Chromosomal Disorders
     - 1.3.1. Incidence and Mechanisms of Chromosomal disorder
     - 1.3.2. Chromosomal abnormalities.
     - 1.3.3. Types of chromosomes abnormalities.
     - 1.3.4. Chromosome abnormalities and malignancies.
     - 1.3.5. Chromosomal breakage studies and malignancies
   - 1.4. Human Karyotype
     - 1.4.1. Cytogenetic nomenclature
     - 1.4.2. Introduction of Cytogenetic methods.
     - 1.4.3. Indication of Cytogenetic analysis.
   - 1.5. Disorders of the Autosomes and Sex Chromosomes
   - 1.6. Genetic basis of cancer
   - 1.7. Applying Genomics to individualize Cancer Therapy
   - 1.8. Molecular cytogenetics
     - 1.8.1. Definition
     - 1.8.2. Types including FISH, Comparative Genomic Hybridization, Array CGH
2. **Molecular genetics**
   - 2.1. Gene
     - 2.1.1. Gene organization, structure and function
     - 2.1.2. DNA and RNA structure and function
   - 2.2. Fundamentals of gene expression
     - 2.2.1. Transcription, translation, proteomics, Integrative multi- 'omics'
   - 2.3. The Human Genome
   - 2.4. Gene structure and function
   - 2.5. Epigenetics and epigenomic aspects of gene expression
   - 2.6. Variation in gene expression and its relevance to medicine
   - 2.7. Genetic variation, inherited variation and polymorphism in DNA
   - 2.8. Mutations : Definition, types of mutations and their consequences, dynamic mutations
   - 2.9. Genotypes, phenotypes
     - 2.9.1. The Hardy –Weinberg Law
   - 2.10. Pattern of Single-Gene Inheritance : Pedigrees
   - 2.11. Inheritance : Pattern of Inheritance, Mendelian Inheritance, Types and Characteristics of Autosomal patterns of Mendelian Inheritance
   - 2.12. Gene mapping, gene identification, positional cloning.
   - 2.13. Sex- Linked Inheritance: Definition, Pseudo-autosomal Inheritance.
   - 2.14. Mosaicism and Chimerism.
   - 2.15. Pattern of origin effects on inheritance patterns.
   - 2.16. Genetics of complex disorder
     - 2.16.1. Qualitative and quantitative traits.
     - 2.16.2. Familial aggregation and correlation.

2.16.3. Determining the relative contributions of genes and environment to complex disease
2.17. Techniques of DNA analysis and application, DNA cloning, Genome sequencing
2.18. Mitochondrial Genetics : Definition, types of diseases associated with mitochondrial genetics
2.19. Evolutionary /Human Developmental Genetics

3. **Special topics**
   3.1. Pharmacogenetics
      3.1.1. Biochemical modification and kinetics of drug metabolism
      3.1.2. Pharmacogenomics- Definition and importance in medicine
      3.1.3. Personalized medicine
   3.2. Immunogenetics
      3.2.1. Different types of immunity and related diseases
      3.2.2. HLA polymorphism and disease association
      3.2.3. Importance and relation of HLA in transplant genetics
      3.2.4. Inherited immunodeficiency disorders
   3.3. Blood grouping and molecular basis of blood grouping
      3.3.1. Hemoglobin and structure of globin gene
      3.3.2. Hemoglobinopathies- structure variants
      3.3.3. Hemolytic anemias, Thalassemia and sickle cell anemias
   3.4. Cancer genetics
      3.4.1. Genetic and environmental factors in cancer.
      3.4.2. Oncogenesis and identification of oncogenes, tumor suppressor genes and its functions
      3.4.3. Epigenetics and cancer
      3.4.4. Common genetic associated cancer like colorectal carcinoma, breast carcinoma, prostate carcinoma and ovarian carcinoma, etc
      3.4.5. Genetic counseling in familial cancer
      3.4.6. Screening in familial cancer
   3.5. Community genetics
      3.5.1. Genetic variation in population
      3.5.2. Genotypes and phenotypes in population
      3.5.3. Ethnic differentiation in the frequency of genetic diseases
      3.5.4. Genetics and ancestry
   3.6. Molecular microbiology and metagenomics : Introduction, importance, uses in disease diagnosis and its pitfalls
   3.7. Human genome project : Introduction and importance of human genome project
   3.8. Stem cell biology and regenerative medicine and genetic cloning : Introduction and applications in modern medicine
   3.9. Synthetic biology : Introduction and its uses
   3.10. Animal models of genetic diseases.

4. **Screening for genetic diseases and carriers**
   4.1. Criteria for screening
   4.2. Prenatal screening: Indications for prenatal testing, techniques used in prenatal diagnosis
   4.3. Special problems in prenatal diagnosis
   4.4. Neonatal screening

4.5. Pre-symptomatic screening of adults
4.6. Ethical considerations in carrier detection and predictive testing

5. **Chromosomal abnormalities**
   - 5.1 Incidence of chromosomal abnormalities
   - 5.2 Trisomies: (Down syndrome, Edward syndrome, Patau syndrome)
   - 5.3 Disorders of sex chromosomes: (Klinefelter syndrome, Turner syndrome, Fragile X syndrome)
   - 5.4 Chromosomal deletion and microdeletion syndromes: (Prader Willi syndrome, Angelman syndrome, Retinoblastoma, DeGearge syndrome)
   - 5.5 Chromosomal breakage syndromes: (Fanconi anemia, Ataxia telangiectasia, bloom syndrome, Xeroderma pigmentosa)
   - 5.6 Disorders of sexual differentiation: (True hermaphroditism, Male pseudo hermaphroditism, Female pseudo-hermaphroditism)
   - 5.7 Indications for chromosomal analysis

6. **Ethical and legal issues in medical genetics**
   - 6.1 General principles
   - 6.2 Ethical dilemmas in medical genetics
   - 6.3 Ethical dilemmas in a wider context including ethical policies
   - 6.4 Privacy of genetic information

Section (B) – 50 Marks

7. **General Pathology**
   - 7.1 Cellular adaptation, injury and death: cellular response to injury, growth and differentiation, Morphology of cell injury and necrosis, apoptosis, intracellular accumulations, calcification
   - 7.2 Acute and chronic inflammation: general features, cells and chemical mediators involved, events, outcome
   - 7.3 Tissue repair and renewal: Normal cell proliferation and tissue growth, their control, mechanism of tissue regeneration, repair by healing , scar and fibrosis, healing by first and second intention, factors effecting wound healing,
   - 7.4 Hemodynamic disorders: Normal hemostasis, thrombosis and embolism, Infarction, Shock, Disseminated intravascular coagulation
   - 7.5 Genetic diseases: Mutations, Mendelian disorders, Karyotyping, Diagnosis of genetic diseases
   - 7.6 Diseases of immunity: Types of immunity, cell involved, cytokines, Histocompatibilty molecules, Hypersensitivity reaction and types, Autroimmune diseases, Immunological immunodeficiency syndromes, AIDS, Amyloidosis
   - 7.7 Neoplasia: Definition, nomenclature, biology of tumor growth, cell cycle, Molecular basis of cancer, Carcinogenic agents, paraneoplastic syndrome, tumor markers, clinical features of tumors, grading and staging, laboratory diagnosis of cancer
   - 7.8 Environmental and nutritional pathology: Common environmental and occupational hazards, food safety, nutrition deficiencies.
   - 7.9 Infectious disease: General principle of microbial pathogenesis, Agents of bio-terrorism, Infections in immunocompromised host, Special techniques in diagnosing infectious agent

8. **Cytopathology**
   - 8.1 Role of Diagnostic Cytology
   - 8.2 Structure and function of cells, morphological features of dysplasia
   - 8.3 Basic Cytogenetics and the Role of Genetics in Cancer Development
   - 8.4 Chromosomal aberration in cancer
   - 8.5 Clinical application of conventional cytogenetics and molecular methods in cytology
   - 8.6 Evaluation of various samples in conventional smearsand liquid based preparations
   - 8.7 Cell blocks and its use in cytological diagnosis
   - 8.8 Immunochemistry and Molecular Biology in Cytological Diagnosis
   - 8.9 Digital Analysis of Cells and Tissues
   - 8.10 Flow Cytometry
   - 8.11 Advanced techniques in diagnostic cytopathology

9. **Histopathology**
   - 9.1 Tissue processing techniques
   - 9.2 Different stains used in bone marrow trephine biopsies and lymph node biopsies
   - 9.3 Interpretation of bone marrow trephine biopsies and lymph node biopsies
   - 9.4 Use of immunohistochemistry in bone marrow and lymph nodes for diagnosis of leukemias and lymphomas and other disorders

10. **Histo/cyto techniques**
   - 10.1 Organization of Histopathology/cytopathology logy Laboratory
   - 10.2 Various Histological equipment, their uses and care
   - 10.3 Reception and recording of specimen
   - 10.4 Theory of routine (H/E, Pap)and special stains and their practical implication
   - 10.5 Preparation, reagent preparation, procedure and quality control of all routine andspecial stains used in Histopathology/cytopathology
   - 10.6 Grossing technique of various surgical specimens
   - 10.7 Technique of processing various tissues including bone for histological studies, Errors in sectioning and remedies
   - 10.8 Frozen section and their uses, processing tissue for frozen section and its interpretation
   - 10.9 Demonstration of pigments and minerals (malarial, mercury, bile, lipofuscin, calcium, iron, copper)
   - 10.10 Demonstration of neuron, neuroglia, myelin and axon
   - 10.11 Stains for bacteria, AFB, fungi, amoeba in tissue
   - 10.12 Preparation of cell blocks and their interpretation
   - 10.13 Mailing of slides
   - 10.14 Fine needle aspiration techniques involved in preparation of smear and staining
   - 10.15 Different types of cytology specimens, their preservation and transport, processing of various cytology specimens, smear preparation and staining
   - 10.16 Liquid based cytology; principle, instruments,procedure advantage, disadvantage
   - 10.17 Cytocentrifuge and itsuses in diagnostic cytopathology
   - 10.18 Immunochemistry: Principle, procedure, uses, quality control, Immunohistochemical markers of various neoplasms
   - 10.19 Use of microwaves in histopathology/cytopathology
   - 10.20 Principle and use of flow cytometry in cytopathology

10.21 Preparation and Quality control of various stains, reagents and methods used in histopathology/ cytology
10.22 Molecular methods in histopathology and cytopathology
10.23 Principle, method and use of In-situ Hybridization, recent methods in hybridization techniques
10.24 Enzyme histochemistry: principle, reagent and specimen preparation, procedure and application
10.25 Electron microscopy
10.26 Histometry, analysis of proliferation
10.27 Tissue culture techniques, HLA typing
10.28 X ray microanalysis
10.29 Methods, procedures, and interpretation of standard karyotyping analysis
10.30 Principle and use of fluorescent in situ hybridization and more specialized techniques
10.31 Cytogenetics of myeloid, lymphoid and plasma cell disorders, their use in prognosis and therapy monitoring
10.32 Recent advances, emerging techniques and technologies in cytogenetics

11. **Laboratory management:**
11.1 Fundamental of Total Quality management
11.2 Statistical process in quality control
11.3 Element of quality assurance program
11.4 Concept of Evidence based medical practice
11.5 Concept of critical values and alert values in laboratory practice
11.6 The laboratory information system
11.7 Concept of reference laboratory
11.8 Implementation of reference system in laboratory medicine
11.9 Standard operating procedure and their preparation
11.10 Errors and identification of the source of error in hematology laboratory
11.11 Internal and External quality control and proficiency testing
11.12 Preparation of quality policy manual
11.13 Laboratory Accreditation, Key component of accreditation, ISO 15189 and others laboratory related accrediting bodies
11.14 Quality control in procedure, equipment, NEQAS, EQAS
11.15 Ethics in medicine
11.16 Health and Safety measures (Physical/Chemical/Biological/Radiation)
11.17 Waste disposal
11.18 Management of under resourced laboratory