निजामती कर्मचारी अस्पताल

प्राविधिक सेवा, मेडिसिन समूह, क्लिनिकल जेनेटिक्स 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

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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

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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. Congenital abnormalities, dysmorphology and learning disability

5.1. Incidence, Definition and classification of birth defects
5.2. Genetic causes of malformations
5.3. Environmental agents (teratogens) including drugs causing malformations
5.4. Malformations of unknown cause
5.5. Neurodevelopmental disabilities, global developmental delay,
5.6. Intellectual disability and autism

Section (B) – 50 Marks

6. Inborn errors of metabolism

6.1. Disorders of amino acid metabolism
6.2. Disorders of carbohydrate metabolism
6.3. Disorders of steroid metabolism
6.4. Disorders of lipid and lipoprotein metabolism
6.5. Lysosomal storage disorders
6.6. Peroxisomal disorders
6.7. Disorders of metabolism of purines and pyrimidines
6.8. Disorders of metabolism of fatty acid and ketone body metabolism
6.9. Disorders of metabolism of porphyrins and heme metabolism
6.10. Disorders of metabolism of trace elements and metals
6.11. Disorders of energy metabolism

7. Chromosomal abnormalities

7.1. Incidence of chromosomal abnormalities
7.2. Trisomies: (Down syndrome, Edward syndrome, Patau syndrome)
7.3. Disorders of sex chromosomes: (Klinefelter syndrome, Turner syndrome, Fragile X syndrome)
7.4. Chromosomal deletion and microdeletion syndromes: (Prader Willi syndrome, Angelman syndrome, Retinoblastoma, DeGeorge syndrome)
7.5. Chromosomal breakage syndromes: (Fanconi anemia, Ataxia telangiectasia, bloom syndrome, Xeroderma pigmentosa)
7.6. Disorders of sexual differentiation: (True hermaphroditism, Male pseudo hermaphroditism, Female pseudo-hermaphroditism)
7.7. Indications for chromosomal analysis

8. Genetic counselling

8.1. Definition
8.2. Indications for genetic counselling
8.3. Establishing the diagnosis
8.4. Pedigree analysis and calculating and presenting risk
8.5. Discussing the options
8.6. Communication including breaking bad news, handling complaints and communication with colleagues and support
8.7. Directive or non-directive Genetic counselling
8.8. Ethical, legal and social consideration in genetic counselling
8.9. Outcomes in genetic counselling

8.10. Special problems in genetic counselling: (Consanguinity, Incest, Adoption, Disputed paternity)

9. Reproductive genetics

9.1. Termination of pregnancy
9.2. Preimplantation genetic diagnosis
9.3. Assisted reproductive techniques and implications for genetic diseases
9.4. Assisted conception and the law
9.5. Prenatal treatment

10. Treatment of genetic diseases

10.1. Enzyme/Protein replacement therapy
10.2. Gene therapy
10.3. Drug therapy
10.4. Genetic engineering
10.5. Tissue transplantation/Stem cell therapy
10.6. Approach to diagnosis and treatment of genetic diseases
10.7. Basics of multidisciplinary management of genetic diseases

11. Ethical and legal issues in medical genetics

11.1. General principles
11.2. Ethical dilemmas in medical genetics
11.3. Ethical dilemmas in a wider context including ethical policies
11.4. Privacy of genetic information

12. Introduction to research methods

12.1. Scientific thinking, reading, critiquing including search and critical review of medical literature
12.2. Scientific writing
12.3. Bioinformatics tools for research
12.4. Information technology and the computer: Their role in research
12.5. Research designs including clinical trial.
12.6. Informed consent and confidentiality issues in conducting research
12.7. Planning experiments for appropriate statistical analysis
12.8. Statistical methods including genetic statistics and linkage analysis
12.9. Data presentation, clinical database and tools for clinicians
12.10. The ethics of use of human and animal subjects in research and related ethical dilemmas
12.11. Plagiarism and major research and publication misconducts
12.12. Detection of fraud and implication

13. Recent advances in clinical genetics