नेपाल नागरिक उड्डयन प्राधिकरण

प्राबिधिक सेवा, सिभिल ईन्जिनियरिङ्ग समूह, सातौं तहको खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

द्वितीय पत्र – सेवा सम्वन्धी

खण्ड (क) – ५० अङ्क

1. **Introduction**
   - 1.1. History of Civil Aviation in the world and in Nepal
   - 1.2. Role and functions of Ministry of Culture, Tourism and Civil Aviation (MOCTCA) and CAAN
   - 1.3. Conventions of International Civil Aviation Organization (ICAO)
   - 1.4. International and Domestic Airports in Nepal

2. **Airport Engineering**
   - 2.1. **Definition**: Aerodrome Elevation, Aerodrome Reference Point, Aeroplane Reference Field Length, Aerodrome Reference Temperature, Runway, Runway Strip, Threshold, Runway Turn Pad, Shoulder, Touch Down Zone, Taxiway, Taxiway Strip, Apron, Maneuvering Area, Movement Area, Obstacle Limitation Surface, Heliport, Passenger Terminal Building, Air Traffic Control Tower, Operation Building, Hangar, Air Side and Land Side.
   - 2.2. Determination of Aerodrome Reference Code as per International civil Aviation Organization (ICAO) Annex-14, Volume I: Aerodrome Design of Operations

3. **Airport Planning**
   - 3.1. The Elements of an Airport Planning Study (Inventory, Forecasts, Airport Capacity, Facility Requirements, Airport site, Factors influencing Airport size, Land use Planning, Environmental Assessment, Economic and Financial Feasibility, Continuous Planning Process)
   - 3.2. Airport Site Evaluation: Factors affecting airport location
   - 3.3. Airport Master Planning, Airport layout Plan, Runway orientation and runway Configurations, Taxiway configuration, Manouvering area, Movement area, Obstacle Limitation Surfaces, Location of the control tower, Terminal area, Apron Aircraft Parking Apron, Isolated Aircraft Parking Position
   - 3.4. Airport Airside Capacity and Delay: Runway capacity, Taxiway Capacity, Apron Gate Capacity
   - 3.5. Aerodrome Design Standards and Aerodrome Reference Code as per International Civil Aviation Organization (ICAO)
     - 3.5.1. Geometric Design of the Aerodrome
     - 3.5.2. Runway, Taxiway Apron and Holding Bays
     - 3.5.3. Control Tower Visibility Requirements

4. **Planning and Design of the Terminal Area**
   - 4.1. The Passenger Terminal System
   - 4.2. Design Considerations
   - 4.3. Terminal Planning Process
   - 4.4. Apron-Gate System

5. **Visual Aids for Navigation:** Indicators and Signaling Devices, Markings, Signs, Lights, Markers

6. **STOLport and Heliports:**
   - 6.1 STOLport: Physical Characteristics of STOLport, Obstacle Limitation Surfaces (OLS)
   - 6.2 Heliports: Physical Characteristics of Heliports, Obstacle Limitation Surfaces (OLS)

7. Structure Analysis and Design

7.1. Stresses and strains; theory of torsion and flexure; moment of inertia

7.2. Analysis of beams and frames: Bending moment, shear force and deflection of beams and frames; determinate structure - Energy methods, three hinged systems, indeterminate structures: slope deflection method and moment distribution method; use of influence line diagrams for simple beams, unit load method

7.3. Reinforced concrete structures: Difference between working stress and limit state philosophy, analysis of RC beams and slabs in bending, shear, deflection, bond and end anchorage, Design of axially loaded columns, isolated and combined footings, introduction to pre-stressed concrete

7.4. Steel and timber structures: Standard and built-up sections: Design of riveted, bolted and welded connections, design of simple elements such as ties, struts, axially loaded and eccentric columns, column bases, design principles on timber beams and columns

8. Airport Pavement

8.1. Types of Airport Pavements (Flexible & Rigid Pavements)

8.2. California Bearing Ratio (CBR) Method of Design for Flexible Airport Pavements

8.3. Design of Rigid Pavements

8.4. Pavements Design Using Elastic Layer Theory

8.5. Effect of Frost on Pavement Thickness and their consideration in pavement design

8.6. The FAA Method of Design for Flexible and Rigid Airport Pavement

8.7. Design of Overlay Pavements

8.8. Aircraft and Airport Pavement Classification Systems (as per ICAO)

खण्ड (ख) – ५० अङ्क

9. Construction Materials for use of airport construction

9.1. Formation and Availability of Stones in Nepal, Methods of Laying and construction with Various Stones

9.2. Gravel as pavement sub-base Course, gradation

9.3. Base-course materials and their gradation, Los Angeles Abrasion (LAA), aggregate crushing value, California Bearing Ratio (CBR), flakiness index and other laboratory testing for quality control of base course

9.4. Surface course material and their laboratory testing

10. Soil Mechanics and Foundation Engineering

10.1. Properties of soils, Identification and classification of soils, Permeability of soils, Shear strength of soils, Stress distribution in soils, Consolidation and settlements, Stability of slopes, Site investigation and soil exploration, Earth pressure and retaining structures, Bearing capacity of soils, Design of building foundation

11. Airport Drainage

11.1. Purpose of Drainage, Design Storm for Surface Run-off, Intensity- Duration Pattern for the Design Storm, Amount of Run-off by the FAA Procedure, Amount of Run-off by the Corps of Engineers Procedure, Layout of Surface Drainage, Subsurface Drainage

12. Engineering Survey

12.1. Introduction and basic principles

12.2. Linear measurements: techniques, chain, tape, ranging rods and arrows, representation of measurement and common scales, sources of errors, effect of

slope and slope correction, correction for chain and tape measurements, Abney level and clinometers

12.3. Compass and plane table surveying: bearings, types of compass, problems and sources of errors of compass survey, principles and methods of plane tabling
12.4. Leveling and contouring: Principle of leveling, temporary and permanent adjustment of level, bench marks, booking methods and their reductions, longitudinal and cross sectioning, reciprocal leveling, trigonometric leveling, contour interval and characteristics of contours, methods of contouring
12.5. Theodolite traversing: need of traverse and its significance, computation of coordinates, adjustment of closed traverse, closing errors
12.6. Uses of Total Station and Electronic Distance Measuring Instruments

13. Estimating and Costing Valuation and Specification

13.1. Types of estimates and their specific uses
13.2. Methods of calculation of quantities
13.3. Key components of estimating, norms and rate analysis
13.4. Preparation of bill of quantities
13.5. Purpose, types and importance of specification
13.6. Purpose, principles and methods of valuation

14. Construction Management

14.1. Construction scheduling and planning: network techniques (CPM, PERT) and bar charts
14.2. Contractual procedure and management: types of contract, tender and tender notice, preparation of bidding (tender) document, contractors' pre-qualification, evaluation of Bid and selection of contractor, contract acceptance, condition of contract, quotation and direct Purchase, dispute resolution
14.3. Material management: procurement procedures and materials handling
14.4. Cost, quality and time control
14.5. Contract management
14.6. Occupational health and safety
14.7. Aerodrome work Safety in Operational airport
14.8. Project monitoring and evaluation
14.9. Quality assurance plan
14.10. Variation, alteration and omissions

15. Aerodrome Construction Technology

15.1. Construction of Runway Strip: Top soil, Earthwork in excavation & filling, Subgrade preparation, compaction, moisture density relationship, field compaction control, soil stabilization, Construction of airport drainages system
15.2. Construction of Pavement: Gravel/crushed aggregate base course without binding material, Cement treated base course, Asphalt concrete pavement layers including prime coat, tack coat, cement concrete pavement
15.3. Pavement construction Materials: Soils, Soil classification systems, Construction materials for pavement, Types of aggregate and tests on their gradation, strength, durability, bitumen, mix Design of airport pavements, Testing procedures
15.4. Construction Equipment: Factors affecting the selection of construction equipment, Earth moving equipment, Rollers, Asphalt concrete plant and paver, Concrete batching plant

15.5. Building Materials and Construction**:**

15.5.1. Classification, specifications and testing of different materials such as Stone masonry, Brick masonry, Hollow Concrete Blocks, Sand, Lime, Mortar, Paintings etc.

15.5.2. Water proofing, Roofing Systems, Different types of roofing system, Doors and windows, Walls, Pre-fabrication: Flooring, Plastering, Formworks

15.5.3. Building Elements: Foundation, super structure, floors, roofs, sun control devices, parapet, staircase, emergency stairs, Lift, elevators and escalators

15.5.4. Building services: water supply and sanitation, electrification, heating, ventilation and air-conditioning

15.5.5. National Building Code, Hierarchy of building codes and its application, procedure for implementation of National building code in Nepal

15.5.6. Maintenance and repair of buildings

15.5.7. Current building norms for estimating and costing

16. Maintenance Management

16.1. Classification of maintenance activities for Airport pavement and facilities, inspection, prioritization and planning of maintenance operations, evaluation of pavement distress and pavement condition, types and methods of pavement repair, types of overlay and strengthening of existing pavements.

16.2. Pavement Management Systems

16.3. Assessment of runway surface condition, Pavement surface friction and tests, different types of contaminants and its removal.

16.4. Pavement evaluation and methods of conducting the test to verify the structural strength of the pavement

द्वितीय पत्रबाट निम्नानुसार प्रश्न सोधिनेछ :

द्वितीय पत्र (विषयगत)				
विषय	**खण्ड**	**अङ्कभार**	**छोटो उत्तर**	**लामो उत्तर**
सेवा सम्वन्धी	**(क)**	५०	२ प्रश्न x ५ अङ्क = १०	४ प्रश्न x १० अङ्क = ४०
	(ख)	५०	२ प्रश्न x ५ अङ्क = १०	४ प्रश्न x १० अङ्क = ४०
जम्मा		**१००**	४ प्रश्न x ५ अङ्क = २०	८ प्रश्न x १० अङ्क = ८०