नेपालखाद्य संस्थान

स्तरः सहायक, सेवा/समूहः प्राविधिक, तहः ५, पदः बरिष्ठ सहायक सव इन्जिनियर

खुला/आन्तरिक प्रतियोगितात्मक लिखित परीक्षाका लागि पाठ्यक्रम एवं परीक्षा योजना

पाठ्यक्रम योजनालाई निम्नानुसारका दुई चरणमा विभाजन गरिएको छः

प्रथम चरणः– लिखित परीक्षा पूर्णाङ्क :– १००

द्वितीय चरणः– अन्तर्वार्ता पूर्णाङ्क :– २०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरण : लिखित परीक्षा (Written Examination) पूर्णाङ्क :- १००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षाप्रणाली		प्रश्नसंख्याXअङ्क	समय
प्रथम	सेवा सम्बन्धी	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न(MCQ)	५० प्रश्न X १अङ्क	२ घण्टा
				विषयगत		६ प्रश्न X ५ अङ्क	
	संस्थागत ज्ञान			विषयगत		४ प्रश्न X ५अङ्क	

२. द्वितीय चरण : अन्तर्वार्ता (Interview) पूर्णाङ्क :- २०

ीविषय	पूर्णाङ्क	परीक्षाप्रणाली	समय
(ख) अन्तर्वार्ता	२०	मौखिक	

द्रष्टव्य :

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

२. लिखित परीक्षामा सोधिने **प्रश्न संख्या र अङ्कभार** यथासम्भव सम्बन्धित पत्र/विषयमा दिईए अनुसार हुनेछ ।

३. 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 ।

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

५. 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 ।

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

७. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि 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 ।

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

९. यस भन्दा अगाडि लागू भएका माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।

१०. पाठ्यक्रम लागू मिति :- २०७५।

नेपालखाद्य संस्थान

स्तरः सहायक, सेवा/समूहः प्राविधिक, तहः ५, पदः बरिष्ठ सहायक सव इन्जिनियर

प्रथमपत्र :– सेवा सम्बन्धी र संस्थागत ज्ञान

भाग (अ)– सेवा सम्वन्धी

खण्ड (क) - ५० %

1. **Civil Engineering Drawing**
   - 1.1 General
     - 1.1.1 Importance, aims and objectives of drawing
     - 1.1.2 Drawing equipments
     - 1.1.3 Standard drawing sheets sizes
     - 1.1.4 Drafting techniques and methods in common practice
     - 1.1.5 Scales: Choice, use and conversion
   - 1.2 Measured Drawing
     - 1.2.1 Methods of measurement of horizontal and vertical dimensions
     - 1.2.2 Sectional measurements
     - 1.2.3 Dimensioning of sketches
     - 1.2.4 Checking for missing details in field
   - 1.3 Working Drawing
     - 1.3.1 Role of working drawing
     - 1.3.2 Interrelationship with estimate and specification
     - 1.3.3 Construction detailing in plan and section
     - 1.3.4 Significance of detailing in terms of accuracy of estimation, bill of quantities and construction supervision
     - 1.3.5 Working drawing for private and public buildings, sanitary installation, electrification
     - 1.3.6 Structural working drawings

2. **Estimating and Costing**
   - 2.1 General
     - 2.1.1 Purpose of estimating
     - 2.1.2 Main items of work
     - 2.1.3 Units of measurement and payment of various items of work and materials
     - 2.1.4 Degree of accuracy
     - 2.1.5 Standard estimate formats of Government of Nepal
     - 2.1.6 Data for estimate
     - 2.1.7 Preliminary estimate, Approximate quantity estimate, Detailed estimate and Revised estimate
   - 2.2 Rate Analysis
     - 2.2.1 Manufactures' cost
     - 2.2.2 Transportation cost
     - 2.2.3 Overheads
     - 2.2.4 Need for contingencies
     - 2.2.5 Use of Government Rate Analysis Norms
   - 2.3 Specifications
     - 2.3.1 Purpose, Types and Necessity
     - 2.3.2 Interpretation of Specifications
   - 2.4 Estimating
     - 2.4.1 Earthwork
     - 2.4.2 Estimate of buildings
     - 2.4.3 Estimate of sanitary installations

2.4.4 Estimate of electrical wiring and sanitary works
2.4.5 Annual maintenance

2.5 Valuation
2.5.1 Purpose and Methods of valuation
2.5.2 Standard formats used for Property Valuation in Nepal

3. **Management**

3.1 Organization
3.1.1 Need for organization
3.1.2 Building agencies
3.1.3 Structure of the Department of Urban Development and Building construction
3.1.4 Responsibilities of a building sub engineer
3.1.5 Relation between owner, contractor and consultants

3.2 Accounts
3.2.1 Familiarity with related Nepalese accounting system
3.2.2 Administrative approval and technical sanction

3.3 Planning and Control
3.3.1 List of activities
3.3.2 Construction, Equipment and materials schedule
3.3.3 Construction stages and operations
3.3.4 Bar Chart

3.4 Building By-laws
3.4.1 Sheet sizes, Scales, Setback, Height controls, FAR

4. **Surveying**

4.1 General
4.1.1 Primary divisions of survey
4.1.2 Classification based on instruments and on methods
4.1.3 Basic principle of surveying
4.1.4 Scales, plans and maps
4.1.5 System of field booking of surveying and levelling data
4.1.6 Theodolite survey

4.2 Levelling
4.2.1 Classification of levelling work
4.2.2 Methods of levelling
4.2.3 Levelling instruments and accessories
4.2.4 Principles of levelling
4.2.5 Temporary and permanent adjustments of a level
4.2.6 Profile levelling
4.2.7 Booking and reducing levels

4.3 Errors and their effects
4.3.1 Kinds of errors
4.3.2 Source of errors in chaining, levelling, plane tabling and compass surveying
4.3.3 Effects of errors

4.4 Plane Tabling
4.4.1 Equipments used
4.4.2 Working operations
4.4.3 Methods of plane tabling
4.4.4 Merits and demerits of plane tabling

4.5 Contouring
- 4.5.1 Definitions of terms
- 4.5.2 Use contour maps

4.6 Setting out
- 4.6.1 Small buildings
- 4.6.2 Simple curves
- 4.6.3 Locating the boundaries of farm lands

5. **Building Construction Technology**

5.1 Foundations
- 5.1.1 Function and necessity
- 5.1.2 Subsoil exploration: test pit
- 5.1.3 Safe bearing capacity of soils and its improvement
- 5.1.4 Type and suitability of different foundations: shallow, deep (pile and well)
- 5.1.5 Methods of excavating
- 5.1.6 Shoring and dewatering
- 5.1.7 Elements of simple spread foundation
- 5.1.8 Stone masonry foundations, Raft foundation

5.2 Walls
- 5.2.1 Types of walls: solid wall, partition wall, cavity wall, curtain wall
- 5.2.2 Features and their functions
- 5.2.3 Types of stone masonry: rubble, hammer dressed and ashlars masonry
- 5.2.4 Brick Masonry: English, Flemish, garden rat trap, monk
- 5.2.5 Types of concrete blocks
- 5.2.6 Choosing wall thickness, height to length relation
- 5.2.7 Use of scaffolding
- 5.2.8 Procedure of constructing various masonry walls

5.3 Damp Proofing
- 5.3.1 Source of dampness
- 5.3.2 Remedial measures to prevent dampness
- 5.3.3 Vertical and horizontal damp proofing
- 5.3.4 Damp proofing materials

5.4 Concrete Technology
- 5.4.1 Constituents, mixing and use of lime concrete
- 5.4.2 Constituents of cement concrete
- 5.4.3 Grading of aggregates
- 5.4.4 Concrete mixes, Water cement ratio
- 5.4.5 Workability, Concrete laying
- 5.4.6 Factors affecting strength of concrete
- 5.4.7 Form work, Vibrators, Curing
- 5.4.8 General introduction to Precast RC units
- 5.4.9 Hydration and segregation

5.5 Wood Work
- 5.5.1 Frame and shutters of doors and windows
- 5.5.2 Timber construction of upper floors
- 5.5.3 Design and construction of stairs
- 5.5.4 Double timber roofs
- 5.5.5 False ceiling
- 5.5.6 Sky-light: elements, functions and construction details

5.6 Steel Work
- 5.6.1 Steel work in windows: Standards, elements and functions
- 5.6.2 Tubular and angle steel roofs
- 5.6.3 Iron grill and lattice work

खण्ड (ख) - ५०%

6. **Building Service**

6.1 Water Supply
- 6.1.1 General principle of water supply
- 6.1.2 Water requirement standard for different buildings
- 6.1.3 Storage and distribution of water
- 6.1.4 Heating of water, storage and distribution requirements

6.2 Disposal system
- 6.2.1 Septic tank, soak pit, vent and manhole
- 6.2.2 Pipes for different sewage
- 6.2.3 Incinerators

6.3 Electricity
- 6.3.1 General principles of electrical installation and distribution
- 6.3.2 Wiring systems in private and public building
- 6.3.3 Ducts for electrical distribution
- 6.3.4 Safety precautions

6.4 Lighting
- 6.4.1 General principles of lighting
- 6.4.2 Illumination requirements and standards
- 6.4.3 Combination of artificial and natural light
- 6.4.4 Lighting fixtures

7. **Construction Materials**

7.1 Stone
- 7.1.1 Rocks and their characteristics
- 7.1.2 Formation and availability of stones in Nepal
- 7.1.3 Quarrying: excavation, Wedging and blasting
- 7.1.4 Methods of laying and construction with various stones

7.2 Aggregates
- 7.2.1 Fine and Coarse aggregates
- 7.2.2 Availability and practice in Nepal

7.3 Cement
- 7.3.1 Different cements: ingredients, properties and manufacture
- 7.3.2 Storage and transport
- 7.3.3 Admixtures

7.4 Metals and Alloys
- 7.4.1 Wrought iron: Properties, use
- 7.4.2 Steel: composition, properties, appearance, strength, constructional forms and manufacture
- 7.4.3 Corrosion and its prevention
- 7.4.4 Brass: uses

7.5 Bricks
- 7.5.1 Type, Manufacture, Laying and availability and practice in Nepal

7.6 Lime
- 7.6.1 Manufacture, Types and properties, Uses

7.7 Paints and Varnishes
- 7.7.1 Type and selection
- 7.7.2 Preparation techniques and Uses

7.8 Floor Finishes
- 7.8.1 Punning
- 7.8.2 Tiles: mosaic, clay, concrete, vinyl
- 7.8.3 Marble and flagstones
- 7.8.4 Wooden boarding and parquetting

7.9 Wall Finishes
- 7.9.1 Plasters: cement, lime, mud
- 7.9.2 Punning: cement, lime
- 7.9.3 Cladding: wood, stone, tiles

7.10 Roofing Materials
- 7.10.1 Clay tiles, ceramic tiles and states
- 7.10.2 CGI and UPVC

7.11 Miscellaneous Materials
- 7.11.1 Glass, Plastics, Asphalt and Bitumen and Surkhi

8. **Structural Design**

8.1 Timber Structures
- 8.1.1 Allowable stresses
- 8.1.2 Design of compression members
- 8.1.3 Design of solid rectangular beams, design of simple steel beams
- 8.1.4 Types of joints and their connections

8.2 Steel Structures
- 8.2.1 Rivetted and welded connections: types, uses, detailing
- 8.2.2 Detailing of simple roof trusses
- 8.2.3 Detailing of rolled steel beams
- 8.2.4 Detailing of column bases

8.3 R.C. Sections in Bending
- 8.3.1 Basis assumptions
- 8.3.2 Position of neutral axis
- 8.3.3 Moment of resistance
- 8.3.4 Under reinforced, over reinforced and balanced sections
- 8.3.5 Analysis of singly and doubly reinforced rectangular sections
- 8.3.6 Analysis of singly reinforced flanged sections

8.4 Shear and Bond for Reinforced Concrete (RC) Sections
- 8.4.1 Behaviour of R.C. section in shear
- 8.4.2 Shear resistance of R.C. section
- 8.4.3 Types of shear reinforcement and their design
- 8.4.4 Local and anchorage bond
- 8.4.5 Determination of anchorage length
- 8.4.6 Bar curtailment

8.5 Axially Loaded R.C
- 8.5.1 Short and long columns
- 8.5.2 Design of a rectangular column section
- 8.5.3 Reinforcement detailing

8.6 Design and Detailing of R.C Structures
- 8.6.1 IS code requirements
- 8.6.2 Methods of design

8.6.3 Singly reinforced T and L beams
8.6.4 Simple one-way and two-way stabs
8.6.5 Simple pad footings for columns
8.6.6 Preparation of bar bending for RC design

8.7 Earthquake Resistant Design of Non-engineered Structures
8.7.1 History of Earthquake in Nepal and damages
8.7.2 Weakness of existing building
8.7.3 Site consideration
8.7.4 Building form, shape and size
8.7.5 Size and location of openings
8.7.6 Selection of materials
8.7.7 Construction technology
8.7.8 Seismic resistant components : through stone, vertical and horizontal reinforcement, diaphragm, boxing of building, lateral restrainers, unsupported length of wall, corner and junction of wall/connection of building components

9. **Water Supply and Sanitation Engineering**

9.1 General
9.1.1 Objectives of water supply system
9.1.2 8.1.2 Source of water and its selection: gravity and artisan spring s, shallow and deep wells; infiltration galleries.

9.2 Gravity Water Supply System
9.2.1 Design period
9.2.2 Determination of daily water demand
9.2.3 Determination of storage tank capacity
9.2.4 Selection of pipe
9.2.5 Pipe line design and hydraulic grade line

9.3 Design of Sewer
9.3.1 Quantity of sanitary sewage
9.3.2 Maximum, Minimum and self cleaning velocity

9.4 Excreta Disposal and Unsewered Area
9.4.1 Pit latrine
9.4.2 Design of septic tank

10. **Highway Engineering**

10.1 General
10.1.1 Introduction to transportation systems
10.1.2 Historic development of roads
10.1.3 Classification of road in Nepal
10.1.4 Basic requirements of road alignment

10.2 Geometric Design
10.2.1 Basic design control and criteria for design
10.2.2 Elements of cross section, typical cross-section for all roads in filling and cutting
10.2.3 Camber
10.2.4 Determination of radius of horizontal curves
10.2.5 Superlevation
10.2.6 Sight distances
10.2.7 Gradient

10.2.8 Use of Nepal Road Standard and subsequent revision in road design
10.3 Drainage System
10.3.1 Importance of drainage system and requirements of a good drainage system
10.4 Road Pavement
10.4.1 Pavement structure and its components: subgrade, sub-base, base and surface courses
10.5 Road Machineries
10.5.1 Earth moving and compacting machines
10.6 Road Construction Technology
10.7 Bridge
10.7.1 T-beam bride
10.7.2 Timber bridges
10.8 Road Maintenance and Repair
10.8.1 Type of maintenance Works
10.9 Tracks and Trails

भाग (आ)– सस्थागत ज्ञान

खण्ड (ग) - २० अङ्क(४ प्रश्नX ५ अङ्क)

१. संविधान, ऐन र नियमहरु तथा संस्थागतज्ञान

१.१ नेपाल खाद्य संस्थानको परिचय, संगठनात्मक संरचना, कार्यक्षेत्र र विधमान अवस्था
१.२ नेपाल खाद्य संस्थान कार्य सञ्चालनतथाकर्मचारी सेवा, शर्त र सुविधा सम्बन्धीविनियमावली २०६४
१.३ वातावरण संरक्षण ऐन, २०५३ र वातावरण संरक्षण नियमावली, २०५४
१.४ सार्वजनिक खरिद ऐन, २०६३ (परिच्छेद १ र २)
१.५ उपभोक्ता संरक्षण ऐन, २०७५
१.६ नेपालको वर्तमान संविधान, २०७२ (खाद्य तथा कृषि) सम्बन्धी जानकारी
१.७ अन्तर्राष्ट्रिय खाद्य तथा कृषि सम्बन्धी संघ संस्थाहरुः इफड(IFAD), खाद्यतथा कृषि संगठन(FAO), र विश्व खाद्य कार्यक्रम (WFP) सम्बन्धी जानकारी

यस पत्र/विषयको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिने छ।

प्रथमपत्र (वस्तुगत र विषयगत)					
भाग	**विषय**	**खण्ड**	**परीक्षा प्रणाली**	**अङ्कभार**	**प्रश्न संख्या**
(अ)	सेवा सम्वन्धी	खण्ड (क)	वस्तुगत बहुवैकल्पिक प्रश्न (MCQ)	२५	२५प्रश्नX १अङ्क= २५
		खण्ड (ख)		२५	२५प्रश्नX १अङ्क= २५
	सेवा सम्वन्धी	खण्ड (क)	विषयगत	१५	३प्रश्नX ५ अङ्क= १५
		खण्ड (ख		१५	३प्रश्नX ५ अङ्क= १५
(आ)	संस्थागत ज्ञान	खण्ड (ग)	विषयगत	२०	४प्रश्नX ५अङ्क= २०