

**लोक सेवा आयोग**  
नेपाल इन्जिनियरिङ्ग सेवा, एगृ इरिगेशन समूह, राजपत्राङ्कित तृतीय श्रेणीको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रूपरेखा :- यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइने छ :

प्रथम चरण :- लिखित परीक्षा पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता पूर्णाङ्क :- ३०

**प्रथम चरण – लिखित परीक्षा योजना (Examination Scheme)**

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या X अङ्कभार	समय
प्रथम	एगृ इरिगेशन I	१००	४०	वस्तुगत बहुउत्तर (Multiple Choice)	१००X१ = १००	१ घण्टा १५ मिनेट
द्वितीय	एगृ इरिगेशन II	१००	४०	विषयगत (Subjective)	१०X१० = १००	३ घण्टा

**द्वितीय चरण**

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- पाठ्यक्रमको प्रथम र द्वितीय पत्रको विषयवस्तु फरक फरक हुनेछन ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- प्रथम तथा द्वितीय पत्रहरूका एकाइहरूबाट सोधिने प्रश्नसंख्या निम्नानुसार हुनेछ :

प्रथम पत्रका एकाई	1	2.1	2.2	2.3	3.1	3.2	3.3	3.4	3.5	
प्रश्न संख्या	10	15	5	20	30	10	2	3	5	
द्वितीय पत्रका खण्ड	A			B			C		D	
द्वितीय पत्रका एकाई	1	2.1	2.2	2.3	2.4	2.5	3.1	3.2	4	5
प्रश्न संख्या	1	1	1	1	1	1	1	1	1	1

- प्रथम पत्रमा वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत १ (एक) अङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात् ०.२ अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- द्वितीय पत्रको विषयगत प्रश्नका लागि तोकिएका १० अङ्कका प्रश्नहरूको हकमा १० अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- द्वितीय पत्रको पाठ्यक्रमलाई ४ वटा खण्ड/एकाईमा विभाजन गरिएको छ, ४ वटा खण्ड/एकाईको लागि ४ वटै उत्तरपुस्तिका दिइनेछ र परिक्षार्थीले प्रत्येक खण्ड/एकाईका प्रश्नहरूको उत्तर सोही खण्ड/एकाईको उत्तर पुस्तिकामा लेख्नु पर्नेछ ।
- यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरू परीक्षाको मिति भन्दा ३ (तीन) महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएको माथि उल्लिखित समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति :- २०६३/२/३० देखि

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प्रथम पत्र :- एगृ इरिगेशन I

- 1. General Agriculture** **10%**
  - 1.1 Agriculture policy and strategy of Nepal
  - 1.2 Principles of agronomy (cereals, cash crops, pulses and oilseeds)
  - 1.3 Introduction to horticulture (fruits and vegetables)
  - 1.4 Agro-meteorological data recording, collection and analysis, and introduction to sunshine recorder, max and min temperature, wind vane, rain gauges, soil temperature and evaporation pan
  - 1.5 Elements of soil science ( soil fertility; physical, chemical and biological properties; measurement and management, and classification)
  - 1.6 Mineral and organic sources of fertilizer
  - 1.7 Introduction to plant protection (emphasis on equipment)
  - 1.8 Crop cut survey and data processing
  - 1.9 Elements of farm management
  - 1.10 Introduction to sociology and rural development
- 2. General Engineering** **40 %**
  - 2.1 Mechanical Engineering (15)**
    - 2.1.1 Work, power and energy
    - 2.1.2 Basic knowledge on workshop technology and metallurgy
    - 2.1.3 Fluid mechanics (compressible and incompressible fluids, viscosity, Bernoulli theorem, Archimedes' principle, buoyancy)
    - 2.1.4 Thermodynamics (laws of thermodynamics, Carnot engine, entropy, enthalpy, kinetic theory of gases)
    - 2.1.5 Basic knowledge on thermal energy conversion, fossil fuels, and refrigerants
    - 2.1.6 Introduction to theory of machines
    - 2.1.7 Design of machines (machines related to agriculture)
    - 2.1.8 Internal combustion engines (petrol and diesel engines)
    - 2.1.9 Engine terminologies
    - 2.1.10 Cams, gears, flywheel, governor
    - 2.1.11 Failure theories, safety factors, and reliability of machine elements
    - 2.1.12 Analysis of machine elements- gears, belt drives, clutches and brakes, bearings, threaded fasteners, riveted and welded joints
  - 2.2 Electrical And Electronics Engineering (5)**
    - 2.2.1 Fundamentals of electricity- current, voltage, resistance, conductance, and electrical circuits
    - 2.2.2 Fundamentals of electronics, basic electronic components and circuits
    - 2.2.3 Introduction to computer software and hardware
    - 2.2.4 Basic knowledge on electric machines, transformers, induction motors
    - 2.2.5 Electromagnetic devices and electric power measurements
    - 2.2.6 Single phase and three phase transmission
  - 2.3 Civil Engineering (20)**
    - 2.3.1 Engineering hydrology (hydrological cycle, measurement and analysis of precipitation; measurement, estimation and analysis of runoff, stream flow, evaporation, flood, hydrograph)
    - 2.3.2 Engineering materials (sand, stone, aggregate, brick, cement, steel, timber, paints etc.)
    - 2.3.3 Strength of material/Mechanics of structure (analysis of forces, shear force and bending moment, torque, couple moments, moment of inertia, elasticity, stress and strain, analysis of simply supported beams)

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and columns; impulse, centripetal and centrifugal forces, gravitational laws)

- 2.3.4 Design of structures (RCC beams, columns, slabs, and trusses in steel and timber)
- 2.3.5 Soil engineering (soil physics, soil mechanics and foundation, engineering properties of soil- stress, strain, compaction, consolidation and settlement, design of shallow foundation)
- 2.3.6 Surveying (measurement of horizontal and vertical distances, angles and directions, plane table, leveling with different types of equipments, topographic surveying, contouring, job layout); and Drawings- pictorial and isometric drawings
- 2.3.7 Building construction technology (brick and stone masonry, concreting, damp proof course, floorings, roofing, plastering, carpentry, painting)
- 2.3.8 Estimating and costing of buildings, irrigation, farm and other agricultural structures.
- 2.3.9 Open channel hydraulics
- 2.3.10 Construction management (scheduling and planning, contractual procedure and management, material management, cost and quality control, project management and operation and maintenance)
- 2.3.11 Concept of benefit cost analysis, and financial and economic evaluation.
- 2.3.12 Design and construction method for land leveling, grading and development

**3. Agricultural Engineering 50%**

**3.1 Soil and Water Engineering (30)**

- 3.1.1 Soil water retention and movement – saturated and unsaturated flow, soil moisture tension, infiltration, permeability, wilting coefficient and hydraulic conductivity
- 3.1.2 Measurements of irrigation water: velocity- area, flow meter, use of flow measuring devices, weirs, Parshal flumes, cut throat flumes, and orifice; tracer method
- 3.1.3 Soil- water- plant- environment relationship, evaporation, transpiration and consumptive use, estimation of evapo- transpiration (ET) and crop water requirements
- 3.1.4 Water requirement, irrigation frequencies, depth of water to be applied during irrigation, irrigation efficiencies, bases of irrigation scheduling
- 3.1.5 Irrigation methods and hydraulics: furrow irrigation, border irrigation and check basin irrigation; methods to reduce water losses in irrigation system.
- 3.1.6 Sprinkler and drip/trickle Irrigation
- 3.1.7 Type of drainage systems, surface and sub surface drainage systems, survey and design of drainage systems
- 3.1.8 Ground water formation and aquifer characteristics, hydraulics of wells, exploration of ground water, kinds of tube-wells; design, estimate and construction of wells; water lifting devices and irrigation pumps, their selection, power requirements and economy.

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- 3.1.9 Mechanics and causes of different forms of soil erosion (rain drop erosion, sheet erosion, rill erosion, gully erosion, stream channel erosion)
- 3.1.10 Assessment and estimation of soil erosion rates
- 3.1.11 Measures of soil conservation – biological and cultural, mechanical and structural
- 3.1.12 Specialized forms of erosion and land degradation – debris flow, landslide and mass wasting
- 3.1.13 Gully control: planning to control gully erosion, general requirements of gully control structures, permanent and temporary gully control structures; design, construction and maintenance of diversion of run-off
- 3.1.14 Concepts of Watershed Management
- 3.2 Farm Power and Machinery (10)**
  - 3.2.1 Sources of farm power- human, animal, mechanical, electrical
  - 3.2.2 Non -conventional energy sources – solar, wind, micro – hydro and biomass energy
  - 3.2.3 Tillage requirement and draft power requirements
  - 3.2.4 Tillage and land preparation machinery- sliding and rolling bottom ploughs, rotary tillers, forces on sliding and rolling cutting tools
  - 3.2.5 Seeding and planting machines and sowing methods of major crops
  - 3.2.6 Machines and equipments for crop intercultural operations
  - 3.2.7 Plant protection equipments- sprayers and dusters
  - 3.2.8 Harvesting and threshing equipments
  - 3.2.9 Power transmission system and devices (belt, chain, shaft, pulley etc.)
  - 3.2.10 Measurements of power requirements of farm implements
- 3.3 Agricultural Processing (2)**
  - 3.3.1 Properties of solid, liquid and powder food products; grain drying theory, Grain pressure theory
  - 3.3.2 Unit operations in processing of cereals, pulses and oilseed ding, sorting, drying, milling and storage
  - 3.3.3 Unit operations in processing fruits and vegetables- factors of deterioration, water and water activity; preservation- by drying and dehydration, by concentration, by irradiation and by freeze drying
- 3.4 Farm Structures (3)**
  - 3.4.1 Animal housing – dairy, poultry, swine, sheep and goat
  - 3.4.2 Farm roads
  - 3.4.3 Farm fencing
  - 3.4.4 Farm ponds and aquaculture ponds
  - 3.4.5 Green houses
- 3.5 Rural Energy (5)**
  - 3.5.1 Major sources of renewable and non-renewable energy in agricultural and rural development
  - 3.5.2 Active and passive use of solar energy
  - 3.5.3 Biomass energy and biogas reactors
  - 3.5.4 Wind energy harnessing
  - 3.5.5 Micro-hydropower generation and utilization

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**वस्तुगत बहुउत्तर नमूना प्रश्नहरू (Sample questions)**

1. *Phaseolus mungo* is the botanical name of:  
A) Bengal gram  
B) Black gram  
C) Pigeon pea  
D) Moth bean  
**Correct Answer :- (B)**
2. The property of a metal on account of which it can be extended in all directions by hammering or rolling is called:  
A) machinability  
B) malleability  
C) plasticity  
D) ductility  
**Correct Answer :- (B)**
3. The coefficient of viscosity is an important physical property of the fluid and varies with its:  
A) temperature  
B) weight  
C) velocity  
D) size  
**Correct Answer :- (A)**
4. The total power in the poly-phase circuit is:  
A) single phase power  
B) double phase power  
C) the sum of the three phase powers  
D) zero  
**Correct Answer :- (C)**
5. For hydrological analysis of storms, recording rainfall gauges provide valuable data of:  
A) runoff  
B) intensity and duration of rainfall  
C) temperature  
D) humidity  
**Correct Answer :- (B)**
6. If the deformation due to external loading entirely disappears on removal of the load the material is said to be perfectly:  
A) plastic  
B) elastic  
C) magnetic  
D) electric  
**Correct Answer :- (B)**
7. When the pressure on a soil is increased equally in all directions, the volume:  
A) remains constant  
B) increases  
C) decreases  
D) diminishes to zero  
**Correct Answer :- (C)**
8. The capillary water is held between tensions of about..... atmospheres and one-third atmosphere.  
A) 31000      B) 3100      C) 310      D) 31  
**Correct Answer :- (D)**
9. Irrigation frequency is a function of:  
A) crop only      B) soil only      C) climate only  
D) crop, soil and climate  
**Correct Answer :- (D)**
10. Furrows are opened to a uniform depth, seeds are uniformly dropped and covered and the soils are compacted around seeds by:  
A) the mold board plough  
B) the disc harrow  
C) the seed drill  
D) the rotary tiller  
**Correct Answer :- (C)**