

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 :- ४०

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 बहुवैकल्पिक (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	समय
सामूहिक परीक्षण (Group Test)	१०	सामूहिक छलफल (Group Discussion)	३० मिनेट
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

- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको 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 ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- 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 पत्रमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- यस भन्दा अगाडि लागू भएको माथि उल्लिखित समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति :- २०६३/२/३० देखि (२०७२/०७/२४ को निर्णय अनुसार सामूहिक परीक्षण समावेश)

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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.)

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- 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 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,

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- estimate and construction of wells; water lifting devices and irrigation pumps, their selection, power requirements and economy.
- 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)