

प्रदेश लोक सेवा आयोग

सुदूरपश्चिम प्रदेश

प्रदेश निजामती सेवा तथा स्थानीय सरकारी सेवा अन्तरगत कृषि सेवा, फूड, न्यूट्रिसन एण्ड क्वालिटी कन्ट्रोल समूह, सातौं तह, खाद्य अधिकृत वा सो सरह पदको खुला, अन्तर तह र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई निम्न अनुसार दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण : लिखित परीक्षा (Written Examination)

पूर्णांक : २००

द्वितीय चरण : (क) सामूहिक परीक्षण (Group Test)

पूर्णांक : १०

(ख) अन्तरवार्ता (Interview)

पूर्णांक : २५

परीक्षा योजना (Examination Scheme)

प्रथम चरण : लिखित परीक्षा (Written Examination)

पूर्णांक : २००

पत्र	विषय	खण्ड	पूर्णांक	उत्तीर्णांक	परीक्षा प्रणाली	प्रश्न × अंक	समय
प्रथम	General Subject	खण्ड (क) General Awareness & General Reasoning Test	100	40	वस्तुगत (Objective) (MCQs)	50 × 1	1:30 Hrs
		खण्ड (ख) General Technical Subject				50 × 1	
द्वितीय	Technical Subject		100	40	विषयगत (Subjective)	छोटो उत्तर 4 × 5	3 Hrs
						लामो उत्तर 8 × 10	

द्वितीय चरण : सामूहिक परीक्षण (Group Test) र अन्तरवार्ता (Interview)

पूर्णांक : ३५

पत्र/विषय	पूर्णांक	उत्तीर्णांक	परीक्षा प्रणाली	समय
सामूहिक परीक्षण (Group Test)	१०	-	सामूहिक छलफल (Group Discussion)	३० मिनेट
अन्तरवार्ता (Interview)	२५	-	मौखिक (Oral)	-

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुबै हुन सक्नेछ ।
- प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- वस्तुगत बहुवैकल्पिक प्रश्नहरू (Multiple Choice Questions) को गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अंक कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अंक दिइने छैन र अंक कट्टा पनि गरिने छैन ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नका लागि तोकिएका १० अंकका प्रश्नहरूको हकमा १० अंकको 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 उत्तर पुस्तिकाहरू हुनेछन । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तर पुस्तिकामा लेख्नु पर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको सामूहिक परीक्षण र अन्तरवार्तामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागु मिति : २०८१।११।०८ गते देखि

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खाद्य अधिकृत वा सो सरह पदको खुला, अन्तर तह र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम  
प्रथम चरण : लिखित परीक्षा (Written Examination)

प्रथम पत्र : खण्ड (क) - (५०अंक)

**General Awareness & General Reasoning Test**

1. **General Awareness and Contemporary Issues** (30 Marks)
  - 1.1 Physical, socio-cultural and economic geography and demography of Nepal.
  - 1.2 Major natural resources of Nepal.
  - 1.3 Geographical diversity, climatic conditions, livelihood & lifestyle of people.
  - 1.4 Notable events and personalities, social, cultural and economic conditions in modern history of Nepal.
  - 1.5 National and Sudurpashchim Province Current periodic plan.
  - 1.6 Information on sustainable development, environment, pollution, climate change, biodiversity, science and technology.
  - 1.7 Nepal's international affairs and general information on the UNO, SAARC & BIMSTEC.
  - 1.8 The Constitution of Nepal (From Part 1 to 5 and Schedules).
  - 1.9 Governance system and Government (Federal, Provincial and Local).
  - 1.10 Sudurpashchim Province Civil Service Act, 2079 & Regulation, 2081
  - 1.11 Sudurpashchim Province Good Governance Act, 2075
  - 1.12 Local Government Operation Act, 2074
  - 1.13 Functional scope of public services.
  - 1.14 Public Service Charter.
  - 1.15 Concept, objective and importance of public policy.
  - 1.16 Fundamentals of management: planning, organizing, directing, controlling, coordinating, decision making, motivation and leadership.
  - 1.17 Government planning, budgeting and accounting system.
  - 1.18 Major events and current affairs of national and international importance.
2. **General Reasoning Test** (20 Marks)
  - 2.1 **Logical Reasoning** (7 Marks)

Verbal Ability, Alphanumeric Series, Reasoning Analogies, Classification, Coding-Decoding, Order & Ranking, Distance & Directions, Analytical and Logical Reasoning, Assertion and Reason, Statement and Conclusion, Input/output, Venn- diagram.
  - 2.2 **Numerical Reasoning** (7 Marks)

Arithmetic Series, Analogy, Classification, Arithmetical Reasoning, Fraction. Percentage, Ratio, Average, Profit & Loss, Time & Work, Date & Calendar, Data Sufficiency, Data Interpretation & Data Verification.
  - 2.3 **Spatial Reasoning** (6 Marks)

Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern Completion, Embedded Images, Image Formation & Analysis, Mirror and Water Images, Cubes and Dices, Paper Folding & Cutting.

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प्रथम पत्र : खण्ड (ख) - (५० अंक)

**General Technical Subject**

**1. Food Chemistry**

**(13 Marks)**

- 1.1 Historical development of food chemistry.
- 1.2 Proximate composition of foods and their determination.
- 1.3 Structure, classification and properties of carbohydrates. Physical and chemical properties of monosaccharides and disaccharides. Structure of different polysaccharides (starch, pectin, cellulose, hemicellulose). Properties of starch, gel formation, retrogradation of starch, modified starch, amylase and amylopectin.
- 1.4 Structure, classification and properties of proteins. Classification and properties of amino acids, essential and non-essential amino acids, denaturation of proteins.
- 1.5 Structure, classification and properties of lipids. Saturated and unsaturated fatty acids, reactions of unsaturated fatty acids, Tran's fat, rancidity, autoxidation, flavour reversion.
- 1.6 Classification and properties of vitamins. Occurrence of minerals in food
- 1.7 Structure of water, hydrogen bond, free water, bound water, water activity and its importance in food.
- 1.8 General properties and classification of enzymes, enzymes in food industry, enzymatic browning, non-enzymatic reactions, caramelization, Maillard reaction.
- 1.9 Natural pigments in food (chlorophyll, carotenoids, anthocyanins), artificial food colours, synthetic coal tar dyes and their assessment of safe limit.
- 1.10 Principal flavouring compound in food, threshold value, flavour enhancers.
- 1.11 Other food additives used in food industries: antioxidants, emulsifiers, preservatives, stabilizers, anti-caking agents, thickening agents, chelating agents, anti-foaming agents, artificial sweeteners (saccharine, aspartame, cyclamate, dulcin).
- 1.12 General introduction to flavonoids and alkaloids.
- 1.13 Chemical aspect of food safety: Basic principle of human toxicology, food sensitivities, residues (pesticides and veterinary drug), Migration from food contact materials, environmental and process contaminants.

**2. Food Microbiology**

**(12 Marks)**

- 2.1 Principle and application of the polarizing microscope, ultraviolet microscope, phase contrast microscope, electron microscope.
- 2.2 Morphology and cytology of bacteria, yeasts, molds, viruses and protozoa.
- 2.3 Growth, reproduction, transformation, mutation and spore formation of microorganism.
- 2.4 General principles of serology and immunology.
- 2.5 Bacterial nutrition and metabolism.

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- 2.6 General morphological and physiological characteristics of yeasts. Identification characteristics of *Saccharomyces* and *Endomyces*.
- 2.7 Identification characteristics of food spoilage microorganisms (*Salmonella* species, *E. coli*, *Staphylococcus* species, *Pseudomonas* species), identification of *Aspergillus*, *Penicillium*, *Rhizopus* species.
- 2.8 Microbiology of meat, fish, poultry and their products, milk and milk products, fruit and vegetable products, fast foods, cereals and cereal products, spices, tea and coffee.
- 2.9 Microbial aspect of food preservation: Lowering the degree of acidity, lowering the water activity, changing redox potential, use of temperature/rays. Chemical preservation, use of anti-microbial substances.
- 2.10 Environmental microbiology (air, water and soil).
- 2.11 Hurdle concept of food preservation.
- 2.12 Food poisoning: Food borne infections and intoxications.
- 2.13 Biotoxins: aflatoxins, fumonisins, ochratoxin, zearalenone.
- 2.14 Cleaning and disinfection.

### 3 Biochemistry and Nutrition

(13 Marks)

- 3.1 Digestion, absorption, metabolism and functions of carbohydrates, proteins and Lipids.
- 3.2 General properties of enzymes, coenzymes and factors, enzyme kinetics and mechanism of action, inhibitors and activators.
- 3.3 Biochemical functions of nucleic acids, elementary notions of protein biosynthesis.
- 3.4 Nutritional importance of vitamins, minerals, trace elements, essential fatty acids and essential amino acids. Protein Efficiency Ratio (PER), Net Protein Utilization (NPU), Chemical Score.
- 3.5 Nutritional classification of food. Food groups, balance diet and application of food composition table.
- 3.6 Nutritional requirements and recommended dietary allowances of infants, preschool children, pregnant and lactating mother.
- 3.7 Importance of mother's milk in child nutrition. Baby foods, infant foods, weaning foods, supplementary foods.
- 3.8 Assessment of nutritional status and their indicators.
- 3.9 Major nutritional deficiency diseases.

### 4 Food Engineering

(12 Marks)

- 4.1 Units, dimensions and their conversion.
- 4.2 Unit operation, heat and material balance, heat transfer (conduction, convection and radiation) and heat exchangers.
- 4.3 Principle, application and equipment for refrigeration & freezing, drying, evaporation, centrifugation, size separation (filtration, sedimentation), size reduction (crushing, slicing, grinding).

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- 4.4 Principle and application of distillation, extraction and super critical fluid extraction.
- 4.5 General introduction to belt conveyers, chain conveyers, screw conveyers, elevators and their importance in food industries.
- 4.6 Steam generation and its application in food industries.
- 4.7 Principle of extrusion cooking and its use in food industries.
- 4.8 High pressure technology, membrane technology (Reverse Osmosis and Ultra Filtration) and its application in food industries.
- 4.9 Process plant and equipment design, scale-up and safety factors.
- 4.10 Heat treatment:
  - 4.10.1 Principle of pasteurization and sterilization, drying and dehydration.
  - 4.10.2 Heat exchangers, drying machines, and evaporators.

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द्वितीय पत्र : Technical Subject

Section (A) - 30 Marks

1. Post-Harvest and Food Processing Technology

- 1.1. The broad-based approach to post-harvest and agro-industry development in Nepal.
- 1.2. Development, growth, maturation, ripening of fruits and vegetables.
- 1.3. Development of post-harvest technology for citrus, apple, mangoes, tomatoes, cabbages, cauliflowers etc. Controlled atmosphere storage (CAS), modified atmosphere storage (MAS), cellar storage, cold storage, zero energy chamber storage.
- 1.4. Post-harvest handling of grains: Grading, storage and transportation of cereal grains.
- 1.5. Qualitative and quantitative assessment of post-harvest losses and management system for loss reduction in rice, maize, wheat and other perishable food commodities such as fruits and vegetable.
- 1.6. GoN's current policy and plan for increase in agriculture production and strategy for development of food and nutrition security.
- 1.7. General principles and methods of food preservation.
- 1.8. Indigenous food processing practices.
- 1.9. Processing and preservation of milk and milk products.
- 1.10. Processing and preservation of meat, fish and poultry.
- 1.11. Technology of cereal, legume and oil seeds.
- 1.12. Confectionery technology.
- 1.13. Processing and preservation of tea, coffee, spice and condiments.
- 1.14. Processing and preservation of fruits and vegetable.
- 1.15. Uses of enzymes in food processing industries.
- 1.16. Use of various packaging materials in food processing.
- 1.17. Recent advancements in food processing technology.

Section (B) - 20 Marks

2. Human Nutrition

- 2.1. Food habits and food taboos.
- 2.2. Food security and nutrition.
- 2.3. Role of Food technology in assuring food security in Nepal.
- 2.4. Functional foods and its importance, therapeutic nutrition and diet.
- 2.5. Supplementation, fortification and enrichment of foods.
- 2.6. Effect of processing on nutrients.
- 2.7. Underline causes and consequences of malnutrition and improvements of nutritional status of infants, pregnant and lactating mother. Double burden of malnutrition.
- 2.8. Lifestyle diseases: diabetes mellitus, obesity, cardiovascular diseases, hypertension.
- 2.9. Food and nutrition surveys to assess the nutritional problems and develop practical measures to mitigate identified nutritional deficiency by food based approach.
- 2.10. Natural occurrence of ant nutritional factors in food, food toxicity and allergenicity.
- 2.11. Different Nutritional surveys (Dietary, Anthropometric and other) conducted in Nepal.
- 2.12. Organizational set ups and policy documents to carryout nutritional activities in Nepal.
- 2.13. International agencies in nutritional activities.

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**Section (C) - 20 Marks**

**3. Industrial Microbiology**

- 3.1. Industrial application of micro organisms.
- 3.2. Isolation and preservation of in
- 3.3. dustrially important micro organisms.
- 3.4. Identification and physiological characteristics of industrially important micro organisms (Lactic acid bacteria, yeast and mold).
- 3.5. Fermented foods and beverages.
- 3.6. Biochemical reaction and fermentation.
- 3.7. Industrial fermentation of organic acids (vinegar, citric acid, lactic acid) and vitamins (vitamin B-12, riboflavin, beta- carotene).
- 3.8. Principle and application of bioreactor, Solid Substrate Fermentation (SSF): Principle and application, Submerged Fermentation. Merits and demerits of Solid Substrate Fermentation and Submerged Fermentation.
- 3.9. Recent trends and developments in biotechnology.
- 3.10. Single cell protein, antibiotics and chemistry of microbial leaching.

**Section (D) - 30 Marks**

**4. Food Quality Control, Safety Management & Acts**

- 4.1. Concept of Quality Control and Quality Assurance.
- 4.2. Food Hygiene and Quality Act, 2081 and Food Regulation, 2027
- 4.3. Feed Act, 2033 and Regulation, 2041
- 4.4. Consumer Protection Act, 2075
- 4.5. Food Sampling and Inspection techniques.
- 4.6. Food adulteration and its control mechanism.
- 4.7. Application and importance of Information technology in food regulation.
- 4.8. Risk Assessment: Chemical and Microbiological, Risk management and communication.
- 4.9. Monitoring of contaminants in foods.
- 4.10. Quality attributes of food and sensory evaluation.
- 4.11. Nepal food standards, its formulation process, Codex Alimentarius Commission.
- 4.12. General concept of Sanitary and Phyto Sanitary (SPS) and Technical Barrier to Trade (TBT) in context of WTO.
- 4.13. General principle and application of Hazard Analysis and Critical Control Point (HACCP), Food Safety Management System, Good Manufacturing Practice (GMP), International Standard Organization (ISO 9001-14000), Total Quality Management (TQM) and Good Agricultural Practice (GAP)
- 4.14. Good Laboratory Practices (GLP), Laboratory Accreditations and LIMS.

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- 4.15. Principle and application: Enzyme Linked Immuno Sorbent Assay (ELISA), Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC), Atomic Absorption Spectroscopy (AAS), Mass Spectrometry (MS), Infra-Red and Ultra Violet Spectroscopy, Rapid Bioassay of Pesticide Residues (RBPR).
- 4.16. General concept of statistical quality control, sampling techniques, measures of location and dispersion, probability, test of significance (Chi-square test, T and Z tests, F-value and ANOVA), regression analysis.
- 4.17. Emerging issues in Food Science and Technology: AMR, drug residues, trans-fat, direct contact material.
- 4.18. Food Plant Sanitation and Management.

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**द्वितीय चरण (Second Phase) : सामूहिक परीक्षण (Group Test) र अन्तरवार्ता (Interview)**

**सामूहिक परीक्षण (Group Test)**

(१० अंक)

**सामूहिक छलफल (Group Discussion)**

यस प्रयोजनको लागि गरिने परीक्षण १० पूर्णाङ्क र ३० मिनेट अवधिको हुनेछ, जुन नेता विहिन सामूहिक छलफल (Leaderless Group Discussion) को रूपमा अवलम्बन गरिने छ । दिइएको प्रश्न वा Topic का विषयमा पालैपालोसंग निर्दिष्ट समय भित्र समूह बीच छलफल गर्दै प्रत्येक उम्मेदवारले व्यक्तिगत प्रस्तुति (Individual Presentation) गर्नु पर्नेछ ।

**सामूहिक छलफलमा दिइने नमुना प्रश्न वा Topic**

उदाहरणको लागि - उर्जा संकट, गरीबी निवारण, बाली बीमा, सामाजिक सुरक्षा, खाद्य सुरक्षा, प्रतिभा पलायन, स्वास्थ्य बीमा, जलवायु परिवर्तन, आरक्षण जस्ता समसामयिक विषयवस्तुहरुबाट कुनै एक Topic दिइनेछ ।

**अन्तरवार्ता (Interview)**

(२५ अंक)

मौखिक (Oral)

ΩΩ THE END ΩΩ