लोक सेवा आयोग  
नेपाल इन्जिनियरिङ्ग सेवा, कॉमिट्टी सम्मुह, राज्यपालिक तृतीय क्षेत्रीय पदको खुद्र प्रतियोगितामा परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ:

<table>
<thead>
<tr>
<th>प्रथम चरण</th>
<th>द्वितीय चरण</th>
</tr>
</thead>
</table>
| लिखित परीक्षा (Written Examination) | (क) सामूहिक परीक्षण (Group Test)  
(ख) अन्तर्वार्ता (Interview) |
| पूर्णाङ्क: 200 | पूर्णाङ्क: 10  
पूर्णाङ्क: 30 |

परीक्षा योजना (Examination Scheme)

| पत्र विषय | खण्ड पूर्णाङ्क उत्तरीणाङ्क परीक्षा प्रायः प्रतिच्छेदन x अघ | समय |
|---|---|---|---|
| प्रथम | General Subject | Part I: General Awareness & General Ability Test  
Part II: General Technical Subject | 100 40 | वस्तुत (Objective)  
बहुविकल्पक प्रश्न (MCQs) | ५० प्रश्न x १ अघ | १ घण्टा ३० मिनेट |
| | | | | ५० प्रश्न x १ अघ | २ घण्टा |
| द्वितीय | Technical Subject | 100 40 | विषयमाला (Subjective)  
छोटा उत्तर लामो उत्तर | ५ प्रश्न x ५ अघ  
५ प्रश्न x १० अघ | २ घण्टा |

परीक्षा योजना (Examination Scheme)

| पत्र विषय | पूर्णाङ्क उत्तरीणाङ्क परीक्षा प्रायः समय |
|---|---|---|
| सामूहिक परीक्षण (Group Test) | ५० | सामूहिक छलफल (Group Discussion)  
30 मिनेट |
| अन्तर्वार्ता (Interview) | ३० | बोर्ड अन्तर्वार्ता (Board Interview) - |

प्रश्नहरू:

1. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुई भने हुनेछ।
2. प्रथमपत्र र द्वितीय पत्रको लिखित परीक्षा छान्द्र हुनेछ।
3. वस्तुत (Multiple Choice) प्रश्नहरूले गलत उत्तर दिइए प्रश्नको गलत उत्तर बापत २० प्रतिशत अघ कडा गरिएको छ। तर उत्तर नैपार्ट तयाः प्रश्नको बापत अघ बिदेइन छैन र अघ कडा पनि गरिएको छैन।
4. बहुविकल्पक प्रश्नहरूले नुसार परीक्षाको लागि प्रश्नहरूले व्यवस्थित गरिएको व्यवस्थित गरिएको।
5. विषयमाला प्रश्नहरूले हकलो तोमुको अर्को एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई मिति भन्ना वेधी भाग (Two or more parts of a single question) वा एउटै प्रश्न अलग अलग दुई वा दो दिपणीहरू (Short notes) स्रोत गरिएको छ।
6. द्वितीय पत्रमा (विषयमाला प्रश्न हुनेका हकलो) प्रश्नको खण्डको लागि छान्द्र उपराज्यकाहरू हुनेछ। परीक्षापत्रमा प्रश्नको प्रश्नहरूको उत्तर सहीकडा उपराज्यकाहरूले लेखेर गरिएको छ।
7. यस पाठ्यक्रम योजनालाई अन्तर्वार्ता पत्र विषयमा विवरणिकाएको जसैको लागि पाठ्यक्रममा पत्रको कानुन, ऐन, नियम तथा नीतिहरू परीक्षाको भाँगिन मिति हस्ता ३ महिना अगाडि (संशोधन भएका बन्दो र संशोधन भएका हटाइएका बन्दो र ठप गरी संशोधन भएका) कारण रहेकालाई यस पाठ्यक्रम पत्रको सम्मनु पर्याय।
8. प्रश्नहरूको परीक्षाबाट छौट्टे भएका उमेदवारहरूलाई नेपाल द्वितीय वर्षको परीक्षामा सम्मिलित गराउनछ।
9. यस भन्न  अगाडि लागे भएको माथि उल्लेखित सेवा समूहको पाठ्यक्रम बारेमा गरिएको छ।
10. पाठ्यक्रम लागू मिति: २०७६/०६/३५
Part (I) : General Subject

1. General Awareness and Contemporary Issues   (25 ×1 Mark = 25 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, and livelihood & lifestyle of people
   1.4 Notable events and personalities, social, cultural and economic conditions in modern history of Nepal
   1.5 Current periodical plan of Nepal
   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 Provisions of civil service act and regulation relating to constitution of civil service, organisational structure, posts of service, fulfillment of vacancy and code of conduct
   1.11 Functional scope of public services
   1.12 Public Service Charter
   1.13 Concept, objective and importance of public policy
   1.14 Fundamentals of management : planning, organizing, directing, controlling, coordinating, decision making, motivation and leadership
   1.15 Government planning, budgeting and accounting system
   1.16 Major events and current affairs of national and international importance

2. General Ability Test   (25 ×1 Mark = 25 Marks)
   2.1 Verbal Ability Test  (8×1 Mark = 8 Marks)
      Jumble words, Series, Analogy, Classification, Coding-Decoding, Matrix, Ranking Order Test, Direction and Distance Sense Test, Common Sense Test, Logical Reasoning, Assertion and Reason, Statement and Conclusions

   2.2 Numerical Ability Test (9×1 Mark = 9Marks)
      Series, Analogy, Classification, Coding, Arithmetical reasoning/operation, Percentage, Ratio, Average, Loss & Profit, Time & Work, Data interpretation & Data verification

   2.3 Non-verbal/Abstract Ability Test (8×1 Mark = 8 Marks)
      Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern Completion/Finding, Analytical Reasoning Test, Figure Formation and Analysis, Rule Detection, Water images, Mirror images, Cubes and Dice &Venn-diagram
Part (B) : - General Technical Subject (50 Marks)

Section A- 20 % Marks

1. Physical Chemistry
   1.1 Ionic Equilibrium and Electrochemistry: pH, Buffer solution, buffer capacity and buffer range, pH change in acid base titration, theory of acid base indicator, hydrolysis of salt, Debye Huckel limiting law, activity and activity coefficient, Ionic strength, Elementary idea on electrical double layer, Emf of a cell, Nernst equation, glass electrode, ion selective electrode and their applications, photo electrochemical and fuel cells
   1.2 Chemical Kinetics: Effect of temperature and catalyst on reaction rate, concept of activation energy, collision theory and transition state theory of reaction rates, chain reaction, photochemical reaction, Fast reaction, techniques to study fast reaction, Enzyme catalyzed reaction, Diffusion controlled reaction in solution kinetic salt effect
   1.3 Thermodynamics: Statistical treatment of entropy, Entropy change in physical and chemical change, free energy change for reaction, Gibbs Helmhotz equation, Thermodynamic criteria of equilibrium, chemical potential, partial molar quantities, Boltzman distribution law
   1.4 Spectroscopy and Solid state chemistry: Electromagnetic radiation, origin of molecular spectra, types of molecular spectra: Rotational spectra, vibrational spectra, vibrational rotational spectra, Electronic spectra. Seven crystal system and fourteen Bravais lattice, Bragg's law, Crystal structure of sodium chloride, Lattice energy of ionic solid, success and limitation of classical free electron theory of metal, point defects: Frenkel and Schottky defects

Section B- 30 %Marks

2. Inorganic chemistry
   2.1 General concept of the followings: Electro negativity, choice of electro negativity system, group electronegativity, electron affinity, anomalous electron affinity, ionization energy, Intrinsic and mean bond energy. Metallic bonding, Buck minister fullerene, Noble gas compounds, Non aqueous solvents, Protiic and non-protiic solvents, Reactions of NH3 and SO2
   2.2 Molecular orbital theory, molecular orbital, LCAO approximation, valence bond theory for simple homonuclear diatomic
   2.3 Bonding and applications of coordinate compounds: Valence bond theory, crystal field, characterization of coordinate compounds, Isomerism in coordination compounds, ligand substitution reactions and trans effect, spectrochemical series, Nepelausetic effect, Jahn Teller effect, Evidence for adjusted crystal field theory
   2.4 Organometallic compounds: General survey of types, synthetic methods, metallocenes
   2.5 Radioactivity and nuclear reactions, 14C dating, tracer technique, radiochemical analysis

3. Analytical chemistry
   3.1 General concept of statistical methods in chemical analysis: Accuracy, precision, minimization of error, significant figures, mean and standard deviation, reliability of results, rejection of results, regression analysis, t-test, chi-test.
3.2 Principle and applications of: Atomic absorption spectroscopy, flame photometry, uv-vis spectrophotometry, NMR, IR, mass spectroscopy, emission spectroscopy.
3.3 Solvent extraction, ion exchange chromatography, gas chromatography, HPLC, exclusion chromatography (gel permeation chromatography), affinity; chromatography, partition, column, and paper chromatography, thermo gravimetric analysis, differential thermal analysis,
3.4 Principle and applications of potentiometry, ion selective electrodes, pH measurement, polarography, amperometry, electrogravimetry and conductometry.
3.5 Gravimetric and volumetric analysis, principles of volumetric and gravimetric analysis, uses of adsorption indicators, use of Redox indicator, metal ion indicator, use of common organic reagent s in gravimetric analysis.

Section C - 20 % Marks

4. Organic Chemistry
4.1 General idea on types, mechanism and scope of the followings:
   4.1.1 Nucleophilic reaction
   4.1.2 Elimination reaction
   4.1.3 Addition reaction
   4.1.4 Free radical reaction
4.2 Study and application of the followings:
   4.2.1 Oxidation and reduction reactions
   4.2.2 Halogenations
   4.2.3 Acetylation
   4.2.4 Alklylation
   4.2.5 Acylation
   4.2.6 Aldol condensation and related reactions.
4.3 Photochemistry:
   4.3.1 Basic concept of Photochemical energy
   4.3.2 Electronic excitation
   4.3.3 Energy transfer
   4.3.4 Photochemistry of carbonyl compounds
4.4 Heterocyclic Chemistry: Structure and reactivity of the following heterocyclic compounds:-
   4.4.1 Pyrrole
   4.4.2 Thiazole
   4.4.3 Furan
   4.4.4 Imidazole
   4.4.5 Pyridine
   4.4.6 Indole
4.5 Stereochemistry:
   4.5.1 Symmetry and symmetry elements
   4.5.2 Enantiomers
   4.5.3 Diastereomers
   4.5.4 Meso-isomers
   4.5.5 Racemic mixture
   4.5.6 Enantioselective reaction
   4.5.7 Diastereoselective reaction
   4.5.8 Regioselective reaction
4.6 Carbohydrate: Chemistry of Glucose, fructose, sucrose and cellulose
Section D- 30 % Marks

5. Biochemistry and applied chemistry

5.1 Biochemistry

5.1.1 Natural products and drug analysis:
  5.1.1.1 Phytochemical screening
  5.1.1.2 Isolation, purification and identification of natural molecules (essential oil, alkaloids, terpenoids, flavonoids)
  5.1.1.3 Biosynthesis of lipids and terpenes with taking typical examples of stearic acid and citral
  5.1.1.4 Vitamins and hormone
  5.1.1.5 Chemotherapy
  5.1.1.6 Drugs
  5.1.1.7 Synthetic drugs: types and typical examples
  5.1.1.8 Identification, qualitative and quantitative analysis of various antibiotics
  5.1.1.9 Quantitative analysis of dextrose, ascorbic acid, vitamin A in various products

5.1.2 Lipids:
  5.1.2.1 Composition of fats
  5.1.2.2 Hydrolyses
  5.1.2.3 Phosphoglycerides
  5.1.2.4 Rancidity types
  5.2.1.5 Prevention

5.1.3 Enzymes, Proteins and Nucleic Acids:
  5.1.3.1 Enzymes and co-enzymes, Co-factors
  5.1.3.2 Application of enzymes in food industries
  5.1.3.3 Structure and reactions of amino acids, peptides
  5.1.3.4 Protein
  5.1.3.5 Nucleic acids, Biological functions of DNA and RNA
  5.1.3.6 Regulation of gene expressions and Genetic code

5.2 Applied chemistry

5.2.1 Soil, sediments and rock analysis:
  5.2.1.1 Soil texture and organic matter in soil
  5.2.1.2 Cu, Pb, Zn & Ag in soil, sediments and rock
  5.2.1.3 Acid insoluble matter, loss on ignition, CaO, MgO, total oxide ((Fe₂O₃, Al₂O₃) and SiO₂ in limestone, dolomite and magnesite.

5.2.2 Water, wastewater and air analysis:
  5.2.2.1 BOD, COD, dissolved oxygen, alkalinity, ammonia, nitrite, nitrate, chloride, phosphate, sulfate, iron, manganese, arsenic and other toxic metals in water and wastewater.
  5.2.2.2 PM₁₀, TSS, SO₂, CO, CO₂, NOₓ in air

5.2.3 Food, food products and feed analysis:
  5.2.3.1 Proximate analysis (moisture, protein, fat and carbohydrate) of food, food products and feed
  5.2.3.2 Color detection in food and food products.
  5.2.3.3 Simple chemical methods (quick test) for detection of food adulteration.
  5.2.3.4 General concept of Pesticide and pesticide residue analysis in water, soil and foodstuff.
5.2.4 Analysis of industrial products:
  5.2.4.1 Urea
  5.2.4.2 Fertilizer
  5.2.4.3 Bleaching powder
  5.2.4.4 Alcohol

5.2.5 Miscellaneous:
  5.2.5.1 Application of chemical methods in preservation of archaeological property.
  5.2.5.2 Application of good laboratory practice and ISO 17025 concepts in the quality management.
  5.2.5.3 Role of Chemists in Environmental Impact Assessment