

लोक सेवा आयोग
नेपाल विविध सेवा, राजपत्राङ्कित तृतीय श्रेणी, रसायनविद पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :-	लिखित परीक्षा (Written Examination)	पूर्णाङ्क :- २००
द्वितीय चरण :-	(क) सामूहिक परीक्षण (Group Test)	पूर्णाङ्क :- १०
	(ख) अन्तर्वार्ता (Interview)	पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण : लिखित परीक्षा (Written Examination)

पूर्णाङ्क :- २००

पत्र	विषय	खण्ड	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या × अङ्क	समय
प्रथम	General Subject	Part I: General Awareness & General Reasoning Test	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × १ अङ्क	१ घण्टा ३० मिनेट
		Part II: General Technical Subject					५० प्रश्न × १ अङ्क	
द्वितीय	Technical Subject		१००	४०	विषयगत (Subjective)	छोटो उत्तर लामो उत्तर	४ प्रश्न × ५ अङ्क ८ प्रश्न × १० अङ्क	३ घण्टा

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

पूर्णाङ्क :- ४०

पत्र / विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	समय
सामूहिक परीक्षण (Group Test)	१०		सामूहिक छलफल (Group Discussion)	३० मिनेट
अन्तर्वार्ता (Interview)	३०		बोर्ड अन्तर्वार्ता (Board Interview)	-

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथमपत्र र द्वितीयपत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- 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 प्रश्नहरूको हकमा तोकिएको 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 (विषयगत प्रश्न हुनेका हकमा) प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले 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 ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएका माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति : - २०८०/०७/२०

प्रथम पत्र (Paper I): General Subject

Part (I) : - General Awareness & General Ability Test (50 Marks)

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 Reasoning Test (25 ×1 Mark = 25 Marks)**
 - 2.1 **Logical Reasoning** (9×1 Mark = 9 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** (8×1 Mark = 8 Marks)
Arithmetic Series, Analogy, Classification, Arithmetical Reasoning, Fraction. Percentage, Ratio, Average, Profit & Loss, Time & Work, Date & Calender, Data Sufficiency, Data Interpretation & Data Verification
 - 2.3 **Spatial Reasoning** (8×1 Mark = 8 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

Part (II) : - General Technical Subject (50 Marks)

Section A- 20 % Marks

1. Physical Chemistry

- 1.1 **Ionic Equilibrium and Electrochemistry:** Ostwald's dilution law, 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, quinhydrone electrode, ion selective electrodes and their applications, photo-electrochemical and fuel cells
- 1.2 **Chemical Kinetics:** Qualitative concepts of parallel, opposing and consecutive reactions, 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, laws of photochemical equivalence, quantum yield, phosphorescence, fluorescence, chemiluminescence and thermoluminescence, Fast reaction, techniques to study fast reaction, Enzyme catalyzed reaction.
- 1.3 **Thermodynamics:** First and second law of thermodynamics, Hess's law of constant heat summation, enthalpy change from bond energy, variation of heat of reaction with temperature (Kirchoff's equation), calorific value of fuel, calorific value of food. Molar heat capacities, adiabatic expansion of an ideal gas for reversible and irreversible expansion, Carnot cycle, thermodynamic efficiency, entropy and its mathematical derivation, entropy changes, irreversible process, relation between enthalpy and entropy changes, Gibbs-Helmholtz equation, free energy and work function and their significance, criteria of spontaneity.
- 1.4 **Solid state chemistry:** 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.
- 1.5 **Surface and Colloid Chemistry:** Physical adsorption and chemical adsorption, adsorption isotherms, Freundlich isotherms, derivation of Langmuir adsorption isotherms, cleansing action of soap and detergents, emulsion and gels, solution of macromolecules, colloidal state of matter, preparation and purification of colloids, brief discussion of kinetic, optical and electrical properties of colloids.

Section B- 30 % Marks

2. Inorganic chemistry

10%

- 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, Protic and non-protic solvents, NH_3 and SO_2 as non-aqueous solvent.
- 2.2 **Molecular orbital theory:** concept of molecular orbital, LCAO approximation, MOT vs VBT
- 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, chelation, application of complexes in analytical and biological fields.

- 2.4 Organometallic compounds: General survey of types, synthetic methods, metallocenes
- 2.5 Radioactivity and nuclear reactions, C^{14} dating, tracer technique, radiochemical analysis

3. Analytical chemistry 20%

- 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.
- 3.3 **Chromatography:** ion exchange chromatography, gas chromatography, HPLC, exclusion chromatography (gel permeation chromatography), affinity; chromatography, partition, column, paper chromatography and solvent extraction,
- 3.4 **Principle and applications of:** potentiometry, ion selective electrodes, pH measurement, polarography, 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 reagents in gravimetric analysis.

Section C- 20% Marks

4. Organic Chemistry

- 4.1 **General idea on mechanism and scope of the following types of reactions:** Nucleophilic reaction, Elimination reaction, Addition reaction and Free radical reaction
- 4.2 **Study and application of the following types of organic reactions:** Oxidation and reduction, Halogenations, Acetylation, Alkylation, Acylation and condensation.
- 4.3 **Organic photochemistry:** basic concepts on photochemistry of carbonyl compounds, photochemical aromatic substitution, photo- isomerization and photoreduction.
- 4.4 **Structure and reactivity of the following heterocyclic compounds:** Thiazole, Furan and Pyridine
- 4.5 **Stereochemistry:** Symmetry and symmetry elements, Enantiomers, Diastereomers, Meso-isomers, Racemic mixture, Enantio-selective reaction, Diastereo-selective reaction, Regio-selective reaction.

Section D- 30 %Marks

5. Conservation technologies

- 5.1 **Terminologies:** Conservation, restoration, preservation, renovation, preventive conservation, consolidation, water repellents, reproduction.
- 5.2 **Introduction to Archaeological objects:** Classification, nature of deterioration, co-operative approach to conservation.
- 5.3 **Introduction to Archival materials:** Nature, causes of deterioration, preventive care, repair and restoration, recovery of faded ink.

- 5.4 Agents of deterioration of Museum objects:** Direct physical forces, thieves, vandals' displacers, fire, water, pests, contaminants, radiation, temperature, relative humidity, pollution and flood
- 5.5 Stone conservation:** Classification of stones, types of deterioration, causes of deterioration, photographic documentation, clearing methods and conservation treatments
- 5.6 Pigments:** Red, green, blue, yellow, black, gold and silver, white.
- 5.7 Metal conservation:** Corrosion, classification of metals on the basis of corrosion behaviour, deterioration of metal objects, cleaning, consolidation and preventive measures.
- 5.8 Ceramics:** Different types of ceramics, causes of deterioration, salt removal (soluble and insoluble), stain removal, repair and cleaning
- 5.9 Wooden artifacts:** Physical, chemical and biological causes of deterioration and control measures.
- 5.10 Uses of traditional techniques for conservation:** Techniques involving uses of Neem, Camphor, Turmeric and Sandalwood
- 5.11 Termite controls in the museums and the historic buildings:** classification, detection and prevention
- 5.12 Eradication of plants in the monuments:** Physical and chemical methods.