

नेपाल सरकार
गृह मन्त्रालय
प्रहरी प्रधान कार्यालय
(मानवश्रोत एवं प्रशासन विभाग, भर्ना तथा छनौट महाशाखा)
नक्साल, काठमाण्डौ ।

प्राविधिक प्रहरी निरीक्षक (विधिविज्ञान समूह, Chemistry उप-समूह) को खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम ।

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

प्रथम चरण:- लिखित परीक्षा (Written Examination)

पूर्णाङ्क :- १५०

द्वितीय चरण:- अन्तरवार्ता (Interview)

पूर्णाङ्क :- २५

प्रथम चरण:- लिखित परीक्षा योजना (Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या x अङ्कभार	समय
प्रथम	Chemistry & Forensic Science	१००	४०	विषयगत	$३ \times १० = ३०$	३ घण्टा
					$१४ \times ५ = ७०$	
द्वितीय	नेपाल प्रहरी सेवा सम्बन्धी	५०	२०	वस्तुगत बहुउत्तर	$१० \times १ = १०$	१ घण्टा १० मिनेट
				विषयगत	लामो उत्तर $१ \times १० = १०$ छोटो उत्तर $६ \times ५ = ३०$	

द्वितीय चरण

परीक्षाको किसिम	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	२५	मौखिक

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- प्रथम पत्रमा पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या निम्नानुसार हुनेछ भने द्वितीय पत्रमा सोधिने प्रश्न संख्या र अंकभार द्वितीय पत्रको पाठ्यक्रममा उल्लेख गरिएको छ ।

विषय	Chemistry									Forensic Science			
पाठ्यक्रमको एकाई	1	2	3	4	5	6	7	8	9	10	11	12	13
लामो प्रश्न	२ वटा									१ वटा			
छोटो प्रश्न	९ वटा									५ वटा			

४. वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत पूर्णाङ्क प्रदान गरिनेछ, भन्ने 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 ।
५. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।
६. अन्तर्वार्ताको अंकभार सम्बन्धमा प्रहरी सेवाको पदमा नियुक्ति र बढुवा गर्दा अपनाउनु पर्ने सामान्य सिद्धान्त, २०६९ को अनुसूची-१९ मा व्यवस्था भए बमोजिम हुनेछ ।
७. पाठ्यक्रम लागू मिति :- २०७०/०७/१५ गते ।

Subject	Unit	No. of Questions and Weightage			Full Marks
		Long Answer Type Question (3)	Short Answer Type Questions (14)	Marks	
CHEMISTRY	1. Principles of Qualitative and Quantitative Analysis	2 x 10 marks = 20 marks	9 x 5 marks = 45 marks	65	100
	2. Refining and Purification of Metals				
	3. Chemistry of d-block Elements and Their Compounds				
	4. Co-ordination Compound and its Bonding and Application of Coordination Compounds				
	5. Name Reactions (With Mechanism):				
	6. Preparation, Properties and Reactions of Organic Compounds				
	7. Chemical Kinetics				
	8. Gaseous State				
	9. Electrochemistry				
FORENSIC SCIENCE	10. Introduction to Forensic Science	1 x 10 marks = 10 marks	5 x 5 marks = 25 marks	35	
	11. Crime Scene Investigation				
	12. Introduction to Forensic Chemistry				
	13. Introduction to Forensic Toxicology				

Group-A
CHEMISTRY (65%)

Inorganic Chemistry

Unit 1: Principles of Qualitative and Quantitative Analysis

Solubility product, common ion effect, their application in group separation, principles of gravimetric and volumetric analysis.

Unit 2: Refining and Purification of Metals

Chromatography, ion exchange, solvent extraction, oxidative refining, parting process, zone refining, Mond's process.

Unit 3: Chemistry of d-block Elements and Their Compounds

General trends in electronic configuration, ionic and covalent atomic radii, electronegativity, electron affinity, ionization potential, colour and magnetic properties, variable valency, complex formation with reference to 3d-block elements, concept of co-ordination complexes, Werner's theory of co-ordination compounds, comparative study of chemistry of elements of 3d-series (excluding Sc, Ti, V), chemistry of representative compound of 3d-block elements.

Unit 4: Co-ordination Compound and its Bonding and Application of Coordination Compounds

Isomerism in coordination compound, IUPAC nomenclature of coordination compounds, factors influencing the formation of complexes (thermodynamic and kinetic stability), Valence bond theory, inner and outer orbital complexes, crystal field theory, characterization of complexes by spectroscopy, optical, magnetic, chelates and polynuclear complexes, stereochemistry of complexes in analytical and biological fields.

Organic Chemistry

Unit 5: Name Reactions (With Mechanism):

Condensation reaction (Aldol Condensation, Claisen Condensation, Dieckmann Condensation, Darzen's reaction, Perkin Condensation, Wittig Reaction), Rearrangement Reactions (Beckmann Rearrangement, Claisen Rearrangement, Cope Rearrangement, Favorskii Rearrangement, Hofmann Rearrangement, Pinacol Rearrangement, Wagner-Merwein Rearrangement, Wittig Rearrangement), Reduction Reactions (Birch Reduction, Clemmensen Reduction, Wolff Reduction, Cannizzaro Reduction, Metal hydride Reduction, Catalytic hydrogenation), Oxidation Reactions (Baeyer-Villiger Reaction, Oppenauer Oxidation, Lead tetraacetate Oxidation, Chromic acid Oxidation, Permanganate Oxidation, Peroxid Oxidation)

Unit 6: Preparation, Properties and Reactions of Organic Compounds

Alkane, Alkene, Alkyne, Alcohol, Ether, Aldehyde and Ketone, Carboxylic Acid, Amine, Phenol.

Physical Chemistry

Unit 7: Chemical Kinetics

Concept of rate of a chemical reaction, measurement of reaction rate, order and molecularity of a reaction, rate equation (differential and integral form) for zero, first and second order reaction, half life of a reaction, effect of temperature of the reaction rates, activation energy, qualitative, treatment of collision theory of bimolecular reactions, activated complex theory, kinetic study of some reaction mechanism (reaction between O_2 and HBr , I_2 and propanone in acidic medium).

Unit 8: Gaseous State

Postulates of kinetic molecular theory and their significance, cause of gas pressure, derivation of kinetic gas equation for ideal gas, derivation of gas laws from velocities of gas molecules (no derivation), average velocity, most probable velocity, root mean square velocity, calculation of root mean square velocity from Maxwell's-equation, relationship between different types of velocities, concept of collision number, collision frequency, collision diameter and mean free path, deviation of real gas from ideal behavior. Van Der Waals equation of state, virial equation of state, Liquefaction of gas: critical state and critical constants, Van Der Waals Constant a and b .

Unit 9: Electrochemistry

Failure of Arrhenius theory in case of strong electrolyte, qualitative treatment of Debye Huckle Onsagar equation, activities and activity coefficient of strong electrolyte, ionic strength, qualitative treatment of Debye Huckle limiting law, EMF of cell: Reversible and irreversible cells, types of electrodes (convention regarding sign of emf, measurement of emf of a cell), Thermodynamics and emf: H and S from emf, potential and equilibrium constants, thermodynamics of electrode potential, standard potential and equilibrium constants, chemical cells without transference and with transference, concentration cells with and without transference and without transference, liquid junction potential (no derivation), principles of photoelectrochemical cells.

Group-B
FORENSIC SCIENCE (35%)

Unit 10: Introduction to Forensic science

- Definition
- History
- Principles
- Different branches
- Importance of forensic science
- Existing scenario of forensic science in Nepal
- Recent Advances in Forensic Science (DNA profiling, AFIS, Gas Chromatograph Mass Spectroscopy (GC-MS), etc

Unit 11: Crime Scene Examination

- Basic steps in crime scene examination-protection, photography, sketching, search, handling and collection of evidence, modern aids
- Crime Scene Safety-Types of Hazards, Types of Safety, Routes of Exposure, Personnel Protective Equipment
- Physical Evidence-Classification, types, sources, importance, collection, handling, preservation, labeling and forwarding of various physical evidences, Chain of custody

Unit 12: Introduction to Forensic Chemistry

- Narcotic drug and psychotropic substances :Classification of drugs, Sampling procedure, Sampling Procedure of drugs, Rapid test kit and its use/Method of analysis, Drug Identification by TLC
- Investigation of Narcotics Drugs cases:Legal provisions, Control delivery, Investigation phases/ Special considerations during investigation
- Explosives and Post Blast Investigation: Classification of explosives, Different types of explosives substances, Bomb, IED and its accessories, Post blast Investigation and evidence collection, Analysis techniques

Unit 13: Introduction to Forensic Toxicology

- Type of poisons, toxic substances, inorganic, metallic poisons, organic poisons, plant poisons, animal poisons, cerebral poisons, Carbon monoxide, alcohol, rat poison and their analysis etc
- Effects of poisons/toxic substances in human body and its mechanism/fate of absorption.
- Physical evidences related with toxicology
- Handling, collection and forwarding of visceral samples
- Precaution, storage and preservation and disposal of samples
- Extraction techniques
- Methods of analysis

Sample Questions

Long Answer Type Questions

1. List the postulates of kinetic theory of gases. Derive kinetic gas equation for ideal gas. (5 + 5 marks)
2. Explain the birch reduction and cannizaro reduction reaction with mechanism. (10 marks)
3. Describe the basic steps involved in crime scene investigation. (10 marks)

Short Answer Type Questions

1. Derive an expression for half life of a second order reaction. (5 marks)
2. Give general methods of preparation of aldehydes and ketones. (5 marks)
3. Give the reason for the failure of Arrhenius theory in case of strong electrolyte. (5 marks)
4. Write a short note on Locardo's principle. (5 marks)

-समाप्त-