राष्ट्रिय विधि विज्ञान प्रयोगशाला विकास समिति
प्राविधिक सेवा अन्तरगत सातौं तहको वैज्ञानिक अधिकृत पदको खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रुपरेखा :- यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइने छ :

प्रथम चरण :- लिखित परीक्षा पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता पूर्णाङ्क :- ३०

प्रथम चरण :- लिखित परीक्षा योजना (Examination Scheme)

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	परीक्षा प्रणाली	प्रश्न संख्या x अंक भार	समय
प्रथम प्रत्र	१००	४०	क) प्रशासन र व्यवस्थापन ख) General science ग) Forensic	विषयगत विषयगत वस्तुगत	५ x ५ = २५ ५ x ५ = २५ २५ x २ = ५०	२ घण्टा ३० मिनेट
द्वितिय पत्र	१००	४०	Forensic	वस्तुगत (Multiple choice) विषयगत	२५ x २ = ५० ५ x १० = ५०	२ घण्टा ३० मिनेट

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक

१. लिखित परीक्षाको माध्यम भाषा अंग्रेजी वा नेपाली अथवा अंग्रेजी र नेपाली दुवै हुन सक्नेछ ।

२. प्रथम र द्वितिय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

३. प्रथम र द्वितिय पत्रको विषयगत प्रश्नहरुको स्वरुप निम्नानुसार हुन सक्नेछ :

३.१ लामो उत्तर दिने ५ वा १० अङ्कका पूरा प्रश्नहरु सोध्न सकिनेछ ।

३.२ एउटै प्रश्नलाई दुई वा दुई भन्दा बढी भागमा (Two of more parts of a single question) विभाजन गरी सोध्न सकिनेछ ।

३.३ एउटा प्रश्न अन्तर्गत दुई वा वढी टिप्पणीहरु (short notes) सोध्न सकिनेछ ।

४. वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरुको उत्तर सही दिएमा प्रत्येक सही उत्तर वापत २ (दुई) अंङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर वापत २० प्रतिशत अर्थात ०.४ अंक कट्टा गरिनेछ। तर उत्तर नदिएमा त्यस वापत अंक दिइने छैन र अंक कट्टा पनि गरिने छैन ।

५. यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मिति भन्दा ३ (तीन) महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ ।

६. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar, Lalitpur
Syllabus of Bio-group
Seventh Level

Subject: General Forensic (1st paper)

Part I: Administration and Management 25%

Management: Concept, Principles, Functions, Scope and Role, Level and Skills of Managers.
Planning: Concept, Principles, Nature, Types, Instruments, and Steps.
Communication and Counseling: Concept, Communication Processes and Barrier to Effective Communication Techniques for Improving Communication.
Decision Making: Importance, Types, Rational Process of Decision Making, Problem Solving Techniques, Improving Decision Making.
Participative Management: Concept, Advantages and Disadvantages, Techniques of Participation.
Time Management: Concept. Essential factors and strategies for effective time management.
Stress Management: Concept, Causes and sources of stress, Techniques of stress management.
Appreciative Inquiry: Concept, Basic principles and management.
Financial Management: Concept, Approaches, Budget Formulation and Implementation, Auditing and topics related to Fiscal administration.
Human Resource Management: Concept, Functions and different aspects.

Part II: GENERAL 25%

Nepalese History of Forensic Science. Present status of Forensic Science in Nepal. Individuality principle. Locard's principle. Physical evidence. Interpretation of laboratory result and report writing. General concept of criminal justice system of Nepal. Expert witness: objective, qualities and courtroom skills. Nepalese acts related to physical evidence and their examination. Establishment and development of National Forensic Science Laboratory.

Part III: FORENSIC BIOLOGY 50%

Hair and Fibers

Morphology and microscopic examination of human and animal hair. Determination of origin species identification), race, site, Forensic aspects of fiber examination- fluorescent, optical properties. refractive index, birefringence, dye analysis etc identification and comparison of man-made and natural fiber.

Forensic Botany

Various types of wood, timber varieties, seeds and leaves– their identification and matching. Diatoms polymorphism and its role in drowning cases. Forensic Palynology. Identification of starch grains, powder and stains of spices etc. Paper and Paper Pulp examination. Isolation, classification and identification of microbial organism

Wild life Forensic

Introduction and Importance of wild life, Protected and endangered species of Animals and Plants, Identification and examination of wildlife materials by conventional and modern method Identification of Pug marks of various animals. Census of wild life population.

Enzyme Techniques

Enzyme kinetics, Purification and protein estimation, Enzyme assay technique, Visible & ultraviolet Spectrophotometric methods, Luminescence method, Radio-isotope method Immuno-chemical method, Automated enzyme analysis, Immobilized enzymes.

Electrophoretic Technique

General principles, Factors affecting electrophoresis, Different type of electrophoresis, Slab gel sequencer and capillary sequencer.

Bio-chemical Hazards Management

Basic concept of bio-chemical hazards (nature, precaution, disposal and management in lab).

MODEL QUESTION (Objective)

Analysis of hair is important to identify

a) species
b) race
c) site
d) all of above

NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar, Lalitpur
Syllabus of Bio-group
Seventh Level

Subject: Forensic Serology & DNA profiling (2nd paper)

Body Fluids/ Stains and Tissues ***10***

Introduction to various types of body fluids, Presumptive and confirmative test of stains of biological fluids like blood, semen saliva. Urine, pus, vomit, milk, sweat, tears etc.

Determination of Origin of species ***10***

Concept of precipitation test Determination of origin from biological stains/tissues through immunodiffusion and immuno - electrophoresis, Identification of closely related species by cross reactivity

Serology and Serogenetic markers ***20***

Biochemistry and genetics of Polymorphic serogenetic markers i.e. antigenic, cellular proteins and enzymatic, Direct and indirect methods of ABO and others blood grouping from body fluid stains, Determination of secretor/non-secretor and its forensic significance, Role of serogenetic markers in civil and criminal cases.

Basic concepts of Genetics- ***20***

Mendelian genetics, Human Genetics - Heredity, Alleles, mutation, multiple alleles, genetic variants, biochemical genetics, Gene pool and gene/genotype frequency determination, Gene mapping and Gene Expression, Genetic markers and their forensic significance.

DNA Profiling ***40***

Molecular Biology of DNA, DNA replication, History of DNA profiling, basic steps of DN profiling, Complication factors in applicability of DNA results and its assessment, Concepts of repeated and sequence based DNA polymorphism. Lineage and Bilineage markers, Evaluation and Interpretation of result, Allele frequency determination, Match probability — Database, Forensic applications of DNA profiling, legal perspectives — legal standards for admissibility of DNA profiling — procedural & ethical concerns. Significance and limitation of DNA profiling. New & Future technologies/methods — DNA chips, SNPS, TOF-MS, DNA cloning.

MODEL QUESTION (Objective)

Cross reactivity is

a) a diffusion test to confirm the origin of biological stains between closely related species.
b) a presumptive test to identify the origin of species.
c) a type of blood grouping test.
d) a test to identify the type of stain.

NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar. Lalitpur

Syllabus of Chem-group
Seventh Level

Subject: General Forensic (1st paper)

Part I: Administration and Management **25%**

Management: Concept, Principles, Functions, Scope and Role, Level and Skills of Managers.
Planning: Concept, Principles, Nature, Types, Instruments, and Steps.
Communication and Counseling: Concept, Communication Processes and Barrier to Effective Communication., Techniques for Improving Communication.
Decision Making: Importance, Types, Rational Process of Decision Making, Problem Solving Techniques, Improving Decision Making.
Participative Management: Concept, Advantages and Disadvantages, Techniques of participation.
Time Management: Concept, Essential factors and strategies for effective time management.
Stress Management: Concept, Causes and sources of stress, Techniques of stress management.
Appreciative Inquiry: Concept, Basic principles and management.
Financial Management: Concept, Approaches, Budget Formulation and Implementation, Auditing and topics related to Fiscal administration.
Human Resource Management: Concept, Functions and different aspects.

Part II: GENERAL **25%**

Nepalese History of Forensic Science. Present status of Forensic Science in Nepal. Individuality principle Locard's principle. Physical evidence. Interpretation of laboratory result and report writing General concept of criminal justice system of Nepal. Expert witness: objective, qualities skills. Nepalese acts related to physical evidence and their examination. Establishment and development of National Forensic Science Laboratory.

Part III: FORENSIC CHEMISTRY **50%**

Forensic Chemistry: Application of Forensic Chemistry. Nature of cases/exhibits and its significance.

Analysis of beverages: Alcoholic and nonalcoholic, country made liquor, illicit liquor and medicinal preparations containing alcohol and drugs as constituents

Examination of petroleum products: Distillation and fractionation, various fractions and their commercial uses, standard methods of analysis of petroleum products for adulteration,

Quantitative and qualitative forensic analysis of Industrial products: Urea fertilizer, bleaching powder and consumer items such as tobacco, tea. sugars and salts.

Explosives: Classification, composition, identification and characteristics of various explosives.

Chromatographic Techniques*:* Basic principles, applications, operation and troubleshooting of GC, HPLC and GCMS Techniques.

Bio-chemical Hazards Management: Basic concept of bio-chemical hazards (nature, precaution, disposal and management in lab).

Statistical methods: 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-square test, odds ratio, p-value and its significance.

Model Question (Objective)

Petroleum product adulteration is detected by

a) Colour
b) Odour
c) Distillation
d) None of above

NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar. Lalitpur

Syllabus of Chem-group
Seventh Level

Subject: Forensic Toxicology (2nd paper)

Part I: TOXICOLOGY 50%

Forensic Toxicology- General concept of forensic toxicology. Collection and preservation of toxicological exhibits in fatal and survival cases. Study of post mortem examination report/finding and specific analysis plan for toxicological examination of poisoning samples. Interpretation of analytical data.

Clinical Toxicology- Concept of clinical toxicological examination and its significance collection and preservation of clinical toxicological exhibits, General concepts of drug metabolism and detection of poisons on the basis of their metabolic studies.

Poisons: classification of poisons, types of poisoning, signs and symptoms of poisoning, mode of action and its effect on vital functions, poisonous plants of Nepal.

Extraction techniques: Extraction, Isolation and clean-up procedures of poisons/drugs using solid phase extraction (SPE) techniques from biological samples (viscera, body fluids).

Identification techniques:
Identification of insecticide poisons using chromatographic techniques (TLC, GC, and GCMS).
Identification of rodenticide poisons from biological samples.
Identification and estimation of volatile poisons (Alcohols, solvents etc.) from biological fluids (blood and urine)
Identification of metallic poisons from biological samples.
Identification of carbon monoxide and cyanide in blood.

Part II DRUGS 50%

Drugs of Abuse: Introduction, classification and its importance of examination in forensic and clinical purpose.
Identification: TLC, GC and GCMS of opiate drugs and psychotropic substances.
Quantitative Test: Quantitation of narcotic drugs (heroin, codeine, morphine etc.) by GC & GCMS

Pharmacology:
Forensic Pharmacology: General concept of mechanism and action of drugs, their safety, uses, mode of administration, adverse drug reaction and drug interaction.
Pharmaceutical care and drug supply management: Comprehensive knowledge of clinical and hospital pharmacy, concept of essential drug, national Formulary, hospital formulary and drugs and theurapatic committee, standard treatment schedules and rationale use of drugs.

Model Question (Objective)
Benzoylecgonine is the metabolite of:
a) heroin b) cocaine c) amphetamine d) LSD

Model Question (Subjective)

What is solid phase extraction?

How do you extract narcotic drug heroin using solid phase extraction?

NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar, Lalitpur

Syllabus of Physics-group
Seventh Level

Subject: General Forensic (1St paper)

Part I: Administration and Management 25%

Management: Concept, Principles, Functions, Scope and Role, Level and Skills of Managers.
Planning: Concept, Principles, Nature, Types, Instruments, and Steps.
Communication and Counseling: Concept, Communication Processes and Barrier to Effective Communication, Techniques for Improving Communication.
Decision Making: Importance, Types, Rational Process of Decision Making, Problem Solving Techniques, Improving Decision Making.
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Appreciative Inquiry: Concept, Basic principles and management.
Financial Management: Concept, Approaches, Budget Formulation and Implementation Auditing and topics related to Fiscal administration
Human Resource Management: Concept, Functions and different aspects.

Part 11: GENERAL 25%

Nepalese History of Forensic Science. Present status of Forensic Science in Nepal. Individuality principle. Locard's principle. Physical evidence. Interpretation of laboratory result and report writing. General concept of criminal justice system of Nepal. Expert witness: objective, qualities and courtroom skills. Nepalese acts related to physical evidence and their examination Establishment and development of National Forensic Science Laboratory.

Part II: FORENSICS 50%

Ballistics: General concept of firearms, bullets, cartridges, primers, Firearm projectiles and their composition. Different types of marks produced during the firing process, determination of range of fire burning and shots dispersion GSR distribution.

Glass: Significance of forensic examination of glass fractures. Determination of direction of impact: cone- fracture, rib marks, hackle marks, backward fragmentation and its physics matching. Density comparison, physical measurements and refractive index comparison.
Paint: General concept of paint and their composition, pigment distribution, macroscopic and microscopic studies. Chromatographic techniques and colorimetry.

Spectroscopy: Principle and application of UV, visible and Infrared spectroscopy, fluorescence and phosphorescence spectrophotometry. Sources of radiation: their utility and limitations. interaction of radiation with matter: reflection, absorption, transmission, fluorescence, phosphorescence and their forensic applications.

Electrostatic Detection Apparatus (ESDA): Principle and application.

Video Spectral Comparator (VSC): Instrumentation, sample handling, illumination and application.

Restoration of erased / obliterated marks; Identification methods of erased and obliterated marks (cast, punch, engraved and etching).

Model Question (Objective)

VSC is used to

a) Compare fingerprints
b) Analyze fake documents
c) Find out erased documents
d) All

NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar, Lalitpur

Syllabus of Physics-group
Seventh Level

Subject: Questioned Documents (2nd paper)

Part I: FINGERPRINTS AND IMPRESSIONS 50%

Fingerprints: Definition and classification of fingerprints (Henry System). Development of fingerprints, formation of ridges, pattern types, pattern areas.

Taking of finger prints from living and dead persons, preserving and lifting of fingerprints comparison of fingerprints. Automatic fingerprint identification system.

Chance prints: Latent & Visible Fingerprints, Plastic Fingerprints, Composition of Sweat, Different techniques of development of latent fingerprints,

Other Prints/marks: Nature, forensic significance, lifting and analysis of Footprints, Tyre Marks.

Printed matters: Identification of type writings (Standard/electric/electronic typewriters), Identification of computer printouts and printers. Examination of photo copies (Black & White colour), scanned documents and FAX messages. Identification of mechanical impressions (rubber stamp/seal impressions), Identification of printed matter, Examination of security document including currency notes, passports and other travel documents,

Part II: QUESTIONED DOCUMENTS 50%

Questioned Documents: Introduction and classification. Nature and problems of document examination
Various types of documents, basic tools needed for forensic documents examination and their use, cross stroke examination.

Forensic Documents: Specimen/admitted writing/type writing etc handling, preservation and marking of documents, Genuine and forged documents, holographic documents. Significance of age estimation of forensic documents.

Handwriting: Common and individual characteristics associated with handwriting and its identification. General characteristics of handwriting, Important guidelines for the collection of known writings for comparison to a questioned documents, Disguised writing and anonymous letters, Examination of disguised /distorted writings/signatures, Identification of writing and signatures, detection of forgery and fixing the authorship of forged writings/signatures.

Papers and inks: Detection and decipherment of alteration including addition, overwriting obliteration and mechanical/chemical erasures. Detection and decipherment of secret writing/indentation, variation in pen inks.

Model Question (Objective)
How- will you differentiate fake and genuine currency?
a) Paper quality

b) Printing ink quality
c) Water marks
d) All above