राष्ट्रिय विधि विज्ञान प्रयोगशाला विकास समिति

प्राविधिक सेवा अन्तर्गत आठौं तहको वरिष्ठ वैज्ञानिक अधिकृत पदको खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसारका दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :– लिखित परीक्षा पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता पूर्णाङ्क :– ३०

परीक्षा योजना (Examination Scheme)

१.प्रथम चरण : लिखित परीक्षा (Written Examination) **पूर्णाङ्क :- २००**

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या × अङ्क	समय
प्रथम	Management & Organisational Knowledge	१००	४०	विषयगत	१० प्रश्न × ५ अङ्क = ५० ५ प्रश्न × १० अङ्क = ५०	३ घण्टा
द्वितीय	सेवा सम्बन्धी	१००	४०	विषयगत	६ प्रश्न × १० अङ्क = ६० २ प्रश्न × २० अङ्क = ४०	३ घण्टा

२. द्वितीय चरण :

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुबै हुनेछ ।

२. प्राविधिक सेवा अन्तर्गत आठौं तहका वरिष्ठ वैज्ञानिक अधिकृत सबै पदका लागि प्रथम पत्रको विषयवस्तु एउटै हुनेछ । तर द्वितीय पत्र (सेवा सम्बन्धी) को विषयवस्तु सम्बन्धित सेवा/समूह अनुरूप फरक फरक हुनेछ ।

३. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

४. लिखित परीक्षामा सोधिने **प्रश्न संख्या र अङ्कभार** यथासम्भव सम्बन्धित पत्र/विषयमा दिईए अनुसार हुनेछ ।

५. विषयगत प्रश्नहरुको हकमा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरु (Short notes) सोध्न सकिनेछ ।

६. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

७. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।

८. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

९. पाठ्यक्रम स्वीकृत मिति : २०७९/१२/१६

राष्ट्रिय विधि विज्ञान प्रयोगशाला विकास समिति
प्राविधिक सेवा अन्तर्गत आठौं तहको वरिष्ठ वैज्ञानिक अधिकृत पदको खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

प्रथम पत्र (Paper I) :
Management & Organisational Knowledge
(Common All Groups)
Section (A): 60 Marks
(6×5 Marks = 30 Marks, 3× 10 Marks = 30 Marks)

1. **General Management (30 Marks)**
   - 1.1 **Management:** Concept, Principles, Functions, Scope and Role, Level and Skills of Managers
   - 1.2 **Planning:** Concept, Principles, Nature, Types, Instruments, and Steps
   - 1.3 **Motivation:** Concept, Theories of Motivation, Reasons for low productivity, Techniques of employee Motivation
   - 1.4 **Leadership:** Concept, Functions, Leadership styles, Leadership and Management effectiveness
   - 1.5 **Coordination:** Concept, Need, Types, Techniques and Approaches of Effective Coordination
   - 1.6 **Communication and Counseling:** Concept, Communication Processes and Barrier to Effective Communication, Techniques for Improving Communication
   - 1.7 **Decision Making**: Importance, Types, Rational Process of Decision Making, Problem Solving Techniques, Improving Decision Making
   - 1.8 **Participative Management:** Concept, Advantages and Disadvantages, Techniques of Participation
   - 1.9 **Time Management:** Concept, Essential factors and strategies for effective time management
   - 1.10 **Conflict Management:** Concept, Approaches to conflict, Levels of Conflict, Causes of Conflict and Strategies for Conflict Management
   - 1.11 **Financial Management:** Concept, Approaches, Budget Formulation and Implementation, Auditing and topics related to Fiscal administration
   - 1.12 **Human Resource Management:** Concept, Functions and different aspects
   - 1.13 **Project Management:** Concept, Process, Techniques and Approaches.
   - 1.14 Rule of Law, Public Accountability, Transparency and Professional Ethics

2. **Organisational Knowledge (30 Marks)**
   - 2.1 राष्ट्रिय विधि विज्ञान प्रयोगशाला विकास समिति (गठन) आदेश, २०५२
   - 2.2 राष्ट्रिय विधि विज्ञान प्रयोगशाला विकास समिति कार्य संचालन नियमावली, २०६५
   - 2.3 राष्ट्रिय विधि विज्ञान प्रयोगशाला विकास समिति कर्मचारी सेवाशर्त नियमावली, २०६५
   - 2.4 प्रमाण ऐन २०३१, मुलुकी अपराध (संहिता) ऐन, २०७४, मुलुकी फौजदारी कार्यविधि संहिता २०७४, मुलुकी देवानी (संहिता) ऐन, २०७४, मुलुकी देवानी कार्यविधि संहिता २०७४ मा रहेका विधि विज्ञानसंग सम्बन्धित कानूनी प्रावधान
   - 2.5 सार्वजनिक खरिद ऐन, २०६३ र सार्वजनिक खरिद नियमावली, २०६४
   - 2.6 सूचनाको हक सम्बन्धी ऐन, २०६४
   - 2.7 सुशासन (व्यवस्थापन तथा संचालन) ऐन, २०६४
   - 2.8 नेपालको संविधानको सामान्य जानकारी
   - 2.9 चालू आवधिक योजनाका उद्देश्य, लक्ष्य, रणनीति र विज्ञान प्रविधिको अवधारणा
   - 2.10 राष्ट्रिय विज्ञान प्रविधि तथा नव-प्रवर्तन नीति, २०७६

Section (B): 40 Marks
(4×5 Marks = 20 Marks, 2× 10 Marks = 20 Marks)

3 **General Forensic Science**

3.1 Forensic science and its scope in judicial system
3.2 Status of Forensic Science in Nepal
3.3 Physical evidence and its type
3.4 Interpretation of laboratory result and report writing
3.5 Admissibility of scientific evidence in court of law, testimony – summon and courtroom procedure, skills.
3.6 Law of probability - calculation and significance
3.7 General concept of criminal justice system of Nepal

4 Laboratory Quality Management

4.1 Quality & significance of analytical results in Forensic Science Laboratory
4.2 Laboratory accreditation including ISO/ICE 17025

5 Laboratory Hazards Management

5.1 Laboratory hazards (nature, precaution, disposal and management in lab)
5.2 Safety precaution in the laboratory
5.3 Care and maintenance of laboratory equipment
5.4 Safety of evidence

6 Research and Statistics

6.1 Meaning of research, Type of research, Hypothesis in scientific research, Scientific attitude and research design, Techniques of data collection and analysis, Proposal writing and presentation of research report
6.2 Sampling in experimental design, Characteristics of mean, median and mode, Measurement of central tendency, Probability, Variance, Standard deviation, Correlation, Frequency distribution, Chi-square test, Students T-test, Correlation and regression, Statistical errors, Accuracy & Precision

द्वितीय पत्र (Paper II) : सेवा सम्बन्धी
(Biology Group)
Section (A) : - 60 Marks
(4× 10 = 40 Marks, 1× 20 = 20 Marks)

1. **Forensic Biology**
   - 1.1 Forensic Anthropology/Odontology
     - 1.1.1 Bone in age estimation: scientific practices and legal needs
     - 1.1.2 Forensic anthropometry/osteometry, determination of personal identity, superimposition technique- video image analysis, facial reconstruction, recovery and identification of skeletal remains in accidents, crimes and mass disasters
     - 1.1.3 Dental pattern in Disaster Victim Identification (DVI)
   - 1.2 Forensic Entomology
     - 1.2.1 General Entomology
     - 1.2.2 Significance of terrestrial and aquatic insects in forensic investigations and their role in crime detection, insect's succession and its relationship to determine time since
     - 1.2.3 Impact of ecological factors on insect's developments
   - 1.3 Wildlife Forensic
     - 1.3.1 Significance of wildlife, Protected and endangered species
     - 1.3.2 Identification and examination of wildlife materials by conventional and modern methods
     - 1.3.3 National Park & wildlife conservation Act 2029, CITES Act 2073
     - 1.3.4 Wildlife forensics: Legal and scientific limitations

2. **Serology and Serogenetic Markers**
   - 2.1 Biological fluids evidence and serological markers - applications and limitations.
   - 2.2 Biochemistry and genetics of different blood groups, Direct and indirect methods of blood grouping from body fluid stains
   - 2.3 Human Leukocyte Antigens (HLA) systems
   - 2.4 Determination of secretor/non-secretor and its forensic significance
   - 2.5 Semen in sexual assault cases
   - 2.6 Role of serogenetic markers in individualization and establishment of biological relationship
   - 2.7 Biological fluids sampling and preservation
   - 2.8 Supreme Court views on blood grouping and semen examination

Section (B): - 40 Marks
(2× 10 = 20 Marks, 1× 20 = 20 Marks)

3. **Basic and Population Genetics**
   - 3.1 Mendelian genetics, Genotypes, Phenotypes, Mutation, Multiple alleles, Genetic variants, Biochemical genetics, Gene structure, its frequency determination, Gene mapping and Gene Expression, Gene pool, Genetic load

3.2 Hardy-Weinberg equilibrium, Deviation from H-W equilibrium, Consanguinity, inbreeding, Inbreeding coefficient

4. **DNA Profiling**

4.1 Biochemistry of Nucleic acids
4.2 History of DNA fingerprinting
4.3 Basic concepts of different kinds of DNA markers and its application
4.4 DNA in human and non-human crime cases and legal provision.
4.5 Standards of DNA profiling sample, sampling and examination precautions
4.6 Concepts of basic principles in various DNA isolation and quantitation methods
4.7 PCR- components and its optimization, Single and multiplex PCR, Primer design guidelines.
4.8 Approaches of evaluation and interpretation of results, Genotype determination, Artifacts and its assessment.
4.9 Need of statistical analysis, Allele frequency determination, Probability of paternity and match probability (LR)
4.10 New & Future DNA technologies
4.11 DNA profiling possible pitfall
4.12 DNA Database - generation and importance, CODIS
4.13 Legal perspectives- legal standards for admissibility of DNA profiling- procedural & ethical concerns, Supreme Court view on DNA profiling

द्वितीय पत्र (Paper II) : सेवा सम्बन्धी
(Chemistry Group)
Section (A) : - 60 Marks
(4× 10 = 40 Marks, 1× 20 = 20 Marks)

1. **Forensic Chemistry**
   - 1.1 **Forensic Chemistry:** Introduction, importance and present scenario of forensic chemistry in Nepal
   - 1.2 **Beverages:** Estimation of ethanol in alcoholic beverages, Medicinal preparations containing alcohol and drugs as constituents
   - 1.3 **Arson:** Chemistry of fire, Management of arson cases and analysis of arson exhibits by instrumental methods
   - 1.4 **Analysis of trace evidence:** Cosmetics, dyes, trap related evidence materials, paints, chemicals and plant material
   - 1.5 **Explosives:** Specific approach to scene of explosion, Post-blast residue collection, Reconstruction of sequence of events, Evaluation and assessment of scene of explosion, Systematic examination of explosives and explosion residues in the laboratory

2. **Forensic Toxicology**
   - 2.1 Medico-legal and post mortem examination report/finding studies, Specific analysis plan/approach to toxicological examination of poisoning samples
   - 2.2 Significance of quantitative estimation in forensic toxicology
   - 2.3 Interpretation of analytical data
   - 2.4 Extraction, isolation and clean-up procedures of poisons/drugs using solid phase extraction (SPE) and solid phase micro-extraction (SPME) techniques from biological samples (viscera and body fluids)
   - 2.5 Identification and estimation of insecticide poisons using chromatographic techniques (GC and GCMS)
   - 2.6 Identification and estimation of rodenticide poisons (Aluminum/Zinc Phosphide) from biological samples
   - 2.7 Identification and estimation of volatile poisons (Alcohols, solvents, etc.) from biological fluid (blood and urine)
   - 2.8 Identification of plant poisons in biological fluids
   - 2.9 Identification and estimation of carbon monoxide poison in blood
   - 2.10 Detection of poisons (OP, OC and Pyrethroids) on the basis of their metabolic studies
   - 2.11 Concept of clinical toxicological examination and its significance

Section (B) : - 40 Marks
(2× 10 = 20 Marks, 1× 20 = 20 Marks)

3. **Drugs of Abuse**
   - 3.1 Introduction, classification and its importance of examination in forensic, clinical and sports
   - 3.2 Identification of drugs of abuse by HPLC & GCMS
   - 3.3 Quantitation of narcotic drugs (heroin, codeine and morphine) and stimulant drugs (cocaine and amphetamines) by GC, GCMS & HPLC

3.4 General concept of mechanism and action of illicit drugs, their safety, uses, mode of administration, adverse drug reaction and drug interaction.

3.5 General concept of drug metabolism (opiates and benzodiazepines)

3.6 General concept of immunoassay techniques and its application to investigate drug abuse

3.7 Narcotic Drugs Control Act, 2033 (1976) of Nepal

3.8 Schedules (List of drugs) of United Nations Convention on Narcotic Drugs & Psychotropic Substances

द्वितीयपत्र (Paper II) : सेवा सम्बन्धी
(Physical Group)
Section (A) : - 60 Marks
(4× 10 = 40 Marks, 1× 20 = 20 Marks)

1. **General forensics**

1.1 **Ballistics**

1.1.1 Classification and characteristics of various firearms, Different types of cartridges, Types of primers and priming composition, Various types of bullets and its composition, Firearm tiles, Safety aspects of handling of firearms and ammunition

1.1.2 Principles and practices of identification of firearms, ammunition and their components, Different types of marks produced during the firing process, Determination of range of fire burning, scorching, blackening, Tattooing and metal fouling, Shots dispersion, GSR (Gun Shot Residue) distribution, Time of firing

1.2 **Glass**

1.2.1 Forensic examination of glass fractures under different conditions

1.2.2 Determination of direction of impact: cone fracture, rib marks, hackle marks, backward fragmentation, Physical matching, Elemental analysis, Interpretation of glass evidence

1.3 **Paint**

1.3.1 Types of paint and their composition, Pigment distribution

1.3.2 Interpretation of paint evidence by IR spectroscopy & X-ray diffraction

1.4 **Computer forensics:** Definition and nature of Cyber Crimes, Computer forensics: recovery of deleted files/folders from storage media, email hacking and documentation, E-documents, Digital signatures

1.5 **Spectroscopy**

1.5.1 Principle and application of Infrared and Raman spectroscopy, Fluorescence and phosphorescence spectrophotometry

1.5.2 Sources of radiation: their utility and limitations

1.5.3 Interaction of radiation with matter: reflection, absorption, transmission, fluorescence, phosphorescence and their forensic applications

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

1.7 **Other Advances**

1.7.1 Pattern Recognition & Biometrics - Face, Iris & Retinal imaging, Speech recognition, Palm print, Gait pattern, Signatures, Pattern comparison, Computer simulation

1.7.2 Image processing – Image capturing, Image restoration & enhancement, Image editing

1.7.3 Compression Technique - Proactive Forensic science

1.8 **Electrostatic Detection Apparatus (ESDA):** Principle and application

1.9 **Audio/Video Forensics**

1.9.1 Fundamental of Audio/Video forensics

1.9.2 Principle of enhancement of video footage

1.9.3 Separation of mixed audio

1.9.4 Comparison of audio clips

2. **Fingerprints and Impressions**

2.1 **Fingerprints:**

2.1.1 Definition and classification of fingerprints- Henry System, Single digit Classification, Extension of Henry System, Search of fingerprints

2.1.2 Development of fingerprints, Formation of ridges, Pattern types, Pattern areas

2.1.3 Taking of finger prints from living and dead persons, Preserving and lifting of fingerprints, Photography of fingerprints, Digital transmission, Comparison of fingerprints

2.1.4 Automatic fingerprint identification system

2.2 **Chance prints:**

2.2.1 Chance Fingerprints, Latent & Visible Fingerprints, Plastic Fingerprint Composition of Sweat

2.2.2 Different techniques of development of latent fingerprints

2.3 **Other Prints/marks:** Nature, forensic significance, lifting and analysis of footprints, tyre marks, lip prints, bite marks and ear prints

2.4 **Printed matters:**

2.4.1 Identification of type writings (standard/electric/electronic type writers)

2.4.2 Identification of computer printouts and printers

2.4.3 Examination of photo copies (Black & White and colour), scanned documents and FAX messages

2.4.4 Identification of mechanical impressions (rubber stamp/seal impressions)

2.4.5 Identification of printed matter, Forgery in credit cards and their examination

2.4.6 Examination of security documents including currency notes, passports and other travel documents

Section (B): - 40 Marks
(2× 10 = 20 Marks, 1× 20 = 20 Marks)

3. **Questioned Documents**

3.1 **Questioned Documents:**

3.1.1 Introduction and classification

3.1.2 Nature and problems of document examination

3.1.3 Various types of documents, Basic tools needed for forensic documents examination and their use, Cross stroke examination

3.1.4 Application of forensic stylistics & linguistics in person identification

3.2 **Forensic Documents:**

3.2.1 Handling, preservation and marking of documents (specimens admitted-written/typewritten)

3.2.2 Genuine and forged documents, Holographic documents

3.2.3 Determination of age of documents by examination of signatures, papers, inks etc.

3.3 **Handwriting:**

3.3.1 Common and individual characteristics associated with handwriting and its identification

3.3.2 General characteristics of handwriting

3.3.3 Important guidelines for the collection of known writings for comparison to a questioned documents

3.3.4 Disguised writing and anonymous

3.3.5 Examination of disguised /distorted writings/signatures

3.3.6 Identification of writing and signatures, detection of forgery and fixing the authorship of forged writings/signatures

3.4 **Papers and Inks:**

3.4.1 Detection and decipherment of alteration including addition, overwriting, obliteration and mechanical/chemical erasures

3.4.2 Detection and decipherment of secret writing/indentation, charred documents and torn documents, variation in pen inks