# राष्ट्रिय विधि विज्ञान प्रयोगशाला विकास समिति

## प्राविधिक सेवा अन्तरगत अधिकृत छैटौं तहको सहायक 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 | प्रश्न संख्या x अङ्कभार | समय |
|---|---|---|---|---|---|
| प्रथमपत्र (General science) | १०० | ४० | वस्तुगत (Multiple choice) विषयगत | २५ x २ = ५०<br>५ x १० = ५० | २ घण्टा |
| द्वितियपत्र (Forensic) | १०० | ४० | वस्तुगत (Multiple choice) विषयगत | २५ x २ = ५०<br>५ x १० = ५० | २ घण्टा |

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 द्वितीय पत्रको विषयगत प्रश्नहरुको स्वरुप निम्नानुसार हुन सक्नेछ :
३.१ लामो उत्तर दिने 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 बढी टिप्पणीहरु (short notes) सोध्न सकिनेछ ।

४. वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरुको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत २ (दुई) अंङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात ०.४ अंक कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत 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 परीक्षावाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

# NATIONAL FORENSIC SCIENCE LABORATORY
## Khumaltar, Lalitpur

### Syllabus of Physics-group
### Sixth Level

### Subject: General Forensic (1st paper)

## Part I: GENERAL 20%

Definition of forensic science, Physical evidence. Locard's principle. Individuality principle. Interpretation of laboratory result and report writing. Expert witness (including cross examination). Nepalese History of Forensic Science. Present status of Forensic Science in Nepal. General concept of criminal justice system of Nepal. Nepalese acts related to physical evidence and its examination.

## Part II: FORENSICS 40%

### BALLISTICS

Significance of forensic examination of firearms, bullets, cartridges and primers. Safety aspects of handling of firearms and ammunitation. Different types of marks produced during the firing process.

***Glass***: Significance of forensic examination of glass fractures. Determination of direction of impact: cone- fracture, rib marks, hackle marks, backward fragmentation and its physical matching. Density comparison, physical measurements and refractive index comparison.

***Paint***: General concept of paint and their composition, pigment distribution, macroscopic and microscopic studies.

***Tool marks***: Different type of tool marks, class characteristics and individual characteristics.

**Computer forensics**
Introduction and significance of Computer forensics.

## Part III: METHODS AND MANAGEMENT 40%

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

**Video Spectral Comparator (VSC):** Principle and application of VSC.

***Photography***: Basic principles and techniques of photography, cameras and lenses, exposing, developments and printing, digital photography, crime scene and laboratory photography.

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

**Other Advances**

Finger for palm print, gait pattern, signatures, Pattern comparison, Computer simulation, Image processing - Image capturing, Image restoration & enhancement, Image editing.

**Model Question (Objective)**

Test fire is useful to individualize the

a) Individualize the firearm used
b) Identify the distance of firearm used.
c) Find the type of bullet used
d) Above all

# NATIONAL FORENSIC SCIENCE LABORATORY
## Khumaltar, Lalitpur

### Syllabus of Physics-group
### Sixth Level
### Subject: Questioned Documents (2nd paper)

## Part I: FINGERPRINTS AND IMPRESSIONS

**50%**

**Fingerprints:** Definition and significance of fingerprints. Development of fingerprints, formation of ridges, pattern types, pattern areas. Taking of reference fingerprints, preserving and lifting of fingerprints, comparison of fingerprints.

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

**Other Prints/marks:** Forensic significance and lifting of Footprints and 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), Identification of mechanical impressions (rubber stamp/seal impressions), Identification of printed matter, Examination of security documents including currency notes, passports and other travel documents.

## Part II: QUESTIONED DOCUMENTS

**50%**

**Questioned Documents:** Introduction and classification of questioned documents. 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.

**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)**

In handwriting major role is played by
a) Pen pressure
b) Slant
c) Individual characteristics
d) slope

# NATIONAL FORENSIC SCIENCE LABORATORY
**Khumaltar, Lalitpur**

**Syllabus of Chem-group**
**Sixth Level**

**Subject: General Chemistry (1st paper)**

## Part I: GENERAL CHEMISTRY 50%

**Physical Chemistry**
General Concept of ionic equillibrium: 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 stength.

**Inorganic Chemistry**
General concept of metals and non-metals, Nobel gas compounds, non-aqueous solvents, protic and non-protic solvents, $^{14}C$ dating and radio-chemical analysis.

**Organic Chemistry**
Study and application of oxidation and reduction reaction, halogenations, acetylation and alkylation. Basic concept of photo-chemical energy.

**Bio-Chemistry and Applied-Chemistry**
Geneeral idea of natural products and drug analysis: isolation, purification and identification of natural molecules (alkaloids, terpinoids and flavonoids) and drugs (sedatives and antibiotics). General concept of pesticide and pesticide residue analysis in water, soil and food stuffs

## Part II: LABORATORY METHODS 50%

**Chromatographic Techniques**
Basic principles and application of chromatography (TLC, HPTLC, GC and HPLC)

**Spectrophotometry techniques**
General Principles and applications of Spectrophotometry techniques (UV, IR, NMR) and Atomic Absorption Spectroscopy.

**Titrimetric analysis**
Fundamentals of acid-base, oxidation-reduction, non-aqueous, complexometric and potentiometric titration.

**Statistical methods**
General concept of stastistical methods in chemical analysis: Accuracy, precision, minimization of error, significant figures, mean and standard deviation, reliability of results.

**Bio-chemical Hazards Management**
Basic concept of bio-chemical hazards (nature and precaution)

# NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar, Lalitpur

## Syllabus of Chem-group
## Sixth Level

## Subject: Forensic (2nd paper)

### Part I: GENERAL — 20%

Definition of forensic science, Physical evidence. Locard's principle. Individuality principle. Interpretation of laboratory result and report writing. Expert witness (including cross examination). Nepalese History of Forensic Science. Present status of Forensic Science in Nepal. General concept of criminal justice system of Nepal. Nepalese acts related to physical evidence and its examination.

### Part II: FORENSIC CHEMISTRY — 40%

**Forensic Chemistry**: Basic concept of Forensic Chemistry and its significance.
**Analysis of beverages**: Alcoholic and nonalcoholic, country made liquor and illicit liquor.
**Examination of petroleum products**: Distillation and fractionation, various fractions and their commercial uses.
**Explosives**: Classification, composition and characteristics of explosives and detection of explosive residue in forensic samples.
**Soil Analysis**
Forensic examination of soil (colour test, density gradient and chemical analysis).

### Part III: TOXICOLOGY — 40%

**Drugs of Abuse**: Introduction, classification and its importance of examination in forensic.

**Forensic Pharmacology:** General concept of mechanism and action of drugs, their safety, uses, mode of administration, adverse drug reaction and drug interaction.

**Forensic Toxicology**- General concept of forensic toxicology. Collection and preservation of toxicological exhibits in fatal and survival cases.

**Poisons**: classification of poisons, types of poisoning, signs and symptoms of poisoning, mode of action and its effect on vital functions,

**Extraction techniques:**, Isolation and clean-up procedures of poisons/drugs using solvent extraction technique from biological samples (viscera, body fluids)

**Identification techniques:** Presumptive tests of drugs of abuse. Identification of insecticides and drugs of abuse using chromatographic techniques (TLC & GC). Identification of rodenticides from biological samples. Identification of volatile poisons ( Alcohols, solvents etc) from biological fluids (blood and urine). Identification of carbon monoxide in blood.

**Model Question (objective):**
Dichlorvos is an insecticide of the type:
a) organochlorine b) organophorous c) carbamate d) pyrethroids
**Model Question (subjective):**
How do you identify the rodenticide poison from the viscera?