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

**पाठ्यक्रमको रुपरेखा:-** 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 xअङ्कभार | समय |
|------|------|-----------|-------------|------------------|------------------------|------|
| प्रथम | Physics & Forensic Science | १०० | ४० | विषयगत | ३x१० = ३०<br>१४x५ = ७० | ३ घण्टा |
| द्वितीय | नेपाल प्रहरी सेवा सम्वन्धी | ५० | २० | बस्तुगत बहुउत्तर<br>विषयगत | १०×१ = १०<br>लामो उत्तर<br>१×१० = १०<br>छोटो उत्तर<br>६×५ = ३० | १ घण्टा १० मिनेट |

**द्वितीय चरण**

| परीक्षाको किसीम | पूर्णाङ्क | परीक्षा प्रणाली |
|-----------------|-----------|------------------|
| ब्यक्तिगत अन्तवार्ता | २५ | मौखिक |

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

२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

३. प्रथम पत्रमा पाठ्यक्रमका एकाईहरुबाट सोधिने प्रश्नहरुको संख्या निम्नानुसार हुनेछ भने द्वितिय पत्रमा सोधिने प्रश्न संख्या र अंकभार द्वितिय पत्रको पाठ्यक्रममा उल्लेख गरिएको छ ।

| विषय | Physics | | | | Forensic Science | | | |
|---|---|---|---|---|---|---|---|---|
| पाठ्यक्रमको एकाई | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| लामो प्रश्न | २ वटा | | | | १ वटा | | | |
| छोटो प्रश्न | ९ वटा | | | | ५ वटा | | | |

४. वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरुको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत पुर्णाङ्क प्रदान गरिनेछ भने 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 उम्मेदवारहरुलाई 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 :-

| Subject | Unit | No. of Questions and Weightage | | | Full Marks |
| --- | --- | --- | --- | --- | --- |
| | | Long Answer Type Question (3) | Short Answer Type Questions (14) | Marks | |
| **PHYSICS** | 1. Mechanics | 2 x 10 marks = 20 marks | 9 x 5 marks = 45 marks | 65 | 100 |
| | 2. Optics | | | | |
| | 3.Atomic and Nuclear Physics | | | | |
| | 4.Electricity and Magnetism | | | | |
| **FORENSIC SCIENCE** | 5.Introduction to Forensic Science | 1 x 10 marks = 10 marks | 5 x 5 marks = 25 marks | 35 | |
| | 6.Crime Scene Investigation | | | | |
| | 7.Introduction to Questioned Document Examination | | | | |
| | 8. Introduction to Physical Examination | | | | |

# Group-A
# PHYSICS (65%)

## Unit 1:Mechanics

**Probability and Statistical Analysis of Data:**Concept of Probability, Distribution function (Minomial, Normal and Possion) Systematic and random errors, Standard errors, least square fit, Chi-square, F and T test, interpolation, numerical value.

**Fluid Mechanics :**Kinematics of moving fluid, equation of continuity, Euler's equation, Bernoulli's theorem. Viscous fluids, stream line and turbulent flow, poiseulle's law and its application, Reynold's number

**Releativity:**Gallilean invariance, inertial frames of reference, Gallibean transformation , non- inertial frames and fictious forces Michelson- Morley experiment, Lorentz transformation. Length contraction, time dilation, transformation and addition of velocities, variation of mass with velocity, mass energy relation, relation between momentum and energy, transformation of energy and momentum.

## Unit 2: Optics:

**Diffraction:**Huygen's principle, Fresnel and Fraunhoffer diffraction. Fresnel's diffraction: Zone plate, Circular aperture, Straight edge, Straight wire, disc. Fraunhoffeer's diffraction: Diffraction through a single and double slit, Circular aperture and disc. Dispersive power of grating, microscope and telescope.

**Polarization:** Unpolarized, plane, circular and elliptically polarized light, Double refraction, Crystal polarizer, Malus law, Brewster's polarization by reflection and scattering, double refraction and Huygen's explanation, Production and analysis of polarized light, activity Laurent's half shade polarimeter and its application.

**Dispersion and Scattering:** Normal and anomalous dispersion, scattering of light.

**Lasers:** Spontaneous and induced emission, condition for laser action, population inversion, optical punping, Ruby and He-Ne lasers and application.

## Unit 3: Atomic and Nuclear Physics:

**Bohr's Atomic Theory:** Bohr's hydrogen atom, energy level diagram and spectra of hydrogen atom, Frank-Hertz experiment and limitation of Bohr's model.

**Fine Structure Spectrum:** Fine structure of Hydrogen lines, doublet structure of alkali spectrum, single and triple series of alkaline earth atoms

**Characteristic X-ray Spectrum:** Characteristic X-ray, X-ray Spectrometer, Fine structure of X-ray transitions, Mosley law and its application

**Radioactivity:** Basic of the theory of radioactive disintegration, half-time, mean life, successive radioactive transformations, equilibrium, natural radioactive series, units of radioactivity, Qualitative discussion of alpha, beta and gamma ray spectra, absorption of alpha- particles, range, straggling and stopping power, theory of alpha-decay, Neutrino hypothesis of beta-decay, qualitative discussion of the theory of beta-decay

## Unit 4: Electricity and Magnetism

**Electrostatic Potential and Field:**Coulomb's law, the electric field, electric flux, Gauss's law and its application, Equipotential surface, potential due to charge distribution, Poissons and Laplace's equations, Work done for a moving charge, Electrostatic energy, Electrical images, Potential and field due to an electric dipole and force on a charged sphere.

**Electromagnetic Induction:**Faraday's law, self and mutual induction, search coil, Grassot's fluxmeter, earth inductor, energy stored in magnetic field transformer, its use and applications

**Maxwell's E.M Equation:**The displacement current, Maxwell's equations and their use n propagation of electromagnetic wave, derivation of Gauss's theorems, Faraday's-Lenz basis law Biot and Savart's law, Ampere's circuital laws, energy of a charged particle in an electromagnetic field general idea about reflection and transmission of electromagnetic waves at the interface between two media.

**Group-B**
**FORENSIC SCIENCE (35%)**

## Unit 5: 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 6: 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 7: Introduction to Questioned Document Examination
- Importance of document.
- Principle of hand writings/individual characteristics
- Identification of Handwriting
- Standard for comparison
- Procedure for obtaining specimen
- Sources of collected standards
- Care and cautions of documents
- Identification of type writer
- Type of printing
- Printed maters
- Ink and paper analysis
- Charred Document
- Forgery and its types
- Rubber stamp impression, seal
- Travel documents
- Passport examination.
- Currency notes examination/Counterfeit currency

## Unit 8: Introduction to Physical Examination
- Forensic Ballistics: Classification of firearms and ammunitions, bore and caliber, Characteristics of tool, Principle of identification of firearms by means of fired cartridge cases and bullets, Difference among homicide, suicide, accident, Physical evidences related to firearms and ammunitions, Method of examinations
- Introduction to Footprints, tool marks, tyremarks, erased chassis and engine numbers, restoration of chassis and engine number
- Glass, soil and paint as physical evidence

# Sample Question

**Long Questions**

1. What are the assumptions of Bhor's model of H- atom?  What are the demerits of Bohr's model? Sketch the energy level diagram of H-atom.                     (3+3+4=10 marks)
2. Define Inertial frame of reference? Discuss the Michelson-Morley Experiment   (4+6=10 marks)
3. Describe the basic steps involved in crime scene investigation.                     (10 marks)

**Short Questions**

1. Differentiate between stream line and turbulent flow?                     (5 marks)
2. Describe the function of He-Ne Lasers?                     (5 marks)
3. Derive the equation of work done for a moving charge inside the electric field?     (5 marks)
4. Write a short note on Locardo's principle.                     (5 marks)

**-समाप्त-**