

नेपाल सरकार
गृह मन्त्रालय
नेपाल प्रहरी प्रधान कार्यालय
(मानवश्रोत विकास विभाग, भर्ना छनौट शाखा)
नक्साल, काठमाण्डौ ।

प्राविधिक प्रहरी निरीक्षक (संचार) पदको खुला प्रतियोगितात्मक
परीक्षाको पाठ्यक्रम

सेवा: नेपाल प्रहरी

उपसमूह: इन्जिनियरिङ, संचार

समूह: प्राविधिक प्रहरी

श्रेणी: राजपत्राङ्कित तृतीय

परीक्षा योजना (Examination Scheme)

क्र.सं.	परीक्षा चरण	विवरण	पूर्णाङ्क
१.	प्रथम चरण	प्रारम्भिक तथा विस्तृत स्वास्थ्य परीक्षण	-
२.	द्वितीय चरण	लिखित परीक्षा	२००
३.	तृतीय चरण	विशेष स्वास्थ्य परीक्षण	-
४.	चतुर्थ चरण	प्रयोगात्मक परीक्षा	५०
५.	पाँचौ चरण	अन्तरवार्ता	३०

प्रथम चरण:- प्रारम्भिक तथा विस्तृत स्वास्थ्य परीक्षण

- प्रहरी सेवाको पदमा नियुक्ति र बढुवा गर्दा अपनाउनु पर्ने सामान्य सिद्धान्त, २०६९ को अनुसूची-६ र ८ बमोजिम हुने ।

द्वितीय चरण:- लिखित परीक्षा योजना (Written Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या अङ्कभार	समय
प्रथम	Professional and Service Specific Test (PSST)	१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (Multiple Choice)	१०० प्रश्न×१ अंक = १००	१ घण्टा १५ मिनेट
द्वितीय		१००	४०	विषयगत (Subjective)	<u>छोटो उत्तर</u> ४ प्रश्न×५ अंक = २० <u>लामो उत्तर</u> ८ प्रश्न ×१० अंक = ८०	३ घण्टा

तृतीय चरण:- विशेष स्वास्थ्य परीक्षण

- प्रहरी सेवाको पदमा नियुक्ति र बढुवा गर्दा अपनाउनु पर्ने सामान्य सिद्धान्त, २०६९ को अनुसूची-९ बमोजिम हुने ।

चतुर्थ चरण:- प्रयोगात्मक परीक्षा योजना (Practical Examination Scheme)

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	समय
प्रयोगात्मक परीक्षा	५०	२५	प्रयोगात्मक	६० मिनेट

पाँचौ चरण:- अन्तरवार्ता (Interview)

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तरवार्ता	३०	मौखिक

- यो पाठ्यक्रमको योजना अनुसार दुई पत्रको लिखित परीक्षा हुनेछ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- पाठ्यक्रमको प्रथम र द्वितीय पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षाको प्रथम तथा द्वितीय पत्रको पाठ्यक्रमका इकाइहरूको प्रश्नहरूको संख्या निम्नानुसार हुनेछ ।

प्रथम पत्रका इकाइ	१	२	३	४	५	६	७	८	९	१०	११	१२	१३	१४	१५	१६	
प्रथम पत्रका प्रश्न संख्या	१०	१०	५	५	५	१०	५	५	१०	५	५	५	५	-	५	१०	
द्वितीय पत्रका खण्ड	खण्ड-क (A)								खण्ड-ख (B)							खण्ड-ग (C)	
द्वितीय पत्रका इकाइ	१	२	३	४	५	६	७	८	९	१०	११	१२	१३	१४	१५	१६	
द्वितीय पत्रका प्रश्न संख्या	छोटो	-	१							१							२
	लामो	२	-	१							१	१	१	२			-

- यस पाठ्यक्रममा जे सुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन नियमहरू तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्छ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत १ (एक) अंक दिईने छ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २०% अंक कट्टा गरिने छ । तर उत्तर नदिएमा त्यस बापत अंक दिईने छैन र अंक कट्टा पनि गरिने छैन ।
- द्वितीय पत्रको विषयगत प्रश्नका लागि तोकिएका १० अङ्कका प्रश्नहरूको हकमा १० अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिनेछ ।
- द्वितीय पत्रको पाठ्यक्रमलाई ३ वटा खण्डमा विभाजन गरिएको छ । ३ वटा खण्डको लागि ३ वटै उत्तरपुस्तिका दिईनेछ र परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस भन्दा अगाडि लागू भएको माथि उल्लेखित समूहको पाठ्यक्रम खारेज गरिएको छ ।

पाठ्यक्रम लागू मिति:- २०७९/१०/१९ गते ।

लिखित परीक्षा (Written Examination)

प्रथम र द्वितीय पत्र :- Professional and Service Specific Test (PSST)

खण्ड “क” (Section-A)

1. **Electronic Device and Circuit**

Use, Operation and characteristics of Diodes (Tunnel, varactor, zener, diac, Triac, bridge, Impatt, Gunn, photo, triode, pentode) and applications, Bipolar transistors switching characteristics, unijunction transistor, MOS transistors switching characteristics, SCR (simple, phase control, temperature control, light control), UJT, TTL logic circuits, NMOS/CMOS logic circuits, memory: RAM, DRAM, PROM, EPROM, operational amplifiers, Butterworth and Chebysev filters, A/D converters, adders, arithmetic operations, digital comparators, parity check generator, multiplexer and demultiplexer, flip-flops, shift register, counters, sequence generators, oscillators(wien bridge oscillators, tuned, LC oscillators, crystal, clap modification), resonant circuits, thyristor, controlled rectifier circuits, 7 segment display, amplifier (Untuned, push-pull, feedback amplifiers, Klystron, Magnetrons) bode plot analysis, Emitter, clipper, collector, clamper, choppers circuits. Measurement of resistance, capacitance, inductance, current, voltage in different R-C-L circuit, different types of amplifiers and rectifiers usage and characteristics, Logical gates and switching algebra, Memory (statics, volatile).

2. **Communication Engineering**

Frequency spectrum (discrete and continuous) and bands, Coulomb's law and electric field intensity, electric flux density and Gauss's law, Spectral density, Noises (atmospheric, thermal, partition, white noise, Gaussian noise, Noise ratio(s)), Maxwell's first equation and application, divergence theorem, energy and potential, Fourier series, Laplace equation and Poisson equation, Biot-Svart's law, Ampere's circuital law, curl, wave motion in free space, perfect dielectric and losses, wave medium, skin effect, impedance matching, antenna fundamental (Horn, slot, parabolic, yagi, Cassegrain, lens), polarization, radiation from dipole antenna, wave guides(broad-band guides, Cylindrical, ridged).

3. **Instrumentation & Control System**

Dynamometer, Multimeter, Oscilloscopes, Signal generator, Impedance Bridges (Maxwell, Hay, Schering, Anderson, Desauty), Transducers (Strain Gauges, Thermistor, Piezoelectric tachometer, thermocouple) and its applications, Open loop and closed loop control system, system stability and sensitivity, system transfer functions and responses, poles and zeros location and their significance, root locus method, frequency response method, Bolometer technique for measurement of power.

4. **Signal analysis and processing**

Discrete probability theory, Information theory, Shannon- Hartley law, transmission of signal, impulse response and convolution, Fourier series, Fourier transform, unit step, delta, sinc and signum function, Hilbert transform, LTI system, system described by differential and difference equations, FIR and IIR filters, discrete Fourier transforms, IDFT, FFT, circular convolutions, Parseval's theorem, energy, power and autocorrelation, Z transform.

5. **Basic Analog and Digital Communications**

Difference between analog and digital communications, basic communication elements, signal and noise in communication system, AM, DSC-SC, PM, FM, Super-heterodyne AM and FM receiver, SSB, D/A and A/D Converters, sampling theorem, sample and hold circuit, A law, μ -law, quantizer, coding (NRZ/HDB3/AMI), error detection and correction, Parity check, PCM/ADPCM, digital

modulation (ASK/PSK/QPSK/MSK/QAM/CDMA/ FDMA/DSSS), pulse modulation, modulation and demodulation circuits, Frequency hopping, frequency converter and mixers, phase locked loop.

6. Telecommunications and advanced communications

Difference between Telecommunications and Radio Communications, return loss transformer and hybrid circuit, signal and noise measurements, echo and ringing, space/time/frequency/wave length division multiplexing, Erlang B formulae, queuing theorem, OSI layers, telephony, functions of switching, electro mechanical switches, stored programmed controlled switch (TS/ST/TST/STS switching, no. 5 and no. 7 control signaling), general concept of ISDN, BISDN, ATM, PDH/SDH, DSL, HDSL, ADSL, numbering, routing and channeling plans; UMTS, IMT-2000, NGN (Next Generation Network), real time protocol, VoIP, IP/PSTN platform, Overview to IN (Intelligent Network), Basics of GIS (Geographical Information System).

7. Optical System

Laser, Photocell, photo device (LED, CRT, photovoltaic, photo-multipliers, APD's PCN), Principle of optical communication, Total internal reflection, Snell's law, Chemical vapour Deposition, optical fibers types, capacity and properties, optical transmission, optical transmitters and receivers, interconnected and switched, Joining techniques, splices, connectors and coupling, fiber optics networks, optical switching, underground cabling (Route and ambient consideration, tension prediction).

8. Wireless Communications

Radio frequency band, Propagation theory (groundwave, spacewave, tropospheric, ionospheric), Euler-Larmour theory, LOS (line of sight) and non- LOS model, Okumura and Hata model, Mobile Technologies (DECT, GSM, CDMA2000-1x and etc.), Fundamental of satellite communication (tracking, Satellite orbits and Radio spectrum, satellite wave propagation and satellite antennas), digital satellite communication system, earth stations, Kepler's laws of orbital motion, signal to noise ratio, interference between different wireless systems. Antennas (Directional, Non-directional, reflective), impedance and effective length of antenna as transmitter & receiver, Radiation pattern, broad-side pattern, End-fire pattern, Pattern synthesis.

खण्ड “ख” (Section-B)

9. Computer Network, Information and Communications Technology (ICT)

Difference between analogue and digital computer, Binary system and Boolean algebra, Gates, Computer structure (I/O devices, Storage devices, Memories) and typical processor architecture, CPU and memory organization, buses, Characteristics of I/O and storage devices, Processing unit and controller design, hardware and micro program control, instruction sets and addressing modes, memory systems (main, auxiliary, virtual, cache), assembly language programming, I/O and interrupt servicing. Protocols: (such as ISO/OSI reference model, X.25, IP), LAN/WAN topologies, access schemes, medium access and logic layers; CSMA/CD and token ring protocols; segmented and hubbed LANs, Operating system principles, components, and usage (Multitasking and/or multiprocessing, Real-time aspects), CCTV Networks, Computer architecture, microprocessor fundamental, microcomputer systems, parallel and serial interfaces, RS-232 standards, flow charts , algorithms, variables, constants, data types, arithmetic expressions, arrays, concept of Operating System, Basic concept on internet, e-mail and web-page (such as DNS, IP, URL, http, ftp, IRQ, Routers). Server (Web, email, printer), General concept of Cyber security (digital signature, SPAM, VIRUS, WORM, hiking, cracking), Unicode, Computer, Microprocessor, Signal processing, Database Management, Computer Architects and Computer Graphics, Internet, email and Web-

pages, e-strategies (e-government, e-business, e-learning, e-health, e-employment, e-environment, e-agriculture, e-science), Tele-culture (Tele-education, Tele-medicine, tele-centre, Tele-phony, and etc.)

10. Communication

Radio propagation in different waves (long wave to SHF), propagation characteristics, frequency availability, limitation element at VHF, UHF, discrete and continuous spectrums, stray capacitance, internal load inductance, dummy load, Traveling and standing waves, match and mismatch lines, distribution component of line, Variable impedance along a mismatched line, Tune circuit and filters, Phase velocity, phase shift, group velocity, wave guides, antenna fundamentals (types, characteristics, pattern, matching), Modulation & demodulation types and techniques for analogue and digital system, different types of Noise and calculation, frequency generation, counters. Random signal theory (Ergodic processes, correction function, white noise)

11. Frequency Management & Monitoring

Radio Frequency band and allocation, Frequency Channel plan (as per separation and system), spurious emissions, system (Simplex, duplex, dual) Type of radio services, Terrestrial line-of-sight communication links (propagation, effects of atmosphere, interference, fading) Broadcasting band, Frequency monitoring systems (techniques and procedures, scanning, location & direction finding), Satellite communication (orbital locations, choice of frequency, modulation techniques) and earth station (antenna, terminal equipment, ground networking, earthling) National Frequency Allocation Plan.

12. Navigation, surveillance, Avionics

Radar range equation, Radar direction indication, Radar Display, different between PAR, SSR, Doppler effect, MTI Radar, HF-SSB communication, General concept of Navigation system (MLS, ILS, Radio Beacons and determinations, VOR, DME, GPS) and Airborne equipment (FIS, altimeter,), ICAO Annex 11.

13. Power supplies

Single phase and Polyphase AC power supply systems, Electrical motors, AC/DC generators, Rectifiers and filters, Regulator power supply system, Uninterruptible Power Supply Systems.

14. Management Concepts

Role of Science and technology in development, Parameters of development, Measurement of Development, Targeting Vision, mission, goal and objectives; strategies and work description of organization and its' structures, authority and power delegation, leadership, motivation, group's dynamics, time management, conflict management, use of MIS, decision support system, customer care, out sourcing, use of inventory and training, service portfolio.

15. Rules, Regulations & Policy

ITU overview, ICAO Overview, ICT policy, Telecommunication Policy, Telecommunication Act & Regulations, Radio Act & Regulations, National Broadcasting Act & Regulation, Cyber-law, National Frequency Allocation Plan.

खण्ड “ग” (Section-C)

16. सामान्य ज्ञान तथा नेपाल प्रहरी सेवा सम्बन्धी

- क. नेपालको भूगोल सम्बन्धी सामान्य जानकारी (भौगोलिक अवस्था, स्वरूप, किसिम र विशेषताहरू, हावापानी किसिम र विशेषता, जल सम्पदा: स्थिति र महत्व, वन सम्पदा: अवस्था र महत्व, संरक्षण क्षेत्रहरू तथा वन विनाशका कारण र संरक्षणका उपायहरू, नेपालका प्रमुख हिमशिखरहरू, तालतलैया, झरना, भञ्ज्याङ ।
- ख. इतिहास र संस्कृति सम्बन्धी सामान्य जानकारी (आधुनिक नेपालको इतिहास (पृथ्वीनारायण शाह देखी हालसम्म), नेपालको सांस्कृतिक, धार्मिक एवं मौलिक परम्परा, जातजाति, भाषाभाषी, कला र साहित्य सम्बन्धी सामान्य जानकारी ।
- ग. नेपालको वर्तमान संविधान २०७२ (भाग १, ३, ४, ५, २८ र अनुसूचीहरू)
- घ. जनसंख्या र वातावरण सम्बन्धी सामान्य जानकारी (जनसंख्या, शहरीकरण, बसोवास (बँसाईसराई), जैविक विविधता, जलवायु परिवर्तन, वातावरण तथा प्रदूषण)
- ङ. समसामयिक घटना तथा नविनतम् विषयवस्तुहरू: (राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वका राजनैतिक, सामाजिक, आर्थिक, वैज्ञानिक, सांस्कृतिक, खेलकूद, पुरस्कार, कला साहित्य, संगीत सम्बन्धी)
- च. नेपाल प्रहरीको पृष्ठभूमि (वि.स. २००७ साल देखि हालसम्म) र वर्तमान अवस्था
- छ. प्रहरी ऐन, २०१२ र प्रहरी नियमावली, २०७१ (संशोधन सहित) का मुख्य-मुख्य व्यवस्थाहरू (संगठनात्मक स्वरूप, सेवाको प्रकार, दर्ज्यानी चिन्ह, पद तथा श्रेणी सेवा, शर्त र सुविधा, प्रहरी आचरण, नियुक्ति र अवकाश, प्रहरी कर्मचारीको काम-कर्तव्य अधिकार, नेपाल प्रहरीमा प्राविधिक प्रहरी कर्मचारीको महत्व र आवश्यकता, नेपाल प्रहरी कार्यालयको स्थापना र कार्यालय प्रमुख सम्बन्धी व्यवस्था)
- ज. विविध:- सुरक्षा समिति (केन्द्र, प्रदेश र जिल्ला), नेपाल प्रहरी र अन्य सुरक्षा निकायहरू (नेपाली सेना, सशस्त्र प्रहरी बलनेपाल र राष्ट्रिय अनुसन्धान विभाग) संगको सम्बन्ध, अपराध परिचय, महत्व र प्रविधिको प्रयोग, विपद व्यवस्थापनमा नेपाल प्रहरी, सार्क, संयुक्त राष्ट्रसंघ, इन्टरपोल सम्बन्धी जानकारी ।

प्रयोगात्मक परीक्षा (Practical Examination)

S.N.	Topic	Marks	Time
1.	Component Testing using Measuring Equipments (Analogue and digital)	10	1 hour
2.	Radio receiver/transmitter and Antenna	10	
3.	Power supply	10	
4.	Computer and Network	10	
5.	CCTV and Optical fiber	10	
Total		50 marks	1 hour

१. प्रयोगात्मक परीक्षामा सहभागी हुने उम्मेदवारलाई मात्र अन्तर्वार्ता परीक्षामा सहभागी गराइनेछ । प्रयोगात्मक परीक्षामा उत्तीर्णाङ्क प्राप्त गर्ने उम्मेदवारहरूको मात्र तीनै चरणको परीक्षाको प्राप्ताङ्क जोडि कुल प्राप्ताङ्कको आधारमा योग्यताक्रम अनुसार परीक्षाफल प्रकाशित गरिनेछ ।
२. प्रयोगात्मक परीक्षाको प्रश्नको हकमा तोकिएका १० अङ्कभार भएको एकाइमा दुई वा दुई भन्दा बढी प्रश्नहरू सोध्न सकिने छ ।

लिखित परीक्षाको नमूना प्रश्नपत्र

वस्तुगत बहुवैकल्पिक प्रश्न (Multiple Choice Question)

1. In the breakdown region, a zener diode behaves like a source.
 - a) Constant voltage
 - b) Constant current
 - c) Constant resistance
 - d) None of the above
2. In which region of operation does a transistor act as a switch?
 - a) Linear region
 - b) Saturation region
 - c) Cut-off region
 - d) Both B and C
3. Which of the following is a vector quantity?
 - a) Electric potential
 - b) Electric field intensity
 - c) Electric charge
 - d) All of the above
4. In lens antenna, what kind of wave energy is transmitted into plane waves?
 - a) Convergent
 - b) Divergent
 - c) Contingent
 - d) Congruent
5. In open loop control system, the control action
 - a) depends on the size of the system
 - b) depends on system variables
 - c) depends on the input signal
 - d) is independent of the output

छोटो प्रश्न (Short Question)

1. Write down the working principle of optical fiber communication?
2. Write short notes.
 - a) ICAO

लामो प्रश्न (Long Question)

1. What is Photo diode? Compare LED, Tunnel diode and Varactor diode?
2. Explain the basic principle of super heterodyne principle. Explain the function of each block of super heterodyne receiver.

-समाप्त-