

सशस्त्र प्रहरी बल नेपाल
प्राविधिक सशस्त्र प्रहरी निरीक्षक (ईन्जिनियर - ईलेक्ट्रोनिक एण्ड टेलिकम्यूनिकेशन (Electronic and Telecommunication) पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

पाठ्यक्रमको रूपरेखा :- यस पाठ्यक्रमको आधारमा निम्नानुसार चरणमा परीक्षा लिइने छ :

प्रथम चरण :- लिखित परीक्षा

पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता

पूर्णाङ्क :- ३०

१. प्रथम चरण : - लिखित परीक्षा						पूर्णाङ्क :- २००	
पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	Technical Subject and General Awareness	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न (MCQs)	१०० प्रश्न x १ अङ्क	१ घण्टा १५ मिनेट
द्वितीय		१००	४०	विषयगत	छोटो उत्तर लामो उत्तर समस्या समाधान	६ प्रश्न x ५ अङ्क ४ प्रश्न x १० अङ्क २ प्रश्न x १५ अङ्क	३ घण्टा
२. द्वितीय चरण : - अन्तर्वार्ता							
विषय		पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		समय	
अन्तर्वार्ता		३०	-	मौखिक			

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरू सोधिनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको 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 ।
- विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति :- २०६५/०४/२९/११/१

२०६५/०४/२९/११/१

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प्रथम तथा द्वितीय पत्र :- Technical Subject and General Awareness

Part I : Technical Subject

Section - (A)

1. COMPUTER

1.1 Computer Programming

1.1.1 Introduction to C programming

Character set, Keywords, and Data Types, Constants and Variables, Operators and Statements

1.1.2 Input and Output

Formatted input/output, Character input/output, Programs using input/output statements

1.1.3 Control Statements

1.1.4 User-Defined Functions

Function definition and return statement, Function prototypes, call by value and call by reference, Recursive functions

1.1.5 Array and Strings

One-dimensional Arrays, Multidimensional Arrays, String and string manipulation, Passing Array and String to function

1.1.6 Structures

Processing a Structure, Structures and Function

1.1.7 Pointers

Pointer declaration, Pointer arithmetic, Pointer and Array, Passing Pointers to a Function, Pointers and Structure

1.1.8 Data Files

Defining opening and closing a file, Input/output operations on files

1.2 Microprocessors

1.2.1 Introduction

Basic block diagram of computer, bus organization, stored program concept, introduction to Register Transfer Language

1.2.2 Programming with 8085 and 8086 microprocessor

Instruction Format and Data Format, Addressing modes, Instruction sets, various programs in 8085 and 8086

1.2.3 Microprocessor System

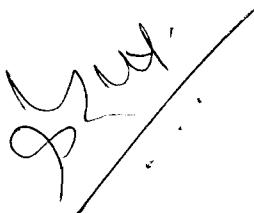
Bus structure, memory device classification and hierarchy, interfacing I/O and Memory, address decoding

1.2.4 Parallel interface

Modes: simple, wait, single handshaking and Double handshaking, introduction to PPI

1.2.5 Serial Interface

Synchronous and Asynchronous transmission, serial interface standard: RS232, RS423, RS422, USB, introduction to DMA





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1.2.6 **Interrupt Operations**

Interrupt Processing Sequence, Interrupt service routine, interrupt processing in 8085

1.2.7 **Advanced Topics**

Resource allocation and deadlock, RISC and CISC architecture

1.3 **Computers and Network**

Different 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, Multiplexing, (time, frequency and code division multiplexing), Digital networks: ISDN, frame relay and ATM. 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)

Section - (B)

2. ELECTRICAL

2.1 Electrical Machines

2.1.1 Magnetic circuits and Induction

Magnetic circuits, Ohm's law for magnetic circuits, series and parallel magnetic circuits, B-H relationship, Hysteresis loss and Eddy current loss, Faraday's law of electromagnetic induction, force on current carrying conductor

2.1.2 Transformer

Construction detail, working principle ideal transformer no load and load operation, losses in transformer, efficiency and condition for maximum efficiency

2.1.3 DC Generator

Construction details and armature winding, working principle, method of excitation, types of DC generator, characteristics, losses in DC generator, efficiency and voltage regulation

2.1.4 DC Motor

Working principle, back emf, methods of excitation, types of DC motor, performance characteristics, speed control (armature control and field control), losses and efficiency

2.1.5 Three phase induction machines

Three phase induction motor, three phase induction generator

2.1.6 Three phase synchronous machines

Three phase synchronous generator, three phase synchronous motor

2.2 Power System

2.2.1 General background

Generation, transmission and distribution component, AC Vs DC Transmission, single phase Vs three phase power delivery

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2.2.2 Introduction to Power System Protection

Power system faults and protection principle, fuse as a protection device, relays; working and types, circuit breakers; working and types, basic protection schemes for generators, motors, transformers and transmission lines

2.3 Instrumentation

2.3.1 Instrumentation Systems

Functions of components of instrumentation system

2.3.2 Theory of measurement

Static Performance parameters- accuracy, precision, sensitivity, resolution and linearity, Dynamic performance parameters-response time, frequency response and bandwidth, errors in measurement, Measurement of voltage and current

2.3.3 Transducer

2.3.4 Electrical Signal Processing and transmission

Basic Op-amp characteristics, Instrumentation amplifier, signal amplification, attenuation, integration, differentiation, effect of noise, fibre optics, electro-optic conversion devices

2.3.5 Analog-digital and Digital-analog conversion

Analog and digital signal, digital to analog convertors, analog to digital convertors

2.3.6 Digital instrumentation

Sample data system, sample and hold circuit, components of data acquisition systems

2.3.7 Electrical equipment

Wattmeter, Energy meter, Frequency meter, Power factor meter, Instrument transformer

2.4 Control System

2.4.1 Component Modeling, Linearization:

Differential equation and transfer function notations, State-space formulation of differential equations, matrix notation, Mechanical components: mass, spring, damper, Electrical components: inductance, capacitance, resistance, sources, motors, tachometers, transducers, operational amplifier circuit, Fluid and fluidic components, Thermal system components, Mixed system, Linearized approximations of non-linear characteristics

2.4.2 System Transfer Functions and Responses:

Combinations of components to physical systems, Block diagram algebra and system reduction, Mason's loop rules, Laplace transform analysis of systems with standard input functions - steps, ramps, impulses, sinusoids, Initial and final steady-state equilibria of systems, Principles and effects of feedback on steady-state gain, bandwidth, error magnitude, dynamic responses

2.4.3 Stability

Heuristic interpretation of the conditions for stability of a feedback system, Characteristic equation, complex plane interpretation of stability, root locations and stability, Routh-Hurwitz criterion, eigenvalue criterion, Setting loop gain using the R-H criterion, Relative stability from complex plane axis shifting

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Section - (C)

3. ELECTRONICS

3.1 Basic and Advanced Electronics

3.1.1 Diodes

Semiconductor diode characteristics, modeling of Semiconductor diode

3.1.2 Transistors

BJT configuration and biasing, T and μ model, BJT switch and logic circuit, MOSFET and CMOS, MOSFET as logic circuits

3.1.3 Operational Amplifier

Bias circuits suitable for IC design, The widlar current source, The differential amplifier, Active loads, Output stages, Input offset voltage, Input bias and input offset currents, Output impedance, Differential and common-mode input impedances, DC gain, bandwidth, gain-bandwidth product, Common-mode and power supply rejection ratios, Higher frequency poles, settling time, Slew rate, Noise in operational amplifier circuits

3.1.4 Power Supplies and Voltage Regulators:

DC Power Supply, Half-wave and full-wave rectifiers, Capacitive filtering, Zener diodes, band gap voltage references, constant current diodes, Zener diode voltage regulators, Series transistor-zener diode voltage regulators, Series transistor-zener diode-constant current diode voltage regulators

3.1.5 Untuned and Tuned Power Amplifiers and Oscillator Circuits

Amplifier classification, Direct-coupled push-pull stage, Transformer-coupled push-pull stages, Tuned power amplifiers, Power dissipation considerations, CMOS inverter relaxation oscillator, Operation amplifier based relaxation oscillators, Voltage-to-frequency converters, Sinusoidal oscillators, Conditions for oscillators, Amplitude and frequency stabilization, Swept frequency oscillators, Frequency synthesizers, Function generator

3.1.6 Log antilog amplifier and power electronics

Instrumentation and Isolation amplifier, Logarithmic Amplifier, Anti-logarithmic amplifier, Log-Antilog Circuit Applications, Switched Power Supplies, Diodes, thyristors, triacs, Controlled rectifier circuits, Inverters, Choppers, DC-to-dc conversion, AC-to-ac conversion

3.1.7 Nano Technology

Introduction and application of Nano Technology, Nenoelectronics, Synthesizing of Carbon Nanomaterials, Development of Nanophosphors, Semiconducting Nanomaterials and applications, Nanocomposites based Solar cells and LED

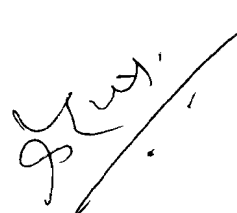
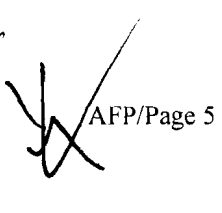
3.2 Electronic Circuits

3.2.1 DC Circuits

Series circuits, parallel circuits, Kirchoff's law, Power and Energy

3.2.2 Network Theorems

Nodal Analysis, Mesh Analysis, Thevenin's Theorem, Norton's Theorem, Maximum Power transfer Theorem

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3.2.3 Single phase AC Circuit Analysis

Current and Voltage in an inductive, capacitive circuits, Concept of complex impedance and admittance, AC series and parallel circuits, RL, RC, and RLC circuit analysis

3.2.4 Power in AC Circuits

Active and Reactive power, Power factor and its practical importance, Improvement of Power factor, Measurement of power in a single phase AC circuit

3.2.5 Three Phase Circuit Analysis

Basic concept and advantages of Three phase circuit, Phase and line quantities, Voltage and current computation in 3-phase balance and unbalance circuits, Measurement of power and power factor in 3-phase system

3.2.6 Transient Analysis in RLC Circuit

Initial conditions, Solution of differential equations with constant coefficients, Complete Time Domain Response of Second and Higher order Systems, Use of Laplace Transform Techniques for Solution of Ordinary Differential Equations with constant Coefficients, Transfer Functions, poles and Zeros of Networks

3.2.7 Frequency Response of Network

Magnitude and Phase response, Basic concept of filters, high pass, low pass, band pass and band stop filters

3.2.8 Fourier series and Transform

Basic concept of Fourier series and analysis, introduction to Fourier transforms

3.2.9 Two-Port Parameters of Networks

Definition of two-port networks, two port circuit parameters, Interconnection of two port network

3.3 Logic Circuit

3.3.1 Digital Logic

The basic gates (NOT, OR, AND) universal logic gates (NOR, NAND) AND - OR- INVERT gates

3.3.2 Combinational Logic Circuits

Boolean Laws and Theorems, Truth Table, SOP and POS method, Karnaugh Simplifications

3.3.3 Data Processing Circuits

Multiplexer, DE multiplexers, Decoder, Encoder

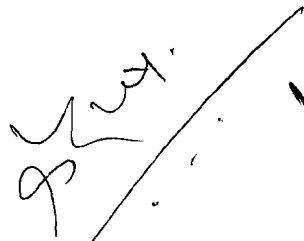
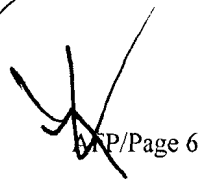
3.3.4 Flip Flops

3.3.5 Sequential Machines

Synchronous machine, Asynchronous machines, Digital Design examples

3.4 Filter Design

The filter design problem, Kinds of filters in terms of frequency response, History of filter design and available filter technologies, Ideal low pass, high pass, band pass and bands top functions, Low pass approximations including Butterworth, Chebyshev, inverse Chebyshev and elliptic, Frequency transformations: lowpass to highpass, lowpass to bandpass and lowpass to bandstop

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Section - (D)

4. COMMUNICATION

4.1 Communication System

4.1.1 Analog communication system

4.1.1.1 Representation of basic communication system, components of communication system, communication channel, Need for modulation, Amplitude Modulation and Demodulation, Frequency Modulation and demodulation, Phase modulation

4.1.1.2 Frequency division Multiplexing system, Super heterodyne receiver in communication system, Representation of random signals and noise in communication system, Noise performance of analog communication systems, comparison of AM (DSB-FC, DSB-SC, SSB) and FM (Narrow band and Wide band) in terms of power efficiency, channel bandwidth and complexity

4.1.2 Digital communication system

4.1.2.1 Digital communication sources, transmitters, transmission channels and receivers, Noise, distortion and interference, fundamental limitations due to noise, distortion and interference, source coding, coding efficiency, Shannon-fano and Huffman codes, coding of continuous time signals (A/D conversion)

4.1.2.2 Sampling Theory: Nyquist-Kotelnikov sampling theorem for strictly band-limited continuous time signal, reconstruction of sampled signal, ideal, flat top and natural sampling process, sampling of band-pass signals, sub-sampling theory, practical considerations: aperture effect, aliasing effect

4.1.2.3 Pulse Modulation system: PAM, generation, bandwidth requirement, spectrum, reconstruction methods, pulse code modulation as a result of A/D conversion, quantization noise, SNR, differential PCM, delta modulation, Parametric speech coding, vocoders

4.1.2.4 Introduction to digital modulation techniques (ASK, FSK, PSK, DPSK, QPSK, GMPSK), demodulation of binary digital modulated signals (coherent and non-coherent), modems and its application, Noise performances of modulated digital systems

4.1.2.5 Error control coding techniques: Basic principles, types, linear block codes (systematic and non systematic), binary cyclic codes (systematic and non systematic), convolution codes

4.2 Electromagnetic, Antenna and Propagation

4.2.1 Electric Field

Coulomb's law, Electric Field intensity, Gauss's law and application, Physical significance of divergence, divergence theorem, Electric potential

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and potential gradient, Free and bound charge, polarization, relative permittivity, electric dipole, current, current density, conservation of charge, continuity equation, relaxation time

4.2.2 **Magnetic Field**

Biot-Savart's law, Magnetic field intensity, Ampere's circuital law and its application, magnetic flux density, Physical significance of curl, Stoke's theorem, scalar and vector potential, Magnetic force, magnetic torque, magnetic moment, magnetic dipole, magnetization

4.2.3 **Wave equation and wave propagation**

Faraday's law, transformer emf, motional emf, displacement current, Maxwell's equations, Uniform plane waves in dissipative media, Polarization, Wave impedance, Skin effect, A. C. resistance, Poynting vector, Reflection and refraction at the interface between two media, Reflection coefficient, Standing wave ratio, Impedance matching, types of wave and propagation, Quarter wave transformer

4.2.4 **Transmission lines**

Transmission line equation, Input impedance, reflection coefficient, standing wave ratio, impedance matching

4.2.5 **Wave guides:** Rectangular wave guide, transverse electric mode, transverse magnetic mode

4.2.6 **Antennas:** Introduction to antenna, all antenna types and properties

4.3 **Digital Signal Processing**

4.3.1 **Introduction**

Basic elements of DSP, need for digital signal processing over analog signal processing, A/D and D/A conversion

4.3.2 **Discrete-time signals and system**

Elementary discrete-time signals, linearity, shift invariance, causality of discrete systems, LTI systems

4.3.3 **Z-Transform**

One side and two side transform, ROC, left sided, right sided and two sided sequence, properties of z-transform

4.3.4 **Discrete Fourier transform**

Definition and application, frequency domain sampling, properties of Discrete Fourier Transform

4.3.5 **Implementation of Discrete-time system**

Structures for FIR and IIR, direct form, cascaded and parallel form, lattice structure for FIR, frequency response

4.4 **Wireless Communications**

Radio frequency band, Propagation theory (groundwave, spacewave, tropospheric, ionospheric), Euler-Larmor theory, LOS (line of sight) and non-LOS model, Okumara 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

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different wireless systems. Antennas (Directional, Non-directional, reflective), impedance and effective length of antenna as transmitter & receiver, Radiation pattern, broad-side pattern, Endfire pattern, Pattern synthesis, satellite, satellite types, satellite communication

4.5 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)

Part II: General Awareness

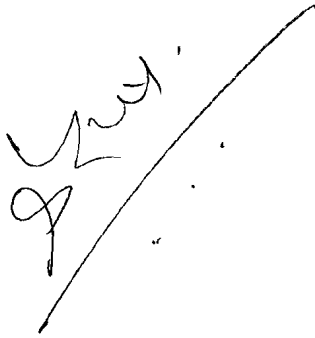
Section - (E)

1. सामान्य ज्ञान

- 1.1 नेपालको भौगोलिक, ऐतिहासिक, आर्थिक, सामाजिक, सांस्कृतिक र राजनैतिक अवस्था सम्बन्धी सामान्य जानकारी
- 1.2 राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामयिक घटनाहरु : राजनैतिक, आर्थिक, वैज्ञानिक, खेलकूद, सूचना प्रविधि, पुरस्कार
- 1.3 विद्यमान नेपालको संविधानको सामान्य जानकारी
- 1.4 सशस्त्र प्रहरी बल र सुरक्षा निकाय सम्बन्धी सामान्य जानकारी
- 1.5 सशस्त्र प्रहरी ऐन, २०५८ र सशस्त्र प्रहरी नियमावली, २०७२

2. विविध

- 2.1 व्यवस्थापनको अवधारणा र प्रकार
- 2.2 निर्देशन
- 2.3 नेतृत्व
- 2.4 उत्प्रेरणा
- 2.5 निर्णय प्रक्रिया
- 2.6 द्वन्द व्यवस्थापन
- 2.7 समावेशीकरण







सशस्त्र प्रहरी बल नेपाल
 प्राविधिक सशस्त्र प्रहरी निरीक्षक (ईन्जिनियर - ईलेक्ट्रोनिक एण्ड टेलिकम्यूनिकेशन (Electronic and
 Telecommunication) पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

प्रथम तथा द्वितीय पत्रमा यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

प्रथम पत्र				
Part	Section	अङ्कभार	प्रश्न संख्या	
			वस्तुगत	विषयगत
I	A	१५	१५ प्रश्न x १ अङ्क = १५	-
	B	२५	२५ प्रश्न x १ अङ्क = २५	-
	C	२५	२५ प्रश्न x १ अङ्क = २५	-
	D	१५	१५ प्रश्न x १ अङ्क = १५	-
II	E	२०	२० प्रश्न x १ अङ्क = २०	-
द्वितीय पत्र				
Part	Section	अङ्कभार	प्रश्न संख्या	
			विषयगत	समस्या समाधान
I	A	२०	४ प्रश्न x ५ अङ्क = २० ४ प्रश्न x १० अङ्क = ४०	२ प्रश्न x १५ अङ्क = ३०
	B	३०		
	C	३०		
	D	२०		
II	E	१०	२ प्रश्न x ५ अङ्क = १०	-

प्रश्न
 २०७२/४/२१

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