

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सबै समूह/उपसमूह, तह ७, विभिन्न पदको लागि खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसारका दुई चरणमा विभाजन गरिएको छ ।

प्रथम चरण: लिखित परीक्षा पूर्णाङ्क :- २००

द्वितीय चरण: अन्तर्वार्ता पूर्णाङ्क :- ३०

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

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	खण्ड	परीक्षा प्रणाली	प्रश्नसंख्या × अङ्क	समय	
प्रथम	सामान्य ज्ञान र बौद्धिक ज्ञान	१००	४०	(क)	वस्तुगत बहुवैकल्पिक प्रश्न (MCQ)	५० प्रश्न * १ अङ्क	४५ मिनेट	
	संस्थागत एवं सामाजिक मामिला			(ख)	विषयगत	छोटो उत्तर आउने प्रश्न लामो उत्तर आउने प्रश्न	६ प्रश्न * ५ अङ्क २ प्रश्न * १० अङ्क	१ घण्टा ३० मिनेट
द्वितीय	सेवा सम्बन्धी विस्तृत ज्ञान	१००	४०	(क)	विषयगत	छोटो उत्तर आउने प्रश्न लामो उत्तर आउने प्रश्न	२ प्रश्न * ५ अङ्क ४ प्रश्न * १० अङ्क	३ घण्टा
						(ख)	विषयगत	

२. द्वितीय चरण: अन्तर्वार्ता (Interview) पूर्णाङ्क :- ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा सोधिने प्रश्न संख्या र अङ्कभार यथासम्भव सम्बन्धित पत्र / विषयमा दिईए अनुसार हुनेछ ।
- 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 ।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेखदा अंग्रेजी ठूलो अक्षर (Capital Letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small Letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नहरूको हकमा 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 ।
- विषयगत प्रश्न हुने पत्र/विषयका प्रत्येक खण्डका प्रश्नका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन। परीक्षार्थीले प्रत्येक खण्डका प्रश्नको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/ विषय विषयवस्तुमा जुनसुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडी (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 स्वीकृत मिति :- २०८०/०८/२१

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प्रथम पत्र

खण्ड (क) सामान्य ज्ञान र बौद्धिक परीक्षण: ५० अङ्क

1. सामान्य ज्ञान: (३०x १ = ३० अङ्क)

- 1.1 नेपालको भूगोल र आर्थिक तथा सामाजिक क्रियाकलाप: धरातलीय स्वरूपको किसिम र विशेषता, नेपालमा पाईने हावापानीको किसिम र विशेषता, नदीनाला, तालतलैया, खनिज पदार्थ, प्राकृतिक स्रोत साधन, विद्युत, शिक्षा, स्वास्थ्य र सञ्चारसम्बन्धी जानकारी
- 1.2 नेपालको सामाजिक एवं सांस्कृतिक अवस्था: प्रथा, परम्परा धर्म, जातजाति, भाषाभाषी, कला, संस्कृति र साहित्य
- 1.3 नेपालमा विद्युत विकास, उर्जाका स्रोत र सम्भावना
- 1.4 नेपालको संघीय, प्रादेशिक र स्थानीय संरचना तथा शासन प्रणाली सम्बन्धी जानकारी
- 1.5 विश्वको भूगोल: महादेश, महासागर, अक्षांश, देशान्तर, अन्तर्राष्ट्रिय तिथि रेखा, समय, पर्वतश्रृङ्खला, नदी, हिमनदी, ताल, हिमताल
- 1.6 अन्तर्राष्ट्रिय सम्बन्ध तथा संघ/ संस्था: संयुक्त राष्ट्र संघ र यसका एजेन्सीहरू (UNO and Its Agencies) दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) सम्बन्धी जानकारी
- 1.7 राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वका समसामयिक घटना तथा नविनतम गतिविधिहरू

2. बौद्धिक परीक्षण: (२०x १ = २० अङ्क)

2.1 Verbal and Non-verbal Aptitude:

Vocabulary, Alphabetical ordering of words, Classification, Coding-Decoding, Insert the missing character, Direction and Distance sense test, Ranking order test, Relationship Test, Logical sequence of words, Common sense test, Assertion and Reason, Logical reasoning, Figure series, Figure analogy, Figure Classification, Figure Matrix, Pattern completion/finding, Construction of squares and triangles, Analytical reasoning.

2.2 Numerical Ability and Quantitative Aptitude

Arithmetical reasoning, Insert the correct mathematical signs, Decimal and Fraction, Percentage, Ratio, Average, Profit and Loss, Time and work.

खण्ड (ख) संस्थागत एवं सामाजिक मामिला: ५० अङ्क

1. Constitution, Act and Rules

- 1.1. Constitution of Nepal
- 1.2. Nepal Electricity Authority Act, 2041
- 1.3. Electricity Regulatory Commission Act, 2074
- 1.4. Electricity Act, 2049 and Electricity Regulation, 2050
- 1.5. Public Procurement Act, 2063 and Regulations, 2064
- 1.6. Nepal Electricity Authority, Present Financial Administration bylaws
- 1.7. Nepal Electricity Authority, Present Employee Service bylaws
- 1.8. Corruption Control Act, 2059
- 1.9. Good Governance (Management and Operation) Act, 2064
- 1.10. Land Acquisition Act, 2034
- 1.11. Environment Protection Act, 2076 and Environment Protection Regulation, 2077

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2. **Electricity Development in Nepal**
 - 2.1 History of power development in Nepal; Energy supply demand trends
 - 2.2 Recent trends in power sector reform; Hydropower potential of Nepal and prospects and challenges for its development
 - 2.3 Nepal Electricity Authority: objective, functions, corporate structure, achievement and challenges
 - 2.4 Concept of NEA Restructuring in federal context
 - 2.5 Reliable and Equality Electricity Services in Administration Development (Nepal: Prospects and Challenges)

3. **Development**
 - 3.1 General concept of development administration
 - 3.2 Planning in Nepal: efforts, achievement and challenges
 - 3.3 Sustainable Development
 - 3.4 Public Private Partnership
 - 3.5 General Concept of Public Administration and its Function

4. **Management and Financial Analysis**
 - 4.1 Concept of Management
 - 4.2 Motivation, Leadership, Control, Coordination and Team work, Decision making
 - 4.3 Corporate planning and strategic management
 - 4.4 Corporate social responsibility
 - 4.5 Project management: Use of network models- CPM, PERT, human resource planning and resource scheduling; project monitoring and control; project control cycle
 - 4.6 Financial analysis: Methods of financial analysis such as benefit cost ratio, internal rate of return (EIRR and FIRR), net present value, payback period, minimum attractive rate of return and their application; tariff structure

5. **New Trends of Power Sector**
 - 5.1 Various Sources of Energy: trend, possibilities and challenges
 - 5.2 Role of IPP (Independent Power Producer), opportunities and challenges
 - 5.3 Power Purchase Agreement (PPA), Power development agreement (PDA)
 - 5.4 Concept of energy exchange pool market, energy banking
 - 5.5 Regional and sub-regional interconnections with Nepalese grid

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परीक्षाको पाठ्यक्रम
द्वितीय पत्र:
सेवा सम्बन्धी विस्तृत ज्ञान
खण्ड (क): ५० अंङ्क

1. **Electric Circuits and Semiconductor Devices**
 - 1.1 **Electric Circuits:** Circuit elements, series and parallel circuits, RLC circuits, resistor color coding, Kirchhoff's laws, single phase and 3 phase circuits, power and energy in AC circuits, transfer functions, frequency response of networks, Fourier series transient and steady state response
 - 1.2 **Semiconductor Materials:** Intrinsic & extrinsic semiconductor devices, impurities, doping, P & N type semiconductor, majority and minority charge carriers, theory of PN junction
 - 1.3 **Semiconductor Devices:** Diodes (PN junction diode, ideal diode, Zener diode, LED, photo diode, tunnel diode, varactor diode, Schottky diode); half- and full-wave rectifications, bipolar junction transistor (construction, operations)
 - 1.4 **Transistor Configurations:** CE, CB and CC configurations, transistor amplification action, small signal model around a DC operating point, load lines, Transistor modeling, different BJT DC biasing and small signal analysis, BJT Frequency response; field effect transistors (construction, characteristics, types of FET, Basic FET circuits), transistor switching circuits (TTL circuits, MOSFET switch, NMOS Circuits; CMOS Circuits), enhancement and depletion type MOSFETs

2. **Logic Circuits and Digital Electronics**
 - 2.1 **Number System:** Decimal, binary, octal, hexadecimal, BCD numbering systems, and their conversions; ASCII and EBCDIC codes and their applications
 - 2.2 **Logic Gates:** Basic gates: NOT, OR, AND; Universal gates: NAND and NOR; Exclusive gates: X-OR, X-NOR gates, laws and theorems of Boolean algebra, De Morgan's theorems, K-map simplification and its applications
 - 2.3 **Combinational Logics:** Half-adder, full-adder, N-bit adder, encoder, decoder, multiplexer, demultiplexer, ROM, PLA
 - 2.4 **Sequential Logic Circuits:** Flip-flops, shift registers, counters: up/down counters, synchronous and asynchronous counters, modulus (mod) and decade counters, a stable, monostable and bistable multivibrators and clock generation and applications
 - 2.5 **Digital Electronics:** Bipolar transistor switching characteristics, MOS transistor switching characteristics, bipolar transistor logic families: RTL, DTL, TTL, I²L, ECL, NMOS logic circuits, CMOS logic circuits, memory, operating principle of different logic gates

3. **Electronics Circuits**
 - 3.1 **Operational Amplifier:** Op-Amps characteristics, basic Op-Amp circuits and their applications
 - 3.2 **BJT Amplifiers:** Class A, Class B, Class AB, Class C and Class D amplifiers and their circuits, classifications of amplifiers on the basis of coupling – RF, transformer, direct coupling amplifier, classifications of amplifiers on the basis of frequency – audio, RF and tuned amplifiers

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- 3.3 **Oscillators:** Feedback concepts, oscillation theory, relaxation oscillator, Colpitts, Hartley, Wien Bridge, LC, crystal oscillators, voltage-controlled oscillator
- 3.4 **Voltage Regulators and Power Supplies:** Unregulated and regulated power supplies, voltage regulation, voltage reference, heat and power design, IC voltage regulators
4. **Communication System**
 - 4.1 **Analog Communication:** Modulation, theory and generation of AM, DSB-SC, SSB, FM and PM; comparison between AM, FM and PM; AM, FM and PM transmitters/receivers, super heterodyne receiver, IF & RF amplifiers, noise in analog communication systems, signal-to-noise ratio, carrier-to-noise ratio and analog communication system applications
 - 4.2 **Digital Communication:** Digital technology, advantages of digital communication; principle of PAM, PWM, PPM and PCM; carrier systems: OOK, ASK, FSK, PSK, M-PSK and M-QAM techniques, fundamentals of data communications, noise in digital communication systems
 - 4.3 **Optical Fiber Communication:** Advantages of optical transmission, optical spectrum, types of optical fiber cable, attenuation in optical fiber cable, joining of fibers-mechanical coupling and fusion splicing, laser diodes, photodiodes, attenuation measurements, operation and line supervision, optical fiber network in NEA
 - 4.4 **Power Line Carrier Communication (PLCC):** Introduction and general theory, transmission channels, frequency range, modulation technique, carrier frequency generation, transmitting amplifier, pilot channel, demodulation, HF filter tuning, line equalization, PLCC and SCADA Communication system of NEA
 - 4.5 **Microwave Communication:** Microwave transmission and reception, microwave triodes, klystrons, magnetrons, travelling wave tube amplifier (TWTA), solid state power amplifier (SSPA)
 - 4.6 **Satellite Communication:** Orbital dynamics and satellite launchers, types of satellites, geostationary and non-geostationary satellites, types of satellite orbits, transponders, ground segments, satellite link designs, propagation effects in satellite-earth link design, multiple access, VSAT systems and satellites applications

खण्ड (ख): ५० अंङ्क

5. **Electromagnetic Fields, Transmission Lines and Antennas**
 - 5.1 **Electromagnetic Fields:** Electrostatic fields in free space, Gauss's law in integral form and application (conductors, insulators and semiconductors), wave equations (polarization, wave impedance, skin effect, reflection and refraction at the interface between two media, standing wave ratio (SWR), impedance matching, quarter wave transformer)
 - 5.2 **Transmission Lines:** Basic principles, fundamentals of transmission lines, characteristics impedance, types of transmission lines (coaxial cable, open wire, wave guide), equivalent diagram of transmission lines, matched and mismatched transmission lines, losses in transmission lines, standing waves, power and signal transmission capability of lines

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- 5.3 **Waveguides and Resonators:** Theory and operation of waveguide, parallel plane, rectangular, circular, ridged and flexible waveguides; waveguide coupling, matching and attenuation; theory and operation of resonator
 - 5.4 **Antennas:** Types, antenna gain, antenna resistance, bandwidth, beamwidth, polarization, directivity, effect of antenna height, dipole, dipole arrays, folded dipole; Yagi-Uda antenna, parabolic, horn, helical, microstrip antenna, helical antenna, dicone and loop antennas, propagation in the radio frequency spectrum
6. **Microprocessor and Microcontroller**
- 6.1 **Microprocessor:** Registers, memory, and input/output, fundamental bus signals, importance of clock pulses, n-bit microprocessors, Intel microprocessor architecture
 - 6.2 **Microcontroller:** Intel 8051 microcontroller family, its architecture and instruction sets: Programming in Assembly Language, a simple interfacing example with 7 segment display
 - 6.3 **Assembly Language Programming:** Assembler syntax, macro assemblers, cross assembler, implementation time of program
 - 6.4 **Internal Architecture of Basic Microprocessor:** Internal resources of microprocessor – registers, data paths, control units and arithmetic and logic units, relation between RTL and assembly language
 - 6.5 **Interrupt Operations:** Interrupt behavior, interrupt service routine requirements, interrupt priority, vectored, chained and polled interrupt structures, peripheral devices using interrupts, interrupt control system
 - 6.6 **Microcomputer:** Building blocks of a microcomputer, RISC and CISC computers, operating systems, software system concepts, data communications concepts, ALU sub-system, memory sub-system, input/output subsystem, control unit, instruction cycle
 - 6.7 **Real Time Operating System:** Basics, task, process, and threads, multiprocessing and multitasking, task scheduling, task synchronization, device drivers
7. **Instrumentation and Control**
- 7.1 **Applied Electronics:** Voltage summing, voltage buffer, switched mode power supply (SMPS), inverters, choppers, diode, thyristors, triac, controlled rectifier circuits, Darlington pair, wave shaping circuits, active filters, phase lock loops, Op-Amp practical uses, timer IC 555 applications, microcontroller-based systems
 - 7.2 **Instrumentation:** Instrumentation systems, theory of measurements (static performance – accuracy, precision, sensitivity, resolution and linearity, dynamic Performance – response time, frequency response, bandwidth and errors in the measurements), types and applications of various transducers
 - 7.3 **Measurement Transducers:** Temperature, light level, strain and displacement, acceleration, pressure, force, velocity, magnetic field measurement, thermocouples
 - 7.4 **Digital to Analog Conversions:** A/D and D/A conversions
 - 7.5 **Output Devices:** Indicators, meters, strip chart recorder, magnetic tape recorders
 - 7.6 **Component Modeling and Linearization:** Differential equations and transfer functions, state space formulation, fluid, fluidic and thermal system components, linearized approximation of non-linear characteristics

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- 7.7 **System Transfer Functions and Responses:** Combinations of components to physical systems, system reductions, Laplace transform, steady state equilibrium system
 - 7.8 **Stability:** characteristic equation, complex plane interpretation of stability, root locations and stability, Root Locus Method, frequency response method, performance specifications for control system
 - 7.9 **Control System:** open loop control, close loop control, PID control and tuning
8. **Electronic Construction and Safety Engineering**
- 8.1 **Prototyping methods:** Breadboards, PC prototyping boards
 - 8.2 **Printed Circuits:** PC board fabrication, PC board designs, CAD/CAM, photolithography
 - 8.3 **Safety and Precautions:** Safety rules and regulations, storage and handling of explosives, compressed gases and flammable substances, safety and precautions in case of hazards
 - 8.4 **Earthing and Shielding Techniques:** Fire hazards, firefighting techniques and equipment
 - 8.5 **Noise Hazards:** Sources of noise, control of noise and its effect on health, first aid requirements for after the event treatment