

नेपाल आयल निगम लिमिटेड

खुला प्रतियोगितात्मक परीक्षाको लागि पाठ्यक्रम एवं परीक्षा योजना

स्तर : अधिकृत, सेवा : प्राविधिक, समूह : इन्जिनियरिङ्ग, तह : ६, पद : सहायक प्रबन्धक (इलेक्ट्रोनिक्स एण्ड कम्यूनिकेशन)

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :- लिखित परीक्षा, पूर्णाङ्क : २००

द्वितीय चरण :- अन्तर्वार्ता, पूर्णाङ्क : ३०

प्रथम चरण - लिखित परीक्षा

पत्र	विषय	परीक्षा प्रणाली	प्रश्न संख्या	अंक भार	समय	पूर्णाङ्क	उत्तीर्णाङ्क
प्रथम	शासकीय व्यवस्था र विकास	विषयगत	१०	१०	३ घण्टा	१००	४०
द्वितीय	सेवा सम्बन्धी	विषयगत	१०	१०	३ घण्टा	१००	४०

द्वितीय चरण - अन्तर्वार्ता

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- परिक्षार्थीले प्रथम पत्रको प्रत्येक खण्डको उत्तर छुट्टाछुट्टै उत्तरपुस्तिकामा र दोस्रो पत्रको लागि सबै प्रश्नको उत्तर एउटै 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 अन्तर्वार्तामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति : २०७४ असोज २२ गते देखि

प्रथम पत्र - शासकीय व्यवस्था र विकास

खण्ड क : शासकीय व्यवस्थाका आधारभूत पक्ष - अंक ३० (३ प्रश्न × १० अंक)

१. नेपालको वर्तमान संविधान र नेपालको संवैधानिक विकासक्रम ।
२. नेपालमा संघीय शासन प्रणाली ।
३. सरकारको कार्यक्षेत्र, काम, कर्तव्य र अधिकार ।
४. कार्यपालिका, व्यवस्थापिका र न्यायपालिका बिचको अन्तरसम्बन्ध ।
५. सार्वजनिक नीति तर्जुमा, कार्यान्वयन र विश्लेषण, अनुगमण र मूल्यांकन ।
६. सुशासन, पारदर्शिता, उत्तरदायित्व, निष्पक्षता र व्यावसायिकता ।
७. राजनीति र सार्वजनिक प्रशासन बीचको सम्बन्ध र सीमा ।
८. नागरिक वडापत्रको अवधारणा ।
९. कानूनी राज्य, मानव अधिकार ।
१०. सामाजिक न्याय र सामाजिक सुरक्षा ।

खण्ड ख : संस्थान व्यवस्थापन तथा संस्थागत सुशासन - अंक ३० (३ प्रश्न × १० अंक)

१. सार्वजनिक संस्थानको आवश्यकता, उद्देश्य
२. सार्वजनिक संस्थानको स्वायत्तता र उत्तरदायित्व
३. सार्वजनिक संस्थानका कार्य सम्पादन सुधारका पक्षहरू
४. नेपालमा सार्वजनिक संस्थान निजीकरणको अवस्था
५. नेपालमा सार्वजनिक संस्थान संचालनमा रहेका समस्या र चुनौतीहरू
६. नेपाल सरकारको निजीकरण सम्बन्धी कार्यक्रम
७. उदारीकरणको सन्दर्भमा सार्वजनिक संस्थानको सान्दर्भिकता
८. संस्थागत सुशासनको अवधारणा र सिद्धान्तहरू
९. नेपालमा संस्थागत सुशासनका सम्बन्धमा रहेका कानूनी, नीतिगत र संस्थागत व्यवस्था
१०. नेपाल आयल निगमबाट संस्थागत सुशासनका लागि गरिएका प्रयासहरू

खण्ड ग : नेपाल आयल निगम र उपभोक्ताको अधिकार - अंक ४० (४ प्रश्न × १० अंक)

१. नेपाल आयल निगमको उद्देश्य, काम, कर्तव्य र अधिकार
२. निगम संचालक समितिको भूमिका तथा उत्तरदायित्व
३. नेपाल आयल निगमको कर्मचारी प्रशासन र कर्मचारीका आचारण
४. नेपाल आयल निगमको खरिद कार्यविधि सम्बन्धी व्यवस्था
५. नेपालमा पेट्रोलियम पदार्थ आयात, ढुवानी तथा बिक्री वितरण सम्बन्धी व्यवस्था
६. पेट्रोलियम पदार्थ गुणस्तर नियन्त्रण सम्बन्धी व्यवस्था
७. पेट्रोलियम पदार्थको स्वचालित मूल्य निर्धारण सम्बन्धी व्यवस्था
८. पेट्रोलियम पदार्थ र यसबाट वातावरणमा पर्ने असर, प्रभाव, समस्या र समाधानका उपायहरू
९. अन्तर्राष्ट्रिय तेल बजार : उत्पादन, बिक्री वितरण तथा मूल्य निर्धारण प्रणाली
१०. उपभोक्ताको हक हित संरक्षण सम्बन्धी अवधारणा
११. कम्पनीको स्थापना तथा खारेजी प्रक्रिया सम्बन्धी कानूनी व्यवस्था
१२. करार तथा सम्झौताका आधारभूत पक्षहरू ।

1. Electronic Devices and Circuits

Basic electronic devices types, characteristics, usage and operations, Power electronics devices types, characteristics, usage and operations, Transistors FET and MOSFET configurations, switching and amplifiers, amplifier types and classes, Tuned and Untuned Amplifiers, Instrumentation and Isolation amplifiers, Loganti-log amplifiers, Monolithic IC manufacturing technique, IC logic families (RTL, DTL, TTL, CMOS, ECL, I2L) circuits, operations and comparisons, Operational amplifier characteristics and applications, Clipper and clamper circuits, Oscillators.

2. Power Supplies

Single phase and polyphase AC power supply systems, Converters (AC-DC, AC-AC, DC-DC), DC to AC inverters, Rectifiers filters and regulators, UPS, SMPS, Regulator(Buck, Boost, Buck-Boost), Solar and Battery Cells, General principle of electrical motors and generators, Series and parallel battery connections, Voltage, current and power calculations, Voltage and current sources, Transformer and losses.

3. Signal Analysis and Processing

Fundamental classes of signals, Complex exponential and sinusoidal signal, Transformation of independent variables, Singularity functions, Properties of Impulse function, Systems and its classifications, LTI system, Properties of LTI system, Parseval's theorem, Transmission of signals, Impulse response and convolution, Fourier series, Fourier Transform, Unit step, delta, sinc and signum function, Hilbert transform, Properties of continuous time Fourier Transform, FIR & IIR Filters, DFT, Laplace transform, Properties of discrete Fourier Transform, IDFT, FFT, Circular convolutions, Difference equation and frequency response, Energy, power and auto correlation, Z transform, Discrete filters, Lattice ladder structure.

4. Digital Logic and Circuits

Number Systems used in digital, Binary addition and subtraction, BCD, Alphanumeric codes, Gray code, Basic Logic Gates usage, circuits and characteristics, Universal gates usage, circuits and applications, De-Morgan's Theorem, Boolean laws, Designing logic circuits, K-map simplification, Minterms and maxterms, Sum of Product and Product of sum, Combinational and Sequential logic circuits, Encoder, Decoder, Multiplexer, Demultiplexer, Adder, Subtractor, Parity bit Checker, BCD to seven segment decoder, PLA, NMOS family of logic circuit, CMOS family of logic circuit, Memory unit, RAM, ROM types and characteristics, Latches and Flip-Flops, Edge-triggered and level triggered, Shift Registers, Counters (synchronous and asynchronous), Up/Down counters, truncated counters, Applications of counters and shift registers, Frequency divider, Sequential machine design.

5. Analogue and Digital Communications

Analogue communication and digital communication comparisons, Modulations and its advantages, Modulation and demodulation (AM/PM/FM), Pre-emphasis and de-emphasis network, PCM/ADPCM, Digital

modulations:ASK/PSK/QPSK/MSK/QAM/CDMA/FDMA/OFDMA, Noise, distortion and interference, Information theory, Signal compressor and expander, A-law, μ -law, Quantization, Source coding, Channel coding, Error detection and correction, Entropy, Superheterodyne radio receiver, types of noises, Transmission losses, Signal to noise ratio, Forward power, Reflected power, VSWR, Transmission efficiency and power, Maximum power transform, Sampling theorem, Shannon-Hartley theorem, Frequency converter, Mixer, Phase locked loop, Basic block diagram, application, advantages and disadvantages of satellite and optical fiber communication.

6. Microprocessor and Computer Architectures

History and evolution of microprocessor and computer, Functional block diagram of microprocessor and computer, Type and performance of microprocessor and computer, Microprocessor buses, Addressing modes, Von Neumann and Harvard architectures, Amdahl's law, Moore's law, Instructions types, Registers and flags, Memory and memory types, Characteristics of memory, Overlapping and parallel processing, control unit and architectures, Instruction fetching, Pipeline hazards, Reduced Instruction Sets Computers (RISC) and Complex Instruction Set Computers (CISC) architectures.

7. Telecommunication and Data Communications

Telephone exchange history, Space/Time/Frequency/Wave length division multiplexing, Erlang B formula, Telephone traffic, Loss system: Grade of service (GOS) and blocking probability, Delay system: Queuing theory, Circuit and Packet switching, Evolution of mobile communication (1G to LTE), Wimax, CDMA, Digital switching: TS/ST/TST/STS, Common channel signaling system (SS7), General concept of ISDN, BSN, ATM, PDH/SDH, IP switching, Routing and flow control, Uses of computer network, Networking model: client/server, p2p and active network, Protocols and standards, OSI and TCP/IP model, Physical layer: Network monitoring, Data link layer: Functions, Error detection and correction, and Channel allocation problem, Networks: VLAN, CSMA/CD, Ethernet, Token bus, Token ring and Wireless LAN, Network layer: Internetworking devices, Addressing (classless and classful), Routing protocols (RIP, OSPF, BGP, Unicast and multicast routing protocols), Transport layer: Services and Protocols (UDP, TCP), Application layer: Different types of protocols, DNS, Introduction of IPV6, Network Securities.

8. Instrumentation and Control Systems

Functions of component of instrumentation system, Theory of measurement, Static and dynamic performance parameters, Error in measurement, Data conversion (ADC/DAC) circuits, operations, advantages and disadvantages,(Wattmeter/Energymeter/Frequency meter/Power factor meter) types and working principle, Transducers (Strain Gauges, Thermistor, Piezoelectric Tachometer, Thermocoupler), Component of data acquisition system, Control system and its importance, Open loop and closed loop control system, System Stability and Sensitivity, System transfer functions and responses, Poles and Zeros locations and their significance, Root locus method, Frequency response method, Oscilloscopes, Signal generator, Impedance Bridges, Bolometer technique for measurement of power, Use of MIS, Decision support system, Customer care, Out sourcing, Service portfolio.

9. Electromagnetic, Waves and Antenna

Coordinate system, Coulomb's law and Electric field intensity, Electric flux density and Gauss's law, Maxwell's first equation and application, divergence theorem, Energy & potential, Current, current density and conservation of charges, Continuity equation, Laplace and Poisson equation, Biot-Savart's law, Ampere's circuital law, Magnetic flux density, Curl, Stoke's theorem, Magnetic force and torque, Wave motion in free space, Perfect dielectric and losses, Wave in medium, Skin effect, Loss tangent, Impedance matching, Quarter wave transformer, Single and double stub matching, Antenna fundamental, Antenna parameters and arrays, Antenna classifications, different types of wave propagation, Polarizations, Radiation from dipole antenna, wave guides and mixtures, Smith chart.

10. Rules, Regulations, Policies and Management Concepts

ITU overview, ICT policy, Telecommunication Policy, Role of regulatory body, Broadband policy, Cyber-law, Spectrum policy, 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.

11. Professional Practice

- 11.1 Ethics and Professionalism: Perspective on morals, codes of ethics and guidelines of professional engineering practice
- 11.2 Legal aspects of Professional Engineering in Nepal. Provision for private practice and employee engineers
- 11.3 Nepal Engineering Council Act, 2055 and regulations, 2056
- 11.4 Relation with clients, contractor and fellow professionals.
- 11.5 Public procurement practices for works, goods and services and its importance.

12. Computer and Information System

- 12.1 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, memory systems (main, auxiliary, virtual, cache).
- 12.2 Digital Networks (LAN, WAN)
- 12.3 Data types, Concept of Management Information System, concept of Operating Systems, Application software, Basic Concept on internet, e-mail and webpage (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.
