

नेपाल आयल निगम लिमिटेड

खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको लागि पाठ्यक्रम एवं परीक्षा योजना

स्तर : अधिकृत, सेवा : प्राविधिक, समूह : इन्जिनियरिङ्ग, तह : ८, पद : प्रबन्धक (केमिकल)

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	शासकी व्यवस्था र विकास	विषयगत	५	५ प्रश्न × १५ = ७५ अंक	३ घण्टा	१००	४०
		समस्या समाधान (विषयगत)	१	१ प्रश्न × २५ = २५ अंक			
द्वितीय	सेवा सम्बन्धी	विषयगत	५	५ प्रश्न × १५ = ७५ अंक	३ घण्टा	१००	४०
		समस्या समाधान (विषयगत)	१	१ प्रश्न × २५ = २५ अंक			

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 ।
- प्रत्येक पत्रको लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक प्रश्नको उत्तर छुट्टाछुट्टै 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

१. नेपालको वर्तमान संविधान र नेपालको संवैधानिक विकासक्रम ।
२. नेपालमा संघ, प्रदेश र स्थानीय तहको अधिकार, अन्तरसम्बन्ध र सीमाहरू ।
३. कार्यपालिका, व्यवस्थापिका र न्यायपालिकाको गठन ।
४. सुशासन, पारदर्शिता, उत्तरदायित्व, निष्पक्षता र व्यावसायिकता ।
५. राजनीति र प्रशासन बीचको सम्बन्ध र सीमा ।
६. विद्युतीय शासन र नागरिक वडापत्रको अवधारणा ।
७. कानूनी राज्य, मानव अधिकार र भ्रष्टाचार नियन्त्रण
८. सामाजिक न्याय र सामाजिक सुरक्षा ।
९. सार्वजनिक संस्थान, सार्वजनिक संस्थानको स्वायत्तता र उत्तरदायित्व
१०. सार्वजनिक संस्थानको कार्यकुशलता मापनका आधार र कार्य सम्पादन सुधारका पक्षहरू
११. नेपालमा सार्वजनिक संस्थान निजीकरणको अवस्था, सम्भाव्यता र आवश्यकता
१२. संस्थागत सुशासनको अवधारणा र सिद्धान्तहरू
१३. सार्वजनिक प्रशासनमा बदलिँदो अवधारणा र समसामयिक मामलाहरू
१४. नेतृत्वको अवधारणा, भूमिका, शैली र उपागम
१५. नेपालमा संस्थागत सुशासनका सम्बन्धमा रहेका कानूनी नीतिगत र संस्थागत व्यवस्था
१६. भूपरिवेष्टित राष्ट्रको अधिकार
१७. नेपाल आयल निगमबाट संस्थागत सुशासनका लागि गरिएका प्रयासहरू
१८. नेपाल आयल निगमको उद्देश्य, काम, कर्तव्य र अधिकार तथा समस्या र चुनौती
१९. निगम संचालक समितिको भूमिका तथा उत्तरदायित्व
२०. नेपाल आयल निगमको कर्मचारी प्रशासन सम्बन्धी व्यवस्था
२१. नेपाल आयल निगमको खरिद कार्यविधि सम्बन्धी व्यवस्था
२२. नेपालमा पेट्रोलियम पदार्थ आयात, ढुवानी तथा बिक्री वितरण सम्बन्धी व्यवस्था
२३. पेट्रोलियम पदार्थ गुणस्तर नियन्त्रण सम्बन्धी व्यवस्था
२४. पेट्रोलियम पदार्थ र यसबाट वातावरणमा पर्ने असर, प्रभाव, समस्या र समाधानका उपायहरू
२५. अन्तर्राष्ट्रिय तेल बजार : उत्पादन, बिक्री वितरण तथा मूल्य निर्धारण प्रणाली
२६. उपभोक्ताको हक हित संरक्षण सम्बन्धी अवधारणा
२७. कम्पनीको स्थापना तथा खारेजी प्रक्रिया सम्बन्धी कानूनी व्यवस्था
२८. करार तथा सम्झौताका आधारभूत पक्षहरू ।

द्वितीय पत्र - सेवा सम्बन्धी

1. UNIT PROCESS

- 1.1 Oxidation:
Definition and Types, Oxidizing agents, Liquid phase oxidation with oxidizing agents and oxygen. Vapor phase oxidation of Methanol, Benzene and Naphthalene, apparatus and its M/s. (Machine) for oxidation reactions
- 1.2 Hydrogenation
Definition and its scope, properties of hydrogen and sources of hydrogen, gas catalytic hydrogenation.
- 1.3 Hydrolysis
Definition and types of hydrolysis, Hydrolyzing agents, equipment's of Hydrolysis, manufacturing of ethanol from ethylene (shell process).
- 1.4 Polymerization
Introduction & chemistry of polymerization reactions, classifications of polymers methods of polymerization

2. HEAT TRANSFER

- 2.1 Modes of Heat Transfer: Fourier conduction equation, General conduction equation in Cartesian, cylindrical and spherical co-ordinates
- 2.2 Heat Transfer by convection: Fluids with and without phase change, Free & force convention, laminar & turbulent flows heat transfer inside and outside tubes, concepts of thermal boundary layers, over all heat transfer co-efficient, LMTD, fouling factors, transfer units, flow over flat plats with heat transfer, empirical relation
- 2.3 Boiling phenomena: Regimes of boiling etc.
- 2.4 Heat Exchangers
- 2.5 Radiation Heat Transfer

3. MASS TRANSFER

- 3.1 Mass Transfer (M. T.) Co-efficient: in laminar, turbulent flows, theories of M. T., Heat, momentum and mass transfer, analogous
- 3.2 Introduction to diffusion in solids: Fick's law
- 3.3 Distillation: VLE data, Flash and simple distillation, continuous, McCabe- Thiele and Panchin-Savarit method etc.
- 3.4 Absorption: Equilibrium, material balance for single component transfer, multi-stage & packed tower operation
- 3.5 Liquid Extraction: Stage wise, Stage type contractor etc.
- 3.6 Drying Mechanism: Batch drying/ continuous (cont.) drying
- 3.7 Crystallization: Equilibrium, Operations, and equipment's

4. CHEMICAL PROCESS CALCULATION

- 4.1 Equilibrium relations;
- 4.2 Rate laws;
- 4.3 Behavior of ideal gases and gaseous mixtures;
- 4.4 Vapor pressure;
- 4.5 Humidity and saturation;
- 4.6 Phase equilibrium;
- 4.7 Non-reacting single-phase systems;

- 4.8 Systems with recycle bypass and purge;
- 4.9 Processes involving vaporization and condensation;
- 4.10 Enthalpy;
- 4.11 Heat of reaction;
- 4.12 Thermochemistry;
- 4.13 Fuel calculations;

5. CHEMICAL ENGINEERING THERMODYNAMIC

- 5.1 First and Second Laws of Thermodynamics
- 5.2 Volumetric properties of pure fluids
- 5.3 Thermodynamics properties of fluids
- 5.4 Production of power from heat
- 5.5 Phase and chemical-reaction equilibria

6. PETROLEUM REFINING PROCESSES

- 6.1 Origin, Formation and Composition of Petroleum; classification and physic-chemical properties of petroleum, testing and uses of petroleum products
- 6.2 Refining processes of petroleum products;
 - 6.2.1 Distillation of petroleum.
 - 6.2.2 Dehydration and Desalting of Crudes.
- 6.3 Petroleum Processing Data;
 - 6.3.1 Thermal Properties of Petroleum Fractions.
 - 6.3.2 Important Products Properties & Test Methods.
- 6.4 Thermal and catalytical processes;
 - 6.4.1 Cracking
 - 6.4.2 Catalytic Cracking, Catalytic Reforming, Coking, Hydrogen Processes.
- 6.5 Conversion of petroleum gases into motor fuel, aviation fuel, lubricating oils, petroleum waxes
- 6.6 Chemical and clay treatment of petroleum products, desulphurization
- 6.7 Oelfin and aromatic hydrocarbons production, treatment and upgrading of oelfinic C4 and C5 cuts
- 6.8 Chemical from C1 compound, ethylene and its derivatives, propylene and its derivatives, butadiene and butane, BTX chemicals

7. MECHANICAL AND FLUID FLOW OPERATION

- 7.1 Fluid properties & Dimensional analysis
- 7.2 Fluid static & it's applications
- 7.3 Friction in pipes & Channels, Pumping of fluids
- 7.4 Agitation & mixing of liquids
- 7.5 Solids, characteristics of solid particles, type of standard screen series.
- 7.8 Sedimentation, settling velocity, flocculation etc.
- 7.10 Filtration, filter media, filter aids, batch & cont. Filtration, filtration equipment, filter press, leaf, cartridge, vacuum filter, rotary drum filters
- 7.11 Mixing and agitation: equipment's, agitation of liquids, types of impellers, power consumption in agitated vessels etc.
- 7.12 Conveyers: mechanical and pneumatic conveying, elevators etc.

8. PROJECT ECONOMICS AND MANAGEMENT OF CHEMICAL INDUSTRIES

- 8.1 Economics and importance in chemical process industries; interest and equivalences: depreciation and taxes

- 8.2 Capital investment, cost estimation, and profitability analysis; scale-up principles of equipment
- 8.3 Plant location and layout and concept of techno-economic feasibility report writing
- 8.4 Project engineering management: selection of alternatives; selection of plant capacity
- 8.5 Optimum Project designs; Project scheduling

9. SAFETY ANF POLLUTION CONTROL

- 9.1 Concepts and definition of pollution and safety
- 9.2 Occupational health and safety management,; safety culture; storage of dangerous materials;
- 9.3 Sources of water, air and land pollution; design of pollution Abatement systems for particulate matter and gaseous constituents; hazardous waste disposal and effluent
- 9.4 Types of hazards in chemical industries, hazards due to high pressure & explosions, dust & vapor cloud explosions, inflammable materials, toxic materials, chemicals chemical reactions and operations, electrostatics, ionizing radiation etc.
- 9.5 Modification; recovery of by-products; energy recovery; waste utilization and recycle and reuse. Waste Minimization;
- 9.6 Environmental Policy, Act and Regulations;
- 9.7 Safety and hazards related to petroleum industry
- 9.9 Pollution from the use of Petroleum fuel and its mitigation measure
- 9.10 Fire and Explosion indices and hazard analysis
 - 9.10.1 Safety protection, equipment for personal and plant for various hazards, safety procedures
 - 9.10.2 Disaster management, insurance, worker's safety act
 - 9.10.3 Sources and effects of environmental pollution: air pollution, water on Pollution, land pollution, management of industrial waste, reuse, recycling, Impact of pollution environment and its assessment

10. PROFESSIONAL PRACTICE

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

11. COMPUTER AND INFORMATION SYSTEM

- 11.1 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).
- 11.2 Digital Networks (LAN, WAN)
- 11.3 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.
