नेपाल आयल निगम लिमिटेड

आन्तरिक प्रतियोगितात्मक परीक्षाको लागि पाठ्यक्रम एवं परीक्षा योजना

स्तर : अधिकृत, **सेवा** : प्राविधिक, **समूह** : इन्जिनियरिङ्ग, **तह** : ९, **पद** : उप निर्देशक (जनरल)

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	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 :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

२. प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

३. प्रत्येक पत्रको लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक प्रश्नको उत्तर छुट्टाछुट्टै उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

४. 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 ।

५. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

६. 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 र अन्तरसम्बन्ध तथा सीमाहरू ।
३. सार्वजनिक नीति तर्जुमा, कार्यान्वयन र विश्लेषण, अनुगमण र मूल्यांकन ।
४. सुशासन, पारदर्शिता, उत्तरदायित्व, निष्पक्षता र व्यावसायिकता ।
५. सार्वजनिक सेवामा जवाफदेहिता, नैतिकता र व्यवसायिकतामा रहेका समस्या र चुनौती ।
६. राजनीति र सार्वजनिक व्यवस्थापन बीचको सम्बन्ध र सीमा ।
७. सार्वजनिक प्रशासन र नेपालमा प्रशासन सुधारका आधारभूत पक्षहरू ।
८. सार्वजनिक सेवा प्रवाह तथा सार्वजनिक व्यवस्थापनका अवधारणा ।
९. सामाजिक न्याय र सामाजिक सुरक्षा ।
१०. सार्वजनिक संस्थान, सार्वजनिक संस्थानको स्वायत्तता र उत्तरदायित्व
११. सार्वजनिक संस्थानको कार्यकुशलता मापनका आधार र कार्य सम्पादन सुधारका पक्षहरू
१२. नेपालमा सार्वजनिक संस्थान निजीकरणको अवस्था, सम्भाव्यता र आवश्यकता
१३. संस्थागत सुशासनको अवधारणा र सिद्धान्तहरू ।
१४. नेपालमा संस्थागत सुशासनका सम्बन्धमा रहेका कानूनी नीतिगत र संस्थागत व्यवस्था
१५. नेपाल आयल निगमबाट संस्थागत सुशासनका लागि गरिएका प्रयासहरू
१६. नेपाल आयल निगमको उद्देश्य, आवश्यकता, समस्या र चुनौती
१७. नेपाल आयल निगमको कर्मचारी प्रशासन सम्बन्धी व्यवस्था
१८. नेपालमा पेट्रोलियम पदार्थ आयात, ढुवानी तथा बिक्री वितरण सम्बन्धी व्यवस्था
१९. पेट्रोलियम पदार्थ गुणस्तर नियन्त्रण सम्बन्धी व्यवस्था
२०. पेट्रोलियम पदार्थ र यसबाट वातावरणमा पर्ने असर, प्रभाव, समस्या र समाधानका उपायहरू
२१. अन्तर्राष्ट्रिय तेल बजार : उत्पादन, बिक्री वितरण तथा मूल्य निर्धारण प्रणाली
२२. उपभोक्ताको आधारभूत हक अधिकार
२३. कम्पनीको स्थापना तथा खारेजी प्रक्रिया सम्बन्धी कानूनी व्यवस्था
२४. करार तथा सम्झौताका आधारभूत पक्षहरू ।
२५. भूपरिवेष्ठित राष्ट्रको अधिकार
२६. सार्वजनिक प्रशासनमा बदलिँदो अवधारणा र समसामयिक मामलाहरू
२७. नेतृत्वको अवधारणा, भूमिका, शैली र उपागम
२८. नेपाल सरकारको सार्वजनिक खरिद कार्यविधि सम्बन्धी व्यवस्था
२९. बोनस वितरण सम्बन्धी कानूनी तथा नीतिगत व्यवस्था
३०. प्रतिस्पर्धा प्रवर्द्धन तथा बजार संरक्षण सम्बन्धी कानूनी तथा नीतिगत व्यवस्था
३१. नेपाल सरकारको आर्थिक नीति, औद्योगिक नीति, आपूर्ति नीति, वाणिज्य नीति
३२. सार्वजनिक जिवनका सिद्धान्त (Principle of public life)
३३. सदाचार, नैतिकता र आचरण
३४. सार्वजनिक सेवामा जवाफदेहिता, नैतिकता र व्यवसायिकतामा रहेका समस्या र चुनौती ।
३५. कानूनी राज्य, मानव अधिकार र भ्रष्टाचार नियन्त्रण

द्वितीय पत्र - सेवा सम्बन्धी

1. Environmental Engineering
   - 1.1 Basic concepts of environmental engineering
   - 1.2 Initial Environmental Examination (IEE) and Environmental Impact assessment (EIA)
   - 1.3 Fundamental s of Environmental Chemistry
   - 1.4 WHO and Nepal Water Quality Standards/Guidelines
   - 1.5 Sources of Water pollution

2. Hazardous Waste management and Treatment
   - 2.1 Characteristics of hazardous wastes
   - 2.2 Physical Treatment
   - 2.3 Chemical treatment
   - 2.4 Biological Treatment
   - 2.5 Waste Incinerators
   - 2.6 Waste Disposal
   - 5.7 Noise pollution and control

3. Environment Pollution
   - 3.1 Air Pollution: Cause and Effects
   - 3.2 Water Pollution: Cause and Effects, Waste water treatment
   - 3.3 Industrial Waste: Collection and disposal
   - 3.4 Indoor Air Quality: Indoor pollutants, Effects of indoor pollutants and Control of indoor pollutants
   - 3.5 Global impacts: Green house effects, Acid rain, Montreal Protocal
   - 3.6 Global-warming phenomena
   - 3.7 Types of sources of pollution: point/non-point (for air and water)
   - 3.8 Concepts of Cleaner Production

4. Global Atmospheric Change
   - 4.1 Green House Effect and Global Warming
   - 4.2 Acid rain
   - 4.3 Climate change

5. Alternative Energy Sources for vehicles
   - 5.1 Knowledge on anaerobic digestion, biogas technologies
   - 5.2 Solar energy, CNG, LNG, LPG, Battery Powered Energy, Wind Powered Energy and Coal Gas
   - 5.3 Natural oil and gas
   - 5.4 Occurrence of oil, gas and water in oil and gas reservoir
   - 5.5 Relation between volume, pressure and temperature of hydrocarbon gases
   - 5.6 Well surveys and establishing the technology of well operation
   - 5.7 Fluid mechanics (oil)

6. Generation, Transmission and Distribution
   - 6.1 Hydroelectric Power plants: Hydraulic to electrical energy conversion, output power equation, classification, elements of hydroelectric power plant and schematic layouts, site selection, classification of water turbines, working principles of different types of water turbines, selection of water turbines, essential features of hydroelectric alternators, auxiliaries in hydroelectric plant, advantages and disadvantages of hydroelectric plants
   - 6.2 Steam power plants : Elements of a steam power plant and their schematic arrangement, working principle, vibration monitoring, governing, cooling efficiency, alternators used for steam turbine driven units
   - 6.3 Diesel power plants: Elements of a diesel power plant and their schematic arrangement, working principle, efficiency, cooling, governing, speed control, application, performance and thermal efficiency, alternators used for diesel units, advantages and disadvantages of diesel plants.
   - 6.4 Non- conventional method of power generation: Concept of solar photovotalic, wind and geothermal method of power generation and their importance
   - 6.5 Power transmission system: Overhead and underground transmissions, advantages and limitations of high voltage transmission; choice of working voltage, conductor size and configuration,

supports and cross arms, insulators used in overhead lines, vibration dampers sag tension calculation

6.6 Power Distribution System: Voltage levels, primary and secondary distribution, radial and ring mains distribution, single phase and three phase ac distribution, pole /tower types , conductors and insulators used in distribution lines, distribution transformer and its accessories, protection coordination in distribution system

7. Process Calculation
   - 7.1 Gas laws and phase equilibrium
   - 7.2 Combustion and chemical processes
   - 7.3 Thermo physics: Heat capacity calculations

8. Petroleum Refinery and Fuel Engineering
   - 8.1 Origin and occurrence, composition, classification and physico-chemical properties of petroleum; testing and uses of petroleum products; refining processes such as distillation, cracking, reforming;
   - 8.2 Conversion of petroleum gases into motor fuel, aviation fuel; lubricating oils; petroleum waxes;
   - 8.3 Chemicals and clay treatment of petroleum products, desulphurization
   - 8.4 Refining operations -dehydration, desalting, gas separation, natural gas production and gas sweetening;
   - 8.5 Tube still heater design; product profile of petrochemicals; petrochemical feed stocks
   - 8.6 Olefin and aromatic hydrocarbons production; treatment and upgrading of olefinic C4 and C5 cuts;
   - 8.7 Chemicals from C1 compounds, ethylene and its derivatives, propylene and its derivatives, butadiene and butane; BTX chemicals.

9. Basic Thermodynamics
   - 9.1 Basic Concepts: Thermodynamic System, Thermodynamic Property, Pure Substance, Zeroth Law.
   - 9.2 First Law of Thermodynamics: Control mass and Control volume formulation
   - 9.3 Second Law of Thermodynamics: Heat engine, Refrigerator and Heat Pump, Kelvin Planok and Clausius Statement, Entropy
   - 9.4 Thermodynamic Cycles: Carnot cycle, Otto cycle, Diesel Cycle, Brayton cycle, Rankine cycle
   - 9.5 Modes of heat transfer: Conduction, Convection and Radiation
   - 9.6 Heat exchangers

10. Fluid Mechanics
    - 10.1 Fluid Properties: Viscosity, Surface tension, Compressibility, Vapor Pressure
    - 10.2 Fluid Statics: Pressure variations in static fluid, Pressure head, Manometer, Force on submerged surfaces
    - 10.3 Equations of Fluid Flow: Types of flow, Continuity equation, Bernoulli's equation and Momentum equation
    - 10.4 Viscous Effects: Reynolds number, Boundary layer, Frictional resistance to flow in pipes
    - 10.5 Flow measurement: Pitot-static tube, Ofifice, Venturimeter, Nozzle, Rotameter

11. Engineering Material
    - 11.1 Major Types of Engineering Material (Stones-characteristics, Ceramic material: ceramic tiles, Mosaic Tile, brick types and testing etc. Cementing materials:types and properties of lime and cement; Timber and wood: types and properties of wood; Miscellaneous material: Asphaltic material (Asphalt, Bitumen and Tar); paints and varnishes; polymers; Soil properties and its parameters; Materials Selection
    - 11.2 Imperfections Atomic Arrangement: Slip and Twinning, Dislocation, Points and Surfaces Defects
    - 11.3 Mechanical Properties and Testing: Tension, Impact, Fatigue, Hardness Test
    - 11.4 Metals: Steel, types and properties; Alloys

12. Engineering Economics
    - 12.1 Types of engineering economics decisions
    - 12.2 Time value of Money

12.3 Project Evaluation Techniques: Payback Period method, NPV method, Future value analysis, IRR method
12.4 Benefit and Cost Analysis: Cost benefit ratio, breakeven analysis
12.5 Corporate tax system in Nepal
12.6 Depreciation and its types

13. Operational Management
13.1 Role of Production/Operation Management and System Concepts
13.2 Plant Location and Plant Layout Design
13.3 Production Planning and Control: Selection of materials, methods, Projects scheduling, machines and manpower
13.4 Application of Network methods: PERT, CPM
13.5 Inventory Control: Inventory costs and Inventory models
13.6 Forecasting Techniques: Requirements of forecasting, Time series and Moving average methods, Regression analysis
13.7 Quality Management: Important of quality, Statistical process control
13.8 Statistical Analysis: Measurement of central tendency, Deviation, Distribution

14. Professional Practice
14.1 Ethics and Professionalism: Perspective on morals, codes of ethics and guidelines of professional engineering practice
14.2 Legal aspects of Professional Engineering in Nepal. Provision for private practice and employee engineers
14.3 Nepal Engineering Council Act, 2055 and regulations, 2056
14.4 Relation with clients, contractor and fellow professionals.
14.5 Public procurement practices for works, goods and services and its importance

15. Computer and Information System
15.1 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).
15.2 Digital Networks (LAN, WAN)
15.3 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

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