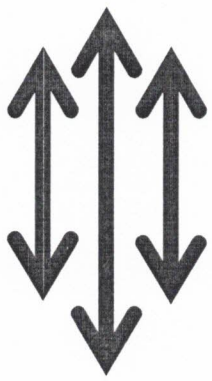
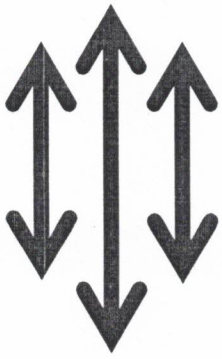
नेपाली सेना

श्री भर्ना छनौट निर्देशनालय, कार्यरथी विभाग,

जंगी अड्डा



प्रा.उ.से. केमिकल ईन्जिनियर (खुला) पदको लिखित परीक्षाको पाठ्यक्रम



२०७७

नेपाली सेना

प्रा.उ.से. केमिकल ईन्जिनियर (खुला) पदको लिखित परीक्षाको पाठ्यक्रम

समय: ४ घण्टा

पूर्णाङ्क : १५०
उत्तीर्णाङ्क : ६०

यो पाठ्यक्रम नेपाली सेनाको प्रा.उ.से. केमिकल ईन्जिनियर (खुला) पदको उम्मेदवार छनौट परीक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सरिक हुने उम्मेदवारहरुको पेशा सम्बन्धी विषयलाई आधारमानी प्रश्नहरु सोधिने छ ।

(क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।

(ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराईनेछ ।

(ग) प्रश्नपत्र निर्माण गर्दा पाठ्क्रममा समावेश भएका सबै विषयहरुलाई यथासंभव समिटनेछ ।

(घ) बस्तुगत र विषयगत संयुक्त रुपमा पूर्णाङ्क र उत्तीर्णाङ्क कायम गरिनेछ ।

(ङ) बस्तुगत र विषयगत परीक्षाको पाठ्यक्रम एउटै हुनेछ ।

(च) बस्तुगत र विषयगत विषयको लिखित परीक्षा एकैपटक वा छुट्टाछुट्टै गरी लिन सकिनेछ ।

(छ) यो पाठ्यक्रम मिति २०७७/०६/०६ गतेबाट लागु हुनेछ ।

लिखित परीक्षाको योजना र पाठ्यक्रम

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या अङ्क	समय
पेशा सम्बन्धी	७५	६०	बस्तुगत (Objective)	बहु वैकल्पिक प्रश्न (MCQs)	७५ प्रश्न x १ अङ्क=७५	१ घण्टा
	७५		विषयगत (Subjective)	छोटो उत्तर	७ प्रश्न x ५ अंङ्क =३५	३ घण्टा
				लामो उत्तर	४ प्रश्न x १० अङ्क =४०	

नेपाली सेना

प्रा.उ.से.केमिकल ईन्जिनियर (खूला) पदको लिखित परीक्षाको पाठ्यक्रम

1. UNIT PROCESS

1.1 Introduction and importance of Nitration, Amination by reduction, Halogenation,Sulphonation and sulphation, Amination by ammonolysis

1.2 Oxidation: Definition and Types, Oxidizing agents, Liquid phase oxidation (with OxidizingAgents and Oxygen), Oxidation of toluene with MnO_2, Manufacturing of Acetaldehyde from Acetic acid and mfg. of Acetic acid fromEthanol, Vapor phase oxidation of Methanol, Benzene and Naphthalene, Apparatus and its Machine for oxidation reactions.

1.3 Hydrogenation: Definition and its scope, properties of hydrogen and sources ofHydrogen, gas catalytic hydrogenation and hydrogenolysis, factors affecting it,Apparatus and M/c. (Machine), Industrial hydrogenation of fat & oil, Manufacture ofMethanol from CO_2& H_2.

1.4 Hydrolysis: Definition and types of hydrolysis, Hydrolyzing agents, Hydrolysis equipment, Industrial Hydrolysis of fat, hydrolysis of carbohydrates, starch to dextrose, Manufacture of ethanol from ethylene (shell process),Manufacture of phenol from benzene sulfonic.

1.5 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 equationin Cartesian, cylindrical and spherical co-ordinates

2.2 Heat Transfer by convection: Fluids with and without phase change, Free & forceconvention, 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 Transfer Coefficient models, including boiling and condensation

2.5 Heat Exchangers

2.6 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, McCabe-Thieleand Panchin-Savarit method

3.4 Absorption: Equilibrium, Material balance for single component transfer, Multistage& 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.

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 Heat effects

5.4 Thermodynamics properties of fluids

5.5 Thermodynamics of flow processes

5.6 Production of power from heat

5.7 Solution thermodynamics

5.8 Phase and chemical reaction equilibrium

6. PROCESS INSTRUMENTATION

6.1 First Principles model development; dynamics of first, second and higher orderlinear systems

6.2 Open loop and closed loop systems

6.3 Linearization

6.4 Feedback control

6.5 Stability

6.6 Root locus diagram

6.7 Frequency response analysis

7. MECHANICAL AND FLUID FLOW OPERATION

7.1 Fluid properties & Dimensional analysis

7.2 Fluid static &its 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

7.6 Size reduction and enlargement, Crushers, grinders, Disintegrates for coarse &intermediate & fine grinding, Energy and power requirements, Law of crushers, Work index

7.7 Screening and other separation methods: screen analysis, Estimation of particlesize, surface area and particle population based on screen analysis, Ideal and actualscreens, Principles of elutriation, flotation, jigging, electrostatics, and magnetic separation processes

7.8 Sedimentation, Settling velocity, Flocculation

7.9 Fluidizations, Dense phase fluidization and boiling beds, Minimum fluidizationvelocity, Minimum (min.) porosity of bed and bed height, batch & cont.fluidization

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, Agitation of liquids, Types of impellers, Powerconsumption in agitated vessels

7.12 Conveyers: Mechanical and pneumatic conveying, Elevators

8. CHEMICAL TECHNOLOGY

8.1 Oil and fats

8.2 Soap and detergent and Method of manufacturing

8.3 Fermentation of ethyl alcohol and citric acid

8.4 Starch, Sugar

8.5 Pulp and paper

8.6 Leather

8.7 Cement and lime

8.8 Ceramic and glass

8.9 Paints and varnishes

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 dangerousmaterials

9.3 Sources of water, air and land pollution,Environmental laws & standards,Design ofPollution Abatement systems for particulate matter and gaseous constituents,Hazardous waste disposal and effluent

9.4 Solid-waste disposal and recovery of useful products

9.5 Modification, recovery of by-products, energy recovery, waste utilization andRecycle and reuse, Waste Minimization

9.6 Environmental Policy, Act and Regulations, ISO 14001

9.7 Concept of Cleaner Production

10. QUALITY, STNDARDIZATION AND PRODUCTIVITY

10.1 Quality and quality control, Quality Circle, Total Quality Management, QualityManagement System

10.2 Standardization and Certification

10.3 Productivity, Kaizen, 5 S

10.4 Existing Nepal Standard (Certification Mark) Act, and Regulation

10.5 Existing Consumer Protection Act

10.6 Project Economics

माथि उल्लेखित पाठ्यक्रमका एकाइहरुबाट सोधिने प्रश्नहरुको संख्या निम्नानुसार हुनेछ

एकाई नं.	परिक्षा प्रणाली			कै.
	वस्तुगत (Objective)	विषयगत (Subjective)		
	बहु बैकल्पिक प्रश्न (MCQS) (प्रश्नxअंक)	छोटो उतर (प्रश्नxअंक)	लामो उतर (प्रश्नxअंक)	
1	7x1	1x5	1x10	
2	7x1	1x5		
3	8x1			
4	7 x 1	1x5	1x10	
5	8x1			
6	7 x 1	1x5	1x10	
7	8x1			
8	7 x 1	1x5	1x10	
9	8x1	1x5		
10	8x1	1x5		
Total	75 x 1 = 75	7 x 5 = 35	4 x 10 = 40	

प्रयोगात्मक परीक्षाको पाठ्यक्रम

समयः ६० मिनेट

पूर्णाङ्कः ५०

उत्तीर्णाङ्कः२५

S.N.	TOPIC	MARKS	TIME (MIN)
1	**Heat Transfer**	**5**	**10**
2	**Mass Transfer**	**5**	**10**
3	**Chemical Process Calculation**	**10**	**10**
4	**Process Instrumentation**	**10**	**10**
5	**Safety and Pollution Control**	**10**	**10**
6	**Viva**	**10**	**10**
Total		**50**	**60**

समाप्त