औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा ईन्जिनियरिङ समुह/सिभिलतर्फको सहायक निर्देशक (प्रा.) तह-८ पदको
खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

यो पाठ्यक्रमलाई देहाय अनुसार दुई चरणमा विभाजन गरिएको छ:

(१) प्रथम चरण: लिखित परीक्षा-पूर्णाङ्क २००

(२) द्वितीय चरण: अन्तरवार्ता-पूर्णाङ्क ३०

परीक्षा योजना (Examination Scheme)

(१) प्रथम चरण लिखित परीक्षा:

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या र अङ्कभार	जम्मा अङ्क	समय
प्रथम	शासकीय प्रबन्ध व्यवसायिकता र सेवा सम्बन्धी विषय	१००	४०	(क) शासकीय प्रबन्ध व्यवसायिकता	७X१०	७०	३ घण्टा
				(ख) ऐन कानून र व्यवस्थापन सम्बन्धी विषय	३X१०	३०	
द्वितीय	सेवा सम्बन्धी	१००	४०	विश्लेषणात्मक समीक्षा	४X१५	६०	३ घण्टा
				विश्लेषणात्मक र सामाधान मुलक प्रश्न	२X२०	४०	

(२) द्वितीय चरण: अन्तरवार्ता

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		समय
व्यक्तिगत अन्तरवार्ता	३०	–	मौखिक		–

द्रष्टव्य:

१. लिखित परीक्षाको माध्यम् भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ।

२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ।

३. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरु सोधिनेछ।

४. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तर पुस्तिकाहरु हुनेछन। परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डको उत्तर पुस्तिकामा लेख्नु पर्नेछ।

५. यस पाठ्यक्रममा जे सुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन नियम तथा विनियमहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ।

६. परीक्षामा कालो मसी भएको कलम वा डटपेन मात्र प्रयोग गर्नुपर्नेछ।

७. वस्तुगत प्रश्नहरुको परीक्षामा कुनै प्रकारको क्यालकुलेटर (Calculator) प्रयोग गर्न पाईने छैन। परीक्षामा सोधिने प्रश्नहरु क्यालकुलेटरको प्रयोग विना नै समधान गर्न सकिने सोधिनेछ।

८. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ।

९. पाठ्यक्रम लागू मितिः २०७८।०३।०७ गते।

औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा ईन्जिनियरिङ समुह/सिभिलतर्फको सहायक निर्देशक (प्रा.) तह-८ पदको
खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

प्रथम पत्र

खण्ड (क) शासकीय प्रबन्ध, ब्यबस्थापन र ब्यावसायिकता **(70 Marks)**

(Governance, Management and Professionalism)

1. **Governance:**
   a. Meaning, features and dimensions of governance.
   b. Present Constitution of Nepal.
   c. Federal, provincial and local level governance.

2. **Public Administration:**
   a. Concept of public administration.
   b. Basics elements of personnel administration.
   c. Financial administration: budget preparation, implementation, monitoring and evaluation.
   d. Public Policy: formulation, implementation, monitoring and evaluation.

3. **Management and Financial Analysis:**
   a. Contemporary issues and emerging concept of management.
   b. Forms of Management: leadership, motivation, team work, decision making, control and coordination in management, time management, resource management, change management, technology management, information management, performance management, grievance management, team management, conflict management, crisis management, stress management, participative management, risk and disaster management.
   c. Corporate strategic management and corporate social responsibility.
   d. Project management: project planning and scheduling: network models, CPM/PERT, manpower planning and resource scheduling, project preparation for implementation and justification, Project monitoring and control: system of control, project control cycle, feedback control systems, cash control, capital planning and budgeting: capital planning procedures, preparation of operating budgets, fixed and flexible budget, budgetary control.
   e. Issues and challenges of human resource management in public enterprises of Nepal.
   f. Financial analysis: methods of financial analysis such as benefit cost ratio, internal rate of return, net present value, payback period, minimum attractive rate of return and their application; concept of EIRR and FIRR; tariff structure.

4. **Planning and Development:**
   a. General concept of development.
   b. Public participation in development.
   c. Planning of Nepal: periodic planning, salient features, efforts, achievement, challenges and priorities.
   d. Sustainable Development Goals.
   e. Diversity of natural resource management.
   f. Public Private Partnership.

5. **Ethics, Morality, Accountability and Professionalism:**
   a. Essence, determinants and dimensions of ethics.
   b. Human values.
   c. Ethical issues in public service delivery and utilization of public funds.
   d. Challenges of corruption and corruption control mechanism.
   e. Accountability, responsibility and authority.
   f. Engineering professional practice and liabilities.
   g. Foundational values for public services- integrity, impartiality, dedication, tolerance and compassion.
   h. Negotiation skills and dispute settlement mechanism.

खण्ड (ख) सेवा सम्बन्धी (Service Related General Issues) (30 Marks)

1. Service Related Policy, Act and Regulations:

a. Industrial Policy, 2067.
b. Industrial Enterprise Act, 2073.
c. Public Procurement Act, 2063 and Regulation, 2064.
d. Corruption Control Act, 2059.
e. Nepal Engineering Council Act, 2055 and Regulation, 2057.
f. Environment Protection Act, 2053 and Regulation, 2054.
g. Disaster Risk Reduction Act, 2074
h. Solid Waste Management Act, 2068
i. Local Government Operation Act, 2074.
j. Nepal's Climate Change Policies and Plans.
k. Nepal National Building Code.
l. Sustainable Development Goals 2016-2030.
m. Industrial District Management Limited Staff Service and Conditions Rules, 2054 (Amended).
n. Industrial District Operation and Management Regulation, 2071 (Amended).

2. Industrial Development in Nepal:

a. Industrial sector development- history, challenges and prospects.
b. Role of Industrial District Management Limited.
c. Various model of investment for industrial development.
d. Natural recourses and industry: status, opportunity and possibilities.
e. Industry and environment.

औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा ईन्जिनियरिङ समुह/सिभिलतर्फको सहायक निर्देशक (प्रा.) तह-८ पदको
खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र : सेवा सम्बन्धी

1. Engineering Survey **[10]**

a. Introduction and principles of surveying.
b. Linear (distance) measurement: distance measurement techniques, instruments and tools, obstacles in measurement, scales, and errors, correction of errors, precision, and accuracy.
c. Types of surveying: as per purpose, as per equipment (compass, theodolite, total station), as per method (tachometry, use of stadia method, compass) bearing computation, determination of error and adjustment Introduction and use of Total Station Instruments and its importance.
d. Leveling: general knowledge of leveling, principle and method of leveling, contour and method of contouring, use of contour map, profile leveling, fly leveling, cross sectioning, trigonometrical leveling (both case of base is accessible, inaccessible) and reciprocal leveling, booking of field data, computation.
e. Traversing in surveying: need of traverse, computation (coordinate), omitted measurement, determination of error and adjust.
f. Special technique of surveying: Triangulation and trilateration, orientation, resection and intersection.
g. Curve surveying: Types of curve, elements of curves, design and calculation of vertical curve, horizontal curve and setting out of simple circular curve, elements of transition curve.
h. Photogrammetry Remote Sensing, GPS and GIS: working principles, and use of GPS, application of GIS to civil engineering projects.

2. Construction Materials and Technology: **[10]**

a. Properties of building materials: physical, chemical, constituents, thermal.
b. Major types of construction material (Stones, Timber, Clay Product, binding material, metals, miscellaneous material.
c. Stones: Characteristics and selection of good building stone.
d. Clay Product: bricks and tiles types and characteristics, testing.
e. Timber and wood: Characteristics, seasoning, preservation.
f. Binding (cementing) materials: Type, Properties and uses (cement, lime).
g. Metals: Types and properties (steel, Alloy).
h. miscellaneous material (Asphalt, Bitumen and Tar, plastic material, PVC material, composite material, Thermal & Sound Insulating Materials , Paints, Varnish & Enamels , Plastics ,Rubber , gypsum board
i. Properties and ingredients of cement concrete physical, chemical.
j. Grade and strength of concrete, concrete mix design, quality control of concrete, testing.
k. Mixing, transportation, placing and curing of concrete.
l. Use of Admixtures, High strength Concrete & pre-stressed concrete.

3. Structural Analysis and Design: **[10]**

a. Concept of stress and strain, theory of torsion and flexure: moment of inertia.
b. Analysis of beam and frames ; shear force, bending moment and deflection of beam and frames; determinate structure- Energy methods; three hinged systems, indeterminate structures- slope deflection methods, and moment distribution method, use of influence line diagrams for simple beams , unit load method.
c. Reinforced concrete structures: difference between working stress method & limit state method, analysis of RC beams, and slabs in bending, shear , deflection, bond and end anchorage, Design axially loaded columns ; isolated and combined footing.
d. Steel structure: Analysis and design, types of connection, tension members, design of column, beam plate girder, and roof components.
e. Timber structure: types of joints, design of column and beams design of riveted, bolted and welded connection.

4. Estimating and costing, valuation, and specification: **[10]**

a. Types and Purpose of estimating. Types, purpose, Importance, requirement of analysis of rate, key component of estimating, basis of rate analysis.
b. Methods of measurement and taking out quantities.
c. Purpose of valuation, Terms used in valuation: Capitalized value, Depreciation, Rent, Mortgage, and Lease. Methods of determining value of property.
d. Specification and Norms, purpose types, and importance in construction industry.
e. Complete estimate of cost of building and road works, water supply and sanitary/ sewerage works, Split up Annual repair and maintenance estimate.
f. Preparation of bill of quantities (BOQ) and Abstract of cost. Abstract of cost Tender Document and Evaluation of Tender Document.

5. <u>Engineering Economics</u>: [10]

a. Definition of Economics, Role of Engineers in Economics, Law of Demand and Supply, Principles of Engineering Economy, Cash Flow Diagram, Concept of Time Value of Money, Interest: Simple Interest and Compound Interest, Effective Rate of Interest, Continuous Compounding.
b. Basic Methods of Engineering Economic Analysis, Minimum Attractive Rate of Return (MARR), Payback Period Method, Accounting Rate of Return, Equivalent Worth Method: Present Worth Method, Future Worth Method, Annual Worth Method, Rate of Return Method: Internal Rate of Return, External Rate of Return, Simple Benefit Cost Ratio, Comparative Analysis of Alternatives.
c. Depreciation: Methods of Depreciation: Straight Line Method, Sinking Fund Method, Sum of the Year Digit Method, Declining Balance Method, Modified Accelerated Cost Recovery System (MACRS).
d. Risk Analysis, Sources of Project Risks, Methods of Project Risks: Sensitivity Analysis, Breakeven Analysis, Scenario Analysis, Probability Concept of Economic Analysis, Decision Tree and Sequential Investment Decision.
e. Capital Investment, Types of Capital: Common Stock, Preferred Stock, and Bonds Bond Amortization and Retirement, Inflation, Measuring Inflation Equivalence Calculation under Inflation.
f. Taxation, Introduction to Corporate Income Tax, Property tax, Sales Tax, Excise Tax. Types of Taxes: Direct Tax, Indirect Tax, and Value Added Tax After Tax Cash Flow Estimate.

6. <u>Public Procurement and Construction Management:</u> [20]

a. Public procurement: basic principles of public procurement.
b. Familiarization with procurement Act, Rules and procedure, procurement regulations and guidelines of GON/ international banks like ADB and World Bank. Type of bidding: ICB, NCB, SQn and direct purchase.
c. Standard procurement documents – Pre-qualification and Post-qualification. SBDs, RFB, RFP; line of credit and securities. Bid Evaluation, Selection and Award.
d. FIDIC conditions of contract: conditions for building and engineering works, plant and design-build, EPC/Turnkey, DBO projects.
e. Construction planning and scheduling: Work Break Down Structure (WBS). Project Scheduling with Gantt Chart, Critical Path Method (CPM). Program Evaluation and Review Technique (PERT).
f. Contract management: Types of Contract. Valid Contract. Contract kick off meeting to contract closure, contract management plan, communication, relationship management, quality assurance, variations, EOT, delay damage, price adjustments, payment certificates, taking-over certificate, DLP, fundamental breach of contract, contractual claims and disputes.
g. Planning Construction Material: procurement procedure and material handling, planning of construction equipment, appropriateness of use of equipment. Construction Site Planning: Responsibility of Site Engineer, Supervising Work of Contractor, Record Keeping, and Progress Report.
h. Construction Safety requirement: Safety, Important Safety Rules, Site Safety Management, Safety in Construction Operations, Safety in the Use of Construction Equipment, Personal Protection Equipment, Motivation Management, Contractual provisions.
i. Personnel management, management principles, leadership styles, centralization and decentralization, communication styles and importance, management and trade unions.

7. <u>Road and Drainage:</u> [10]

a. Modes of transportation and comparison between them.
b. History and development of road transportation.
c. Road classification in Nepal (NRS, NRRS).
d. Highway alignment and its requirement: Factors controlling highway alignment Geometric Design of Highway: map study, Basic design control and criteria, Cross sectional elements, Radius of horizontal curve, Super elevation, extra widening, Transition curves, Sight distances, Setback distances, Gradients, grade compensation Design of vertical curves, right of way, traffic engineering.
e. Highway Drainage: Surface drainage system including design of side drains, subsurface drainage system, Cross drainage system, Energy dissipating structures.
f. Road Pavement: Definition and types of pavement and their applicability, Difference between flexible and rigid pavements, Factors controlling pavement design, Flexible pavement design methods (CBR method, Road Note 31 method, Nepalese guidelines, IRC method, and AI method).
g. Road Construction technology and Maintenance: Road construction activities, tools, equipment and plants, Construction of earthen roads, gravel roads, WBM roads, Construction of Soil stabilized roads, Construction of bituminous roads (interface treatment, surface dressing, Otto seal, grouted macadam, bituminous carpet, mastic asphalt, bituminous concrete), cement concrete pavement, Classification of highway maintenance, Maintenance

priorities, Pavement distress evaluation (Benkelman beam test), Flexible and rigid pavement failures, causes and remedial measures.

8. <u>Water, sanitation, health and environment</u>: [10]

a. Water, sanitation, health and environment, Classification of sources of water.
b. Water demand and quantity determination, Types of water demand, Variation in demand of water, Population forecasting - necessity and methods.
c. Impurities in water, their classification and effects, Living organisms in water, Water related diseases, Examination of water. National drinking water quality standards, Objectives of water treatment.
d. Design of intake, collection chamber, break pressure tank, transmission line, water treatment, reservoir, and distribution system.
e. Sanitary and environmental engineering, Sewage/Wastewater, Domestic sewage, industrial sewage, Sanitary sewage, Storm water, Sullage, Sewer, Sewerage, Rubbish, Garbage, Refuse/Solid waste, environmental pollution, Importance of Wastewater and Solid Waste Management, Wastewater and Solid waste management methods Collection, Conveyance, Treatment and Disposal; Objectives of sewage disposal, Sanitation systems, Quantity Estimation of Wastewater, design and construction of sewer, Sewer Appurtenances.
f. Examination of waste water, Wastewater Treatment Method, Wastewater Disposal, Sludge Treatment and Disposal, Disposal of Sewage from Isolated Buildings, Solid Waste Disposal, water treatment plant before final discharge.
g. Environmental health engineering, epidemiology, pathogen (bacteria, virus, helminthes, protozoa).
h. Legislation in environmental protection: Environment protection act and regulation, (EIA, IEE).

9. <u>Engineering professional practice and liabilities:</u> [10]

a. Role of engineers in a society: ethical and unethical behaviors in professional practice, professional decisions by following existing regulatory and professional frameworks, Select appropriate dispute and conflict resolution methods, and analyze professional engineering issues related to ethics, code of conduct, conflict of interest, norms and standards and to render decisions on appropriateness of steps taken and assign degree of responsibility in specific cases.
b. Legal Provisions Related to Construction; Construction quality and standards, Environment law, Labor law , Building by-laws and codes, Land acquisition and resettlement, Cyber act, IPR Acts, Nepal Engineering Council Act,
c. Globalization and cross cutting issues : Case Studies Related to Practice of Engineering Profession: public safety, industrialization and protection of environment, conflict of interest, personal integrity, and personal privacy, Cases involving professional negligence (duty, breach, proximate cause and damage), Cases involving breach of duty, criminal law, and tort, Cases involving breach of NEC's code of conduct, cases involving breach of Public Procurement Act and Public Procurement Regulation, cases involving breach of intellectual property rights and copyrights, Cases involving abuse of position and authority.

…….END……