

लोक सेवा आयोग
स्थानीय तह अन्तर्गतका प्राविधिक तर्फ इञ्जिनियरिङ्ग सेवा, सिभिल समूह, छैठौं तह, इञ्जिनियर पदको
प्रतियोगितात्मक परीक्षाको लागि पाठ्यक्रम

प्रथम पत्र :- सिभिल इञ्जिनियरिङ्ग

1. Structure Analysis and Design

- 1.1 Stresses and strains; theory of torsion and flexure; moment of inertia
- 1.2 Analysis of beams and frames: Bending moment, shear force and deflection of beams and frames: determinate structure - Energy methods; three hinged systems, indeterminate structures- slope deflection method and moment distribution method; use of influence line diagrams for simple beams, unit load method
- 1.3 Reinforced concrete structures: Difference between working stress and limit state philosophy, analysis of RC beams and slabs in bending, shear, deflection, bond and end anchorage, Design of axially loaded columns; isolated and combined footings, introduction to pre-stressed concrete
- 1.4 Steel and timber structures: Standard and built-up sections: Design of riveted, bolted and welded connections, design of simple elements such as ties, struts, axially loaded and eccentric columns, column bases, Design principles on timber beams and columns

2. Construction Materials

- 2.1 Properties of building materials: physical, chemical, constituents, thermal etc.
- 2.2 Stones-characteristics and requirements of stones as a building materials
- 2.3 Ceramic materials: ceramic tiles, Mosaic Tile, brick types and testing etc.
- 2.4 Cementing materials: types and properties of lime and cement; cement mortar tests
- 2.5 Metals: Steel; types and properties; Aluminium
- 2.6 Timber and wood: timber trees in Nepal, types and properties of wood
- 2.7 Miscellaneous materials: Asphaltic materials (Asphalt, Bitumen and Tar); paints and varnishes; polymers
- 2.8 Soil properties and its parameters
- 2.9 Alternative materials / technology

3. Concrete Technology

- 3.1 Constituents and properties of concrete (physical and chemical)
- 3.2 Water cement ratio
- 3.3 Grade and strength of concrete, concrete mix design, testing of concrete
- 3.4 Mixing, transportation pouring and curing of concrete
- 3.5 Admixtures
- 3.6 High strength concrete
- 3.7 Pre-stressed concrete technology

4. Construction Management

- 4.1 Construction scheduling and planning: network techniques, bar charts and computer aided construction management
- 4.2 Contractual procedure and management: types of contract, tender and tender notice, preparation of bidding (tender) document, contractors pre-qualification, evaluation of tenders and selection of contractor, contract negotiation, contract acceptance, condition of contract; quotation and direct order, classifications of contractors; dispute resolution
- 4.3 Material management: procurement procedures and materials handling
- 4.4 Cost control, quality control and time control
- 4.5 Utility maintenance
- 4.6 Health, safety and insurance
- 4.7 Project monitoring and evaluation

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- 4.8 Quality assurance plan
- 4.9 Variation and changes
- 4.10 Use of construction equipments
- 5. Estimating and Costing, Valuation and Specification**
 - 5.1 Types of estimates and their specific uses
 - 5.2 Methods of calculating quantities
 - 5.3 Key components of estimating norms and rate analysis
 - 5.4 Preparation of bill of quantities
 - 5.5 Purpose and importance of specification
 - 5.6 Purpose, principles and methods of valuation
- 6. Drawing Techniques**
 - 6.1 Drawing sheet composition and its essential components
 - 6.2 Suitable scales, site plans and location plans, preliminary drawings, conceptual and working drawings
 - 6.3 Theory of projection drawing: perspective, orthographic and axonometric projection; first and third angle projection
 - 6.4 Drafting tools and equipments; conventions and symbols
 - 6.5 Topographic, electrical, plumbing and structural drawings
 - 6.6 Techniques of free sketches drawing
- 7. Engineering Survey**
 - 7.1 Introduction and basic principles
 - 7.2 Linear measurements: techniques; chain, tape, ranging rods and arrows; representation of measurement and common scales; sources of errors; effect of slope and slope correction; correction for chain and tape measurements; Abney level and clinometers
 - 7.3 Compass and plane table surveying: bearings; types of compass; problems and sources of errors of compass survey; principles and methods of plane tabling
 - 7.4 Leveling and contouring: Principle of leveling; temporary and permanent adjustment of level; bench marks; booking methods and their reductions; longitudinal and cross sectioning; reciprocal leveling; trigonometric leveling; contour interval and characteristics of contours; methods of contouring
 - 7.5 Theodolite traversing: need of traverse and its significance; computation of coordinates; adjustment of closed traverse; closing errors
 - 7.6 Uses of Total Station, Electronic Distance Measuring Instruments & GPS
- 8. Engineering Economics**
 - 8.1 Benefit cost analysis, cost classification, sensitivity analysis, internal rate of return, time value of money
 - 8.2 Economic equilibrium, demand, supply and production, net present value, financial and economic evaluation
- 9. Professional Practices and Legislations**
 - 9.1 Ethics and professionalism: code of conduct and guidelines for professional engineering practices
 - 9.2 Nepal Engineering Council Act, 2055; and regulations, 2056
 - 9.3 Relation with clients, contractor and professionals
 - 9.4 Public procurement concept and practices for works, goods and services and its importance
 - 9.5 The Constitution of Nepal (From Part 1 to 5, 13, 14, 15, 16, 17, 18, 19 & 20; and Schedules)
 - 9.6 Local Government Operation Act, 2074

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द्वितीय पत्र :- जनरल इञ्जिनियरिङ्ग सम्बन्धी
Section (A) – 30 Marks

1. Transportation and Trail Bridge

- 1.1. Transportation system and its classification.
- 1.2. Transportation planning: rationale, types and its philosophy.
- 1.3. Road transport and road construction in Nepal.
- 1.4. Classification of roads in Nepal (NRS and IRC)
- 1.5. General principles of road network planning.
- 1.6. Feasibility study of road projects.
- 1.7. Alignment, engineering survey and its stages.
- 1.8. Geometric design of roads: map study, element of cross-section and highway alignment, design of horizontal curve, super elevation, transition curve, vertical curves, right of way.
- 1.9. Drainage consideration in roads:
 - 1.9.1. Introduction and design of culverts and minor bridges, cross drainage structures, subsurface drainage system.
- 1.10. Special consideration in Hill roads design:
 - 1.10.1. Problems associated with hill roads construction
 - 1.10.2. Route location, hairpin bends and special structures.
- 1.11. Road Pavement: Types of pavement and their applicability in hill roads, Design of pavement,
- 1.12. Bioengineering practices along hill side
- 1.13. Activities and techniques in road construction in rural roads
- 1.14. Maintenance, repair and rehabilitation of roads.
- 1.15. Basic knowledge on design, construction and maintenance of suspended and suspension bridge in Nepal.
- 1.16. Role of social mobilization in rural road development.
- 1.17. Low-cost road construction

Section (B) – 20 Marks

2. Water Supply and Sanitation

- 2.1 Rural and community based water supply system.
- 2.2 Water supply sources and their management.
 - 2.2.1 Surface water
 - 2.2.2 Ground water
- 2.3 Selection of source.
- 2.4 Water quality and treatment, water demand and supply, source protection
- 2.5 Intakes, collection chamber and break pressure tanks.
- 2.6 Reservoir and distribution system.
- 2.7 Intakes, Pipeline design, design of transmission and distribution system, reservoir design.
- 2.8 Pipe and fittings: Pipe materials, pipe laying and fittings.
- 2.9 Operation and maintenance of water supply systems
- 2.10 Sanitation, wastewater and solid waste management:
 - 2.10.1 On-site sanitation system
 - 2.10.2 Types of sewerage system, design and construction of sewers.
 - 2.10.3 Types, characteristics, sources, quantity, generation, collection, transportation and disposal of solid wastes.
 - 2.10.4 Sanitary landfill, incineration, composting etc.

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- 2.11 Environmental health engineering- Epidemiology, pathogens (Bacteria, Virus, Helminthes, Protozoa)

Section C – 30 Marks

3. Energy System 10%

- 3.1 Hydrological study, planning and design of small hydropower projects.
3.2 Head works, dams, spillways, surge tanks, stilling basin etc.
3.3 River diversion works.
3.4 Biogas- Introduction.
3.5 Alternative energy systems in Nepal

4. Irrigation and River training works 20%

- 4.1 Status of irrigation development in Nepal.
4.2 Methods of irrigation and their suitability.
4.3 Design of irrigation canals.
4.4 Operation and maintenance of irrigation systems
4.5 Management of Farmers managed irrigation system.
4.6 Preventive and remedial measures of water logging.
4.7 Flood control, its necessity and flood mitigation measures.
4.8 River training works.
4.9 Specific considerations in design, operation and management of hill irrigation systems

Section D – 20 Marks

5. Housing, building and urban planning 10%

- 5.1 Present status and practices of building construction in Nepal
5.2 Specific considerations in design and construction of buildings in Nepal
5.3 Indigenous technology in building design and construction
5.4 Local and Modern building construction material in Nepal
5.5 Community buildings: School and hospital buildings and their design considerations
5.6 Urban planning needs and challenges in Nepal

6. Technology, Environment and civil society 10%

- 6.1 Technological development in Nepal
6.2 Promotion of local technology and its adaptation
6.3 Environmental Impact Assessment, Initial Environmental Examination, Global-warming phenomena
6.4 Types of sources of pollution: point / non-point (for air and water)
6.5 Social mobilization in local infrastructure development and utilization in Nepal
6.6 Participatory approach in planning, implementation, maintenance and operation of local infrastructure