

वी.पी. कोइराला मेमोरियल क्यान्सर अस्पताल
प्राविधिक अन्य सेवा, इन्जिनियरिङ्ग सेवा, सिभिल समूह, सातौं तह, सिभिल इन्जिनियर पदको खुला र आन्तरिक
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :- लिखित परीक्षा (Written Examination)

पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता (Interview)

पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण (First Phase) : लिखित परीक्षा

Paper	Subject	Full Marks	Pass Marks	No. Questions & Weightage	Time Allowed
I	Technical Subject & Organizational Knowledge	100	40	100 × 1 = 100 (Objective Multiple Choice Questions)	1.15 hrs
II		100	40	4 × 5 = 20 8 × 10 = 80 (Subjective Descriptive Type)	3.00 hrs

द्वितीय चरण (Second Phase)

Subject	Full Marks	Examination
Interview	30	Oral

द्रष्टव्य :

- यो पाठ्यक्रमको योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई भागमा विभाजन गरिएको छ ।
- प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कटौत गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कटौत पनि गरिने छैन ।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र /विषयमा दिइए अनुसार हुनेछ ।
- परीक्षामा परीक्षार्थीले मोबाइल वा यस्तै प्रकारका विद्युतीय उपकरण परीक्षा हलमा लैजान पाइने छैन ।
- विषयगत प्रश्न हुने पत्रका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्ने छ ।
- 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 परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति :- २०७८/०९/३१

Paper I & II : - Technical Subject & Organizational Knowledge

Section (A): 45 % Marks

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
 - 2.2 Stones-characteristics and requirements of stones as a building materials
 - 2.3 Ceramic materials: ceramic tiles, Mosaic Tile, brick types and testing
 - 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

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- 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
- 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

Section (B): 45 % Marks

- 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. Transportation and Trail Bridge

- 9.1 Transportation system and its classification
- 9.2 Transportation planning: rationale, types and its philosophy
- 9.3 Road transport and road construction in Nepal
- 9.4 Classification of roads in Nepal (NRS and IRC)
- 9.5 General principles of road network planning
- 9.6 Feasibility study of road projects
- 9.7 Alignment, engineering survey and its stages
- 9.8 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
- 9.9 Drainage consideration in roads:
 - 9.9.1 Introduction and design of culverts and minor bridges, cross drainage structures, subsurface drainage system
- 9.10 Special consideration in Hill roads design:
 - 9.10.1 Problems associated with hill roads construction
 - 9.10.2 Route location, hairpin bends and special structures
- 9.11 Road Pavement: Types of pavement and their applicability in hill roads, Design of pavement,
- 9.12 Bioengineering practices along hill side
- 9.13 Activities and techniques in road construction in rural roads
- 9.14 Maintenance, repair and rehabilitation of roads
- 9.15 Basic knowledge on design, construction and maintenance of suspended and suspension bridge in Nepal
- 9.16 Role of social mobilization in rural road development
- 9.17 Low-cost road construction

10. Water Supply and Sanitation

- 10.1 Rural and community based water supply system
- 10.2 Water supply sources and their management
 - 10.2.1 Surface water
 - 10.2.2 Ground water
- 10.3 Selection of source
- 10.4 Water quality and treatment, water demand and supply, source protection
- 10.5 Intakes, collection chamber and break pressure tanks
- 10.6 Reservoir and distribution system
- 10.7 Intakes, Pipeline design, design of transmission and distribution system, reservoir design
- 10.8 Pipe and fittings: Pipe materials, pipe laying and fittings
- 10.9 Operation and maintenance of water supply systems
- 10.10 Sanitation, wastewater and solid waste management:
 - 10.10.1 On-site sanitation system
 - 10.10.2 Types of sewerage system, design and construction of sewers
 - 10.10.3 Types, characteristics, sources, quantity, generation, collection, transportation and disposal of solid wastes
 - 10.10.4 Sanitary landfill, incineration, composting
- 10.11 Environmental health engineering- Epidemiology, pathogens (Bacteria, Virus, Helminthes, Protozoa)

11. **Energy System**
 - 11.1 Hydrological study, planning and design of small hydropower projects
 - 11.2 Head works, dams, spillways, surge tanks, stilling basin
 - 11.3 River diversion works
 - 11.4 Biogas- Introduction
 - 11.5 Alternative energy systems in Nepal
12. **Irrigation and River training works**
 - 12.1 Status of irrigation development in Nepal
 - 12.2 Methods of irrigation and their suitability
 - 12.3 Design of irrigation canals
 - 12.4 Operation and maintenance of irrigation systems
 - 12.5 Management of Farmers managed irrigation system
 - 12.6 Preventive and remedial measures of water logging
 - 12.7 Flood control, its necessity and flood mitigation measures
 - 12.8 River training works
 - 12.9 Specific considerations in design, operation and management of hill irrigation systems
13. **Housing, building and urban planning**
 - 13.1 Present status and practices of building construction in Nepal
 - 13.2 Specific considerations in design and construction of buildings in Nepal
 - 13.3 Indigenous technology in building design and construction
 - 13.4 Local and Modern building construction material in Nepal
 - 13.5 Community buildings: School and hospital buildings and their design considerations
 - 13.6 Urban planning needs and challenges in Nepal
14. **Technology, Environment and civil society**
 - 14.1 Technological development in Nepal
 - 14.2 Promotion of local technology and its adaptation
 - 14.3 Environmental Impact Assessment, Initial Environmental Examination, Global-warming phenomena
 - 14.4 Types of sources of pollution: point / non-point (for air and water)
 - 14.5 Social mobilization in local infrastructure development and utilization in Nepal
 - 14.6 Participatory approach in planning, implementation, maintenance and operation of local infrastructure

Section (C): 10 % Marks

15. **Concept of management**
 - 15.1 Management: concept, scope, functions, principles, and its practices
 - 15.2 Hospital Management : concept, scope, function, principle and its practices
 - 15.3 Communication skills, problem solving and decision making
 - 15.4 Planning, organizing, monitoring and evaluation in health sector
 - 15.5 Participative management
 - 15.6 Social justice and social security system in Nepal
 - 15.7 Positive attitude and self-development
 - 15.8 Demographic characteristic of Nepal

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16. Organizational Knowledge and Professional Practices

- 16.1 B.P.Koirala Memorial Cancer Hospital : History, organizational structure, functions, roles, services, problems and challenges
- 16.2 B.P.Koirala Memorial Cancer Hospital related act and regulations
- 16.3 Ethics and professionalism: code of conduct and guidelines for professional engineering practices
- 16.4 Nepal Engineering Council Act, 2055; and regulations, 2056
- 16.5 Relation with clients, contractor and professionals
- 16.6 Public procurement concept and practices for works, goods and services and its importance
- 16.7 The Constitution of Nepal (From Part 1 to 5, 13, 14, 15, 16, 17, 18, 19 & 20; and Schedules)
- 16.8 Local Government Operation Act, 2074