

बुढीगण्डकी जलविद्युत कम्पनी लिमिटेड
नेपाल इञ्जिनियरिङ्ग सेवा, सिभिल समूह, सातौं तहका करार सेवाका पदहरुको प्रतियोगितात्मक
परीक्षाको पाठ्यक्रम

यस पाठ्यक्रमलाई दुई चरणमा विभाजन गरीएको छः

प्रथम चरण:- लिखित परीक्षा (Written Examination)

पूर्णाङ्क:- १००

द्वितीय चरण:- क) अन्तर्वार्ता (Interview)

पूर्णाङ्क:- २०

प्रथम चरण: लिखित परीक्षा (Written Examination)

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या Xअङ्क	समय
प्रथम	General Subject	Part I: General Awareness Test (२०)	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQS)	१०X २	१ घण्टा
		Part II: General Technical Subject (८०)				४०X २	

द्वितीय चरण: अन्तर्वार्ता (Interview)

पूर्णाङ्क:- २०

पत्र/विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली	समय
अन्तर्वार्ता (Interview)	२०		अन्तर्वार्ता (Interview)	३० मिनेट

- १) लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- २) यस पाठ्यक्रम अन्तर्गतका पत्र/विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- ३) प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

प्रथम खण्ड (Part I)

सामान्य ज्ञान [Part I: General Knowledge] [१०*२=२० अंक]

1. सामान्य ज्ञान:

- 1.1 नेपालको भूगोल, नेपालमा पाइने हावापानीको किसिम र विशेषता, नदीनाला, तालतलैया, पर्वत श्रृंखला, हिमनदी, प्राकृतिक स्रोत साधन, विद्युत सम्बन्धी जानकारी
- 1.2 नेपालमा विद्युत विकास, उर्जाका स्रोत र सम्भावना, विद्युत व्यापार

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1.3 नेपालको संघीय, प्रादेशिक र स्थानीय संरचना तथा शासन प्रणाली सम्बन्धी जानकारी

1.4 Policy, Act and Rules:

- Electricity Regulatory Commission Act, 2074
- Electricity Act, 2049 and Electricity Regulation, 2050
- Public Procurement Act, 2063 and Regulations, 2064
- Memorandum of Association , Article of Association of Budhigandaki Jalbidhyut Company Limited
- Good Governance (Management and Operation) Act, 2064
- Land Acquisition Act, 2034
- Environment Protection Act, 2076 and Environment Protection Regulation, 2077

1.5 Electricity Development in Nepal

- History of power development in Nepal; Electricity supply demand supply
- Hydropower potential of Nepal and prospects and challenges for its development
- Budhi Gandaki Jalbidhyut Company Ltd: objective, functions, corporate structure, achievement and challenges
- Reliable and Equality Electricity Services in Administration Development (Nepal: Prospects and Challenges)

दोस्रो खण्ड (Part II) General Technical Subject [40*2=80]

1. Hydrology and Sedimentology (3 x 2 = 6)

- 1.1 Rainfall, runoff, and their correlation, stream gauging (selection of sites, types of gauges and measurement), rating curve and its uses
- 1.2 Velocity & discharge measurement of stream flow; computation of runoff from a catchment area
- 1.3 Methods of determination the maximum & minimum discharge in a river
- 1.4 Flow duration curve and its application, design discharge, diversion flood, design flood and maximum probable flood
- 1.5 Snowfall and its measurements, glacier hydrology, glacier lake and glacier lake outburst phenomena including glacier lake outburst flood (GLOF)
- 1.6 Sediment: its types, estimation of sediment load in a river, sediment yield, factors that influence sediment yield and its effect in reservoir
- 1.7 Storage reservoir and potential energy; evaporation losses and methods of reducing evaporation losses from a reservoir & reservoir operation study

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2. Hydraulic Engineering (3 x 2 = 6)

- 2.1 Losses in the hydraulic system: head loss, friction loss, local loss, Total head loss; gross head and net head
- 2.2 Principles of open channel flow and pipe flow; Reynold's Number, Froude Number and their usage, Practical applications of open channel flow and pipe flow
- 2.3 Purpose, types, selection as well as hydraulic and structural design of Weirs, dams, spillways, intakes, de-silting basins and gates, Canals, box culverts, siphons, aqueducts and forebay, Tunnels, surge tanks, penstock pipes, anchor blocks and saddle piers
- 2.4 Powerhouse and appurtenant structures
- 2.5 Slope stabilization measures
- 2.6 General layout of different project components
- 2.7 Hydraulic transient analysis
- 2.8 Knowledge of computer aided design and software packages for the design of different components of hydropower project
- 2.9 Shallow foundation and deep foundation
- 2.10 Transmission Line tower foundation

3. Hydro-Mechanical and Electro-Mechanical Installations(3 x 2 = 6)

- 3.1 General knowledge of hydraulic installations such as gates, valves, draft tubes
- 3.2 General knowledge of hydro-mechanical installations
- 3.3 Types of turbines, their usage and selection criteria, concept of specific speed
- 3.4 Need and working principle of governors
- 3.5 General knowledge of electro-mechanical installations
- 3.6 Types of generators and their usage
- 3.7 Need and selection of Transformers and auxiliary equipment
- 3.8 General knowledge on transmission lines and substations

4. Optimization Studies of Hydropower System (3 x 2 = 6)

- 4.1 Concept and philosophy of hydropower system optimization
- 4.2 Optimization of: Dam height, water conveyance system and installed capacity
- 4.3 Concept of firm capacity of the plant, dependable capacity, load factor, utilization factor, diversity factor and plant capacity factor
- 4.4 Firm energy, secondary energy, spill energy, useable energy, load curve and plant outage
- 4.5 Concept of daily poundage basin and its importance for run-off river schemes
- 4.6 Importance of storage type hydropower plants in Nepal

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5. Project Investigation (3 x 2 = 6)

- 5.1 Concept of multipurpose water resources system and its development,
- 5.2 Concept of river basin development and integrated water resource management
- 5.3 Guidelines for the study of hydropower projects in Nepal Stages of project studies and field investigation
- 5.4 Basic idea of: Topographical survey, Geological and geotechnical investigation, Seismological study, Hydro-meteorological investigation and sedimentological investigation
- 5.5 Construction materials and its investigation
- 5.6 Concepts of Initial environmental examination (IEE) and environmental impact assessment (EIA) Studies and their importance in Project development

6. Surveying (3 x 2 = 6)

- 6.1 Basic principles of surveying
- 6.2 Linear measurement techniques, representation of measurement and common scales, sources of errors; effect of slope and slope correction, and its techniques, Introduction to: chain, tape, ranging rods and arrows, and their uses, measurement and scales, sources of errors, effect of slope and its correction, correction for chain and tape measurements, Abney level and clinometers
- 6.3 Leveling and Contouring: principles of leveling, temporary and permanent adjustment of level, bench marks, booking methods and their reductions, longitudinal and cross sections survey, reciprocal leveling, trigonometric leveling, contour interval and their characteristics, method of contouring
- 6.4 Theodolite traversing: Need of traverse and its significance, computation of coordinates, adjustment of closed traverse and closing errors
- 6.5 Principle of triangulation, Computation of area and volume by different methods
- 6.6 Introduction and Use of Total Station and Electronic Distance Measuring Instrument

7. Construction Materials (3 x 2 = 6)

- 7.1 Properties of civil engineering materials: Physical, chemical, thermal and their use in construction
- 7.2 Stones: characteristics and requirements of stones as a construction material
- 7.3 Brick: types and testing of bricks
- 7.4 Ceramic materials: ceramic tiles, Mosaic tiles Cementing materials: types and properties of lime and cement, cement mortar tests
- 7.5 Metals: Steel, types and properties, Alloys of steel
- 7.6 Timber and wood: timber trees in Nepal, types and properties of wood

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8. Concrete Technology (3 x 2 = 6)

- 8.1 Constituents and properties of concrete (physical and chemical) Grade and strength of concrete; effect of properties of constituents on strength of concrete
- 8.2 water cement ratio and its effect on the quality and strength of concrete
- 8.3 Concrete mix design, testing of concrete
- 8.4 Mixing, transportation, pouring and curing of concrete
- 8.5 Use of steel reinforcements concrete and its applicability
- 8.6 General knowledge on mixing, transportation, placement and curing of concrete
- 8.7 Different chemical admixtures in concrete, High strength concrete, green concrete, pre-stressed concrete technology

9. Structural Analysis and Design (3 x 2 = 6)

- 9.1 Types of structures based on the material used
- 9.2 Introduction to: Stress and strain, moment of inertia, theory of flexure and torsion
- 9.3 Analysis of: Beams and frames - bending moment, shear force, deflection of beams and frames
- 9.4 Analysis of Determinate structures by strain energy methods, Analysis of three hinged Arch beam
- 9.5 Analysis of Indeterminate structures by: slope deflection method, moment distribution method, Use of influence line diagrams for simple beams
- 9.6 Concept of reinforced concrete structures, working stress and limit state philosophy
- 9.7 Analysis of reinforced concrete beams and slabs in bending, shear, deflection, bond and end anchorage
- 9.8 Design of axially loaded columns with isolated and combined footings
- 9.9 Concept of pre-stressed reinforced concrete structures
- 9.10 Analysis of steel and timber structures for standard and built-up sections
- 9.11 Elements of a Simple Suspension Bridges
 - 9.12 Design of riveted, bolted and welded connections of steel structures in bending
 - 9.13 Design of simple elements of steel structures: ties, struts, axially loaded and eccentric columns
- 9.14 Design principles of timber: beams and columns

10. Estimating, Specification and Valuation (3 x 2 = 6)

- 10.1 Types of estimates and their specific uses,
- 10.2 Procedure of estimating, building estimates, estimates of other civil engineering structures (main items not covered in building estimates)
- 10.3 Rules and methods of measurement of works and taking out quantities norms and rate analysis
- 10.4 Preparation of abstract of cost and billing Purpose, types and importance of specification

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10.5 Purpose, Principles and methods of valuation of civil engineering structures

11. Basic Drawing Techniques (3 x 2 = 6)

11.1 Fundamentals of Standard drawing sheets and its essential components dimensions and scale etc.

11.2 Drawing tools and equipment

11.3 Concept of drafting conventions and symbols

11.4 Scale, line diagram preliminary drawings, working drawings, etc.

11.5 Orthographic projection, isometric projection/view, pictorial views, and sectional drawing

11.6 Introduction to drawings for: topographic, electrical, mechanical, plumbing and structural work

12. Safety Engineering (3 x 2 = 6)

12.1 Effects of non-ionizing electromagnetic fields on human body: physical effects of electric shocks, safety and precautions, safety rules and regulation, safety tools and devices for electricity

12.2 General knowledge on Safety rules and regulation in the project construction area including

12.3 Safety of storage and handling of explosives; Safety of storage and handling of compressed gases and flammable substances; Necessary precaution for electrical equipment in the premises with explosives such as earthing and shielding technique

12.4 General knowledge of fire hazard, firefighting technique and equipment

12.5 General knowledge on noise hazard, noise hazard sources, its control and effect in health

12.6 General knowledge on first aid technique and requirements for accidental cases

13. Contract Management (2 x 2 = 4)

General knowledge of contractual procedures and management; types of contracts, tender, tender notice, tender documents; contractors' prequalification, evaluation of tenders, selection of contractor, contract acceptance, condition of contract, quotation and direct order, contract packaging, dispute resolution, concept of slicing of contract and its affects Project management:

14. Management and Financial analysis (2 x 2 = 4)

14.1 Use of network models- CPM, PERT, human resource planning and resource scheduling; project monitoring and control; project control cycle

14.2 Financial analysis: Methods of financial analysis such as benefit cost ratio, internal rate of return (EIRR and FIRR), net present value, payback period, minimum attractive rate of return and their Application