

लोक सेवा आयोग
संघीय संसद सेवा, प्राविधिक समूह, राजपत्राङ्कित तृतीय श्रेणी, मेकानिकल इन्जिनियर पदको खुला
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :-	लिखित परीक्षा (Written Examination)	पूर्णाङ्क :- २००
द्वितीय चरण :-	(क)सामूहिक परीक्षण (Group Test)	पूर्णाङ्क :- १०
	(ख) अन्तर्वार्ता(Interview)	पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण : लिखित परीक्षा (Written Examination)

पूर्णाङ्क :- २००

पत्र	विषय	खण्ड	पूर्णाङ्क	उर्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या × अङ्क	समय
प्रथम	General Subject	Part I: General Awareness & General Ability Test	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × १ अङ्क	१ घण्टा ३० मिनेट
		Part II: General Technical Subject					५० प्रश्न × १ अङ्क	
द्वितीय	Technical Subject		१००	४०	विषयगत (Subjective)	छोटो उत्तर लामो उत्तर	४ प्रश्न × ५ अङ्क ८ प्रश्न × १० अङ्क	३ घण्टा

द्वितीय चरण : सामूहिक परीक्षण (Group Test) र अन्तर्वार्ता (Interview)

पूर्णाङ्क :- ४०

पत्र /विषय	पूर्णाङ्क	उर्तीर्णाङ्क	परीक्षा प्रणाली	समय
सामूहिक परीक्षण (Group Test)	१०		सामूहिक छलफल (Group Discussion)	३० मिनेट
अन्तर्वार्ता (Interview)	३०		बोर्ड अन्तर्वार्ता(Board Interview)	-

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथमपत्र र द्वितीयपत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नहरूको हकमा तोकिएको अंकको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- द्वितीय पत्रमा (विषयगत प्रश्न हुनेका हकमा) प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोहीखण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- 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 ।
- प्रथमचरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीयचरणको परीक्षामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएका माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति : - २०७८/०७/२४ मा प्रकाशित विज्ञापन देखि ।

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प्रथम पत्र (Paper I): General Subject

Part (I) : - General Awareness & General Ability Test (50 Marks)

1. **General Awareness and Contemporary Issues** (25 ×1 Mark = 25 Marks)
 - 1.1 Physical, socio-cultural and economic geography and demography of Nepal
 - 1.2 Major natural resources of Nepal
 - 1.3 Geographical diversity, climatic conditions, and livelihood & lifestyle of people
 - 1.4 Notable events and personalities, social, cultural and economic conditions in modern history of Nepal
 - 1.5 Current periodical plan of Nepal
 - 1.6 Information on sustainable development, environment, pollution, climate change, biodiversity, science and technology
 - 1.7 Nepal's international affairs and general information on the UNO, SAARC & BIMSTEC
 - 1.8 The Constitution of Nepal (From Part 1 to 5 and Schedules)
 - 1.9 Governance system and Government (Federal, Provincial and Local)
 - 1.10 Provisions of civil service act and regulation relating to constitution of civil service, organisational structure, posts of service, fulfillment of vacancy and code of conduct
 - 1.11 Functional scope of public services
 - 1.12 Public Service Charter
 - 1.13 Concept, objective and importance of public policy
 - 1.14 Fundamentals of management : planning, organizing, directing, controlling, coordinating, decision making, motivation and leadership
 - 1.15 Government planning, budgeting and accounting system
 - 1.16 Major events and current affairs of national and international importance
2. **General Ability Test** (25 ×1 Mark = 25 Marks)
 - 2.1 **Verbal Ability Test** (8×1 Mark = 8 Marks)
Jumble words, Series, Analogy, Classification, Coding-Decoding, Matrix, Ranking Order Test, Direction and Distance Sense Test, Common Sense Test, Logical Reasoning, Assertion and Reason, Statement and Conclusions
 - 2.2 **Numerical Ability Test** (9×1 Mark = 9Marks)
Series, Analogy, Classification, Coding, Arithmetical reasoning/operation, Percentage, Ratio, Average, Loss & Profit, Time & Work, Data interpretation & Data verification
 - 2.3 **Non-verbal/Abstract Ability Test** (8×1 Mark = 8 Marks)
Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern Completion/Finding, Analytical Reasoning Test, Figure Formation and Analysis, Rule Detection, Water images, Mirror images, Cubes and Dice & Venn-diagram

Part (II) : - General Technical Subject (50 Marks)

1. **Material Science and Metallurgy** (5 marks)
 - 1.1 Types of materials and material selection
 - 1.2 Imperfections in atomic arrangement: Slip and twinning, dislocation, points and surface defects
 - 1.3 Mechanical properties and testing: Tension, Impact, Fatigue and Hardness tests
 - 1.4 Cold working and Hot working
 - 1.5 Types of steels and Cast iron
 - 1.6 Phase transformation and heat treatment: Iron-carbon equilibrium diagram, Hardening, Tempering, Annealing and Normalizing

2. **Fluid Mechanics** (5 marks)
 - 2.1 Fluid properties: Viscosity, Surface tension, Compressibility, Vapor pressure
 - 2.2 Fluid statics: Pressure variations in static fluid, Pressure head, Manometer, Force on submerged surfaces
 - 2.3 Equations of fluid flow: Types of flow, Continuity equation, Bernoulli's equation, and Momentum equation
 - 2.4 Viscous effects: Reynold's number, Laminar and Turbulent flow, Boundary layer, Frictional resistance to flow in pipes, Energy losses in pipes
 - 2.5 Flow measurement: Pitot-static tube, Orifice, Venturimeter, Nozzle and Rotameter

3. **Thermodynamics and Heat Transfer** (7 marks)
 - 3.1 Basic concepts: Thermodynamic system, Thermodynamic property, Pure substance, Laws of thermodynamics, Heat engine, Refrigerator and Heat pump
 - 3.2 Thermodynamic cycles: Carnot cycle, Otto cycle, Diesel cycle, Brayton cycle and Rankine cycle
 - 3.3 IC engines: Classifications, Components, Two-stroke and Four-stroke operations, Performance of IC engines
 - 3.4 Refrigeration: Reversed Carnot cycle, Vapor compression cycle, Absorption refrigeration systems, Refrigerants and their properties
 - 3.5 Air Conditioning: Psychometric properties and Psychometric chart, Heating, cooling, Humidification and dehumidification process, Air conditioning systems
 - 3.6 Modes of heat transfer: Conduction, Convection and Radiation, Heat exchanger: Types and application

4. **Workshop Technology and Metrology** (5 marks)
 - 4.1 Machine tools operation and application: Lathe, Shaper, Milling, Grinding, Drilling and Planing machines
 - 4.2 Numerical Control (NC) and Computer Numerical Control (CNC) machines, NC machine tools, Machine control units, General introduction to CNC programming
 - 4.3 Modern Machining techniques: Ultrasonic machining, Abrasive jet machining, Abrasive water jet machining, Electro chemical machining, Electrical discharge machining, Laser beam machining, Electron beam machining, Plasma arc machining
 - 4.4 Welding: Classification of welding processes, Principles and equipment used in Gas welding, Arc welding, Resistance welding, Thermitt welding, Soldering and Brazing
 - 4.5 Limits, Fits, Tolerances and Gauges

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- 4.6 Measurements: Linear and Angular measurements, Types of measuring instruments
- 4.7 Errors in measurement and calibration
5. **Hydraulic and Electric Machines** (5 marks)
- 5.1 Working principle and characteristic of water turbines: Pelton, Francis, Kaplan and Cross flow turbines
- 5.2 Working principle and Characteristic of Pumps: Centrifugal pump, Reciprocating pump and Hydraulic ram
- 5.3 DC Motors: Shunt field, Series field and Compound field motors, Torque- speed characteristics
- 5.4 DC Generators: Shunt, Series and Compound field machines, Voltage/Speed/Load characteristics, Effects of variable load, Variable torque
- 5.5 Synchronous and Induction Machines: Basic structure of synchronous machines, Generator on isolated load, Generator on large system, Synchronous motor
6. **Instrumentation and Control** (5 marks)
- 6.1 Basic concepts of control system: Classification, Transfer function, Block diagram and Signal flow graph
- 6.2 Sensors and transducers: Mechanical detector-transducer elements, Resistance, variable inductance, Mutual inductance, Capacitive, Piezo-electric, Linear variable differential, Thermoelectric, Hall effect, Photo electric and Photo emissive transducers, Strain gauges
- 6.3 Basic concepts of microprocessors and microcontrollers, their applications
- 6.4 Basic Boolean algebra and numbering systems, Basic logic gates
- 6.5 Control system: Components, Derivatives, Proportional and Integral controllers and their combinations, Hydraulic and Pneumatic control systems, Response characteristics of control systems
7. **Automobile Engineering** (8 marks)
- 7.1 Classification of automobiles and their features, parts and components
- 7.2 Fuel Systems: Fuel system for petrol engine, Fuel injection system for diesel engine
- 7.3 Cooling and lubrication systems for engines
- 7.4 Supercharging and Turbocharging: Working principle of Supercharger and Turbocharger, Advantages and disadvantages
- 7.5 Electrical system: Ignition system, Charging system, Lightings, and Accessories
- 7.6 Chassis layout and frames, Suspension system, Wheels, Tyres and Brakes
- 7.7 Transmission system and Steering system
- 7.8 Automobile emission and its control: Combustion, Constituents of exhaust, Effect of air fuel ratio and Driving mode, Control of automobile emission
- 7.9 Automobile service stations and service procedure: Types of service stations, Location and lay out, Equipment, Tools, Service procedures
- 7.10 Electric Vehicles: Body frame, Battery charging system, Types of battery chargers, Battery: Types and Cooling system
- 7.11 Hybrid vehicles: Technology and types
- 7.12 Vehicle diagnostic tools

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8. **Engineering Economics** (5 marks)
- 8.1 Time Value of Money: Simple interest, Compound interest, Continuous compound interest
 - 8.2 Project Evaluation Techniques: Payback period method, NPV method, Future value analysis, IRR method
 - 8.3 Engineering economics decisions: Benefit and Cost Analysis, Break even analysis, Owning, Leasing and Hiring decision
 - 8.4 Corporate tax system in Nepal
 - 8.5 Depreciation and its types
- 9 **Printing press and water treatment plant** (5 marks)
- 9.1 Printing Press
 - 9.1.1 Basic print media, Printing technology, Printing process and Maintenance of printing machines
 - 9.1.2 Digital printing, Offset printing, Flexography printing, Gravure and Screen printing
 - 9.1.3 Basic principle of imaging technique: Pre-press, Presses
 - 9.1.4 Printing Electronics: Materials, Components
 - 9.1.5 Printing inks: Types of printing inks
 - 9.2 Water treatment plant
 - 9.2.1 Water quality and treatment, Water treatment processes
 - 9.2.2 Stages of water treatment
 - 9.2.3 Problems faced in water treatment and their remedies
 - 9.2.4 Nepal's drinking water quality standard
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