

लोक सेवा आयोग

नेपाल इन्जिनियरिङ्ग सेवा मेकानिकल समूह अन्तर्गतकाजनरल मेकानिकल र निर्माण उपकरण संभार उपसमूहहरूको राजपत्राङ्कित तृतीय श्रेणीका पदहरूको 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 एउटा 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 । परीक्षार्थीले 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 सम्भन्नु 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 : - २०७६/०७/२५

**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 steel
  - 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, boundary layer, frictional resistance to flow in pipes
  - 2.5 Flow measurement: Pitot-static tube, orifice, venturimeter, nozzle, rotameter
  
3. **Thermodynamics and Heat Transfer** (10 marks)
  - 3.1 Basic concepts: Thermodynamic system, thermodynamic property, pure Substance, laws of thermodynamics, heat engine, refrigerator and heat pump
  - 3.2 Refrigeration: Reversed Carnot cycle, vapor compression cycle, absorption refrigeration systems, refrigerants and their properties
  - 3.3 Air Conditioning: Psychometric properties and psychometric chart, heating, cooling, humidification and dehumidification process, air conditioning systems
  - 3.4 Thermodynamic cycles: Carnot cycle, Otto cycle, Diesel cycle, Brayton cycle, Rankine cycle
  - 3.5 IC engines: Classifications, components, two-stroke and four-stroke operations, performance of IC engines
  - 3.6 Modes of heat transfer: Conduction, convection and radiation
  
4. **Workshop Technology and Metrology** (5 marks)
  - 4.1 Machine tools operation and application: Lathe, shaper, milling, grinding, drilling machines
  - 4.2 Metal joining operation and application: Oxy-acetylene welding and arc welding
  - 4.3 Limits, fits, tolerances and gauges
  - 4.4 Linear measurement: Block Gages, length bars, comparators
  - 4.5 Angular measurement: Bevel protractor, sine bar, spirit level, clinometers and angle gauges
  - 4.6 Errors in measurement
  
5. **Advance Machines and Machining Techniques** (5 marks)
  - 5.1 Numerical Control (NC) and Computer Numerical Control (CNC) machines, CNC machine tools, machine control units, general introduction to CNC programming

- 5.2 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
6. **Hydraulic and Electric Machines** (8 marks)
- 6.1 Working principle and characteristic of water turbines: Pelton, Francis, Kaplan and Cross flow turbines
- 6.2 Working principle and Characteristic of Pumps: Centrifugal pump and Reciprocating pump , Hydraulic ram
- 6.3 DC Motors: Shunt field, Series field and Compound field motors, Torque- speed characteristics
- 6.4 DC Generators: Shunt, Series and Compound field machines, Voltage/speed/load characteristics, Effects of variable load, variable torque
- 6.5 Synchronous and Induction Machines: Basic structure of synchronous machines, Generator on isolated load, Generator on large system, Synchronous motor
7. **Instrumentation and Control** (5 marks)
- 7.1 Basic concepts of control system: Classification, transfer function, block diagram and signal flow graph
- 7.2 Sensors and transducers: Mechanical detector-transducer elements, resistance, variable inductance, mutual inductance, capacitive, piezo-electric, linear variable differential, thermoelectric, Hal effect, photo electric and photo emissive transducers, strain gauges
- 7.3 Basic concepts of microprocessors and microcontrollers and their applications
- 7.4 Basic Boolean algebra and numbering systems, basic logic gates
- 7.5 Control system: Components, derivative, proportional and integral controllers and their combinations, hydraulic and pneumatic control systems, response characteristics of control systems
8. **Automobile Engineering** (7 marks)
- 8.1 Classification of automobiles and their features, parts and components of engine
- 8.2 Fuel Systems: Fuel system for petrol engine, fuel injection for diesel engine, petrol fuel injection system
- 8.3 Cooling and lubrication systems for engines
- 8.4 Electrical system : Battery, ignition system, charging system, accessories
- 8.5 Chassis layout and frames, suspension system, wheels, tyres and brake
- 8.6 Transmission system and steering system
- 8.7 Automobile emission and its control: combustion, constituents of exhaust, effect of air fuel ratio and driving mode, control of automobile emission
- 8.8 Automobile service stations and service procedure: types of service stations, location and lay out, equipment, tools, service procedures
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