

नेपालगंज उप-महानगरपालिका

नेपाल इन्जिनियरिङ्ग सेवा अटोमोवाइल्स/मेकानिकल समुह अन्तर्गतका अधिकृत छैठौं तह

पदको खुल्ला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम।

यस पाठ्यक्रमलाई दुई चरणमा विभाजन गरिएको छ।

प्रथम चरण:- लिखित परीक्षा पूर्णाङ्क:- १००

द्वितीय चरण:- अन्तर्वार्ता पूर्णाङ्क:- २०

परीक्षा योजना

| पत्र | विषय | पूर्णाङ्क | उत्तीर्णाङ्क | परीक्षा प्रणाली | प्रश्नसंख्या*अङ्क | समय |
|-------|---|-----------|--------------|----------------------------|-------------------|---------------------|
| प्रथम | General Knowledge, IQ and Technical Subject | १०० | ४० | वस्तुगत बहुवैकल्पिक प्रश्न | १०० प्रश्न*१ अङ्क | १ घण्टा ४५ मिनेट |

(Part I): General Subject (30 Marks)

1. General Awareness and Contemporary Issues

(20 ×1 Mark = 20 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 Functional scope of public services
- 1.11 Public Service Charter
- 1.12 Concept, objective and importance of public policy
- 1.13 Fundamentals of management : planning, organizing, directing, controlling, coordinating, decision making, motivation and leadership
- 1.14 Government planning, budgeting and accounting system
- 1.15 Major events and current affairs of national and international importance

2. General Ability Test (10 ×1 Mark = 10 Marks)

2.1 Verbal Ability Test (3×1 Mark = 3 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 (4×1 Mark = 4Marks)

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 (3×1 Mark = 3 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 (70 Marks)

Paper (II) : - General Technical Subject (70 Marks)

1. Material Science and Metallurgy (10 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 (10 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 (13 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, Hall 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 (12 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
