



**Nepal Rastra Bank**  
**Syllabus for**  
**Mechanical Engineer**  
Contract

## Stages of Examination

- |  |                        |                       |
|--|------------------------|-----------------------|
| 1. <b>First Stage:</b> Written Examination | <b>Full Marks: 100</b> | <b>Pass Marks: 40</b> |
| 2. <b>Second Stage:</b> Interview          | <b>Full Marks: 20</b>  |                       |

**Remarks:**

1. In written examination, questions shall be asked in English.
2. Objective questions will be asked.
3. 20% marks will be deducted for each incorrect answer.
4. The candidates selected from the written examination will be called for the second stage examination.
5. This syllabus is applicable from September 11, 2023.

**First Stage: Written Examination Full Marks: 100 Time : 1 hour**

Examination System	Section	Number of Question and Marks	Marks
<b>Multiple Choice Questions</b>	1	5 questions × 2	10
	2.1	5 questions × 2	10
	2.2	5 questions × 2	10
	2.3	5 questions × 2	10
	2.4	5 questions × 2	10
	2.5	5 questions × 2	10
	2.6	5 questions × 2	10
	2.7	5 questions × 2	10
	2.8	5 questions × 2	10
	2.9	5 questions × 2	10
<b>Total</b>	<b>50 questions × 2 Mark</b>		<b>100</b>

## **1. General Awareness and service related general subject**

- 1.1 Geographical, socio-cultural, economic and demography of Nepal
- 1.2 The Constitution of Nepal
- 1.3 Governance system and Government (Federal, Provincial and Local)
- 1.4 Government planning, budgeting and accounting system
- 1.5 Major events and current affairs of national and international importance
- 1.6 Banking and financial sector of Nepal
- 1.7 Nepal Rastra Bank : history, objectives, organizational structure and functions
- 1.8 Current Macroeconomic situation of Nepal
- 1.9 Minting in Nepal: history, current scenario and coins in Nepal

## **2. Technical Subject**

### **2.1 Machine Design and Drawing**

- 2.1.1 Design analysis: Types of loads and stresses, theories of failure, factor of safety.
- 2.1.2 Design of machine components: Design of parts subjected to tension, compression, shear, bending, design of shafts, keys, splines, couplings, fasteners, power screws, helical compression springs, knuckle joints, riveted joints and welded connections.
- 2.1.3 Design of power transmission elements: Belt drives, selection of flat and V belts, design of pulleys and flywheels, design of gear drives, spur, helical, bevel and worm gear drives.
- 2.1.4 Design of bearings: Hydrodynamic journal bearings, pressure fed and self-contained bearings and rolling contact bearings .
- 2.1.5 Load lifting devices: Selection of steel wire ropes for hoists and cranes, crane hooks, design of hook block, sheaves and rope winding drums.
- 2.1.6 Pressure vessels: classification, material selection, loads and types of failures.

### **2.2 Industrial Engineering**

- 2.2.1 Plant location and layout: Factors affecting location of factory plant building and service facilities, product or line layout, process or functional layout and fixed position layout.
- 2.2.2 Production planning and inventory control: Forecasting techniques- time series, moving average, exponential smoothing, trend and seasonality. Inventory functions, cost, classification, deterministic and probabilistic inventory models.
- 2.2.3 Operation research: Linear programming, problem formulation, simplex method, duality and sensitivity analysis, transportation and assignment models, PERT and CPM methods of project management.

2.2.4 Quality Management: Concept of quality, statistical quality control, acceptance sampling, zero defects, six sigma, quality circle, quality assurance, total quality management.

2.2.5 Safety: Workplace hazards and risks, hazard identification and risk assessment, risk control, causes and prevention of accidents, fire prevention and firefighting equipment, electrical safety, safe handling of chemicals, material handling and material safety data sheets.

### 2.3 **Maintenance Management.**

2.3.1 Maintenance: Reliability, maintainability, total life cycle, routine, fixed time, break down and shut down maintenance, maintenance work load and budget, documentation and recording, maintenance audit.

2.3.2 Preventive and Predictive maintenance: Condition monitoring, signature analysis, online and off-line maintenance, non-destructive test, wear particles and oil analysis, thermography, scanning electron microscope.

2.3.3 Tribology: Surfaces, friction and wear, lubrication, surface topography measurement.

2.3.4 Total Productive Maintenance (TPM): Types of losses, measures to control losses, basics of TPM, cost estimation and safety measures.

### 2.4 **Environmental engineering**

2.4.1 Air Pollution: Pollution from combustion and atmospheric pollution, types of pollutants, sources of pollutants, particulate control, control of gaseous pollutants, indoor air pollution control .

2.4.2 Noise Pollution: Measurement of noise, noise control.

2.4.3 Water Pollution: Causes and effects, Waste water treatment.

2.4.4 Solid Waste Management: Recycling, energy recovery, incineration, land filling

2.4.5 Global impacts: Green-House Effect, acid rain, climate change, ozone layer depletion.

### 2.5 **Energy Resources:**

2.5.1 Energy consumption scenario of Nepal, commercial and non-commercial energy resources.

2.5.2 Hydroelectricity, national potentials, achievements and utilization.

2.5.3 Solar energy and its applications: Solar thermal, solar photovoltaic.

2.5.4 Biomass energy, wind energy.

2.5.5 Methods of enhancing energy efficiency & energy conservation.

## 2.6 **Engineering Economics**

- 2.6.1 Time Value of Money: Simple interest, Compound interest, Continuous compound interest.
- 2.6.2 Project Evaluation Techniques: Payback period method, NPV method, Future value analysis, IRR method.
- 2.6.3 Engineering economics decisions.
- 2.6.4 Corporate tax system in Nepal.
- 2.6.5 Depreciation and its types.

## 2.7 **Professional Practice**

- 2.7.1 Ethics and Professionalism: Perspectives on morals, codes of ethics and guidelines of professional engineering practice, Nepal Engineering Council Act and Rules.
- 2.7.2 Procurement and procurement procedure, Public Procurement Act, Rules and Guidelines in Nepal.
- 2.7.3 Contemporary issues in engineering.

## 2.8 **Construction Equipment, Planning and Management**

- 2.8.1 Construction equipment, their types and uses: Earthmoving equipment, Hauling equipment, Hoisting equipment, Finishing equipment, Drilling equipment, Blasting equipment, Tunneling equipment, Pile driving equipment .
- 2.8.2 Equipment life and replacement procedures: Physical life, profit life, economical life, replacement analysis, replacement decision making.
- 2.8.3 Planning of equipment: Equipment selection, fleet standardization, resources management for operation, maintenance and service facilities.

## 2.9 **Lubrication and journal bearings**

- 2.9.1 Types of lubrication, viscosity and charts.
- 2.9.2 Petroff law, stable lubrication, thick film lupr.
- 2.9.3 Hydrodynamic theory.
- 2.9.4 Design consideration for journal bearing
- 2.9.5 Minimum film thickness.
- 2.9.6 Coefficient of friction, lubricant flow, film pressure and temperature rise, temp and viscosity consideration.
- 2.9.7 Optimization techniques.