

**Nepal Airlines Corporation**  
**Syllabus for Technical Officer Grade- VI**  
**General Technical Services**  
**Internal Competition**

**Stages and Procedure of Examination System**

**First Stage: Written Examination - Full Marks 200**

Weightage Allocation and Marks Distribution

S.No.	Paper	Subject	Time	Full Mark	Section	Marks
1	I	General Knowledge, Institutional Awareness and Management	3 Hrs.	100	Section "A" General Knowledge	Multiple Choice Questions 25x2=50
					Section "B" Institutional Awareness and Management	Short Answer Questions 8x5=40 Long Answer Questions 1x10=10
2	II	Service Related	45 Min.	100	Multiple Choice Questions	50x2=100

**Second Stage - Interview**

Individual Interview

Full Marks – 30

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी वा दुवै हुनेछ ।
२. प्रथम, द्वितीय र तृतीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
३. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाइबाट प्रश्नहरू सोधिनेछ ।
४. 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 ।
५. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तर पुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डका उत्तर पुस्तिकामा लेख्नुपर्नेछ ।
६. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मितिभन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
७. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
८. यस भन्दा अगाडि लागू भएका माथि उल्लिखित सेवा/समूहको पाठ्यक्रम खारेज गरिएको छ ।
९. पाठ्यक्रम लागू मिति :- २०७९।०५।०४

**Paper I**  
**General Knowledge, Institutional Awareness and Management**

Full Marks: 100

Time: 3 Hrs.

**Section: A (General Knowledge 25x2=50 Marks)**

**1.1 Geography of Nepal and the World (10 Marks)**

1.1.1 Continent, Ocean, Pole, Latitude, Longitude, Time, Distance, Mountains, Deserts, Rivers, Glaciers, Lakes, Climate, Trade Winds, Monsoon

1.1.2 Physical, Socio-cultural and Economic Geography, Major Natural Resources and Demography of Nepal

**1.2 History and Culture (10 Marks)**

1.2.1 Major Historical Events of the World

1.2.2 Notable Events, Personalities and Socio-cultural Aspects of Ancient, Medieval and Modern History of Nepal

1.2.3 Customs, Traditions, Values, Religions, Ethnicity, Languages, Cultures, Arts, Literature, Music and Heritages of Nepal

**1.3 Economic Aspects of Nepal (10 Marks)**

1.3.1 Economic Indicators (Economic Growths, GDP, GNP, Per Capita Income, Remittance, Foreign Aid and Investment)

1.3.2 Infrastructures of Development (Agriculture, Industry, Trade, Tourism, Transportation, Communication, Health, Electricity)

1.3.3 Government Planning and Budgeting

**1.4 Governance and Organizations (10 Marks)**

1.4.1 The constitution of Nepal; Federal Provincial and local governance

1.4.2 General information about UNO, WTO, ICAO, WB, ADB, AIIB, SAARC and BIMSTEC

**1.5 Contemporary Issues (10 Marks)**

1.5.1 Information on sustainable development, environment, pollution, climate change, biodiversity, demography, Urbanization, Science and technology

1.5.2 Recent advanced and major achievements in Aviation Sector

1.5.3 Major events and current affairs of national and international importance

**Section B: –Institutional Awareness and Management (25x2=50 Marks)**

**2. Management Concepts (1x10) + (4x5) = 30 Marks**

2.1. Concept of Management, modern approaches to management

2.2 Vision Mission, Goal, Objectives, Targets, Strategies, Organization Structure

2.3 Authority and power Delegation, Leadership, Control, Coordination, Motivation, Team Work and Group dynamics

2.4 Managing workforce diversity and appreciative inquiry

2.5 Quality management and TQM Techniques

2.6 Time management, conflict management, crisis management, stress management, customer care

2.7 Outsourcing, inventory control

2.8 Job description, training, performance evaluation system

2.9 Corporate and strategic planning and management, corporate social responsibility

2.10 Ethics, integrity and accountability

**3. Institutional Awareness (4x5=20 Marks)**

3.1 History of Civil Aviation in Nepal

3.2 Nepal Airlines Corporation: Introduction, Objective and Scope

3.3 Current Employees' Service and Conditions Regulation of NAC (Leaves, Conducts, Discipline and Disciplinary Actions)

3.4 Corruption Control Act, 2059

3.5 Functions, Duties and Rights of Ministry of Culture, Tourism and Civil Aviation

3.6 Functions, Duties and Rights of Civil Aviation Authority of Nepal

## Paper II

### Subject: Service Related

Full Marks: 100 (Multiple Choice Questions 50x2)

Time: 45 Minutes

#### 1. Workshop and Maintenance Practices

(5x2=10 Marks)

##### 1.1 Bench Tools and Basic Hand Operations

- 1.1.1 Familiarization with tools and their use
- 1.1.2 Types of screw drivers
- 1.1.3 Classification of files
- 1.1.4 Types of pliers and cutters
- 1.1.5 Soldering and brazing equipment

##### 1.2. Machine Shop Practice:

- 1.2.1. Accident Prevention and Safety Precautions in Machine Shop.
- 1.2.2. Limits, Fits and Tolerances: (Definitions, System and Uses), Representation in engineering drawing.

##### 1.3. Measuring and Gauging:

- 1.3.1. Semi-precision tools such as rules, scales, try square, inside/outside calipers, depth gauge, feeler gages
- 1.3.2 Precision tools such as micrometers, vernier calipers, vernier height gages, telescoping gages, hole gages, bevel protractors, dial indicators, gage blocks and surface plates
- 1.3.2 Engineering drawings, diagram & standards: orthographic projection. First Angle & third angle, isometric and oblique projection. Wiring diagrams & schematic diagrams Standard conventions, symbols and legends, scale and dimensioning. Specific Symbolic representation, limit/fits/tolerances

#### 2. Electronic Fundamentals and semi conductors

5x2=10 Marks

- 2.1 Diode, Symbols, characteristics and properties, main characteristics and use of silicon controlled rectifiers (SCR thyristors), LED, photo conductive diode, varistor, rectifier diode, functional testing of diodes, Zenner Diode.
- 2.2 Transistors symbols, component description, transistor characteristics and properties of transistor, testing of Transistors.
- 2.3 Integrated circuit (IC)
- 2.4 Description and operation of logic circuits and linear circuit, operational amplifier used as: integrator, differentiator, voltage follower, comparator, advantage and disadvantage of positive and negative feedback
- 2.5 Printed circuit boards: description and use of PCB

#### 3. Engineering Economics

5x2=10 Marks

- 3.1 Introduction
  - 3.1.1 The role of engineers in organization
  - 3.1.2 Types of engineering decisions.
  - 3.1.3 The elements of cost.
  - 3.1.4 Direct and indirect costs
  - 3.1.5 Overhead cost allocation.

- 3.2 Project Evaluation Techniques
  - 3.2.1 Payback period.
  - 3.2.2 Benefit and flaws of payback period method.
  - 3.2.3 Net Present Value (NPV) Criterion
  - 3.2.4 The meaning of Net Present Value
  - 3.2.5 Future value and annual equivalent analysis
- 3.3 Investment Decisions
  - 3.3.1 Independent and dependent projects
  - 3.3.2 Multiple alternative comparison by NPV method
  - 3.3.3 Multiple alternative comparison by IRR Method

**4. Technological Management: 5x2=10 Marks**

- 4.1 Production process and Productivity, Concept of Time and motion study
- 4.2 Materials Handling. (Safe and Efficient handling Procedures)
- 4.3 Quality Control: Objective and Importance, TQM Concept and application.
- 4.4 Inventory Management: Meaning and Necessity: EOQ Models
- 4.5 Estimating and Costing: Estimating and Costing of Jobs and Services/ Calculations
- 4.6 SOP of jobs/services (Concept and benefits): Requirement of SOP
- 4.7 Rules and Regulations of General Technical Activities

**5. Industrial Hygiene and safety: 5x2=10 Marks**

- 5.1 Industrial Environment: Health Hazards and Their Prevention.
- 5.2 Pollution in Industrial Environment (Air Pollution, Industrial Vibration, Noise Pollution, Radiations).
- 5.3 Electrical Accident Prevention ( Electrocutation/Electrical fires /Short Circuits )
- 5.4 Industrial Lighting and Ventilation ( Concept)
- 5.5 Fire Protection.
  - 5.5.1 Fire Hazards and principles of prevention
  - 5.5.2. Storage of Explosives and flammable inventories
  - 5.5.3 Fire Alarm System (Basic Concept and Operating Techniques)
  - 5.5.4. Suppression of fire and firefighting equipment
- 5.6. Chemical handling: Effects of Toxic Materials. Store of Toxic Materials
- 5.7 Safety Requirements of industrial Equipment and Processes: Machine Guarding, Operating Controls, Safeguards, Interlocks, signals and Colors, Hoisting, Loading and Handling Mechanisms/ Procedures.
- 5.8. Three types Safety (Personal/Equipment/Job)

**6. Metrology( Measurement Techniques) 5x2=10 Marks**

- 6.1 Standard, Units of Measurement used in Engineering Practices.
- 6.2 Measuring Instruments (Construction, Types, Applications and Care).
  - 6.2.1 Measurements: Precision and Non-precision.
  - 6.2.2 For Surface Level, Surface Straightness Measurements: Spirit Level, Straight Edge, etc.
  - 6.2.3 Graduation. (Calibration) and Reading of Measuring Instruments.
  - 6.2.4 Error, its Types and Measurement - of Errors

**7. Electrical Fundamentals 10x2=20 Marks**

- 7.1 Basic Concept of Electricity
  - 7.1.2 Electric charge and current

- 7.1.3 Conventional versus electron flow
- 7.1.4 Potential difference and electromotive force
- 7.1.5 Conductors, insulators and electron flow
- 7.1.6 Resistance and its variation with temperature and related numerical
- 7.1.7 Direct and alternating current Unit
- 7.2 Electric Circuit Fundamentals
  - 7.2.1 Circuit elements: Resistor, Inductor, Capacitor
  - 7.2.2 Electric current and voltage: definition and explanation.
- 7.3 Series and Parallel Circuits
  - 7.3.1 Resistive circuits with dc excitation
  - 7.3.2 Resistor in parallel, resistors in series
  - 7.3.3 Potential drop and potential rise
  - 7.3.4 Circuits fed from voltage sources, from current sources
  - 7.3.5 Output resistances of sources and effects on terminal characteristics
  - 7.3.6 Power and energy considerations in dc circuits
- 7.4 Kirchhoff's Laws
  - 7.4.1 Kirchhoff's loop voltage and branch current laws for DC circuits
  - 7.4.2 Loop and nodal formulations of circuit equations
  - 7.4.3 Matrix Method of writing and solving simultaneous equations of networks
- 7.5 Network Analysis Theorems
  - 7.5.1 Maximum power transfer
  - 7.5.2 Thevenin's equivalent circuit
  - 7.5.3 Norton's equivalent circuit
  - 7.5.4 Reciprocity
- 7.6 Single phase AC Circuit analysis
  - 7.6.1 Series, parallel and network circuits with ac excitation and resistances only
  - 7.6.2 The concept of complex impedance and admittance
  - 7.6.3 Sinusoidal excitation of inductive and capacitive reactances and complex impedances.
  - 7.6.4 Concept of time phase differences between various sinusoidal quantities
  - 7.6.5 Sinusoidal waveform and phasor representation of AC quantities
- 7.7 Power and energy in AC Circuits
  - 7.7.1 Effective value of sinusoidal and other waveforms of voltages and currents
  - 7.7.2 Power and energy balances in ac excited circuits containing various combinations of resistors, capacitors and inductors.
  - 7.7.3 Instantaneous power, average real power, reactive power, power factor
  - 7.7.4 Measurement of real and reactive power
- 7.8 Three Phase Circuit Analysis
  - 7.8.1 AC circuits with several ac sources
  - 7.8.2 The three phase excitation case
  - 7.8.3 Phase relationships between line and phase quantities in three phase circuits
  - 7.8.4 Real and reactive power in three phase circuits
  - 7.8.5 Measurement of real and reactive power
  - 7.8.6 Single phase representation of balanced three phase circuits
  - 7.8.7 Power factor and power factor correction
- 7.9 DC Motor/Generator
  - 7.9.1 Basis motor and generator theory
  - 7.9.2 Construction and purpose of components in DC generator, series wound, shunt wound and compound motors starter generator construction.

**8. Probability and Statistics**

**5x2=10**

- 8.1** Descriptive Statistics and Basic Probability
  - 8.1.1** Introductions in statistics and its importance in engineering

- 8.1.2 Describing data with graphs (bar, pie, line diagram, box plot)
- 8.1.3 Describing data with numerical measure (measuring center, measuring variability)
- 8.1.4 Basic probability additive law, multiplicative law, Baye's theorem

## 8.2 Discrete Probability Distribution

- 8.2.1 Discrete random variable
- 8.2.2 Binomial probability distributions
- 8.2.3 Negative binomial distribution
- 8.2.4 Poisson distribution
- 8.2.5 Hyper geometric distributions

## 8.3 Continuous Probability Distributions

- 8.3.1 Continuous random variable and probability densities
- 8.3.2 Normal distribution
- 8.3.3 Gamma distribution
- 8.3.4 Chi-square distribution

## 8.4 Sampling Distribution

- 8.4.1 Population and sample
- 8.4.2 Central limit theorems
- 8.4.3 Sampling distribution of sample mean
- 8.4.4 Sampling distribution of sampling proportion

## 8.5 Correlation and regression

- 8.5.1 Least square methods
- 8.5.2 An analysis of variance of linear regression model
- 8.5.3 Inferences concerning least square method
- 8.5.4 Multiple correlation and regression

## 8.6 Inference concerning mean

- 8.6.1 Point estimation and interval estimation
- 8.6.2 Test of hypothesis
- 8.6.3 Hypothesis test concerning one mean
- 8.6.4 Hypothesis test concerning two mean
- 8.6.5 One way ANOVA

## 8.7 Inference concerning proportion

- 8.7.1 Estimation of proportions
- 8.7.2 Hypotheses concerning one proportion
- 8.7.3 Hypotheses concerning two proportions
- 8.7.4 Chi-square test of independence

## 8.8 Application of computer on statistical data computing

- 8.8.1 Application of computer in computing statistical problem e.g. Scientific
- 8.8.2 Calculator, EXCEL, SPSS, Matlab, etc.

## 9. Thermodynamics 5x2=10

### 9.1 Thermodynamic Properties

- 9.1.1 closed systems
- 9.1.2 open systems
- 9.1.3 working substances
- 9.1.4 the pure substance; properties and state

### 9.2 First law of Thermodynamics

- 9.2.1 Thermodynamic cycle; equivalence of heat and work

9.2.2 Control Volumes

9.2.3 Non flow and steady flow system

9.3 Second Law of Thermodynamics

9.3.1 Heat Engine and Refrigerator, Convertibility of heat and work, efficiency

9.3.2 Kelvin-Planck Statement of second law

9.3.3 Clausius statement of second law

9.3.4 Application to processes; Clausius Inequality

9.3.5 Entropy; entropy of pure substance, entropy change for reversible and irreversible processes; entropy change for an ideal gas

9.3.6 Second Law for a control volume

9.3.7 Processes; steady-state, steady flow, Uniform-state, uniform flow

**9.4 Conservation of Energy**

9.4.1 Measuring potential, kinetic and internal energy

9.4.2 Heat and Thermal Equilibrium

9.4.3 Enthalpy Applied to the steady flow energy equation

**9.5 Processes for an ideal Gas**

9.5.1 The ideal gas and equation of state

9.5.2 Specific heat; Constant volume  $C_v$ ; Constant Pressure  $C_p$

9.5.3 Boyle's Law and Charles's Law

9.5.4 The gas constant and relationship between  $C_p$  and  $C_v$

9.5.5 Internal energy and enthalpy

9.5.6 Constant volume and constant pressure process for the P-V and T-s Planes

9.5.7 Isothermal process

9.5.8 Adiabatic and Isentropic process on T- $\phi$  diagrams; relationship among p, V and T and work and heat, polytropic Specific heat.