

Nepal Airlines Corporation
Syllabus for Senior AME (Avionics) Grade VIII
Aircraft Maintenance Service
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	Institutional Awareness and Management	3 Hrs.	100	Section "A" Institutional Awareness	Long Answer 5x10=50
					Section "B" Management	Long Answer 5x10=50
2	II	Service Related	45 Min.	100	Multiple Choice Questions	50x2=100

Second Stage - Interview

Individual Interview

Full Marks - 30

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी वा दुबै हुनेछ ।
- प्रथम, द्वितीय र तृतीयपत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाइबाट प्रश्नहरू सोधिनेछ ।
- 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 ।
- विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तर पुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डका उत्तर पुस्तिकामा लेख्नुपर्नेछ ।
- 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 ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएका माथि उल्लिखित सेवा/समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति :- २०७९।०१।०४

Paper I

Subject: Institutional Awareness and Management

Full Marks: 100

Time: 3hrs.

खण्ड (क) :- संस्थागत ज्ञान (५० अङ्क)

१. संस्थागत ज्ञान (३x१०=३० अङ्क)

- १.१ नेपाल वायुसेवा निगमको स्थापनाको उद्देश्य, संगठनात्मक संरचना, कार्यक्षेत्र, SWOT Analysis, समस्या र चुनौती
- १.२ नेपाल वायुसेवा निगमको पुनर्संरचनाको आवश्यकता र औचित्य
- १.३ नेपाल वायुसेवा निगमबाट प्रवाह हुने सेवाको गुणस्तर, गुणस्तर नियन्त्रण तथा सेवाग्राहीको सन्तुष्टि तथा सेवाको मूल्य निर्धारण सम्बन्धी व्यवस्था
- १.४ अन्य वायुसेवाहरु सँगको प्रतिस्पर्धा, चुनौती तथा भावी कार्यदिशा
- १.५ अन्तर्राष्ट्रिय नागरिक उड्डयन संगठनको स्थापना, लक्ष्य तथा उद्देश्य
- १.६ नेपाल नागरिक उड्डयन प्राधिकरणको स्थापना, लक्ष्य, उद्देश्य, कार्यहरु र नियमनकारी भूमिका
- १.७ नेपालमा सार्वजनिक संस्थानको आवश्यकता, उद्देश्य, स्वायत्तता, उत्तरदायित्व, समस्या र चुनौती
- १.८ संस्थागत सुशासनको अवधारणा र नेपाल वायुसेवा निगमको संस्थागत सुशासनको अवस्था
- १.९ आवधिक योजनामा हवाई क्षेत्र
- १.१० नेपाल वायुसेवा निगमको नेपाल सरकार तथा सम्बद्ध निकायहरुसँगको सम्बन्ध र समन्वय

२. संविधान र सम्बद्ध कानूनहरु (२x१०=२० अङ्क)

- २.१ नेपालको वर्तमान संविधान
- २.२ नेपाल वायुसेवा निगम ऐन, २०१९
- २.३ नेपाल वायुसेवा निगमका कर्मचारीहरुको सेवा, शर्त सम्बन्धी विनियमावली र आर्थिक विनियमावली
- २.४ भ्रष्टाचार निवारण ऐन, २०५९
- २.५ आवश्यक सेवा सञ्चालन ऐन, २०१४
- २.६ सुशासन (व्यवस्थापन तथा सञ्चालन) ऐन, २०६४ र सुशासन (व्यवस्थापन तथा सञ्चालन) नियमावली, २०६५
- २.७ सूचनाको हक सम्बन्धी ऐन, २०६४
- २.८ सार्वजनिक खरिद ऐन, २०६३

खण्ड (ख) :- व्यवस्थापन (५० अङ्क)

3. General Management 3x10=30 Marks

- 3.1 Modern Approaches to Management
- 3.2 Motivation, Leadership, Control, Coordination and Team Work
- 3.3 Role of Manager and Managerial Functions
- 3.4 Managerial Decision Making and Problem Solving
- 3.5 Managing Workforce Diversity
- 3.6 Succession Planning
- 3.7 Quality Management and TQM Techniques

- 3.8 Corporate Planning, Strategic Management and Corporate Social Responsibility
- 3.9 Forces of Organizational Change
- 3.10 Resistance to Change and Overcoming the Resistance to Change
- 3.11 Concept and Characteristics of Organizational Development
- 3.12 Stress Management
- 3.13 Crisis Management

4. Management Information System (MIS) 1x10=10 Marks

- 4.1 Information and Decision Making
- 4.2 Role and Importance of MIS
- 4.3 Managers and Environment
- 4.4 Management as a Control System
- 4.5 System View of Business
- 4.6 Impact of Information System in the Organization and the Society
- 4.7 MIS as a Tool for Management Process
- 4.8 Basic Knowledge of IT
- 4.9 Role of IT in Employee and Organizational Performance
- 4.10 Use of IT in HRM and Accounting System of Nepal Airlines Corporation
- 4.11 ERP (Enterprise Resource Planning)

5. Project Management and Project Evaluation 1x10=10 Marks

- 5.1 Project Concept, Objectives, Project Implementation Schedule, Project Implementation Alternative Solutions and Project Leadership
- 5.2 Preparation of Cost Estimate and Budget, Variation in Project Cost, Opportunity Cost Concept, Incremental Cost and Revenue Analysis, Cost Benefit Analysis, Present Value of Project Cost, Internal Rate or Return, Average Rate of Return and Investment, Network, Cost of Capital

Paper II
Service Related

Full Mark: 100 (Multiple Choice Questions 50x2)

Time: 45 minutes

Part I. Human Factors (8x2=16 Marks)

- a) General; Need to take Human Factor into account, incidents attributable to human factor/human error, Murphy's law.
- b) Human factor performance and limitations, vision, hearing, information processing; attention & perception; memory, claustrophobia & fear of heights.
- c) Social psychology, social environment, responsibility individual & group; motivation and de-motivation, peer pressure, culture issues, team working, management, supervision and leadership.
- d) Factors affecting performance: Fitness/health, stress:-domestic and work related, time pressures and deadlines, workload, overload & under load, sleep and fatigue, shift work, alcohol, medication, drug abuse.
- e) Physical environment: Noise, fumes, illumination, climate & temperature, motion and vibration, confined spaces, working environment.
- f) Tasks: Physical work, repetitive tasks, visual inspection, complex systems
- g) Communication: within and between team, work logging and recording, keeping update, currency, dissemination of information.
- h) Human error: understanding human error, Error models & theories, Types of error in maintenance tasks: implications of error, avoiding and managing errors.
- i) Hazards in the workplaces
- j) Summary: Dirty dozen aviation errors (put safety first and minimize 12 common causes of mistakes in the aviation workplace)
- k) Hazard identification and Risk Management.
- l) Safety Management System.

Part II. Aviation Legislation (8x2=16 Marks)

- a) Regulatory framework
Role of ICAO/ Role of CAA Nepal (CAAN)
General understanding of CAAN Regulations
Relationship between NCAR Part -145, NCAR-Part 66, NCAR Part-147 and NCAR Part – M
Relationship with other Aviation Authorities
- b) NCAR Part 66- Certifying Staff- Maintenance
- c) NCAR Part 145 – AMO, CAMMOE, Approved maintenance organization(Continuing Airworthiness Management and Maintenance Organization Exposition)- Organization Structure, management and working procedure- general understanding
- d) Commercial Air Transportation Air operators certificate (AOC)

Operators Responsibility Documents

to be carried on board Aircraft

placarding / Marking.

- e) Aircraft certification
 - i) General certification rules
 - ii) Type certification
 - iii) Supplemental type certification
 - iv) NCAR Part-21 Design/ Production Organization Approvals Documents:
 - C of A
 - C of R
 - Noise Certificate
 - Weight & Balance
 - Radio station License Approval (RML)
- f) NCAR Part-M Detailed understanding of Part M
- g) Applicable national and substantial requirements
 - Maintenance Program (CMP) (Customized Maintenance Programme)
 - Maintenance checks and inspection
 - MMEL, MEL, DDG, AD, SB, SI, Mods and repairs
 - Maintenance documentation MM, SRM, IPC etc.
- h) Continuing Airworthiness
 - Test flight, ETOPS, maintenance and dispatch requirements, All weather Ops.
 - Cat 2/3 and minimum equipment requirements, RVSM/ RNAV.

Part III. Aviation General Knowledge (5x2=10 Marks)

- a) Physics of the atmosphere, International Standard Atmosphere (ISA)
- b) Aerodynamics, Airflow, Boundary layer, laminar & turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation
 - Terms: camber, chord, mean aerodynamic chord, profile & parasite drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fitness ratio, wing shape and aspect ratio, thrust, weight, aerodynamic resultants, generation of lift and drag, lift coefficient, drag coefficient, polar curve, stall (angle of attack), Aero foil contamination including ice, snow, frost.
- c) Theory of flight: relationship between lift, weight, thrust & drag. Glide ratio, steady state flights performance, theory of the turn, influence of load factor, stall, flight envelope and structural limitations, lift augmentation
- d) Flight stability and dynamics:
 - Longitudinal, lateral and directional stability
- e) Wing design, Aerodynamic and structural requirements, Aspect Ratio, plan form, sweep back, Delta wing design of subsonic, trans sonic and supersonic planes.
- f) Engines: Piston engine, Turbine engine, Types and their principles.

Part IV. Communication & Navigation and aircraft systems (Avionics) (ATA 23/34) (14x228 Marks)

- a) Fundamental of radio wave propagation.
- b) Characteristic, propagation at LF, MF, HF, VHF, SHF.
- c) Polarization , properties of ionosphere, refraction, absorption, skip distance, reflection, fading, scatter, cyclic and irregular variations in the ionosphere
- d) Properties of troposphere, temperature inversion.
- e) Relationship between velocity of propagation frequency and wavelength, field strength.
- f) Frequency tolerance and stability.
- g) Antennas: half and quarter wave antennas current and voltage distribution, impedance, methods of feed, polarization , effective height, radiation pattern.
- h) Gain, bandwidth, side bands, advantage of SSB equipment, antennae tuning and loading (Antenna Coupler). SWR . Antenna losses, Magnitude of RF voltages, types of insulators used at HF and precaution to be used with lead – ins. (disc) parabola and plate antenna for SHF transmission lines and wave guides: characteristics, impedance, standing waves, WSR and its measurement, impedance matching balanced and unbalanced transmission lines ,losses, transfer of energy in waveguides, bends & joints, loop and sense antennas. HF and VHF communication (Air Band)
- i) Radio transmitter – Functional block diagram, stages, oscillator, and crystal controlled variable frequency, frequency stabilization, modulation, types of modulators, RF amplifiers.
- j) Radio receiver: functional diagram & stages
- k) Working principles of following systems
 - l) VHF communication
 - m) VR communication
 - n) Audio ICS
 - o) ELT
 - p) CVR
 - q) ADF
 - r) VOR
 - s) DME
 - t) ILS
 - u) Headsets and microphones
 - v) In-flight entertainment systems (Music/Video)
 - w) Area navigation RNAV system
 - x) FMS
 - y) GPS
 - z) INS
 - aa) ATC transporter, secondary surveillance radar.
 - bb) TCAS (Traffic Alert & Collision Avoidance System)
 - cc) W^X avoidance radar
 - dd) Radio altimeter
 - ee) ARINC communication and reporting
 - ff) ACARS

gg) EGPWS

hh) Electrical Power: (ATA 24) Batteries, installation and operation. (Various types), DC power generation, AC power generation, Emergency Power, Voltage regulation, power distribution, Inverters, transformers, rectifiers, Circuit Protection, External ground power unit (GPU).

ii) Auto flight; (ATA 22) Fundamentals and auto flight control including, working principles and current terminology, Command signal processing, Mode of operation, Roll, Pitch, and Yaw channels, Yaw Dampers (Dutch Rolling), Auto trim controls, Autopilot navigation aids interface, Auto throttle system, Auto landing system principle and categories, modes of operation, approach, glideslope, land, go around, system monitors and failure condition.

jj) Fire/Smoke detection ATA26: Detection and warning system, extinguishing system.

kk) Inspection and test

ll) Fuel System ATA28. Fuel supply system, dumping, venting and draining, cross feed, transfer and balancing, indication and warning, refueling and defueling, fuel hazard and fuel tank pressurization with N2.

mm) Instruments, indicating and recording; ATA31./ Pitot Static System, altimeter, VSI, ASI, Machmeter.

nn) Altitude reporting and alerting system, Airdata computers, Direct reading pressure and temperature gauges, Gyro principles, Artificial Horizon, Turn and Bank Indicator, Directional gyro, Compass systems, EGPWS, FDR, EFIS, Instrument warning system, centralized warning system panel, stall warning system, Angle of attack indicating system., Vibration measurement and indication, EICAS, VEMD.

oo) Lights, ATA 33./ External navigation, landing, taxiing, internal cabin, cockpit, cargo and emergency lighting system.

pp) On board Maintenance System, ATA 45./ Data loading system, Electronic Library, printing, structure monitoring (Damage tolerance monitoring.)

Part V. Propulsion/ Gas Turbine Engine /Propeller (10x2=20 Marks)

a. Fundamentals:

b. Potential energy, Kinetic energy, Newton's law of motion, Brayton's cycle. The relation between force, work, power, energy, velocity, acceleration.

c. Constructional arrangement and operation of turbojet, turbofan, turboshaft and turboprop.

d. Engine performance: Gross Thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equipment shaft horsepower

e. Specific fuel consumption: engine efficiency by pass ratio and engine pressure ratio (EPR).

f. Properties and specification : fuel additive; safety precautions;

g. Lubrication systems:, system operation, layout and components.

- h. Fuel systems: operation of engine control and fuel metering systems including electronic engine control (EECU), Full authority digital engine control (FADEC). systems layout and components.
- i. Air systems: operation of engine air distribution and anti-ice control system, including cooling, sealing and external air services.
- j. Starting and ignition systems: operation of engine start systems and components; ignition systems and component, Maintenance safety requirements.
- k. Engine Indicating System:
 - l. EGT/ITT .Exhaust gas temp./Inter turbine temp. indication.
- m. Engine thrust indication: engine pressure ratio EPR, engine turbine discharge pressure, or jet pipe pressure systems. Oil pressure and temperature; fuel pressure and flow; engine speed; vibration measurement and indication; torque, power.
- n. Power Augmentation systems: operation and application. Water injection; water methanol; Afterburner systems.
- o. Turbo Prop engines: Gas Coupled/ Free turbine and gear coupled turbines: reduction gears: integrated engine and propeller Control; over speed safety devices.
- p. Turboshaft engine: arrangement, drive systems, reduction gearing, couplings, control systems.
APU: Purposes, operation, Protective systems.
Power plant installation: Configuration of firewalls, Cooling, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.
Fire protection systems: operation of detection and extinguishing systems. (different types)
Engine monitoring and ground operation: procedure for starting and ground run-up, interpretation of engine power output and parameters; Trends (including oil analysis, vibration and boroscope)
Monitoring: inspection of engine and components to criteria, tolerances and data specified by engine manufacturer: compressor washing/ cleaning: FOD
Engine storage and preservation: Preservation and de-preservation for the engine and accessories/ Systems.

Part VI. Propeller (5x2=10 Marks)

- a. Fundamentals: Blade element theory; High/ low blade angle, reverse angle, angle of attack, rotational speed, propeller slip:
- b. Aerodynamic, Centrifugal and thrust forces: Torque; Relative airflow on blade angle of attack; vibration and resonance.
- c. Propeller constructions: Construction method and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly.
- d. Fixed Pitch, controlled pitch, Constant speed propeller.
- e. Propeller pitch, controllable pitch, constant speed propeller,.
- f. Propeller Pitch Control: Speed control and pitch change methods, mechanical and electric/ electronic: Feathering and reverse pitch, over speed protection.
- g. Propeller synchronization: synchronizing and synchrophasing equipment.
- h. Propeller ice protection: fluid and electrical de-icing equipment.