नेपाल नागरिक उड्डयन प्राधिकरण

प्राविधिक सेवा, एयर वर्दिनेश/फ्लाइट अपरेशन सर्भिसेस समूह, एघारौं तह, निर्देशक पद (AE,FO)को खुला/आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र : सेवा सम्वन्धी

खण्ड (क) - ६० अङ्क

1. Airframe And Systems

Types and construction of airframes, Aerofoils, Control surfaces, types and uses, Flight controls,types and uses, Principle of operation and construction of piston and turbine engines, Basic Lubrication, hydraulic electrical and fuel system of general aircraft, Operational procedures and limitations of power plants, Principle of operation of movable aerofoils

2. Aircraft Performance

Aircraft performance, definition and practical use., Factors affecting aircraft performance, Use of various performance charts, Weight and balance- computation and practical uses, Factors affecting C of G, Computation of landing distance, take-off distance, climb and descent using performance charts. Limitation of aircraft operation

3. Flight Planning

Preparation of a flight plan, Computation of fuel plan, Computation of headings, ground- speeds, time en-route (EET), true airspeed,, wind velocities, Selection of routes (IFR/VFR), Necessity of obtaining weather briefing, Alternate course.

Chart plotting, checking of AIP, NOTAMS, Radio planning practice, Interpretation of aerodrome chart

4. Aerodynamics

Newton's Laws of motion and their application in aircraft flying, Bernoulli's' principle and application, Lift-causes, factors affecting lift, Drag-causes, factors affecting drag, Thrust- causes, factors affecting thrust, Weight-factors affecting the gravity (load factors), Components of lift, drag, thrust and weight (gravity), Circular motion- theory, practical usefulness in aircraft flying, equilibrium, stability, instability of forces acting on aircraft, Factors affecting stability, stalls, turns, climb, descent, load factors, Various conditions of flight and the forces acting on it

5. Aircraft Instruments

Basic flight instruments, principle of operation and practical uses, Basic navigation instruments for IFR/VFR flights, principle of operation and practical uses. Basic engine instruments, principle of operation and practical uses, Pictorial interpretation of the cockpit instruments, Gyroscopic and pressure instruments

6. Basic Navigation

The earth, Great circles, small circles, rhumb lines, Latitudes, longitudes, and its uses in air navigation, Directions- compass, true and magnetic, definitions, their interrelationship and uses, Magnetic compass (Principle of operation and limitations)

7. Dead Reckoning

Fundamentals of dead-reckoning., Practical application of track, heading, wind, speeds (airspeed, groundspeed), Computation of EET, ETA, groundspeeds, airspeeds, Computation of drift, wind correction angle, Determining DR, position fix

8. Navigational Computer

Practical application of navigational computer, Computation of various speeds, time enroute (EET, ETA), distances, headings, wind, fuel consumption etc., Triangle of velocities, its practical use in air navigation

9. Charts

General properties of various types of projections, Representation of meridians, parallels, great circles and rhumb line, Use of aeronautical charts

10. The Atmosphere and Physical Process

Composition, extent and vertical division, Pressure, density and temperature. Variation

of pressure, density and temperature and their effects on the weather

Adiabatic processes, dry air, evaporation, condensation, latent heat, saturated and unsaturated air, inversions and their influences on the weather, Stability, instability of air and weather associated to it, Lapse rate, vertical distribution of temperature and density

11. Motion of Atmosphere

Relationship between isobars and wind, Fundamental cause of wind, pressure gradient, carioles force, geotropic and cyclostrophic winds, Convergence and divergence effects, Local winds (Font, anabatic, catabatic winds, land and sea breezes and others), Variation of wind with height, Thermal component of wind. Origin of jet streams and standing waves, Mountain waves, Wind shear

12. Human Information Processing

Central and peripheral nervous system, Mechanism of perception, constancies, selective perception, Reflexes and biological control systems, Functional anatomy of eye, Physiology of visual system, Night vision, Functional anatomy of ear, Hearing loss (perceptive, conductive), Detection of rotary and linear acceleration, Motion sickness

13. Human Behaviour

General personality and characteristics, Individual differences in personality, Attitude development, Behaviour and skills, Learning, motivation and performance, Types of human error, prevention and counter measures, Crew coordination, Optimizing of crew performance in flight, Effects of different communication styles, Pilot judgement concepts, Identification of hazardous attitudes, Cockpit stress management and safety awareness

14. Flying and Health

Causes and symptoms of incapacitation, Side effects of drug and medication, Procedures for dealing with incapacitation, Various toxic materials, alcohol, smoking, Effects of disturbances and treatment, Causes, types, symptoms, prevention and treatment of fatigue, Effects of anxiety and defense mechanism.

Common minor ailments, Tropical climates

15. Flight Safety

Safety briefing to passengers, Safety procedures to be followed during embarkation and disembarkation of passengers, Handling of passengers during emergency situations, Hazards to flight safety due to cabin pressurization failure, Flight crew at their duty station, Use of seatbelts, harnesses and their significances, Wake turbulence hazard to flight safety, Unauthorized operations, Notification to ATS authority of any incident and or accident

16. Fundamental

Basic radio theory, Waves, and wave transmission, Radio waves, Characteristics of radio wave propagation, Frequency, frequency bands, Current, Reception, transmission of radio waves/signals and disturbances to it, Types of radio aids to navigation

17. VOR

Principle of operation, Bearings (Radial), To, From indication and uses, Position of aircraft in relation to radial, Components of VOR receiver, functions and uses, Accuracy, Limitations, Errors, Pictorial interpretation, Tests

18. DME

Principle of operation, DME arcs and indication, DME distances, Difference between DME distance and actual distance, Components of DME receiver, Pictorial interpretation, Frequency band, Accuracy, Limitations, Errors, Test of DME receiver

19. NDB

Principle of operation, Bearings, QDM, QD, Position of aircraft in relation to bearing, Components of ADF receiver, Differences between ADF & VOR, Fixed card and routable card type indicators, Pictorial interpretation, Limitations, Errors, Accuracy, Frequency band

20. ILS

Ground facilities involved, ILS identification, ILS and VOR differences, Sources of azimuth information and utilization, Sources of range information and utilization, Sources of height information and utilization, Runway environment indicating systems, Back course and front course approaches, Approaches with one or more ILS components unserviceable, Limitations, Errors, Accuracy, Frequency bands, Pictorial interpretation

21. RADAR

Concept and principle of operation of RADAR, Types of RADAR, Uses of RADAR in navigation, Uses of RADAR in approaches, Frequency band, Limitations, Accuracy

22. Maintenance Practices and Procedures

22.1 **Composite and non-metallic**

- 22.1.1 Bonding methods, practices and inspection of bonded joints
- 22.1.2 Environmental conditions

22.2 **Aircraft Weight and Balance**

- 22.2.1 Centre of Gravity/Balance limits calculation: use of relevant documents
- 22.2.2 Preparation of aircraft for weighing; Aircraft weighing

22.3 **Aircraft Handling and Storage**

- 22.3.1 Aircraft taxiing/towing and associated safety precautions
- 22.3.2 Aircraft jacking, chocking, securing and associated safety precautions
- 22.3.3 Aircraft storage methods
- 22.3.4 Refuelling/defuelling procedures
- 22.3.5 De-icing/anti-icing procedures
- 22.3.6 Electrical, hydraulic and pneumatic ground supplies
- 22.3.7 Effects of environmental conditions on aircraft handling and operation

22.4 **Electromagnetic Environment :** Influence of the following phenomena on maintenance practices for electronic system:

- 22.4.1 Electromagnetic Compatibility (EMC)
- 22.4.2 Electromagnetic Interference (EMI)
- 22.4.3 High Intensity Radiated Field Lightning (HIRF)/lightning protection

22.5 **Typical Electronic/Digital Aircraft Systems :** General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) such as:

- 22.5.1 Communication and Addressing and Reporting System (ACARS – ARINC)
- 22.5.2 Engine Indication and Crew Alerting System (EICAS)
- 22.5.3 Fly-by-Wire (FBW)
- 22.5.4 Flight Management System (FMS)
- 22.5.5 Inertial Reference System (IRS)
- 22.5.6 Electronic Centralized Aircraft Monitoring(ECAM)
- 22.5.7 Electronic Flight Instrument System (EFIS)
- 22.5.8 Global Positioning System (GPS)
- 22.5.9 Traffic Alert Collision Avoidance System (TCAS)
- 22.5.10 Integrated Modular Avionics Cabin Systems Information Systems

23. Aviation Legislation

23.1 **Aircraft Certification**

23.1.1 **General**

- Certification Rules: Type Certificate, Supplementary Type Certificate
- NCAR Part – 21 Design/Production Organization Approvals

23.1.2 **Documents**

- Certificate of Airworthiness
- Permit to fly
- Certificate of Registration
- Noise Certificate
- Weight and Balance Schedule
- Radio Station License

23.2 **Continuing airworthiness**

23.1.3 NCAR Part – 21 provisions related to continuing airworthiness

23.1.4 NCAR Part-M Subpart F

खण्ड (ख) - ४० अंक

24. HUMAN FACTORS

24.1 **General / Introduction to human factors**

24.1.1 Need to address human factors

24.1.2 Statistics

24.1.3 Incidents

24.2 **Safety Culture / Organisational Factors**

24.3 **Human Error**

24.3.1 Error models and theories

24.3.2 Types of errors in maintenance tasks

24.3.3 Violations

24.3.4 Implications of errors

24.3.5 Avoiding and managing errors

24.3.6 Human reliability

24.4 **Human performance & limitations**

24.4.1 Vision

24.4.2 Hearing

24.4.3 Information-processing

24.4.4 Attention and perception

24.4.5 Situational awareness

24.4.6 Memory

24.4.7 Claustrophobia and physical access

24.4.8 Motivation

24.4.9 Fitness/Health

24.4.10 Stress

24.4.11 Workload management

24.4.12 Fatigue

24.4.13 Alcohol, medication, drugs

24.4.14 Physical work

24.4.15 Repetitive tasks / complacency

24.5 **Environment**

24.5.1 Peer pressure

24.5.2 Stressors
24.5.3 Time pressure and deadlines
24.5.4 Workload
24.5.5 Shift Work
24.5.6 Noise and fumes
24.5.7 Illumination
24.5.8 Climate and temperature
24.5.9 Motion and vibration
24.5.10 Complex systems
24.5.11 Hazards in the workplace
24.5.12 Lack of manpower
24.5.13 Distractions and interruptions

24.6 **Procedures, information, tools and practices**
24.6.1 Visual Inspection
24.6.2 Work logging and recording
24.6.3 Procedure – practice / mismatch / norms
24.6.4 Technical documentation – access and quality

24.7 **Communication**
24.7.1 Shift / Task handover
24.7.2 Dissemination of information
24.7.3 Cultural differences

24.8 **Teamwork**
24.8.1 Responsibility
24.8.2 Management, supervision and leadership
24.8.3 Decision making

24.9 **Professionalism and integrity**
24.9.1 Keeping up to date; currency
24.9.2 Error provoking behaviour
24.9.3 Assertiveness

24.10 **Organisation's human factor program**
24.10.1 Reporting errors
24.10.2 Disciplinary policy
24.10.3 Error investigation
24.10.4 Action to address problems
24.10.5 Feedback

25. SAFETY MANAGEMENT SYSTEM

25.1 **Safety**
25.1.1 Defining safety
25.1.2 Safety process: gathering data, identifying & evaluating safety problems, and implementing changes

25.2 **Maintenance Safety Program**
25.2.1 Maintenance safety, Ramp safety, Foreign object damage

25.3 **Emergency preparedness & response**
25.3.1 Accident investigation & crisis communication

25.4 **Maintenance Safety**
25.4.1 Communication, Maintenance personnel, Maintenance Organization, Maintenance Program, Reduction of maintenance error

नेपाल नागरिक उड्डयन प्राधिकरण

प्राविधिक सेवा, एयर वर्दिनेश/फ्लाइट अपरेशन सर्भिसेस समूह, एघारौं तह, निर्देशक पद (AE,FO)को खुला/आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

26. SAFETY OVERSIGHT Monitoring

26.1 **Objective of Airworthiness Safety Oversight**

26.2 **Means of Airworthiness Safety Oversight**

26.3 **Airworthiness Audit**

26.3.1 Team Composition

- Audit Manager
- Team Leader
- Observer
- Attributes of the Auditing Inspector
- Conflict of Interest and Confidentiality

26.3.2 Phases of the Audit

- The Initiation Phase : Establishing the 'Need for Audit; Team Selection; Team Preparation: Audit Plan, Pre-audit Team Meeting
- The Audit Execution Phase : Pre-audit Meeting; The Audit; The Audit Check List; The Three Main Steps: Observation; Interview; Some valuable Don'ts; Sampling; Recording and Documenting; Analysis of Findings; Audit Findings; Levels of Audit Findings: Level 1, Level 2 and Level 3 Findings; Confirmation Request; Corrective Action Request; Follow–up and Closure Report; Audit Record Log; Communication during the Audit; Post Audit (Exit) Meeting
- The Post Audit Phase : The Audit Report - Parallel Report, Auditee Correction Action Proposals, Audit Report Retention

26.4 **Monitoring the Follow Up**

26.5 **Setting Audit Frequency**

26.5.1 Resource Allocation

- Criteria
- Risk Indicators
- Periodic Cycle

27. State Safety Programme (SSP)

27.1 National Civil Aviation Security Programme

द्वितीय पत्रबाट निम्नानुसार प्रश्न सोधिनेछ :

द्वितीय पत्र					
विषय	**खण्ड**	**अङ्कभार**	**परीक्षा प्रणाली**		**प्रश्न संख्या x अङ्क**
सेवा सम्वन्धी	**(क)**	६०	विषयगत	समस्या समाधानमूलक प्रश्न	३ प्रश्न x २० अङ्क
	(ख)	४०		सैद्धान्तिक-तर्कयुक्त र विश्लेषणात्मक प्रश्न	१ प्रश्न x १५ अङ्क
				व्यावसायिक योजना/मामिला विश्लेषण सम्बन्धी प्रश्न	१ प्रश्न x २५ अङ्क
जम्मा		**१००**			