नेपाल नागरिक उड्डयन प्राधिकरण

प्राबिधिक सेवा, फ्लाइट अपरेशन सर्भिसेज समूह, आठौं तह, उपप्रबन्धक पदको खुला/आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र : सेवा सम्वन्धी

खण्ड (क) - ५० अङ्क

A. Aircraft and Engines

1. Airframe and Systems

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

2. Aircraft Performance

2.1 Aircraft performance, definition and practical use
2.2 Factors affecting aircraft performance
2.3 Use of various performance charts
2.4 Weight and balance- computation and practical uses
2.5 Factors affecting C of G
2.6 Computation of landing distance, take-off distance, climb and descent using performance charts
2.7 Limitation of aircraft operation

3. Flight Planning

3.1 Preparation of a flight plan
3.2 Computation of fuel plan
3.3 Computation of headings, ground-speeds, time en-route (EET), true airspeed, wind velocities
3.4 Selection of routes (IFR/VFR)
3.5 Necessity of obtaining weather briefing
3.6 Alternate course
3.7 Chart plotting
3.8 Checking of AIP, NOTAM
3.9 Radio planning practice
3.10 Interpretation of aerodrome chart

4. Aerodynamics

4.1 Newton's Laws of motion and their application in aircraft flying
4.2 Bernoulli's' principle and application
4.3 Lift-causes, factors affecting lift
4.4 Drag-causes, factors affecting drag
4.5 Thrust-causes, factors affecting thrust
4.6 Weight-factors affecting the gravity (load factors)
4.7 Components of lift, drag, thrust and weight (gravity)
4.8 Circular motion- theory, practical usefulness in aircraft flying
4.9 Equilibrium, stability, instability of forces acting on aircraft
4.10 Factors affecting stability, stalls, turns, climb, descent, load factors
4.11 Various conditions of flight and the forces acting on it

5. Aircraft Instruments

5.1 Basic flight instruments, principle of operation and practical uses
5.2 Basic navigation instruments for VFR flights, principle of operation and uses
5.3 Basic engine instruments, principle of operation and practical uses
5.4 Pictorial interpretation of the cockpit instruments
5.5 Gyroscopic and pressure instruments

B. Air Navigation

6. Basic Navigation

6.1 The earth
6.2 Great circles, small circles, rhumb lines
6.3 Latitudes, longitudes, and its uses in air navigation
6.4 Directions: Compass, true and magnetic, definitions, their interrelationship and uses
6.5 Magnetic compass: Principle of operation and limitations

7. Dead Reckoning

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

8. Navigational Computer

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

9. Charts

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

10. In-Flight Navigation

10.1 Navigation during climb and descent regime of flight
10.2 Navigation in cruise flying
10.3 Use of fixes to revise navigation data e.g. speed, track, wind, EET and ETA and others
10.4 Computation of speed, distance, time, fuel etc associated with climb descent and cruise phase of flight

C. Instrument Flying Procedures

11. Basic Instrument Environment

11.1 Fundamentals of instrument flying
11.2 Pitch instrument
11.3 Yaw instrument
11.4 Roll instrument
11.5 Power instrument
11.6 Primary and supporting instruments
11.7 Cross checking of instruments
11.8 Gyroscopic, and pilot-static instruments
11.9 Causes and prevention of disorientation

12. Attitude Flying

12.1 Flying with reference to instruments
12.2 Recognition of deviation from required flying attitudes
12.3 Establishing coordinated turns, climbs and descents at various speeds, and power settings
12.4 Definitions of standard rate of turn, V-speed and others associated with instrument flying
12.5 Relation between speed, power and attitude of aircraft

12.6 Maintaining constant attitude
12.7 Change of attitude
12.8 Pictorial interpretations

13. Navigation

13.1 Orientation to radio navigational aids
13.2 Bearings
13.3 Interception, tracking of bearings
13.4 Way points
13.5 Minimum IFR altitudes
13.6 Alternate course of action
13.7 RADAR & Non RADAR environment
13.8 Pictorial Interpretation

14. IFR Charts

14.1 Basic concept of charts
14.2 Aerodrome charts
14.3 Departure charts
14.4 En-route navigation charts
14.5 Approach charts
14.6 Identification of initial, intermediate and final approach fixes
14.7 Deriving information from charts
14.8 Determination of MRA, MOCA, MSA, MEA from the charts

15. Standard Instrument Departures/Arrivals

15.1 Use of radio navigational aids
15.2 Operating minima
15.3 Clearance limits
15.4 Runway lights and markings
15.5 Taxiway lights and markings
15.6 Threshold lights and markings
15.7 Touch down zone light and markings
15.8 Approach lights
15.9 Aerodrome beacon
15.10 RVR
15.11 Computation of speeds versus heights
15.12 Decision heights, minimum descent altitudes
15.13 Approach fixes
15.14 Holding patterns and entry procedures and speeds to be maintained while holding
15.15 Procedures to be followed to make SIA and SIDs

16. Emergency Procedures

16.1 Emergency reference data
16.2 Emergency communication procedures
16.3 Deviations from flight plan
16.4 Lost procedures
16.5 Choice of alternate
16.6 Communication failure procedures
16.7 Partial panel flights
16.8 Power plant failures
16.9 Vision adaptation
16.10 Unusual attitudes

D. Radio aids to navigation

17. Fundamental

17.1 Basic radio theory
17.2 Waves, and wave transmission
17.3 Radio waves
17.4 Characteristics of radio wave propagation
17.5 Frequency, frequency bands
17.6 Current
17.7 Reception, transmission of radio waves/signals and disturbances to it
17.8 Types of radio aids to navigation

18. VOR

18.1 Principle of operation
18.2 Bearings (Radial)
18.3 To/From indication and uses
18.4 Position of aircraft in relation to radial
18.5 Components of VOR receiver, functions and uses
18.6 Accuracy
18.7 Limitations
18.8 Errors
18.9 Pictorial interpretation
18.10 Tests

19. DME

19.1 Principle of operation
19.2 DME arcs and indication
19.3 DME distances
19.4 Difference between DME distance and actual distance
19.5 Components of DME receiver
19.6 Pictorial interpretation
19.7 Frequency band
19.8 Accuracy
19.9 Limitations
19.10 Errors
19.11 Test of DME receiver

20. ILS

20.1 Ground facilities involved
20.2 ILS identification
20.3 ILS and VOR differences
20.4 Sources of azimuth information and utilization
20.5 Sources of range information and utilization
20.6 Sources of height information and utilization
20.7 Runway environment indicating systems
20.8 Back course and front course approaches
20.9 Approaches with one or more ILS components unserviceable
20.10 Limitations
20.11 Errors
20.12 Accuracy
20.13 Frequency bands
20.14 Pictorial interpretation

21. RADAR

21.1 Concept and Principle of operation of RADAR

21.2 Types of RADAR
21.3 Uses of RADAR in navigation
21.4 Uses of RADAR in approaches
21.5 Frequency band
21.6 Limitations
21.7 Accuracy

22. INS and GNSS

22.1 Fundamental principle of operation
22.2 Uses in air navigation.
22.3 Uses in approaches
22.4 Sources of information

23. RADIOTELEPHONY

23.1 Radiotelephony Procedure and Phraseology as applied to VFR operation
23.2 Action to be taken in case of communication failure

खण्ड (ख) - ५० अङ्क

A. Meteorology

1. The Atmosphere and Physical Process

1.1 Composition, extent and vertical division
1.2 Pressure, density and temperature
1.3 Variation of pressure, density and temperature and their effects on the weather
1.4 Adiabatic processes, dry air, evaporation, condensation, latent heat, saturated and unsaturated air, inversions and their influences on the weather
1.5 Stability, instability of air and weather associated to it
1.6 Lapse rate, vertical distribution of temperature and density

2. Humidity and Precipitation

2.1 Humidity in atmosphere and its effect on density
2.2 Humidity variation and weather associated with it
2.3 Condensation, precipitation, sublimation and freezing in atmosphere
2.4 Precipitation, its characteristics and development

3. Clouds

3.1 Types and classification of clouds
3.2 Principle of formation of clouds and its modifications
3.3 Flying characteristics in different types of clouds
3.4 Cooling by advection, radiation and adiabatic expansion
3.5 Characteristics of all clouds
3.6 Hazards to flying by various clouds

4. Motion of Atmosphere

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

5. Surface Weather

5.1 Formation of fog, mist, haze

5.2 Effect on weather by haze, fog and mist
5.3 Effect on visibility due to fog, mist, haze, blowing sand, snow or dust etc
5.4 Types of fog and source of their origin

6. Air Masses

6.1 Description, factors affecting the properties of an air mass
6.2 Classification of air masses, modification due to various factors and their area of origin
6.3 Fronts
6.4 Warm, cold, occluded, Stationary fronts, associated clouds and weather
6.5 Frontal depressions, non-frontal depressions and associated weather
6.6 Electricity in atmosphere
6.7 Movement of fronts
6.8 Turbulence, thunderstorm, squall lines

7. Weather Observation

7.1 Weather charts
7.2 Ground observation
7.3 Pilot observation.
7.4 Significant of weather charts
7.5 Weather forecast

B. Human Performance and Limitation

8. Altitude Flying

8.1 Respiration and blood circulation
8.2 Hypoxia, definition, causes, symptoms and remedy
8.3 Time of useful consciousness
8.4 Definition, causes of hyperventilation
8.5 Symptoms and remedy of hyperventilation
8.6 Blood pressure
8.7 The gas law
8.8 Rapid decompression, effects and counter measures
8.9 Entrapped gases

9. Human Information Processing

9.1 Central and peripheral nervous system
9.2 Mechanism of perception, constancies, selective perception
9.3 Reflexes and biological control systems
9.4 Functional anatomy of eye
9.5 Physiology of visual system
9.6 Night vision
9.7 Functional anatomy of ear
9.8 Hearing loss (perceptive, conductive)
9.9 Detection of rotary and linear acceleration
9.10 Motion sickness

10. Integration of Sensory Inputs

10.1 Basic concepts and definition
10.2 Categories of disorientation
10.3 Vertigo, Coriolis Effect, pressure vertigo, flicker vertigo
10.4 Visual illusions
10.5 Prevention and handling of disorientation
10.6 Effects of stress and time of day

11. Human Behaviour

11.1 General personality and characteristics

11.2 Individual differences in personality
11.3 Attitude development
11.4 Behaviour and skills
11.5 Learning, motivation and performance
11.6 Types of human error, prevention and counter measures
11.7 Crew coordination
11.8 Optimizing of crew performance in flight
11.9 Effects of different communication styles
11.10 Pilot judgement concepts
11.11 Identification of hazardous attitudes
11.12 Cockpit stress management and safety awareness

12. Flying and Health

12.1 Causes and symptoms of incapacitation
12.2 Side effects of drug and medication
12.3 Procedures for dealing with incapacitation
12.4 Various toxic materials, alcohol, smoking
12.5 Effects of disturbances and treatment
12.6 Causes, types, symptoms, prevention and treatment of fatigue
12.7 Effects of anxiety and defense mechanism
12.8 Common minor ailments
12.9 Tropical climates

C. Operation procedures

13. General

13.1 Definitions as per ICAO Annex 6
13.1.1 Flight operations
13.1.2 Aerodrome operating minima
13.1.3 Minimum flight altitudes
13.1.4 Requirement for alternate aerodrome
13.2 Oxygen requirements
13.3 Duties and responsibility of Pilot-In-Command and First Officer
13.4 Equipment required for aircraft on all flights
13.5 Fuel and oil requirements
13.6 Fitness of flight crew members

14. Safe Transport of Dangerous Goods

14.1 Definitions as per ICAO Annex-18
14.2 Carriage of freight in passenger cabin with passengers on board
14.3 Proper loading and stowing of freight
14.4 Weight and balance reports
14.5 Classification of dangerous goods
14.6 Packing, labelling and markings of freight and dangerous goods
14.7 Procedures to be followed for transportation of dangerous goods
14.8 Identification of dangerous and non-dangerous goods
14.9 Responsibility of Pilot-In-Command

15. Flight Safety

15.1 Safety briefing to passengers
15.2 Safety procedures to be followed during embarkation and disembarkation of passengers
15.3 Handling of passengers during emergency situations
15.4 Hazards to flight safety due to cabin pressurization failure
15.5 Flight crew at their duty station

15.6 Use of seatbelts, harnesses and their significances
15.7 Wake turbulence hazard to flight safety
15.8 Unauthorized operations
15.9 Notification to ATS authority of any incident and or accident

16. Rules and Regulations for CPL Holders

16.1 National legislation
16.2 Necessity to hold Nepalese CPL
16.3 Requirements to issue CPL
16.4 Privileges for CPL holder pilots
16.5 Limitations for CPL holders
16.6 Responsibility
16.7 Logging of flight time
16.8 Maintaining the currency of License
16.9 Renewal process

17. Rules of The Air

17.1 Definition as per ICAO Annex 2 and 11
17.2 Classification and types of aircraft
17.3 Right of way
17.4 Lights to be displayed by aircraft
17.5 Requirements to submit flight plan
17.6 Altimeter setting procedures
17.7 Instrument flight rules
17.8 Visual flight rules
17.9 Air Traffic Control clearances and any changes to it
17.10 Unlawful interferences
17.11 Communication failure procedures
17.12 Visual, light signals to aircraft

D. ICAO annex and CAAN requirements

18. Annex

18.1 Annex 1
18.2 Annex 2
18.3 Annex 6
18.4 Annex 13
18.5 Annex 19

19. Requirements

19.1 Flight Operations Requirement (FOR)
19.2 Nepalese Civil Airworthiness Requirement (NCAR)
19.3 Aeronautical Information Publication (AIP)
19.4 Air Operator Certification Requirement (AOCR)
19.5 Personnel Licensing Requirement (PELR)
19.6 Civil Aviation Requirement 19 (CAR 19)

द्वितीय पत्रबाट निम्नानुसार प्रश्न सोधिनेछ :

द्वितीय पत्र (विषयगत)				
विषय	**खण्ड**	**अङ्कभार**	**तर्कयुक्त विश्लेषणात्मक प्रश्न**	**समस्या समाधानमूलक प्रश्न**
सेवा सम्बन्धी	**(क)**	५०	३ प्रश्न X १० अङ्क = ३०	१ प्रश्न X २० अङ्क = २०
	(ख)	५०	३ प्रश्न X १० अङ्क = ३०	१ प्रश्न X २० अङ्क = २०
जम्मा		**१००**	६ प्रश्न X १० अङ्क = ६०	२ प्रश्न X २० अङ्क = ४०