नेपाल नागरिक उड्डयन प्राधिकरण

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

द्वितीयपत्र : सेवा सम्वन्धी

खण्ड (क) - ६० अङ्क

A. Aircraft and System

1.1 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 airfoils, Jet Propulsion, Flight at transonic and supersonic speeds. Difference between turboprop and jet engine aircraft. Different aspect of jet engine aircraft operations

1.2 Aerodynamics

Newton's Laws of motion and their application in aircraft flying, Berneoullis' 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

1.3 Aircraft Instruments

Basic flight instruments, principle of operation and practical uses, Basic navigation instruments for 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

1.4 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

1.5 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

B. Air Navigation

1.1 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)

1.2 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

1.3 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

1.4 Charts

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

1.5 In-Flight Navigation

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

C. Meteorology

1.1 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

1.2 Humidity and Precipitation

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

1.3 Clouds

Types and classification of clouds, Principle of formation of clouds and its modifications, Flying characteristics in different types of clouds, Cooling by advection, radiation and adiabatic expansion, Characteristics of all clouds. Hazards to flying by various clouds

1.4 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

1.5 Surface Weather

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

1.6 Air Masses

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

1.7 Weather Observation

Weather charts, Ground observation, Pilot observation, Significant of weather charts, Weather forecast

D. Human Factor

1.1 General / Introduction to human factors

Need to address human factors, Statistics, Incidents

1.2 Human Error

Error models and theories, Types of errors in maintenance tasks, Violations, Implications of errors, Avoiding and managing errors, Human reliability

1.3 Human performance & limitations

Vision, Hearing, Information-processing, Attention and perception, Situational awareness, Memory, Claustrophobia and physical access, Motivation, Fitness/Health, Stress, Workload management, Fatigue, Alcohol, medication, drugs, Physical work, Repetitive tasks / complacency

1.4 Environmental Factors

Peer pressure, Stressors, Time pressure and deadlines, Workload, Shift Work, Noise and fumes, Illumination, Climate and temperature, Motion and vibration, Complex systems, Hazards in the workplace, Lack of manpower, Distractions and interruptions

1.5 Procedures, Tools and Practices

Visual Inspection, Work logging and recording, Procedure – practice / mismatch / norms, Technical documentation – access and quality

1.6 Communication

Shift / Task handover, Dissemination of information, Cultural differences

1.7 Teamwork

Responsibility, Management, Supervision and leadership, Decision making

1.8 Professionalism and integrity

Keeping up to date/Currency, Error provoking behaviour, Assertiveness

1.9 Organization's human factor program

Reporting errors, Disciplinary policy, Error investigation, Action to address problems, Feedback

1.10 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

1.11 Integration of Sensory Inputs

Basic concepts and definition, Categories of disorientation, Vertigo, Coriolis effect, pressure vertigo, flicker vertigo, Visual illusions, Prevention and handling of disorientation, Effects of stress and time of day

1.12 Altitude Flying

Respiration and blood circulation, Hypoxia, definition, causes, symptoms and remedy, Time of useful consciousness, Definition, causes of hyperventilation. Symptoms and remedy of hyperventilation, Blood pressure, The gas Laws, Rapid decompression, effects and counter measures, Entrapped gases

1.13 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

E. Basic Instrument Flying Procedures

1.1 Basic Instrument Environment

Fundamentals of instrument flying, Pitch instrument, Yaw instrument, Roll instrument, Power instrument, Primary and supporting instruments, Cross checking of instruments, Gyroscopic, and pilot-static instruments, Causes and prevention of disorientation

1.2 Attitude Flying

Flying with reference to instruments, Recognition of deviation from required flying attitudes, Establishing coordinated turns, climbs and descents at various speeds, and power settings, Definitions of standard rate of turn, V-speed and others associated with instrument flying, Relation between speed, power and attitude of aircraft. Maintaining constant attitude, Change of attitude, Pictorial interpretations

1.3 Navigation

Orientation to radio navigational aids, Bearings, Interception, tracking of bearings. Way points, Minimum IFR altitudes, Alternate course of action, RADAR & Non RADAR environment, Pictorial Interpretation

1.4 IFR Charts

Basic concept of charts, Aerodrome charts, Departure charts, En-route navigation charts, Approach charts, Identification of initial, intermediate and final approach fixes, Deriving information from charts, Determination of MRA, MOCA, MSA, MEA from the charts

1.5 Standard Instrument Departures/Arrivals

Use of radio navigational aids, Operating minima, Clearance limits, Runway lights and markings, Taxiway lights and markings, Threshold lights and markings, Touch down zone light and markings, Approach lights, Aerodrome beacon, RVR, Computation of speeds versus heights, Decision heights, minimum descent altitudes, Approach fixes, Holding patterns and entry

procedures and speeds to be maintained while holding, Procedures to be followed to make SIA and SIDs

1.6 Emergency Procedures

Emergency reference data, Emergency communication procedures, Deviations from flight plan, Lost procedures, Choice of alternate, Communication failure procedures, Partial panel flights, Power plant failures, Vision adaptation, Unusual attitudes

1.7 Fundamental

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

1.8 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

1.9 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

1.10 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

1.11 RADAR

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

1.12 INS, GPS, GNNS

Fundamental principle of operation, Uses in air navigation, Uses in approaches, Sources of information

1.14 RADIOTELEPHONY

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

खण्ड (ख) - ४० अङ्क

2. Operational Procedures

2.1. Formulation of Nepalese Aviation Regulations and requirements with respect to the Chicago Convention and its associated Annexes

2.2. Global Aviation Safety Roadmap (GASR) of ICAO and Nepal's commitment

2.3. Universal Safety Oversight Audit of ICAO in the context of Nepalese Civil Aviation Authority
2.4. Air incident / accident investigation and the role of Flight Operations responsibilities, contributions and challenges (ANNEX 13)
2.5. Process and procedures for the issuance and renewal of Air Operator Certificates with respect to Annex 6 and CAAN's Air Operator Certificate Requirements
2.6. Flight Operations Regulatory Audit processes and procedures of air operators
2.7. Sports and recreational aviation in Nepal – opportunities and challenges
2.8. Fatigue Risk Management in Flight operations and FRMS DOC 9966
2.9. Procedures for Root Cause Analysis in Flight Operations
2.10. Human resource development in Flight Operations – requirements, capability and shortcomings
2.11. Short term and long term planning of Flight Operations in terms of aviation growth in Nepal

3. ICAO Annex and CAAN Requirements

3.1. Nepalese Civil Airworthiness Requirement (NCAR)
3.2. Aeronautical Information Publication (AIP)
3.3. Personnel Licensing (ANNEX 1), Personnel Licensing Requirement (PELR)
3.4. Rules of the Air (ANNEX 2)
3.5. Operations of Aircraft (ANNEX 6), Flight Operations Requirement (FOR)
3.6. Air Traffic Services (ANNEX 11)
3.7. Security (ANNEX 17) and National Civil Aviation Security Program of Nepal
3.8. The safe transport of dangerous goods by air (ANNEX 18)
3.9. Manual on flight data analysis program (DOC 10000)
3.10. Performance base navigation manual (DOC 9613), RNP Procedures
3.11. Policy and guidance material of the economic regulation of international air transport (DOC 9587)
3.12. Safety Management manual (DOC 9859), Civil Aviation Requirement 19 (CAR 19)

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**			