पाठ्यक्रमको रुपरेखा :- यस पाठ्यक्रमको आधारमा निम्नानुसारका चरणमा परीक्षा लिइने छ :

प्रथम चरण :– लिखित परीक्षा **द्वितीय चरण** :– अन्तर्वार्ता

परीक्षा योजना (Examination Scheme)

१. प्रथम चरण : लिखित परीक्षा (Written Examination)

पूर्णाङ्ग :- २००

पूर्णाङ्ग :- ३०

पूर्णाङ्क :- २००

पूर्णाङ्क :- ३०

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्ष	ना प्रणाली	प्रश्नसंख्या X अङ्क	समय
प्रथम	सामान्य ज्ञान, बौद्धिक परीक्षण, व्यवस्थापन र सेवा सम्वन्धी	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न (MCQ)	१०० प्रश्न x१ अङ्क	१ घण्टा ३० मिनेट
द्वितीय	सेवा सम्वन्धी	१००	४०	विषयगत	छोटो उत्तर लामो उत्तर	४ प्रश्न x	३ घण्टा

२. द्वितीय चरण: अन्तर्वार्ता (Interview)

विषयपूर्णाङ्कपरीक्षा प्रणालीसमयव्यक्तिगत अन्तर्वार्ता३०मौखिक-

<u>द्रष्टव्य</u>ः

लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी हुनेछ ।

२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छट्टाछट्टै हनेछ।

- ३. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरु सोधिनेछ ।
- ४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको 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 ।
- ४. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- ६. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्कममा परेको सम्भन् पर्दछ ।
- ७. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएका माथि उल्लिखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
- ९. पाठ्यक्रम लागू मिति :-

प्रथम र द्वितीय पत्र :- सामान्य ज्ञान, बौद्धिक परीक्षण, व्यवस्थापन र सेवा सम्बन्धी

भाग (अ) - सामान्य ज्ञान, बौद्धिक परीक्षण र व्यवस्थापन

1. सामान्य ज्ञान

<u>(25 × 1 Mark = 25 Marks)</u>

- 1.1 नेपालको भौगोलिक, ऐतिहासिक, सामाजिक, सांस्कृतिक, राजनैतिक, आर्थिक अवस्था बारे जानकारी
- 1.2 नेपालका प्रमुख प्राकृतिक स्रोतहरु सम्वन्धी जानकारी
- 1.3 नेपालमा पूर्वाधार विकासको वर्तमान अवस्था (यातायात, विद्युत, संचार र प्रविधि)
- 1.4 चाल् आवद्यिक योजना वारे सामान्य जानकारी
- 1.5 संयुक्त राष्ट्रसंघ, सार्क, बिमस्टेक, आसियान र युरोपियन संघ
- 1.6 दिगो विकास, वातावरण, प्रदुषण, जनसंख्या, शहरीकरण, जलवायु परिवर्तन र जैविक विविधता
- 1.7 विज्ञान र प्रविधिका महत्वपूर्ण उपलब्धि र अन्तर्राष्ट्रिय महत्वका समसामयिक घटनाहरु
- 1.8 नेपालको वर्तमान संविधान सम्बन्धी जानकारी
- 1.9 नेपाल नागरिक उड्डयन प्राधिकरण एवं नेपालमा हवाई यातायात तथा पर्यटन क्षेत्रको विकास वारे जानकारी
- 1.10 अन्तर्राष्ट्रिय नागरिक उड्डयन संगठन (ICAO), अन्तर्राष्ट्रिय हवाई यातायात संघ (IATA) र अन्य उड्डयन सम्बन्धित क्षेत्रिय संगठन बारे जानकारी
- 1.11 नेपाल नागरिक उड्डयन प्राधिकरण ऐन, २०४३
- 1.12 नागरिक उड्डयन नियमवाली, २०४८
- 1.13 नेपाल नागरिक उड्डयन प्राधिकरण कर्मचारीहरुको सेवाका शर्त र सुविधा सम्वन्धी नियमावली, २०४६
- 1.14 नेपाल नागरिक उड्डयन प्राधिकरण आर्थिक प्रशासन सम्वन्धी नियमावली, २०५७
- 1.15 नेपाल नागरिक उड्ययन प्राधिकरण विमानस्थल सेवा शुल्क नियमावली, २०६७
- 1.16 नागरिक उड्डयन सुरक्षा नियमावली, २०७३
- 1.17 विदेशी लगानी तथा प्रविधि हस्तान्तरण ऐन, २०४९
- 1.18 सार्वजनिक खरीद ऐन, २०६३
- 1.19 भ्रष्टाचार निवारण ऐन, २०४९

2. बौद्धिक परीक्षण (General Ability Test)

(10× 1 Mark = 10 Marks)

2.1 Verbal Reasoning Test:

Jumble words, Series, Analogy, Classification, Coding-Decoding, Matrix, Ranking Order Test, Direction and Distance Sense Test, Common Sense Test, Logical Reasoning, Assertion and Reason, Statement and Conclusions, Arithmetical Reasoning/Operation, Decimal, Fraction, Percentage, Ratio, Data interpretation, Data sufficiency, Data verification

2.2 Non-verbal/Abstract Reasoning Test:

Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern Completion/Finding, Analytical Reasoning Test, Figure Formation and Analysis, Rule Detection, Water images, Mirror images, Cubes and Dice, Venn-diagram

3. Management

(15× 1 Mark = 15 Marks)

- 3.1 Prevailing Governance System in Nepal
- 3.2 Measures to make governance better
- 3.3 Collaborative Governance (Public Private Partnership)
- 3.4 Policy Formulation, Implementation, Analysis, Monitoring and Evaluation
- 3.5 Citizen Involvement in Governance and Service Delivery
- 3.6 Human Resource Management, Human Resource Planning, Human Resource Development, Outsourcing of Human Resources, Performance Appraisal System, Management Audit, Total Quality Management, Quality Circle, Group Dynamics, Team Work, Performance Based Incentive System, Leadership, Motivation, Decision Making, Delegation of Authority, Change Management, Conflict Management, Stress Management, Grievance Handling, Communication, Coordination, Trade Union and Collective Bargaining
- 3.7 Project Management
- 3.8 Inclusive Development
- 3.9 Domestic Resource Mobilization and Foreign Aid Management
- 3.10 Federalism and Local self-Governance
- 3.11 Diversity Management

<u>भाग (आ) – सेवा सम्वन्धी</u>

खण्ड (क) - ४० %

1. Aircraft Materials and Maintenance Practices

1.1 **Sheet Metal** - Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work, Bonding practices, Environmental condition.

- 1.2 **Aircraft Weight and Balance** Centre of Gravity / Balance limits calculation: use of relevant documents; Preparation of aircraft for weighing; Aircraft weighing.
- 1.3 **Disassembly, Inspection, Repair and Assembly Techniques** Types of defects; visual inspection techniques; Corrosion removal, assessment and reprotection. General repair methods; Ageing, fatigue and corrosion control programmes; Non destructive inspection techniques including, penetrants, radiographic, eddy current, ultrasonic and Boroscope methods.
- 1.4 **Aircraft Materials Composite and Non-Metallic -** The detection of defects/deterioration in composite and non metallic material; Repair of composite and non metallic material.
- 1.5 **Corrosion** Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.
- 1.6 **Standard Practice and Safety Precautions, General Handling-Aircraft and Workshop** - Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals; instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents; Aircraft taxiing / towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling / defuelling procedures; Electrical, hydraulic and pneumatic ground supplies; Effects of environmental conditions on aircraft handling.

2. Aerodynamics and Aircraft System

2.1 **Theory of Flight**

- 2.1.1 **Physics of the Atmosphere:** International Standard Atmosphere (ISA), application to aerodynamics.
- 2.1.2 **Aerodynamics:** Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.
- 2.1.3 **Theory of Flight:** Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.

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नेपाल नागरिक उड्डयन प्राधिकरण

प्राविधिक सेवा, एयरवर्दिनेश इन्जिनियरिङ्ग समूह, बरिष्ठ अधिकृत, सातौँ तहको खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

- 2.1.4 **Flight Stability and Dynamics:** Longitudinal, lateral and directional stability (active and passive).
- 2.1.5 Aeroplane Aerodynamics and Flight Controls: Operation and effect of: roll control: pitch control: yaw control, Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels.
- 2.1.6 **High Speed Flight:** Speed of sound, subsonic flight, transonic flight, Mach number, critical Mach number, buffet, Effects of sweepback on critical Mach number.

2.2 Airframe Structures - General Concepts

- 2.2.1 Airworthiness requirements for structural strength : Structural classification, Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Aircraft bonding.
- 2.2.2 Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; fuselage, wings, stabilisers, flight control.

2.3 Airframe Structures – Aeroplanes

- 2.3.1 **Fuselage** Construction and pressurisation sealing; Wing, stabiliser, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms.
- 2.3.2 **Wings -** Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.
- 2.3.3 **Stabilisers -** Construction; Control surface attachment.
- 2.3.4 **Nacelles/Pylons** Construction; Firewalls; Engine mounts.
- 2.4 **Air Conditioning and Cabin Pressurisation -** Sources of air supply including engine bleed, APU and ground cart; Air conditioning systems; Air cycle and vapour cycle machines; Distribution systems; Flow, temperature and humidity control system; Protection and warning devices.
- 2.5 **Protection -** Fire and smoke detection and warning systems; Fire extinguishing systems; Portable fire extinguisher.
- 2.6 **Flight Controls -** Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems; Balancing and rigging; Stall protection/warning system.
- 2.7 **Fuel Systems -** System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defueling; Longitudinal balance fuel systems.
- 2.8 **Hydraulic Power -** System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.

- 2.9 **Ice and Rain Protection -** Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air, pneumatic and chemical; Rain repellant; Probe and drain heating; Wiper systems.
- 2.10 Landing Gear Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering; Air-ground sensing.
- 2.11 **Oxygen -**System layout; cockpit, cabin; sources, charging and distribution; supply regulation; Indications and warnings
- 2.12 **Pneumatic/Vacuum -** System layout; cockpit, cabin Sources, storage, charging and distribution; Supply regulation; Indications and warnings; Interfaces with other systems.

खण्ड (ख) - ४० %

3. Gas Turbine Engine and Propeller

- 3.1 **Fundamentals** Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop.
- 3.2 **Engine Performance** Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption;Engine efficiencies;By-pass ratio and engine pressure ratio;Pressure, temperature and velocity of the gas flow;Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations
- 3.3 Inlet -Compressor inlet ducts; Effects of various inlet configurations; Ice protection.
- 3.4 **Compressors** Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; Operation: Causes and effects of compressor stall and surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.
- 3.5 **Combustion Section** Constructional features and principles of operation.
- 3.6 **Turbine Section** Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.
- 3.7 **Exhaust** Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction. Thrust reversers.
- 3.8 **Lubrication Systems** System operation/lay-out and components, fuel system, air systems, starting and ignition system, engine indication systems, power augmentation system, fire protection systems
- 3.9 **Fuel Systems** Operation of engine control and FADEC; Systems lay-out and components.
- 3.10 Air Systems Operation of engine air distribution and anti ice control systems, including internal cooling, sealing and external air services.
- 3.11 **Starting and Ignition Systems** Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.
- 3.12 **Propeller Construction and Fundamentals** Blade element theory; High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance; Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.

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- 3.13 **Propeller Pitch Control** Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.
- 3.14 **Propeller Maintenance** Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.

4. Electrical, Electronic and Avionics

25

- 4.1 **Electrical Terminology and Generation of Electricity** Following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow; Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism, motion.
- 4.2 **DC Sources of Electricity** Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.
- 4.3 **DC Circuits** Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.
- 4.4 **Resistance / Resistor** Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Construction, Operation and use of potentiometers and rheostats; Construction and Operation of Wheatstone Bridge
- 4.5 Capacitance; Magnetism
 - 4.5.1 Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor colour coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.
 - 4.5.2 Theory of magnetism; Properties of a magnet; Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor; Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.
- 4.6 **DC Motor / Generator Theory** Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.
- 4.7 **AC Theory** Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power; Triangular/Square waves; Single / 3 phase principles.
- 4.8 **Transformers** Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase

voltages and currents; Calculation of power in a three phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.

- 4.9 AC Generators and AC Motors
 - 4.9.1 Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Permanent Magnet Generators.
 - 4.9.2 Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.
- 4.10 **Printed Circuit Boards** Description and use of printed circuit boards.
- 4.11 **Servomechanisms**-Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue transducers; servomechanism ; Principles of operation and use of the following synchro system components / features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters; Servomechanism defects
- 4.12 **Instrument Systems** Atmosphere; Pressure measuring devices and systems; Pitot static systems; Altimeters; Vertical speed indicators; Airspeed indicators; Machmeters; Altitude reporting / alerting systems; Air data computers; Instrument pneumatic systems; Direct reading pressure and temperature gauges; Temperature indicating systems; Fuel quantity indicating systems; Gyroscopic principles; Artificial horizons; Slip indicators; Directional gyros; GPWS; Compass systems; Flight Data Recording systems; Electronic Flight Instrument Systems; Instrument warning systems and angle of attack indicating systems; Vibration measurement and indication; Glass cockpit.
- 4.13 Navigation and Communication Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter. Working principles of following systems: VHF; HF; ELT; CVR; VOR; ADF; ILS; MLS; FD; DME; VLF/Omega; Doppler navigation; Area navigation, RNAV systems; FMS; GPS, GNSS; INS; ATC transponder, secondary surveillance radar; TCAS; Weather avoidance radar; Radio altimeter.

प्रथम पत्र (वस्तुगत बहुवैकल्पिक)							
भाग	विषय		अङ्कभार	प्रश्न संख्या			
(अ)	1. सामान्य ज्ञान		રપ્ર	२४ प्रश्न x १ अङ्क = २४			
	2. बौद्धिक परीक्षण	(General Ability Test)	90	१० प्रश्न x १ अङ्क = १०			
	3. व्यवस्थापन (M	anagement)	१४	१४ प्रश्न x १ अङ्क = १४			
(आ)	सेवा सम्वन्धी	खण्ड (क)	રપ્ર	२४ प्रश्न x १ अङ्क = २४			
		खण्ड (ख)	રપ્ર	२४ प्रश्न x १ अङ्क = २४			
	অ	मा	900	१०० प्रश्न x १ अङ्क = १००			

प्रथम पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिने छ ।

द्वितीय पत्र (विषयगत)							
भाग	ाग विषय खण्ड		अङ्कभार	छोटो उत्तर	लामो उत्तर		
(अ)	-	-	-	-			
(आ)	सेवा सम्वन्धी	(क)	XO	२ प्रश्न x ४ अङ्क = १०	४ प्रश्न x १० अङ्क = ४०		
		(ख)	XO	२ प्रश्न x ४ अङ्क = १०	४ प्रश्न x १० अङ्क = ४०		
	जम्मा			४ प्रश्न x ४ अङ्क = २०	८ प्रश्न x १० अङ्क = ८०		

द्वितीय पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिने छ ।