

नेपाली सेना

प्रा.उ.से. एरोनटिकल ईन्जिनियर (खुला) पदको लिखित परीक्षाको पाठ्यक्रम

समय : २ घण्टा ३० मिनेट

पूर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

यो पाठ्यक्रम नेपाली सेनाको विभिन्न ईकाईहरूमा रिक्त रहेको प्रा.उ.से. एरोनटिकल ईन्जिनियर (खुला) पदका उम्मेदवार छनौट परीक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सरिक हुने उम्मेदवारहरूको पेशा सम्बन्धि विषयलाई आधारमानी प्रश्नहरू सोधिने छ ।

- (क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।
- (ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराईने छ ।
- (ग) प्रश्न पत्र निर्माण गर्दा पाठ्यक्रममा समावेश भएका सबै विषयहरूलाई समेटिनेछ ।
- (घ) नेपाली सेनाको आवश्यकता तथा विविध परिस्थितमा नेपाली सेना अनुकूल हुने गरी उल्लेखित विवरणहरूमा हेरफेर हुन सक्नेछ ।
- (ङ) पाठ्यक्रमको रूपरेखा देहायमा उल्लेख गरे अनुसार हुनेछ ।
- (च) पाठ्यक्रम लागु मिति २०७३/१/७ गते ।

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या X अङ्क	समय
पेशा सम्बन्धी	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	४० प्रश्न X १ अङ्क = ४०	२ घण्टा ३० मिनेट
			विषयगत (Subjective)	छोटो उत्तर	६ प्रश्न X ५ अङ्क = ३०	
				लामो उत्तर	३ प्रश्न X १० अङ्क = ३०	

पेशा सम्बन्धी विषयको पाठ्यक्रम**(SYLLABUS FOR AERONAUTICAL ENGINEER)****1. Aerodynamics and Flight Controls**

- 1.1 Concept about International Standard Atmosphere (ISA), IAS, TAS, CAS along with concept of QNH and QFE
- 1.2 Concept and different types of airfoils, different types of the wing, aspect ratio, camber
- 1.3 Fundamental of airfoils, pressure distribution, lift, drag and different types of drag
- 1.4 Laminar and turbulent flow, boundary layer, vortex generators, angle of attack, angle of incidence, pitch angle, centre of pressure, lift/drag ratio
- 1.5 Three axis of rotation
- 1.6 Principle and function of ailerons, elevators, rudder, flaps, slats and spoilers
- 1.7 Tabs-balance, trimming and servo tabs
- 1.8 Elementary aero-elasticity and flutters, mass balance
- 1.9 Basic concept of compressibility and non-compressibility flow
- 1.10 Subsonic, transonic and supersonic speed and Bernoulli's equation
- 1.11 Stability and control: equilibrium and center of gravity, longitudinal, and directional and lateral stability
- 1.12 Maneuvers : forces on the aero plane during climb, descend, turn and roll
- 1.13 Aircraft performances in level flight, maximum speed in level flight, conditions for minimum drag and power required, range and endurance in propeller & Jet Airplane, climbing and gliding flight, absolute and service ceiling
- 1.14 Helicopter Engineering
 - 1.14.1 Types of main rotor systems
 - 1.14.2 Helicopter controls: Collective, Cyclic & anti-tor
 - 1.14.3 Three hinges: Flapping, drag & feathering
- 1.15 Helicopter Aerodynamics:
 - 1.15.1 Blade lift & drag with concept of vector diagram of two forces along with aero-dynamic resultant force
 - 1.15.2 Lift dissymmetry
 - 1.15.3 Air flow through the rotor in power flight: hover, vertical climb/descent and derivation of required thrust (force) and its application
 - 1.15.4 Various flying conditions and relations of different forces in power flight: hover, vertical, forward and transverse flight
- 1.16 Helicopter Performance:
 - 1.16.1 Basic power: induced power, profile power, parasite power and available power
 - 1.16.2 Autorotation
 - 1.16.3 Ground Resonance and main rotor and tail rotor vibration

2. Aircraft Electrical Power Supply System, Instrument System and Radio System

- 2.1 A/C internal and external power supply, capacity, storage and operation of battery
- 2.2 Principle and purposes of DC generators and simple alternators, and constant speed drives voltage regulation
- 2.3 Electric motors and actuators
- 2.4 Circuit protection mechanisms in AC and DC
- 2.5 Basic principle of engine starting system
- 2.6 Overheating and engine fire protection system along with smoke detection, heat detection system
- 2.7 Essentials and non-essential electric power system
- 2.8 Basic flight instruments and its principle and purposes along with Mach meter, gyroscopic instruments, pressure and temperature and position indicators, quantity and flow indicators, and working principle of pitot static system
- 2.9 Location and purposes of radio communication
- 2.10 General principle of ADF, VOR/ILS, DME, NDB and different types of radar
- 2.11 General principle and operation of HF, U/VHF, ELT, CVR and FDR
- 2.12 Different types of radio antennae
- 2.13 General principle of radio altimeter, transponder, GPS, TCAS, EGPWS and RVSM
- 2.14 Principle and functions with associated components of Auto pilot system

3. Gas Turbine Engine

- 3.1 Constant pressure cycles, and general turbine engine theory, HP, BHP, and SHP
- 3.2 Types of aircraft engines and comparative merits
- 3.3 Principle and use of propeller and jet for thrust production and comparative merits
- 3.4 Compressor principle and types of compressor mainly used in engine
- 3.5 Compressor surge, stall and bleed valve
- 3.6 Principle of diffusers, guide vanes, type of combustion chamber, rich and lean mixture and different types of fuel nozzle
- 3.7 Working principle of gas generator and power turbine, reaction and impulse turbine blades
- 3.8 Exhaust systems, concept of afterburner
- 3.9 Basic engine lubrication system along with cooling system and engine fuel system
- 3.10 Basic principle of engine thrust reverser system
- 3.11 Different engine starting system (APU, air starter, electric motors)
- 3.12 Effect of altitude, temperature, pressure, humidity and forward speed on performance
- 3.13 Engine surging and stalling, method alleviation of engine
- 3.14 Modular concept of engine and its purposes

4. Aircraft Structures

- 4.1 Solid mechanics: concept of stress and strain, Hooke's law, shear force and torsion force, bending moments for simply supported and cantilever beams, equilibrium of rigid bodies, free body diagram, vector force analysis
- 4.2 Type of construction of fuselage, monocoque and semi monocoque with examples
- 4.3 Bulkheads, formers, longerons, stringers, ribs, spar

- 4.4 Mass balances and aerodynamics balances of control surfaces
- 4.5 Structure of wing and different types of wings
- 4.6 Empennage
- 4.7 Types of landing gears, shock strut
- 4.8 Brakes: types of brakes, brake mechanism, anti-skid system, heat dissipation, landing gear doors

5. Aircraft System

- 5.1 Principle and functions of hydraulic system
- 5.2 Principle and function of pneumatic system
- 5.3 Air conditioning system and pressurization system
- 5.4 De-icing and anti-icing system
- 5.5 Fuel and Fuel System:
 - 5.5.1 Fuel specification: kerosene, wide cut, additives
 - 5.5.2 Tank and Fuel System Layouts
 - 5.5.3 Types of tanks, venting, tank pumps, quantity and flow indication, cocks and pipes
 - 5.5.4 Jettisoning
 - 5.5.5 Refueling and de-fuelling: over wing and under wing system, filtration, fire and explosion precautions
 - 5.5.6 Protection from ice
 - 5.5.7 Vapor locking and microbiological contamination
- 5.6 Basic principle of oxygen system, storage distribution and flow control oxygen masks
- 5.7 Fire protection system: fire risk in aircraft, principle of fire and smoke detection equipment, fire extinguishing agents

6. Aviation Management

- 6.1 Concept of routine, planned, preventive, corrective and predictive maintenance
- 6.2 Engineering activities in maintenance management: inspection, overhaul, testing, calibration, improvements/modifications
- 6.3 Aircraft documentation: Log card, maintenance manuals, IPC and service bulletins, TBO & TSN of aircraft components
- 6.4 Airworthiness Directives

7. Aircraft Materials

- 7.1 Different types of corrosion with preventive measures
- 7.2 Concept of creep, fatigue on aircraft components
- 7.3 Commonly used aircraft materials: aluminium alloys, magnesium alloys, copper alloys, steel alloys
- 7.4 Concept of heat treatment in brief (quenching, surface hardening, annealing, normalising)
- 7.5 Non-destructive testing methods
- 7.6 Concept, types and purposes of composites materials

यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या निम्नानुसार हुनेछ ।

एकाई नं. (Unit No.)	अङ्कभार (Weightage)	बहुवैकल्पिक प्रश्न (MCQs) को संख्या	छोटो उत्तर प्रश्नको संख्या	लामो उत्तर प्रश्नको संख्या
१	२५	१०	६ प्रश्न X ५ अङ्क	३ प्रश्न X १० अङ्क
२	२०	१०		
३	२०	१०		
४	१५	५		
५	२०	५		
६				
७				
जम्मा	१००	४० प्रश्न x १ अङ्क = ४० अङ्क	६ प्रश्न X ५ अङ्क = ३० अङ्क	३ प्रश्न X १० अङ्क = ३० अङ्क