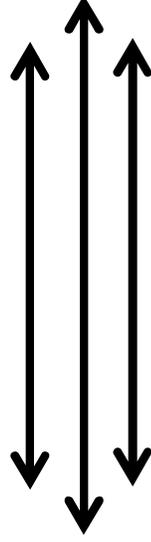
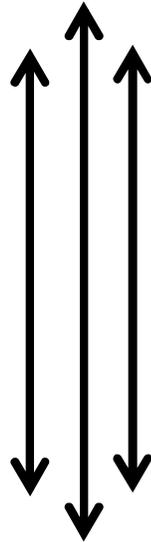


नेपाली सेना
श्री भर्ना छनौट निर्देशनालय, कार्यरथी विभाग
जंगी अड्डा



प्रा.उ.से. एरोनोटिकल/मेकानिकल इन्जिनियर (खुला) पदको पेशा सम्बन्धी लिखित
परीक्षा र प्रयोगात्मक परीक्षाको पाठ्यक्रम योजना



२०७५

नेपाली सेना

प्रा.उ.से. एरोनोटिकल/मेकानिकल इन्जिनियर (खुला) पदको पेशा सम्बन्धी लिखित परीक्षा र प्रयोगात्मक परीक्षाको पाठ्यक्रम योजना

यो पाठ्यक्रम नेपाली सेनाको विभिन्न ईकाईहरूमा रिक्त रहेको प्रा.उ.से. एरोनोटिकल/मेकानिकल इन्जिनियर (खुला) पदका उम्मेदवार छनौट परीक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सहभागि हुने उम्मेदवारहरूको विविध विषय (अंग्रेजी, गणित, नेपाली र सामान्यज्ञान), पेशा सम्बन्धी विषय र पेशागत विषयको प्रयोगात्मक परीक्षाको लागि निम्न विषयहरूलाई आधार मानी प्रश्नहरू सोधिने छ ।

- (क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।
- (ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराइने छ ।
- (ग) प्रश्न पत्र निर्माण गर्दा पाठ्यक्रममा समावेश भएका सबै विषयहरूलाई समेटिनेछ ।
- (घ) नेपाली सेनाको आवश्यकता तथा विविध परिस्थितिमा नेपाली सेना अनुकूल हुने गरी उल्लेखित विवरणहरूमा हेरफेर हुन सक्नेछ ।
- (ङ) वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको 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 ।
- (च) वस्तुगत बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- (छ) विषयगत प्रश्न हुने पत्र/विषयका प्रत्येक भाग खण्ड/एकाइ/प्रश्नका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थी प्रत्येक भाग/खण्ड/एकाइ/प्रश्न प्रश्नको उत्तर सोही भाग/खण्ड/एकाइ/प्रश्नको उत्तर पुस्तिकामा मात्र लेख्नुपर्नेछ ।
- (ज) पाठ्यक्रमको रूपरेखा देहायमा उल्लेख गरे अनुसार हुनेछ ।
- (झ) पाठ्यक्रम लागू मिति २०७५/१०/२७ गतेदेखि ।

प्रा.उ.से. एरोनोटिकल/मेकानिकल इन्जिनियर (खुला) पदको पेशा सम्बन्धी विषयको लिखित
परीक्षा योजना र पाठ्यक्रम

| विषय | पुर्णाङ्क | 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 (Subject) | छोटो उत्तर | ६ प्रश्न x ५ अङ्क = ३० | |
| | | | | लामो उत्तर | ३ प्रश्न x १० अङ्क = ३० | |

लिखित परीक्षाको पाठ्यक्रम

AERONAUTICAL SECTION

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 aerodynamic resultant force
 - 1.15.2 Lift Dissymmetry
- 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

1.16.4 Ground Effect (OGE and IGE)

1.16.5 Coriolis effect and its compensation

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. Essentials and non-essential electric power system

2.5. Basic flight instruments and its principle and purposes along with gyroscopic instruments, pressure and temperature and position indicators, quantity and flow indicators, and working principle of pitot static system

2.6. General principle of ADF, VOR/ILS, DME

2.7. General principle of radio altimeter, transponder, GPS

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

3.7. Working principle of gas generator and power turbine, reaction and impulse turbine blades

3.8. Exhaust systems – Principle

3.9. Basic engine lubrication system along with cooling system and engine fuel system

3.10. Different engine starting system (APU, air starter, electric motors)

3.11. Effect of altitude, temperature, pressure, humidity and forward speed on performance

3.12. Engine surging and stalling

4. **Aircraft Structures**

4.1. Type of construction of fuselage, monocoque and semi monocoque with examples

4.2. Bulkheads, formers, longerons, stringers, ribs, spar

4.3. Mass balances and aerodynamics balances of control surfaces

4.4. Structure of wing and different types of wings

4.5. Empennage

4.6. Types of landing gears

4.7. 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: ATF

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. 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

MECHANICAL SECTION

1. Strength of Materials

- 1.1. Solid mechanics: concept of stress and strain,
- 1.2. Hooke's law and Modulus of Material
- 1.3. Stress-Strain Curve
- 1.4. Shear force and torsion force
- 1.5. Bending moments for simply supported and cantilever beams
- 1.6. Equilibrium of rigid bodies, free body diagram, vector force analysis

2. Thermodynamics

- 2.1. Thermodynamic properties
- 2.2. Closed and Opened System
- 2.3. Law's of Thermodynamics
- 2.4. Refrigeration And Air Conditioning
- 2.5. Turbine: Its Types and Working Principle

3. Machine Design

- 3.1. Axial load, torsion load, bending load, shear load
- 3.2. Ball and roller bearing
- 3.3. Construction and types, friction and lubrication of bearings, bearings materials
- 3.4. Gear drives: Spur gear, spiral gear, bevel gear, rack and pinion gear
- 3.5. Types of gear train

4. Materials

- 4.1. Mechanical Properties of Materials
- 4.2. Fundamentals of metals and its alloys
- 4.3. Structures of metals, Formation of Grains, Deformation of metals, Recovery, Re-crystallization and Grain Growth
- 4.4. Iron Carbon Equilibrium Diagram
- 4.5. Ferrous Metals and Alloys (Properties and Uses)
 - 4.5.1. Pig Iron ,Cast Iron, Wrought Iron, Carbon Steel, Alloy Steel
 - 4.5.2. Special Alloy's Steels, Cutting Alloys
- 4.6. Non-Ferrous Metals and Alloys
 - 4.6.1. Aluminum and its Alloys
 - 4.6.2. Copper and its Alloys (Brass and Bronze)
- 4.7. Composite Materials
 - 4.7.1. Applications, constructions and types
- 4.8. Plastic and its types

4.9. Heat treatment of Metals and Alloys

4.9.1. Purposes

4.9.2. Methods of Heat Treatment: Annealing, normalizing, hardening ,Quenching

4.10. Destructive and Non-Destructive Testing: Methods

4.11. Different types of corrosion with preventive measures

4.12. Concept of creep and fatigue

5. Workshop Technology

5.1. Welding Technology

5.1.1. Weldability

5.1.2. Types of Welding: Arc Welding, Gas Welding

5.2. Bench tools and Hand Tools; Principal measuring Instruments

5.3. Types of Fits

यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरू निम्नानुसार हुनेछ ।

| Section | Unit | Weightage | MCQ | Short Q&A | Long Q&A |
|----------------------|------|------------|-----------------------------------|---------------------------------|----------------------------------|
| Aeronautical 60 % | 1 | 15 | 5X1 | - | 1X10 |
| | 2 | 5 | - | 1X5 | - |
| | 3 | 15 | 5X1 | - | 1X10 |
| | 4 | 10 | 5X1 | 1X5 | - |
| | 5 | 10 | 5X1 | 1X5 | - |
| | 6 | 5 | - | 1X5 | - |
| Mechanical 40 % | 1 | 10 | 5X1 | 1X5 | - |
| | 2 | 5 | - | 1X5 | - |
| | 3 | 5 | 5X1 | - | - |
| | 4 | 15 | 5X1 | - | 1X10 |
| | 5 | 5 | 5X1 | - | - |
| Total | | 100 | 40 Q X 10 Mark 40 Mark | 6 Q X 5 Mark 30 Mark | 3 Q X 10 Mark 30 Mark |

प्रा.उ.से. एरोनोटिकल/मेकानिकल इन्जिनियर (खुल्ला) पदको पेशागत विषयको
प्रयोगात्मक परीक्षा पाठ्यक्रम

समय : १ घण्टा

पूर्णाङ्क : ५०

उत्तीर्णाङ्क : २५

1. Identification of Hand tools, bench tools, measuring tools and their uses: (15)
2. Machine tools, cutting tools and their uses: (10)
 - 2.1. Lathe machine
 - 2.2. Drilling machine
 - 2.3. Grinding machine
3. Maintenance safety and support equipment: (10)
 - 3.1. Fire extinguisher and its types
 - 3.2. Ground equipment
 - 3.3. Aircraft safety
 - 3.4. Workshop safety
 - 3.5. Personnel safety
4. Aircraft General: (15)
 - 4.1. Types of aircraft
 - 4.2. Identification of aircraft (Rotor Wing and Fixed Wing) Components
 - 4.3. Locking Techniques