नेपाल नागरिक उड्डयन प्राधिकरण
प्राविधिक सेवा, इलेक्ट्रिकल इन्जिनियरिङ्ग समूह, बरिष्ठ अधिकृत, सातौं तहको खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

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

प्रथम चरण :– लिखित परीक्षा — पूर्णाङ्क :– २००
द्वितीय चरण :– अन्तर्वार्ता — पूर्णाङ्क :– ३०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरण : लिखित परीक्षा (Written Examination) — **पूर्णाङ्क :- २००**

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	सामान्य ज्ञान, बौद्धिक परीक्षण, व्यवस्थापन र सेवा सम्वन्धी	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न (MCQ)	१०० प्रश्न x १ अङ्क	१ घण्टा ३० मिनेट
द्वितीय	सेवा सम्वन्धी	१००	४०	विषयगत	छोटो उत्तर लामो उत्तर	४ प्रश्न X ५ अङ्क ८ प्रश्न X १० अङ्क	३ घण्टा

२. द्वितीय चरण : अन्तर्वार्ता (Interview) — **पूर्णाङ्क :- ३०**

विषय	पूर्णाङ्क	परीक्षा प्रणाली	समय
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक	-

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी हुनेछ ।
२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
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 ।
५. 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 पाठ्क्रममा परेको सम्झनु पर्दछ ।
७. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
८. यस भन्दा अगाडि लागू भएका माथि उल्लिखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
९. पाठ्यक्रम लागू मिति :–

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

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

1. **सामान्य ज्ञान** **(25 × 1 Mark = 25 Marks)**

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 चालु आवधिक 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, २०५३
1.12 नागरिक उड्डयन नियमावली, २०५८
1.13 नेपाल नागरिक उड्डयन प्राधिकरण कर्मचारीहरुको सेवाका शर्त र सुविधा सम्वन्धी नियमावली, २०५६
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, २०५९

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

नेपाल नागरिक उड्डयन प्राधिकरण
प्राविधिक सेवा, इलेक्ट्रिकल इन्जिनियरिङ्ग समूह, बरिष्ठ अधिकृत, सातौं तहको खुला/आन्तरिक
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

भाग (आ) – सेवा सम्वन्धी

खण्ड (क) - ५० %

1. **Basic Concept of Electrical Engineering**
   1.1 Electric charge and current, direct and alternating currents, electric voltage. potential difference, power and energy.
   1.2 Ohm's Law, Kirchhoff's Law; Star/ Delta and Delta / Star transformation; Circuit Analysis; Transient and Steady State Condition; Frequency response on circuit analysis; Relationship between current and voltage in capacitor and inductor.
   1.3 AC fundamentals: RMS and average value of different waveform; Generation of alternating emf; Power and Power Factor; Three Phase System, Voltage and Current relations for Star and Delta connected System; Balanced and Unbalanced Load on Three Phase System; Three Phase Power measurement

2. **Electrical Machine**
   2.1 **Transformers**: type, construction, load and no load condition, open circuit and short circuit test, equivalent circuit, losses, efficiency and voltage regulation, auto transformer, parallel operation, load sharing, instrument transformer.
   2.2 **DC Machines:** type, construction. voltage /speed/ load characteristics of dc generators, separate and self-exited machines, voltage regulation of generator, torque/speed characteristics of shunt field, series field and compound field motors, armature reaction and commutation, DC motor starters, speed regulation and control of DC motor.
   2.3 **Synchronous Generators**: classification and construction, voltage regulation of an alternator by synchronous impedance method and mmf method, losses and efficiency, power angle characteristics.
   2.4 **Synchronous Motors:** equivalent circuit, power and torque, effect of excitation, stability v-curve, hunting, starting and application.
   2.5 **Induction Motors**: type, construction, equivalent circuits. Torque-slip characteristics starters, speed control and motor selection.
   2.6 **Induction Generators:** principle of operation, application, controllers and harmonics.

3. **Power Generation**

   Types of Generating Plants- Thermal, Hydro, Diesel and Solar (Working Principles, Equipment, Bus Bar, AVR and Reactors; Stand by Generator and Auto Transfer Switch; Uninterruptible Power Supplies (UPS); Basic Principle of No-break power generation for airports.

4. **Power System Analysis**
   4.1 **Load Flow Study**: Load characteristics, effects on voltage and frequency, real power frequency balance, reactive power frequency balance, basic complex power flow equations for a network, voltage profile and VAR compensation, causes and effects of low power factor, advantages and methods of power factor improvement.

4.2 **Stability:** Steady state, dynamic and transient stability, equal area criterion, Swing equation for multi machine, Steady-state stability implications.

4.3 **Control and Protection**: Faults in power system and their calculation, Components of power system protection, Isolators/Disconnecting switches, contactors, Types and characteristics of circuit breakers and protective relays, Automatic reclosure, Protection of generators, transformers and transmission/distribution lines, Lightning protection, Governor's principle and characteristics.

4.4 **Load dispatching:** principle of economic load dispatch, requirements, tools and benefits, role of a dispatcher.

4.5 **Transmission System**: Choice of voltage, route selection, right of way, substation layout and location.

4.6 **Distribution System**: Types of Distribution systems, Distribution substations, Bus bar schemes, Power factor correction, Protection coordination in distribution systems, Distribution system reliability indices, rural distribution system and Loss reduction.

4.7 **Quality of Electricity**: Supply quality parameters, effect of quality on equipment and application, standards.

5. **Power Distribution and Consumer Services**

Sub-station & switchyards: General layout of Sub-station and their key elements. Types of underground Cable, Cable Resistances and Capacitances, Insulation Resistance, general concepts about Cables used for runway power distribution, selection of cable and selection criteria. Airport series circuit. Advantages and disadvantages of series and parallel circuits. Handling of cable and protection, Cable joints, Single wire power Distribution, lightening phenomenon, lightening arrestors types and function, overhead earth wire, voltage drops, Ferranti effects, SIL of Transmission Line; earthing of electrical system and electrical equipment. its importance and methods of earthing, Energy Tariffs structure.

6. **Economics of Power Utilization**

Basic concept about Energy Audit, Load management TOD meter, Demand side management Power Factor Improvement: Causes and effects of low power factor, advantages and methods of power factor improvement. Economics of power generation, Load forecast, demand factor, load factor, plant use factor, diversity factor, energy rates (tariff), depreciation, Rate of Return

खण्ड (ख) - ५० %

7. **Electrical Maintenances**

Maintenance schedules – Periodic, Preventive and emergency maintenance, NOTAM, Fault reporting and fault finding: fault reporting procedures, fault category and action plan, maintaining log, fault clearing and logging and fault recording system; Check list of equipment – Daily, Weekly, Monthly and Yearly. Duty and Responsibilities of Shift-In charge and section Chief, Roaster Duty.

8. **Electrical Safety**

Physical effect of electric shock, safety rules and regulation, safety tools and devices, explosion of electrical equipment In premises and precaution to be taken Concept of touch voltage, effects of non-ionizing electromagnetic fields on human, earthing and shielding techniques for electrical equipment. Fire hazards, firefighting techniques and equipment, First aid requirements for after the event treatment Fire Alarm System-Principle and operation, electrical induction into communication and transmission lines, effects of non-ionizing magnetic fields on human body, Noise hazard.

9. **Power Electronics and illumination**

Power diodes, Thyristors, Transistors, Gate turn off devices, AC to DC and DC to AC conversions, Harmonic filtering, Switched Mode Power Supplies.

Law of illumination; Radiant Efficiency, design of Lighting Schemes; Type of Electric Lamps and comparison between Filament lamp and Fluorescent Lamp.

10. **Engineering Economics**

Cash flow analysis, project evaluation indicator, payback period, risk analysis, taxation system in Nepal, Energy Tariff.

11. **Project Management**

Project Planning and Scheduling, capital Planning and budgeting, project monitoring and control, organizational management, Internal Organization, Management Information System, Motivation and Leadership, Personal Management, Familiarization with procurement guidelines and standard of World Bank, ADB, Preparation of Contract documents, specifications, condition of contract and other contractual procedure.

12. **Basic Information about Aeronautical Ground Lighting System at Airport**

12.1 Approach Lighting System.
- 12.1.1 Simple Approach Light
- 12.1.2 Precision Approach Light

12.2 Visual Approach Slope Indicator System
- 12.2.1 T- VASIS
- 12.2.2 PAPI

12.3 Runway lights
- 12.3.1 Edge light.
- 12.3.2 Threshold and wing bar lights.
- 12.3.3 End lights.
- 12.3.4 Center line lights.
- 12.3.5 Touch zone lights.
- 12.3.6 Guard lights.

12.4 Stop way Lights
12.5 Taxiway lights
  12.5.1 Centre line lights.
  12.5.2 Edge lights.
  12.5.3 Stop bar lights.
12.6 Apron floodlighting
12.7 Road holding position light
12.8 Aircraft stand maneuvering lights
12.9 Aeronautical beacon light
12.10 Runway lead-in lighting system
12.11 Runway Threshold Identification Light
12.12 Signs:
  12.12.1 Mandatory Instruction Sign
  12.12.2 Information Sign

13. **ICAO Annex – 14 (Related Portion only)**
  13.1 Aerodrome design manual part 4.
  13.2 Aerodrome design manual part 5.

प्रथम पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिने छ ।

प्रथम पत्र (वस्तुगत बहुवैकल्पिक)				
भाग	**विषय**		**अङ्कभार**	**प्रश्न संख्या**
(अ)	1. सामान्य ज्ञान		२५	२५ प्रश्न x १ अङ्क = २५
	2. बौद्धिक परीक्षण (General Ability Test)		१०	१० प्रश्न x १ अङ्क = १०
	3. व्यवस्थापन (Management)		१५	१५ प्रश्न x १ अङ्क = १५
(आ)	सेवा सम्वन्धी	**खण्ड (क)**	२५	२५ प्रश्न x १ अङ्क = २५
		खण्ड (ख)	२५	२५ प्रश्न x १ अङ्क = २५
जम्मा			**१००**	**१०० प्रश्न x १ अङ्क = १००**

द्वितीय पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिने छ ।

द्वितीय पत्र (विषयगत)					
भाग	**विषय**	**खण्ड**	**अङ्कभार**	**छोटो उत्तर**	**लामो उत्तर**
(अ)	-	-	-	-	
(आ)	सेवा सम्वन्धी	(क)	५०	२ प्रश्न x ५ अङ्क = १०	४ प्रश्न x १० अङ्क = ४०
		(ख)	५०	२ प्रश्न x ५ अङ्क = १०	४ प्रश्न x १० अङ्क = ४०
जम्मा			**१००**	४ प्रश्न x ५ अङ्क = २०	८ प्रश्न x १० अङ्क = ८०