

**नेपाल नागरिक उड्डयन प्राधिकरण**  
**प्राविधिक सेवा, इलेक्ट्रिकल ईन्जिनियरिङ्ग समूह,**  
**उपनिर्देशक (इलेक्ट्रिकल ईन्जिनियर), दशौं तहको खुला तथा आन्तरिक**  
**प्रतियोगितात्मक परीक्षाको पाठ्यक्रम**

लिखित परीक्षाको विषय, पूर्णाङ्क, परीक्षा प्रणाली, प्रश्नसंख्या, अंकभार र समय निम्नानुसार हुनेछ ।

पत्र	विषय	पूर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या	अंक भार	समय
प्रथमपत्र	प्रशासन तथा व्यवस्थापन र ऐन नियम	१००	तर्कयुक्त विश्लेषणात्मक समस्या समाधान	२ x २०	४०	३ घण्टा
			विषयगत – छोटो प्रश्न	६ x १०	६०	
द्वितीयपत्र	सेवा सम्बन्धी	१००	तर्कयुक्त विश्लेषणात्मक समस्या समाधान	२ x २०	४०	३ घण्टा
			विषयगत – छोटो प्रश्न	६ x १०	६०	

द्रष्टव्य :

१. प्रथमपत्र र द्वितीयपत्रको परीक्षा २ दिनमा हुनेछ ।
  २. परीक्षाको माध्यम नेपाली वा अंग्रेजी वा दुवै हुनसक्ने छ ।
  ३. प्रत्येक पत्रको उत्तिर्णाङ्क ४०% (चालिस प्रतिशत) हुनेछ । दुवै पत्रमा न्यूनतम उत्तिर्णाङ्क प्राप्त नगर्ने उम्मेदवारहरू अन्तर्वार्तामा सम्मिलित हुन योग्य हुनेछैनन् ।
  ४. अन्तर्वार्ता र शैक्षिक योग्यता
 

क) अन्तर्वार्ताको अङ्क भार	- ३०
ख) शैक्षिक योग्यताको अङ्कभार	- ३
- शैक्षिक योग्यता वापतको अङ्क : न्यूनतम शैक्षिक योग्यता वापत प्रथम श्रेणीलाई ३, द्वितीय श्रेणीलाई २ र तृतीय श्रेणीलाई १ अङ्क प्रदान गरिनेछ ।
५. यस पाठ्यक्रममा जेसुकै विषयवस्तु समावेश गरिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मितिभन्दा ३ महिना अगाडि संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा परेको संभन्नुपर्दछ ।
  ६. यस पाठ्यक्रममा उल्लेख भएका विषयहरूका अतिरिक्त समसामयिक घटना तथा विषयवस्तुहरूका सम्बन्धमा समेत प्रश्न सोध्न सकिनेछ ।

## प्रथमपत्र : प्रशासन तथा व्यवस्थापन र ऐन नियम

### क) प्रशासन तथा व्यवस्थापन

१. सार्वजनिक प्रशासनको परिचय, यसको प्रयोग र नवीनतम अवधारणा
२. प्रशासनिक विधिहरू :- कार्य विश्लेषण, कार्य विवरण, कार्य मूल्यांकन र छरितो व्यवस्थापन
३. नेपाल नागरिक उड्डयन प्राधिकरणको सांगठनिक संरचना र कार्यविधि
४. जनशक्ति व्यवस्थापनका विविध पक्षहरू
५. संगठनात्मक व्यवहार, समूहगत गतिशीलता, समूहगत कार्य र यसको प्रभावकारिता
६. व्यवस्थापनमा मनोबल, उत्प्रेरणा, वृत्ति विकास
७. व्यवस्थापनमा समन्वय, सुपरिवेक्षण, अनुगमन तथा मूल्यांकन
८. व्यवस्थापनमा अधिकार प्रत्यायोजन, संचार, समन्वय, सुपरिवेक्षण
९. व्यवस्थापनमा निर्णयको महत्व, निर्णय प्रक्रिया र पारदर्शिता
१०. व्यवस्थापन सूचना प्रणाली र महत्व
११. सार्वजनिक उत्तरदायित्व र संगठनमा यसको प्रभाव
१२. आर्थिक अनुशासन, लेखापालन र लेखापरीक्षण
१३. वार्ता, संभौता तथा मध्यस्थ गर्ने शीपहरू र मस्यौदा तयारी गर्ने सम्बन्धी सैद्धान्तिक र व्यवहारिक ज्ञान एवं चुनौतीहरू
१४. आवधिक योजना, परियोजना र कार्यक्रम तर्जुमा, कार्यान्वयन, अनुगमन मूल्यांकन र नेपाल नागरिक उड्डयन प्राधिकरणमा यसको प्रयोग
१५. सार्वजनिक नीति तर्जुमा, विश्लेषण, कार्यान्वयन
१६. नेपालमा संवैधानिक विकासका विभिन्न चरणहरूको विश्लेषण
१७. नेपाल नागरिक उड्डयन प्राधिकरणको उद्देश्य, कार्य, नेपाल सरकारसित सम्पर्क
१८. नेपालमा हवाई यातायातको विकासक्रम, सम्भावना र चुनौतीहरू
१९. विश्वव्यापीकरण, उदारीकरण र सार्वजनिक संस्थानको अवधारणा र प्रयोग
२०. हवाई नीति, २०६३
२१. Proficiency in using office application software

## ख) ऐन नियम

१. नेपालको अन्तरिम संविधान, २०६३
२. नेपाल नागरिक उड्डयन प्राधिकरण ऐन, २०५३
३. नेपाल नागरिक उड्डयन प्राधिकरण कर्मचारीहरूको सेवाका शर्त र सुविधा सम्बन्धी नियमावली, २०५६
४. नेपाल नागरिक उड्डयन प्राधिकरण आर्थिक प्रशासन सम्बन्धी नियमावली, २०५७
५. नागरिक उड्डयन नियमावली, २०५८
६. नेपाल नागरिक उड्डयन प्राधिकरण विमानस्थल सेवा शुल्क नियमावली, २०६७
७. हवाई सुरक्षा व्यवस्था नियमावली, २०४६
८. भ्रष्टाचार निवारण ऐन, २०५९
९. गैः सैनिक हवाई उडान ऐन, २०१५ र नियमावली
१०. करार सम्बन्धी कानूनी र प्रकृयागत व्यवस्था
११. सार्वजनिक खरिद ऐन, २०६३ तथा नियमावली २०६४
१२. श्रम ऐन, २०४८
१३. करार ऐन, २०५६
१४. Convention on International Civil Aviation 1944.

## द्वितीयपत्र : सेवा सम्बन्धी

### 1. **General**

- 1.1 External Financing and Donor Funding Policy
- 1.2 Institution Strengthening
- 1.3 Budget Planning and Allocation of Resources
- 1.4 Dispute Resolution in Contract
- 1.5 Optimization & Productivity & Efficiency of Organization

### 2. **Equipment Procurement Policy**

- 2.1 Procurement guidelines of World Bank & Asian Development Bank (WB & ADB)
- 2.2 International Standard Bidding Document
- 2.3 National Standard Bidding Document

### 3. **Basic Concept of Electrical Engineering**

- Electric charge and current, direct and alternating currents, electric voltage. potential difference, power and energy.
- Ohm's Law, Kirchoff'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.
- 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

### 4. **Electrical Machine:**

- 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.

- DC Machines type, construction. voltage /speed/ load characteristics of dc generators, separate and self-excited 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.
- Synchronous Generators classification and construction, voltage regulation of an alternator by synchronous impedance method and mmf method, losses and efficiency, power angle characteristics.
- Synchronous Motors: equivalent circuit, power and torque, effect of excitation, stability v-curve, hunting, starting and application.
- Induction Motors type, construction, equivalent circuits. torque-slip characteristics starters, speed control and motor selection.
- Induction Generators: principle of operation, application, controllers and harmonics.

## 5. 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

## 6. Power System Analysis

- 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.
- Stability: Steady state, dynamic and transient stability, equal area criterion, Swing equation for multi machine, Steady-state stability implications..
- 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.
- Load dispatching : principle of economic load dispatch, requirements, tools and benefits, role of a dispatcher.
- Transmission System :Choice of voltage, route selection, right of way, substation layout and location.
- 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, Loss reduction.
- Quality of Electricity: Supply quality parameters, effect of quality on equipment and application, standards.

## 7. 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. Handling of cable and protection, Cable joints, Single wire power Distribution, lightning phenomenon, lightning arrestors types and function, overhead earth wire, voltage drops, Ferranti effects, SIL of Transmission Line; earthing of electrical system and electrical equipments its importance and methods of earthing, Energy Tariffs structure.

**8. 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

**9. 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, Manpower Management and Leadership, Motivation.

**10. Electrical Safety**

Safety rules and regulation, storage and handling of explosives and compressed gases and flammables substances, 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. First aid requirements for after the event treatment Fire Alarm System.- Principle and operation, electrical induction into communication and transmission lines.

**11. Power Electronics**

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

**12. Illumination**

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

**13. Instrumentation**

Theory of measurements, transducers, electrical signal transmission and processing, non-electrical signal transmission, analog to digital and digital to analog converters, digital instrumentation, output devices, display and recording system.

**14. Maintenance Planning of Electrical equipments**

- a. Periodic/Routine Plan
- b. Recurrent Plan
- c. Emergency Plan
- d. Replacement Plan
- e. Transitional Plan
- f. Risk Analysis
- g. Cost Benefit Analysis

**15. Visual Aids for Aerodrome Lighting**

Lighting fixture and structures, Elevated lights, Surface(Inset) lights, Airport Lighting Control and Monitoring System(ALCMS) based on TCP/IP (Touch screen control).

**16. Application, Location and Characteristics of followings lights :**

Aerodrome beacon, circling guidance system, runway threshold identification lights, runway edge lights, runway threshold lights, wing bar lights, runways end light, runway centre line lights, runway touchdown zone lights, rapid exit taxiway light, , stopway light, taxiway centre line lights, taxiway edge lights, runway turn pad lights, stop bar lights, runway guard lights.

**17. Approach Lighting System**

Simple Approach Lighting System, Precision Approach Lighting System, types and characteristics of approach lighting system, intensity control of approach lights.

**18. Visual Approach Slope Indicator System**

T-VASIS and AT-VASIS, PAPI and APAPI

**19. Organization And Management**

Concept of Management, Internal Organization, Motivation, Leadership, control, coordination and team work, Decision making, Corporate planning and strategic management, Management Information System , Job description, Job analysis, Performance appraisal, Auditing and inventory control, Personnel Management, Familiarization with procurement guidelines and standards of ADB, PPMO. Preparation of Contract documents, specifications, condition of contract and other contractual procedures. Safety Management System (Aerodrome), ICAO.

**20. Project Management**

Project Planning and Scheduling: Network models- CPM/PERT, Manpower leveling, Material scheduling, Project preparation for implementation and justification of the project. Project monitoring and control: System of control, Project control cycle, Feedback control systems

**21. ICAO Annex – 14 (Related Portion only)**

**22. Aerodrome Design Manual Part-4 Visual Aids**

23. ICAO Universal Safety Oversight Audit Programme सम्बन्धी आधारभूत ज्ञान

24. ICAO Safety Management System सम्बन्धी आधारभूत ज्ञान