नेपाल नागरिक उड्डयन प्राधिकरण
प्राविधिक सेवा, मेकानिकल इन्जिनियरिङ्ग समूह, आठौं तह, उपप्रबन्धक पदको खुला/आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र : सेवा सम्वन्धी
खण्ड (क) - ५० अङ्क

1. **Workshop Technology and Management**
   - 1.1. Machine Tool, Application and selection
   - 1.2. Casting, metal forming and mechanical joining processes
   - 1.3. Corrosion and its prevention
   - 1.4. Workshop design and layout
   - 1.5. Planning and operation of safe, reliable and efficient workshop facilities
   - 1.6. Optimization of workshop facilities

2. **Engineering Materials**
   - 2.1. Mechanical properties of materials (Metals & Non-metals)
   - 2.2. Ferrous & Non-ferrous metals & their alloys
   - 2.3. Types of steel and their application
   - 2.4. Phase Transformation and Heat Treatment: Iron-Carbon Equilibrium Diagram, Hardening, Tempering, Annealing, Normalizing

3. **Instrumentation and Measurement**
   - 3.1. Selection of Measuring Tools and device
   - 3.2. Errors in measurements
   - 3.3. Controlling and Monitoring Device use in Electro-mechanical equipment
   - 3.4. Methods of measurement (Linear, angular), Alignment tests
   - 3.5. Calibration of measuring instruments
   - 3.6. Precision and Accuracy

4. **Project Management & Economics**
   - 4.1. Inventory Control & Management
   - 4.2. Quality Management & Certification Process
   - 4.3. Budget Planning and Allocation
   - 4.4. Network Methods: PERT and CPM
   - 4.5. Project Evaluation Techniques: Payback period method, NPV method, Future value analysis and IRR method
   - 4.6. Benefit and Cost Analysis: Cost benefit ratio, breakeven analysis
   - 4.7. Depreciation and its types
   - 4.8. Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) of Airports

5. **Airport Terminal Facilities Equipment**
   - 5.1. Elevator: Operation, Maintenance, Design and Troubleshooting
   - 5.2. Escalator: Operation, Maintenance, Design and Troubleshooting
   - 5.3. Baggage Handling System (BHS): Working principle, Types, Layout, Design, and Troubleshooting
   - 5.4. Working Principle of Aerobridge and troubleshooting
   - 5.5. Airport Trolley

6. **Airport Rescue and Firefighting (ARFF) Vehicles**
   - 6.1. Automatic Transmission System
   - 6.2. Firefighting pump
   - 6.3. Foam proportioning system
   - 6.4. Operation and application of Pneumatic System
   - 6.5. Operation and application of Hydraulic System
   - 6.6. Application of Electrical System
   - 6.7. Maintaining of Firefighting Category
   - 6.8. Power Take-Off

खण्ड (ख) - ५० अङ्क

7. **Automotive System**
   - 7.1. CI engine, SI engine: Functions and components,
   - 7.2. Braking system, Transmission system, Suspension system, Cooling system, Lubricant system, Steering system, Exhaust system, Troubleshooting of each system
   - 7.3. Electrical system, Fuel injection System, Types and Properties of Batteries and Troubleshooting of each system
   - 7.4. Identification of need of engine overhaul
   - 7.5. Purpose and function of super charger and turbo charger
   - 7.6. Types of wheel, tyres and rating of tyres, Advantages and disadvantages of radial ply and cross ply tyres
   - 7.7. Types of Fuel, Types of Lubricants, application and replacement
   - 7.8. Vehicular Emission Standards and Preventive measures and pollution control
   - 7.9. Working principle of Electric Vehicle, their components and functions, Battery Management System, Charging System

8. **Refrigeration and Air condition system**
   - 8.1. Working Cycle: Vapour Compression and Vapour absorption refrigeration cycle
   - 8.2. Air conditioning Equipment and it's types
   - 8.3. Cooling Load and Heating Load calculation, Design and Equipment selection
   - 8.4. Troubleshooting and Maintenance of Air condition system/Equipment
   - 8.5. Refrigerant: Type, Properties, Environmental effect and selection criteria

9. **Energy Resources and Conservation**
   - 9.1. Different types of energy resources and their application
   - 9.2. Application of solar photovoltaic system in airports
   - 9.3. Energy auditing and Energy Saving Opportunities

10. **Power Generation**
   - 10.1. Types of Generating Plants - Thermal, Hydro, Diesel and Solar (Working Principles)
   - 10.2. Stand by Generator Types, Application and Selection

10.3. Concept of Transfer Switch, AMF Panel, Application, Requirements and selection
10.4. Uninterruptible Power Supplies (UPS)
10.5. Principle of No-break power generation

11. **Maintenance Planning of Mechanical Equipment**
11.1. Maintenance Practice and Different types of Maintenance
11.2. Replacement Plan of equipment and systems
11.3. Cost Benefit Analysis and Risk Analysis of equipment replacement
11.4. Record keeping and Statistical Method of Data analysis
11.5. Tool for System and Process Approach
11.6. Spare parts Management
11.7. Ergonomics and Maintainability

12. **Aerodrome Safety**
12.1. Safety management system frameworks (Regulatory framework, ICAO SARPs)
12.2. Safety Policy, Safety organization, Safety planning and safety Standards
12.3. Hazard identification, Safety Risk Assessment, gap-analysis
12.4. Acceptable level of Safety, Risk mitigation and Safety Assurance
12.5. SMS implementation
12.6. Runway safety program, ramp safety

13. **Professional Practice**
13.1. Contract Law and Contract Documents
13.2. Dispute Resolution in Contract, Methods of dispute resolution
13.3. Claim and Arbitration
13.4. Standard Bidding Document: International Competitive Bidding (ICB) and National Competitive Bidding (NCB)
13.5. Procurement of Consulting Services; TOR, EOI and RFP
13.6. ICAO Annex – 14 Part -1, Annex 9, Annex 15 (related with mechanical equipment's, system and facilities)
13.7. ICAO Annexes, Manuals and Circulars (Related with mechanical equipment, systems and facilities)
13.8. Airport Service Manual Doc 9137
13.9. NOTAM/AIP & its revision process

द्वितीय पत्रबाट निम्नानुसार प्रश्न सोधिनेछ :

द्वितीय पत्र (विषयगत)				
विषय	**खण्ड**	**अङ्कभार**	**तर्कयुक्त विश्लेषणात्मक प्रश्न**	**समस्या समाधानमूलक प्रश्न**
सेवा सम्वन्धी	**(क)**	५०	३ प्रश्न X १० अङ्क = ३०	१ प्रश्न X २० अङ्क = २०
	(ख)	५०	३ प्रश्न X १० अङ्क = ३०	१ प्रश्न X २० अङ्क = २०
जम्मा		**१००**	६ प्रश्न X १० अङ्क = ६०	२ प्रश्न X २० अङ्क = ४०