नेपाल दूरसञ्चार प्राधिकरण
प्राविधिक सेवाः इञ्जिनियरिङ्ग समूह, उपनिर्देशक (अधिकृत स्तर द्वितीय श्रेणी) को
आन्तरिक प्रतियोगिताको लिखित परीक्षाको
पाठ्यक्रम
एवं परीक्षा योजना

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

प्रथम चरण :– लिखित परीक्षा — पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता — पूर्णाङ्क :– ३०

१. प्रथम चरण : – लिखित परीक्षा — **पूर्णाङ्क :– २००**

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	दूरसञ्चार, व्यवस्थापन तथा नियमनसम्बन्धी	100	40	विषयगत	छोटो उत्तर	८ प्रश्न X ५ अङ्क	३ घण्टा
					लामो उत्तर	४ प्रश्न X १० अङ्क	
					समस्या समाधान	१ प्रश्न X २० अङ्क	
द्वितीय	सेवा सम्बन्धी	100	40	विषयगत	छोटो उत्तर	८ प्रश्न X ५ अङ्क	३ घण्टा
					लामो उत्तर	४ प्रश्न X १० अङ्क	
					समस्या समाधान	१ प्रश्न X २० अङ्क	

२. द्वितीय चरण : – अन्तर्वार्ता — **पूर्णाङ्क :– ३०**

विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	30	-	मौखिक

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी वा दुवै हुन सक्नेछ ।

२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

३. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाइबाट प्रश्नहरू सोधिनेछन् ।

४. विषयगत प्रश्नमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

५. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मितिभन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

६. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

७. यसभन्दा अगाडि लागु भएका माथि उल्लिखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।

८. पाठ्यक्रम लागु मिति :– २०७८।०८।०९

नेपाल दूरसञ्चार प्राधिकरण

प्राविधिक सेवाः इञ्जिनियरिङ्ग समूह, उपनिर्देशक (अधिकृत स्तर द्वितीय श्रेणी) को आन्तरिक प्रतियोगिताको लिखित परीक्षाको पाठ्यक्रम

प्रथम पत्रः दूरसञ्चार, व्यवस्थापन तथा नियमनसम्बन्धी

Section (A) – 50 Marks

1. Telecommunications and Society

1.1 Principles of Telecommunication
1.2 Social & Cultural aspects of Telecommunication
1.3 Role and importance of Telecommunication/ICT in national development
1.4 Information superhighway
1.5 Relevance of global information network
1.6 Convergence technologies
1.7 Declaration of Principles of the World Society on Information Systems (WSIS), 2003 and Agreement on the Tunis Commitment, 2005,WSIS Outcomes and the WSIS+10 Vision for WSIS Beyond 2015
1.8 Sustainable Development Goals (SDGs)
1.9 Indicators as adopted by the nations of the world
1.10 ITU, APT, SATRC, ICAO, INTELSAT, INMARSAT, ABU (Asia Pacific Broadcasting Union), WTO
1.11 Disaster Communications
1.12 Principles of unbundling, Local loop unbundling, shared access and Bit Stream Access

2. Regulatory Aspects

2.1 **Licensing of Telecom Services:**

2.1.1 Licensing Service: Licensing Objective, Licensing Process & Licensing rules in WTO regulation reference paper

2.2 **Numbering and Interconnection**

2.2.1 ITU Recommendations for numbering system for Telephone & Voice
2.2.2 National Numbering Plan
2.2.3 Mobile Number Portability
2.2.4 Interconnection issues
2.2.5 Interconnection Guidelines, 2076

2.3 **Universal Service Obligation (USO)**

2.3.1 Provisions on RTDF in Telecommunication Act, 2053 and Telecommunication Policy, 2060, RTDF Bylaw, 2012
2.3.2 Issues on RTDF Utilization: Technical Domain, Financial Domain and Business Domain

2.3.3 Practices, Limitation, Challenges and Opportunities for the Disbursement of RTDF

2.4 **Radio Spectrum Management**

2.4.1 Spectrum Management Principles

2.4.2 National Spectrum Management Policies

2.4.3 National Frequency Allocation Plan (NFAP), 2060

2.4.4 Radio Spectrum Measurement and Monitoring

2.4.5 Techniques adopted for Assignment of spectrum: Administrative Pricing, Beauty Contest, and Auctioning of Spectrum, Advantages and disadvantages of each in the context of Nepal

2.4.6 Spectrum Pricing

2.4.7 Engineering Spectral analysis and interference resolving

2.5 **Standardization of Telecommunication Equipment and Services**

2.5.1 Telecommunication Equipment Standardization

2.5.2 Type Approval of Radio Telecommunication Terminal Equipments

2.5.3 Standards on EMR from Mobile Tower

2.5.4 Testing of Radio Telecommunication Terminal Equipments - EMC, Safety, RF, SAR

2.5.5 Quality of Experience (QoE)

2.5.6 Quality of Service (QoS) benchmarks as set out by NTA for Telephone services including Mobile Service based on GSM/3G/4G technology and Internet Services

2.5.7 Billing performance, Billing Accuracy & its Audit

2.5.8 QoS Benchmarks indicating percentage of customers satisfied with reliability & availability of network, Customer satisfaction

2.5.9 Method for evaluation of achievement of QoS benchmarks by service providers as set out by NTA

नेपाल दूरसञ्चार प्राधिकरण

प्राविधिक सेवाः इञ्जिनियरिङ्ग समूह, उपनिर्देशक (अधिकृत स्तर द्वितीय श्रेणी) को आन्तरिक प्रतियोगिताको लिखित परीक्षाको

पाठ्यक्रम

Section (B) – 50 Marks

3. Engineering Economics

3.1 Demand and Supply
3.2 Laws of return, Types of business organization
3.3 Taxation, Industrial laws
3.4 Cost accounting
3.5 Depreciation
3.6 Wages and Incentives
3.7 Capital budgeting
3.8 Capital structure
3.9 Basic methodology of engineering economic studies
3.10 Financial analysis
3.11 Risk analysis
3.12 Interest and time value of money
3.13 Basic knowledge of trial balance and balance sheet
3.14 Income statements
3.15 Revenue and capital expenditure
3.16 Budgeting and capitalization
3.17 Depreciation and subsidy
3.18 Procurement procedures (FOB, CIF, LQD, LC, Insurance, Invoice, Bid security, performance bond)
3.19 Competitive bidding
3.20 Procurement of Goods
3.21 Procurement of Consulting Services
3.22 Fundaments of Electronic Commerce
3.23 Internet and Networking Economics
3.24 Tariff and Market segmentation concepts
3.25 Concept and Practices of Cyber Law in e-commerce/e-governance

4. Management : Concept and Principles

4.1 Vision, Mission, Goal, Objectives
4.2 Targets, Strategies
4.3 Organization structure
4.4 Authority and Power delegation
4.5 Job description
4.6 Leadership
4.7 Team Work
4.8 Motivation
4.9 Group dynamics

4.10 Time management
4.11 Conflict Management
4.12 Management Information System (MIS)
4.13 Outsourcing
4.14 Inventory control
4.15 Negotiation Skills
4.16 Arbitration

5. Project Management

5.1 The project life cycle
5.2 Setting project objectives and goals
5.3 Network models: CPM & PERT
5.4 Gantt chart
5.5 Project scheduling
5.6 Resource leveling
5.7 Systems of Project control
5.8 Cost control
5.9 Preparation of operational budget
5.10 Introduction to Budgetary Control and Program Budgeting
5.11 Planning the quality
5.12 Time and cost dimensions
5.13 Negotiation Skills
5.14 Supplies and Services
5.15 SWOT Analysis

6. Legislative Provisions

6.1 ITU Radio Regulations
6.2 Radio Act, 2014
6.3 National Broadcasting Act, 2052
6.4 Telecommunications Act, 2053
6.5 Telecommunications Regulation, 2054
6.6 Company Act, 2063
6.7 Privatization Act, 2050
6.8 Consumer Protection Act, 2075
6.9 Competition Promotion and Market Protection Act, 2063
6.10 Telecommunication Policy, 2060
6.11 Radio Frequency Policy for Telecommunications Services (Distribution & Pricing)2069,
6.12 Broadband Policy, 2071
6.13 ICT Policy, 2072
6.14 Long-term Policy of Information and Communication Sector 2059

6.15 Nepal Telecommunication Authority (conditions related to employee's service) bylaw, 2076
6.16 Nepal Telecommunication Authority Financial Management bylaw, 2070
6.17 Monitoring Working Procedure Bylaws, 2068
6.18 NTA work performance bylaw, 2076
6.19 NTA Cases Procedure bylaw, 2011
6.20 Type Approval Working Procedure for Customer Premises Radio Telecommunication Equipment -2016 (TAP-04)
6.21 Tariff Guidelines, Interconnection Guidelines, 2076

नेपाल दूरसञ्चार प्राधिकरण

प्राविधिक सेवाः इञ्जिनियरिङ्ग समूह, उपनिर्देशक (अधिकृत स्तर द्वितीय श्रेणी) को आन्तरिक प्रतियोगिताको लिखित परीक्षाको

पाठ्यक्रम

द्वितीय पत्रः सेवा सम्बन्धी

Section (A) – 40 Marks

1. Telecommunication Systems and Engineering Design Data Systems

1.1 Telecommunication network
1.2 Transmission media, transmission lines
1.3 signal and noise measurements
1.4 Echo and singing
1.5 Space/time/frequency/wave length division multiplexing
1.6 Packet
1.7 Message and circuit switching
1.8 X.25 Protocol
1.9 Frame relay
1.10 TCP/IP Protocol
1.11 Functions of switching
1.12 Stored Programmed Controlled switch
1.13 TS/ST/TST/STS switching
1.14 No 5 and No 7 signaling
1.15 ISDN
1.16 BISDN
1.17 ATM
1.18 PDH/SDH
1.19 DSL
1.20 Navigational systems
1.21 Numbering
1.22 Routing and charging plans,
1.23 Video systems- NTSC, PAL, SECAM
1.24 Standards, Transmission and reception
1.25 Video compression and standards
1.26 Telecommunication system analysis and planning
1.27 Wireless systems: Satellite, Microwave/Ultra High frequency (UHF)
1.28 Wireless Local Loop (WLL), Cellular
1.29 Wireline Systems: PSTN, Optical fiber, LAN/MAN/WAN, Broadband Cable
1.30 LTE,UMTS, IMT-2000, WiMAX, IMS, NGN, MPLS, Real time protocol, Voice over IP, IP/PSTN Platform, IN, SSP, SCP, SCP, SSP, SMS and basics of GIS

Section (B) – 60 Marks

2. **Communication Engineering for Voice and Data**
   - 2.1 Transmission and Switching
   - 2.2 Multiplexing and Signaling
   - 2.3 Alerting and Supervision
   - 2.4 Call traffic Engineering, Network Optimization
   - 2.5 Erlang B formulae, Erlang C formulae
   - 2.6 Engset Concept, Busy hour, Carried traffic
   - 2.7 Offered traffic
   - 2.8 Transmission Systems
   - 2.9 Digital Multiplexing
   - 2.10 Broadband techniques - DSL, ATM, SDH, SONET, ISDN, VoIP, OSI model
   - 2.11 Frame relay
   - 2.12 TCPIP
   - 2.13 Real time Protocol
   - 2.14 MPLS
   - 2.15 NGN
   - 2.16 IMS
   - 2.17 Optical fiber communication
   - 2.18 Difference between analog and digital communications
   - 2.19 Basic communications elements
   - 2.20 Signal and noise in communication system
   - 2.21 AM, DSC-SC, SSB-SC, PM, FM, Super heterodyne AM and FM receiver
   - 2.22 Digital to analog and analog to digital conversion
   - 2.23 Sampling theorem, Sample and hold Circuit, A law, μ-law, quantizer
   - 2.24 Coding: NRZ/HDB3/AMI
   - 2.25 Error detection and correction
   - 2.26 PCM/ADPCM
   - 2.27 Digital Modulation: ASK/PSK/FSK /QPSK /MSK / QAM
   - 2.28 Modulation and demodulation circuits
   - 2.29 Frequency converter and Mixers, Phase locked loop,
   - 2.30 Internet Systems : Internet and World Wide Web, Protocols used in network and applications, Capabilities, Privacy and security issues

3. **Digital Networks and Wireless Network**
   - 3.1 Architecture
   - 3.2 Network components

3.3 Framing, Channelization and Signaling
3.4 Digital Voice and Video
3.5 Packet and Switched Services-ATM, xDSL
3.6 Frame Relay, X-25
3.7 Encryption and Security issues
3.8 Convolution codes
3.9 Viterbi codes
3.10 Trellis coding and decoding
3.11 Low Power Radio communication Devices and its Regulation
3.12 Unlicensed Band and its regulation with existing national practices
3.13 Wireless LAN development tools
3.14 IEEE802.11 products
3.15 IEEE 802.15 products
3.16 IEE802.16 products
3.17 Wi-Fi
3.18 Other Low Power Devices like Bluetooth
3.19 Ultra-Wideband (UMB) device
3.20 Radio Frequency Identification (RFID)
3.21 Software Defined Radio
3.22 Cognitive Radio
3.23 Speed Spectrum Encoding: Direct Sequence Spread Spectrum, Frequency Hopping Spread Spectrum
3.24 Dynamic Frequency Selection (DFS)
3.25 Orthogonal Frequency Division Multiplexing (OFDM)