

**नेपाल दूरसञ्चार प्राधिकरण**  
**प्राविधिक सेवा, इञ्जिनियरिङ्ग समूह, उपनिर्देशक (अधिकृत स्तर द्वितीय श्रेणी) को**  
**खुल्ला प्रतियोगिताको लिखित परिक्षाको**  
**पाठ्यक्रम**  
**एवं परीक्षा योजना**

पाठ्यक्रमको रूपरेखा :- 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	दूरसंचार, व्यवस्थापन तथा नियमन सम्बन्धी	१००	४०	विषयगत	छोटो उत्तर	८ प्रश्न X ५ अङ्क
					लामो उत्तर	४ प्रश्न X १० अङ्क
					समस्या समाधान	१ प्रश्न X २० अङ्क
द्वितीय	सेवा सम्बन्धी	१००	४०	विषयगत	छोटो उत्तर	८ प्रश्न X ५ अङ्क
					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	३०	-	मौखिक

**द्रष्टव्य :**

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी वा दुवै हुन सक्नेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरु सोधिनेछ ।
- विषयगत प्रश्नमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- 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 पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएका माथि उल्लिखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति :-

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प्रथम पत्र: दूरसंचार, व्यवस्थापन तथा नियमन सम्बन्धी

**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, 2065
- 2.3 **Universal Service Obligation (USO)**
  - 2.3.1 Provisions on RTDF in Telecommunication Act, 2053 and Telecommunication Policy, 2060, RTDF Bylaw, 2012 A. D.
  - 2.3.2 Issues on RTDF Utilization: Technical Domain, Financial Domain and Business Domain

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- 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 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

**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

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- 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 Fundamentals 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 MIS
- 4.13 Outsourcing
- 4.14 Inventory control
- 4.15 Negotiation Skills
- 4.16 Arbitration

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**5. Project Management**

- 5.1 The project life cycle
- 5.2 Setting project objectives and goals
- 5.3 Network model: 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, 2047
- 6.4 Telecommunications Act, 2053
- 6.5 Telecommunications Regulation, 2054
- 6.6 Company Act, 2053
- 6.7 Privatization Act, 2050
- 6.8 Consumer Protection Act, 2054
- 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, Broadband Policy, 2071
- 6.12 ICT Policy, 2072
- 6.13 Long-term Policy of Information and Communication Sector 2059, (2003)
- 6.14 RTDF Bylaw, 2012
- 6.15 Nepal Telecommunication Authority (conditions related to employee's service) bylaw, 2007 A. D.
- 6.16 Nepal Telecommunication Authority Financial Management bylaw, 2010 A. D.
- 6.17 Monitoring Working Procedure Bylaws Final, 2012 A.D.
- 6.18 NTA work performance bylaw, 2068
- 6.19 NTA Cases Procedure bylaw, 2011 A. D.

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- 6.20 Type Approval Working Procedure for Customer Premises Radio  
Telecommunication Equipment -2016 (TAP-04)
- 6.21 Tariff Guidelines, Interconnection Guidelines, 2065 (with Amendment)

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द्वितीय पत्र: 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

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**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,  $\mu$ -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



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- 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)