

नेपाल दूरसञ्चार प्राधिकरण
प्राविधिक सेवा, इञ्जिनियरिङ्ग समूह, निर्देशक (अधिकृत प्रथम) पदको
खुला प्रतियोगिताको परीक्षाको लागि 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	लामो उत्तर	६ प्रश्न X १० अङ्क	३ घण्टा
					समस्या समाधान	२ प्रश्न X २० अङ्क	
द्वितीय	सेवा सम्बन्धी	१००	४०	विषयगत	लामो उत्तर	६ प्रश्न X १० अङ्क	३ घण्टा
					समस्या समाधान	२ 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 ।
- 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 ।
- पाठ्यक्रम लागू मिति :-

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प्रथम पत्र: दूरसंचार, ब्यवस्थापन तथा नियमन सम्बन्धी

Section (A) – 50 Marks

1. Telecommunications and Society

- 1.1 Principles of Telecommunication
- 1.2 Social and Cultural aspects of Telecommunication
- 1.3 Telecommunication/ ICT and 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 Indicators as adopted by the nations of the world
- 1.9 ITU, APT, SATRC, ICAO, INTELSAT, INMARSAT, ABU (Asia Pacific Broadcasting Union), WTO
- 1.10 Principles of unbundling, Local loop unbundling, shared access and Bit Stream Access
- 1.11 Disaster Communications
- 1.12 Sustainable Development Goals (SDGs)

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, 2005

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
 - 3.7 Capital budgeting
 - 3.8 Capital structure,

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- 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 Job description
 - 4.5 Authority and Power delegation
 - 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
- 5. Project Management**
- 5.1 The project life cycle
 - 5.2 Setting project objectives and goals

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- 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, 2063
- 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 Existing Nepal Telecommunication Authority (conditions related to employee's service) bylaw
- 6.16 Existing Nepal Telecommunication Authority Financial Management bylaw
- 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.
- 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

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

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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 IEEE802.16 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 Spread Spectrum Encoding: Direct Sequence Spread Spectrum, Frequency Hopping Spread Spectrum
- 3.24 Dynamic Frequency Selection (DFS)
- 3.25 Orthogonal Frequency Division Multiplexing (OFDM)