नेपाल दूरसञ्चार कम्पनी लिमिटेड
(नेपाल टेलिकम)
खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

सेवाः- प्राविधिक   समूहः-टेलिकम इन्जिनियरिङ   उप समूहः-टेलिकम

तहः-७   पदः- कम्प्युटर इन्जिनियर   किसिमः- खुला तथा आ.प्र.

पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ

प्रथम चरण :- लिखित परीक्षा   पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता   पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

१ प्रथम चरण - लिखित परीक्षा (Written Exam)   पूर्णाङ्क :- २००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या X अङ्क	समय
प्रथम	General Awareness, Management & Institutional Awareness Test	१००	४०	वस्तुगत	बहुबैकल्पिक प्रश्न (MCQs)	५० प्रश्न X १ अङ्क	४५ मिनेट
				विषयगत	छोटो उत्तर आउने प्रश्न	६ प्रश्न X ५ अङ्क	१ घण्टा ३० मिनेट
					लामो उत्तर आउने प्रश्न	२ प्रश्न X १० अङ्क	
द्वितीय	Technical Subject (Service Specific)	१००	४०	विषयगत	छोटो उत्तर आउने प्रश्न	४ प्रश्न X ५ अङ्क	३ घण्टा
					लामो उत्तर आउने प्रश्न	८ प्रश्न X १० अङ्क	

२ द्वितीय चरण - अन्तर्वार्ता (Interview)   पूर्णाङ्क :- ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्यः

१. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ।

२. लिखित परीक्षाको प्रश्नपत्रको भाषा नेपाली वा अंग्रेजी हुनेछ।

३. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी वा दुबै हुन सक्नेछ।

४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ। तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन।

५. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ। सानो अक्षर (Small letter) a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ।

६. बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन।

७. विषयगत प्रश्नहरूको हकमा एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू(Short notes) सोध्न सकिनेछ।

८. विषयगत प्रश्न हुने पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन्। परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्ने छ।

९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जुनसुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका कानुन, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ।

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

११. पाठ्यक्रम स्वीकृत मिति : २०८१/१०/२१

खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

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तहः-७   पदः- कम्प्युटर इन्जिनियर   किसिमः- खुला तथा आ.प्र.

प्रथम पत्र:
General Awareness, Management & Institutional Awareness Test
Section (A):- General Awareness
MCQs (50 Questions × 1 Mark = 50 Marks)

1. **General Awareness and Contemporary Issues (30 Marks)**
   1.1 **Geography, History and Culture**
   1.1.1 Physical geography of Nepal and the world
   1.1.2 Socio-cultural and economic geography and demography of Nepal
   1.1.3 Major natural resources of Nepal
   1.1.4 Geographical diversity, climatic conditions, livelihood and lifestyle of people
   1.1.5 Major Historical Events of Nepal and the World
   1.1.6 Notable Events, Personalities and Socio-Cultural Aspects of Ancient, Medieval and Modern History of Nepal
   1.1.7 Customs, Traditions, Values, Religions, Ethnicity, Languages, Cultures, Arts, Literature, Music and Heritages of Nepal

   1.2 **Economic Aspects of Nepal**
   1.2.1 Economic Indicators (Economic Growth, GDP, GNP, Per Capita Income, Remittance, Foreign aid & Investment)
   1.2.2 Infrastructures of Development (Agriculture, Industry, Trade, Tourism, Transportation, Communication, Health, Electricity)
   1.2.3 Government Planning and Budgeting
   1.2.4 Current periodical plan of Nepal

   1.3 **Governance & Organizations**
   1.3.1 The Constitution of Nepal; Federal, Provincial and local Governments
   1.3.2 General Information on the UNO, WTO, ITU, WB, ADB, AIIB, SAARC & BIMSTEC
   1.3.3 Public Service Charter and scope of public services

   1.4 **Contemporary Issues**
   1.4.1 Information on Sustainable Development, Environment, Pollution, Climate Change, Biodiversity, Demography, Urbanization, Science and Technology.
   1.4.2 Recent Advance and Major Achievements in Telecommunication Sectors.
   1.4.3 Major Events and Current Affairs of National and International Importance
   1.4.4 Concept of Good Governance

2. **Mathematics and Statistics (20 Marks)**
   2.1 **Mathematics**
   2.1.1 Arithmetical Reasoning, Percentage, Ratio, Average, Profit & Loss, Time & Work, Data interpretation & Data verification
   2.1.2 Function and Limit, Maxima and Minima, Differentiation and Integration Equations of Straight Lines, Circle, Parabola, Hyperbola, Spheres, Cylinders and Cones

2.1.3 Linear Differential Equations, Fourier Series, Fourier Transforms, Fourier Integral, Odd and Even Function, Laplace Transforms, Taylor Series, Z-Transforms

2.2 **Statistics**

2.2.1 Introduction of Statistics, Mean, Median, Mode, Dispersion, Variance, Correlation and Regression

2.2.2 Probability, Random Variables and Probability Distributions, Samples and Sampling

Section (B):- Management and Institutional Awareness Test
Subjective (6 Questions × 5 Marks + 2 Questions × 10 Marks = 50 Marks)

3. **General Management and Marketing**
   3.1 Management : Concept and Modern Approaches
   3.2 Motivation, Leadership, Control, Coordination, Teamwork and Group Dynamics
   3.3 Management Information System
   3.4 Corporate and Strategic Planning and Management
   3.5 Corporate Social Responsibility
   3.6 Ethics, Integrity and Responsibility in Business /Service Like Institution
   3.7 Business Strategic Planning, Marketing Process, Product Planning, Developing the Marketing Program

4. **Project Management & Financial Management**
   4.1 Project life Cycle
   4.2 Network Models: CPM & PERT, Gantt Chart
   4.3 Project Scheduling, Resource Leveling, Systems of Project Control, Cost Control, Preparation of Operational Budget, Planning of Quality, Time & Cost Dimensions, Negotiating for Materials, Supplies & Services, Project Monitoring and Evaluation,
   4.4 Quality Management & TQM Techniques
   4.5 Essential Business & Accounting Terminology, Cost Classification & Analysis, Interest & Time Value of Money, Basic Methodology of Engineering Economics, Cost and Benefit Analysis, Risk Analysis, Investment Decisions, Demand Analysis and Sales Forecasting, Concept of EIRR (Economic Internal Rate of Return) and FIRR (Financial Internal Rate of Return)
   4.6 Basic Knowledge of Trial Balance & Balance Sheet, Income Statements, Revenue and Capital Expenditure, Budgeting and Capitalization, Depreciation and Subsidy, Procurement Procedures (FOB, CIF, Liquidated Damages, Letter of Credit, Insurance, Invoice, Bid Security, Performance Bond), Competitive Bidding

5. **संस्थागत ज्ञान र सम्वद्ध कानुनहरू**
   5.1 नेपाल दूरसञ्चार कम्पनी लिमिटेड सम्बन्धी जानकारीः उद्देश्य, संगठनात्मक संरचना र कार्यक्षेत्र
   5.2 नेपाल दूरसञ्चार कम्पनी लिमिटेडले सेवा प्रवाहमा अवलम्वन गरिएका प्रविधि
   5.3 सेवाको महशूल दर निर्धारण सम्बन्धी व्यवस्था
   5.4 नेपाल दूरसञ्चार प्राधिकरण : स्थापना, लक्ष्य, उद्देश्य, कार्यहरू र भूमिका
   5.5 नेपाल सरकारको चालु आवधिक योजनामा दूरसञ्चार सेवा

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तहः-७   पदः- कम्प्युटर इन्जिनियर   किसिमः- खुला तथा आ.प्र.

5.6 नेपाल दूरसञ्चार कम्पनी र नेपाल सरकार तथा अन्य सरोकारवाला निकायहरूसंगको सम्बन्ध

5.7 दूरसञ्चार ऐन, २०५३ तथा दूरसञ्चार नियमावली, २०५४

5.8 नेपाल दूरसञ्चार कम्पनी लिमिटेडको प्रवन्धपत्र र नियमावली

5.9 नेपाल दूरसञ्चार कम्पनी लिमिटेडको कर्मचारी विनियमावली, २०७८ को परिच्छेद-७ बिदा, परिच्छेद-९ आचरण तथा अनुशासन, परिच्छेद-१० सजाय र पुनरावेदन , परिच्छेद-११ अवकाश, उपदान, निबृत्तिभरण तथा अन्य सुबिधा

5.10 नेपाल दुरसञ्चार कम्पनी लिमिटडको आर्थिक बिनियमाली, २०७१को भाग -२ को खरिद सम्बन्धी कार्यबिधि, भाग ३ को परिच्छेद -१ योजना तर्जुमा वार्षिक कार्यक्रम र बजेट, परिच्छेद-३ कम्पनीको सम्पत्तिको जिम्मा, त्यसको लगत, संरक्षण र बरबुझारथ सम्बन्धी व्यवस्था

5.11 कम्पनी ऐन, २०६३ को परिच्छेद -२ कम्पनीको संस्थापना, परिच्छेद-३ प्रवन्धपत्र, विनियमावली र विवरणपत्र र परिच्छेद -५ कम्पनीको साधारण सभा

5.12 दुरसञ्चार नीति,२०६०

5.13 डिजिटल नेपाल फ्रेमवर्क, २०७६ (डिजिटल फाउण्डेसन बुँदा १ देखि १९ सम्म)

5.14 सूचना तथा सञ्चार प्रविधि नीति, २०७२

5.15 राष्ट्रिय साइबर सुरक्षा नीति, २०८०

सेवाः- प्राविधिक समूहः-टेलिकम इन्जिनियरिङ उप समूहः-टेलिकम
तहः-७ पदः- कम्प्युटर इन्जिनियर किसिमः- खुला तथा आ.प्र.

द्वितीय पत्र :
Technical Subject (Service Specific)
Section (A):- 50 Marks
(2 Questions × 5 Marks + 4 Questions × 10 Marks)

1. **Digital Signal Processing**
   1.1 Theory of Discrete-time linear Systems
   1.2 Digital Filtering
   1.3 Discrete Fourier Analysis
   1.4 Application to Voice and Image Processing, Communications
   1.5 Hardware for Digital Signal Processing, Including Digital Signal Processors

2. **Digital Systems Design**
   2.1 Design of Combinatorial and Sequential Logic
   2.2 Programmable Logic Devices and Gate Arrays
   2.3 Characteristics of Digital Integrated Circuit Families
   2.4 Analysis and Design for Controllers, Processors and Memories
   2.5 Microprocessors, Including Components, Data flow, Signals and Timing
   2.6 Small System Design, Interconnection of Associated Devices
   2.7 Computer Interfacing, Including Parallel and Serial I/O, Interrupts and DMA
   2.8 Common Bus Structures

3. **Computer Architectures**
   3.1 Architecture, Programming, I/O and Storage Devices
   3.2 Computer Structure and Typical Processor Architecture
   3.3 CPU and Memory Organization, Buses
   3.4 Processing Unit and Controller Design, Hardwired and Micro Program Control
   3.5 Instruction Sets and Addressing Modes; Assembly Language Programming, I/O and Interrupt Servicing
   3.6 RISC and RISC Architecture
   3.7 Architecture of High Speed Work Station and Personal Processors and Systems
   3.8 Instruction Set Design for Pipelined Machines
   3.9 Multiple Processor Architectures, Highly Parallel Machines, Systolic Arrays
   3.10 Neural Networks, Multitasking Machines, Real-Time Systems, Interconnection of Multiple Processor Systems
   3.11 Architectures for Specialized Purposes, Array Processors, Vector Processors
   3.12 Virtual Machines

4. **Principles of VLSI**
   4.1 Very Large Scale Integrated Circuits
   4.2 Simplified Design Rules
   4.3 Static and Dynamic Logic, Multiphase Clocking
   4.4 Memory Elements and Memory Structures
   4.5 Gate Arrays and Standard Cell Technology; Placement and Routing
   4.6 Programmable Logic Devices
   4.7 I/O Devices

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तहः-७   पदः- कम्प्युटर इन्जिनियर   किसिमः- खुला तथा आ.प्र.

5. **Computer Communications**
    5.1 Data Communications, Including Signals, Modulation and Reception
    5.2 Error Detecting and Correcting Codes
    5.3 Multiplexing, Including Time, Frequency and Code Division Multiplexing
    5.4 Protocols: The ISO/OSI Reference Model, X.25
    5.5 Internetworking and Router-Based Networks: TCP/IP Suite of Protocols, Routing and flow Control
    5.6 Internet Addressing and Domain Names
    5.7 Local Area Networks, Topologies, Access schemes, Medium Access and Logic layers; CSMA/CD and Token Ring Protocols; Segmented and Hubbed LANs

6. **Artificial Intelligence and Expert Systems**
    6.1 Concepts of Artificial Intelligence
    6.2 Overview of Knowledge-Based and Expert Systems
    6.3 Logic Programming
    6.4 Programming Languages (LISP and Prolog) for AI
    6.5 Knowledge Representation
    6.6 Rule-Based and Object-Based Systems

7. **Distributed Systems & Cloud Computing**
    7.1 Characteristics of Distributed Systems
    7.2 Networked vs. Centralized Systems
    7.3 Fundamental Concepts and Mechanisms
    7.4 Client-Server Systems
    7.5 Process Synchronization and Inter Process Communications
    7.6 Principles of Fault Tolerance
    7.7 Transaction Processing Techniques
    7.8 Distributed File Systems
    7.9 Operating Systems for Distributed Architectures
    7.10 Cloud Service Model
    7.11 Cloud Deployment Model
    7.12 Cloud Virtualization

Section (B):- 50 Marks
(2 Questions × 5 Marks + 4 Questions × 10 Marks)

8. **Program Design and Data Structures**
    8.1 Programming Language Syntax and Semantics
    8.2 Design of Structured and Modular Programs in a High-level Language (C, C++)
    8.3 Basics of Object-Oriented Programming Classes
    8.4 Non-Numerical Processing
    8.5 Design and Construction of Programs Involving Structured Data: Arrays, Stacks, Queues, Lists, Trees and Records

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9. Operating Systems
9.1 Operating System Principles, Components and Usage
9.2 Design and Implementation of Operating Systems
9.3 Synchronization of Concurrent Processes, Resource Allocation, Scheduling, Protection and Privacy
9.4 Data, Task and Job Management: Loading, Linking; I/O Control
9.5 Multitasking and Multi-Processing
9.6 Real-time Aspects
9.7 Basic Characteristics of Modern Operating Systems: UNIX, Windows

10. Software Engineering
10.1 Software Development Lifecycles Models and Software Requirement Specification
10.2 Design, Implementation, Test, Verification and Validation, Documentation, Quality Assurance, Control and Life-cycle Management of Correct, Reliable, Maintainable and Cost Effective Software
10.3 Object Oriented Design
10.4 Graphical Design Tools, Design in High-level Languages and Data Flow Driven Designs
10.5 Software Projects Management
10.6 Software Maintenance and Configuration Management
10.7 Source code Management and Testing
10.8 Software Re-engineering, Reverse Engineering and Forward Engineering

11. Databases and File Systems
11.1 Data Models, Data Normalization, Data Description Languages, Query Facilities, Data Integrity and Reliability, Concurrency
11.2 Databases: Hierarchical, Network and Relational Databases; Data Organization
11.3 Relational Query Languages: Relational Algebra and Calculus, SQL
11.4 Relational Database Design
11.5 Transaction Processing, Query Processing, Reports
11.6 Security and Integrity; Concurrency Control
11.7 File Organization: Sequential, Indexed and Direct Access, Multiple Key and Hashing
11.8 File Processing: Records, Files, Compaction
11.9 Sorting, Merging and Updating Files.
11.10 Algorithms for Inverted Lists, Multi-list, Indexed Sequential and Hierarchical Structures
11.11 File I/O: Control, Utility, Space Allocation and Cataloging
11.12 Index Organization

12. Internet Programming
12.1 Common Gateway Interface (CGI) Application
12.2 Input to CGI: Environment Variables, Accessing from Input
12.3 Output from CGI: CGI and Response Headers
12.4 Forms and CGI: Sending Data to The Server Using HTML Tags
12.5 Executing External Program and CGI Program

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12.6   Hypermedia Documents: Creating Dynamic Pages Using CGI, PHP

12.7   Introduction to JAVA: JAVA Evolution and Features, Difference Between JAVA and C/C++, Simple JAVA Program, JAVA Program Structure, JAVA Statements, JAVA Virtual Machine - Introduction and Implementation Basics

13. Client Server Computing

13.1   Client Server Computing Concepts: Building Blocks, State of Client Server Architecture

13.2   SQL Database Services: Fundamentals of Database Servers, Functions, Procedures, Triggers and Rules

13.3   SQL Middleware Basics: SQL API, Open SQL Gateway

13.4   Concept of Data Warehouses

13.5   Client Server Transaction Processing: Transaction Concepts, Transaction Models,

13.6   Processing Monitors, Transaction Management Standards

13.7   Caching and Cache Servers

14. Cryptography and Network Security

14.1   Introduction to Cryptography: Security Attacks, Conventional Encryption Model, Simplified DES, Block Cypher Principle

14.2   Principles of Public-Key Crypto Systems: RSA Algorithm, Diffie-Hellman Key exchange, Number Theory-Prime and Relatively Prime Numbers

14.3   Message Authentication and Hash Function

14.4   Digital Signatures, Digital Signature Standards and Authentication Protocols

14.5   Network Security: Authentication Applications, Kerberos, Electronic Mail Security

14.6   Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction

14.7   Intruders and Virus Related Threats

14.8   Firewall Design Principles

14.9   Introduction to Trusted Systems

14.10 Concept of Block Chain

15. Basic Electricity and Electronics

15.1   Circuit Elements, Series & Parallel Circuits, Resistance, Resistivity, Ohm's laws, Kirchoff's laws, Single Phase & Three Phase Circuit Analysis

15.2   Primary & Secondary Cells, Cells in Series & Parallel, Star & Delta Connections

15.3   Fundamentals of Transformers, Generators and Induction Motors

15.4   Electrical Shock Hazards, Earthing and Shielding Techniques for Telecom Equipments, Lightning Protections.

15.5   Diode, Zener Diode, LEDs, Transistors, PNP, NPN, FET, MOSFETS, Op-Amps,

15.6   Integrated Circuits, NMOS, CMOS, MOSFET Amplifiers, Junction Field Effect Transistor, Quadratic Caracteristics, JFET Amplifiers

15.7   Bipolar Transistor and Its Configurations, Load Line Biasing in CE Configuration

15.8   Number Systems

15.9   Power Supplies & Voltage Regulators, Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier

15.10 Logic Gates: AND, OR, NOT, NAND, NOR