नेपाल टेलिकम

नेपाल दूरसंचार कम्पनी लिमिटेड

अधिकृतस्तर तह ७, प्राविधिक सेवा, टेलिकम ईन्जिनियरिङ समूह, कम्प्युटर उपसमूह, कम्प्युटर ईन्जिनियर पदको खुला तथा समावेशी र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

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

प्रथम चरण :– लिखित परीक्षा पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता पूर्णाङ्क :– ३०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरण : लिखित परीक्षा (Written Examination) **पूर्णाङ्क :- २००**

पत्र	विषय	खण्ड	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्या × अङ्क	समय
प्रथम	General Subject	General Awareness & General Ability Test	१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (MCQ)	५० प्रश्न X १ अङ्क = ५०	४५ मिनेट
		Management & Institutional Awareness			विषयगत	१० प्रश्न X ५ अङ्क = ५०	१ घण्टा ३० मिनेट
द्वितीय	Technical Subject		१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (MCQ)	३० प्रश्न X १ अङ्क	३० मिनेट
					विषयगत	२ प्रश्न X ५ अङ्क ६ प्रश्न X १० अङ्क	२ घण्टा ३० मिनेट

२. द्वितीय चरण :

विषय	पूर्णाङ्क	परीक्षा प्रणाली	समय
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक	

द्रष्टव्य :

१. यो पाठ्यक्रमको योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई भागमा विभाजन गरिएको छ ।

२. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

३. प्रथम र द्वितीयपत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

४. लिखित परीक्षामा सोधिने **प्रश्न संख्या र अङ्कभार** यथासम्भव सम्बन्धित पत्र/विषयमा दिईए अनुसार हुनेछ ।

५. वस्तुगत बहुवैकल्पिक (Multiple Choice)प्रश्नहरुको 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 ।

६. 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 ।

७. बहुवैकल्पिक प्रश्नहरु हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

८. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

१०. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीयचरणको परीक्षामा सम्मिलित गराइनेछ ।

११. पाठ्यक्रमलागु मिति :-२०७८।०४।०१

नेपाल टेलिकम
नेपाल दूरसंचार कम्पनी लिमिटेड
अधिकृतस्तर तह ७, प्राविधिक सेवा, टेलिकम ईन्जिनियरिङ समूह, कम्प्युटर उपसमूह, कम्प्युटर ईन्जिनियर पदको खुला तथा समावेशी र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

प्रथम पत्र (Paper I): General Subject

Section (A) : - General Awareness & General Ability Test (50% Marks)

1. **General Awareness and Contemporary Issues(25 ×1 Mark = 25 Marks)**

   1.1 **Geography of Nepal and the World (5 Marks)**
   - 1.1.1 Continent, ocean, pole, latitude, longitude, time, distance, mountains, deserts, rivers, glaciers, lakes, climate, trade winds, monsoon.
   - 1.1.2 Physical, socio-cultural and economic geography, major natural resources and demography of Nepal.

   1.2 **History & Culture (5 Marks)**
   - 1.2.1 Major historical events of the World.
   - 1.2.2 Notable events, personalities and socio-cultural aspects of ancient, medieval and modern history of Nepal.
   - 1.2.3 Customs, traditions, values, religions, ethnicity, languages, cultures, arts, literature, music and heritages of Nepal.

   1.3 **Economic aspects of Nepal (5 Marks)**
   - 1.3.1 Economic indicators (economic growth, GDP, GNP, per capita income, remittance, foreign aid & investment)
   - 1.3.2 Infrastructures of development (agriculture, industry, trade, tourism, transportation, communication, health, electricity)
   - 1.3.3 Government planning and budgeting.

   1.4 **Governance & Organisations (5 Marks)**
   - 1.4.1 The Constitution of Nepal; federal, provincial and local governments
   - 1.4.2 General information on the UNO, WTO, ITU, WB, ADB, AIIB, SAARC & BIMSTEC.

   1.5 **Contemporary Issues (5 Marks)**
   - 1.5.1 Information on sustainable development, environment, pollution, climate change, biodiversity, demography, urbanization, science and technology.
   - 1.5.2 Recent advance and major achievements in telecommunication sectors.
   - 1.5.3 Major Events and Current Affairs of National and International Importance.

2. **General Ability Test** (15 ×1 Mark = 15 Marks)

   2.1 **Verbal and Non- Verbal Ability Test** (8×1 Marks = 8 Marks)

   Jumble words, Coding-Decoding, Ranking Order Test, Direction and Distance Sense Test, Logical Reasoning, Statement and Conclusions, Series, Analogy, Classification, Matrix, Analytical Reasoning, Figure Formation and Analysis, Rule Detection, Water images, Mirror images, Cubes and Dice & Venn-diagram

2.2 **Numerical Ability Test** (7×1 Marks = 7Marks)
Series, Analogy, Classification, Coding, Arithmetical reasoning/operation, Percentage, Ratio, Average, Loss & Profit, Time & Work, Data interpretation & Data verification

3. **Mathematics and Statistics** **(**10 ×1 Mark = 10 Marks)

3.1 Function and Limit, Maxima and Minima, Differentiation and Integration and their interpretation, Equations of straight lines, circle, parabola, hyperbola, spheres, cylinders and cones, Linear differential equations (up to second order), Fourier series, Fourier Transforms, Fourier integral, inverse Fourier integral formula, odd and even function, Laplace transforms, Line, surface and volume integral, Taylor series, Zeros and Poles, Z-transforms

3.2 Introduction of statistics and descriptive statistics, Mean, Mode, Variance, Dispersion, Probability, Discrete random variables and probability distribution, continuous random variables and probability distributions, Samples, Sampling theorems, Linear regression, Population mean & sample mean and accuracy, pi & bar diagrams, error functions.

Section (B) : - Management and Institutional Awareness Test (50% Marks)

4. **Management Concepts** (10 Marks)

4.1 Concept of Management, Modern approaches to management

4.2 Vision, Mission, Goal, Objectives, Targets, Strategies, Organization Structure, Authority and Power Delegation, Leadership, Control, Coordination, Motivation, Teamwork and Group Dynamics

4.3 Managing work force diversity and appreciative inquiry

4.4 Quality management & TQM techniques

4.5 Time Management, Conflict Management, MIS, Customer Care, Decision Support System, Outsourcing, Inventory Control, Job Description, training, service portfolio and tariff structure of Nepal Telecom.

4.6 Corporate and strategic planning and management, corporate social responsibility,

4.7 Ethics, Integrity and responsibility in business/service like institution

5. **Project Management & Marketing** (10 Marks)

5.1 Definitions, the project life cycle, Setting project objectives & goals, Network model: CPM & PERT, Gantt Chart, Project scheduling, Resource leveling, Systems of project control, Cost control, Preparation of operational budget, Introduction to budgetary control, Planning of quality, time & cost

dimensions, Negotiating for Materials, Supplies & Services, project monitoring and evaluation, Bringing the project to a successful conclusion.

5.2 Concept of EIRR(Economic internal rate of return) and FIRR(Financial internal rate of return)

5.3 Business Strategic planning, Marketing Process, Product Planning, Developing the Marketing Program

6. **Finance and General Accounting Principles** (10 Marks)

6.1 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,

6.2 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.

7. **संस्थागत ज्ञान र सम्वद्ध कानुनहरु** (20 Marks)

7.1 नेपाल दूरसंचार कम्पनी स्थापनाको उद्देश्य, संगठनात्मक संरचना, कार्यक्षेत्र र चुनौती

7.2 नेपाल दूरसंचार कम्पनी लिमिटेडको शेयर संरचना, vision, mission, goal, objectives, strategies

7.3 नेपाल दूरसंचार कम्पनी लिमिटेडले प्रवाह गर्ने सेवाका प्रकारहरु, अवलम्वन गरिएका प्रविधिहरु, सो को गुणस्तर, गुणस्तर नियन्त्रण तथा सेवाग्राहीको सन्तुष्टी तथा सेवाको मूल्य निर्धारण सम्वन्धी व्यवस्था

7.4 नेपाल दूरसंचार प्राधिकरणको स्थापना, लक्ष्य, उद्देश्य, कार्यहरु र नियमनकारी भूमिका

7.5 नेपाल दूरसंचार कम्पनी र नेपाल सरकार तथा सम्वद्ध निकायहरु संगको सम्वन्ध र समन्वय

7.6 दूरसंचार ऐन, २०५३ तथा दूरसंचार नियमावली, २०५४

7.7 नेपाल दूरसंचार कम्पनी लिमिटेडको प्रवन्धपत्र र नियमावली

7.8 नेपाल दूरसंचार कम्पनी लिमिटेडको कर्मचारी विनियमावली, २०७८ को बिदा, आचरण तथा अनुशासन, सजाय र पूनरावेदन , अवकाश,उपदान,निबृत्तभरण तथा अन्य सुबिधा

7.9 नेपाल दुरसंचार कम्पनी लिमिटडको आर्थिक बिनियमाली २०७१को भाग २ को खरिद सम्वन्धी कार्यबिधि, भाग ३ को परिच्छेद (१) योजना तर्जूमा वार्षिक कार्यक्रम र बजेट, परिच्छेद(३) कम्पनीको सम्पत्तिको जिम्मा,त्यसको लगत, संरक्षण र बरबुझारथ सम्बन्धी व्यवस्था

7.10 कम्पनी ऐन, २०६३ को परिच्छेद २, ३ र ५

7.11 दुरसंचार नीति,२०६०

7.12 सूचना तथा सञ्चार प्रविधि नीति, २०७२

7.13 भ्रष्टाचार निवारण ऐन, २०५९

नेपाल टेलिकम
नेपाल दूरसंचार कम्पनी लिमिटेड
अधिकृतस्तर तह ७, प्राविधिक सेवा, टेलिकम ईन्जिनियरिङ समूह, कम्प्युटर उपसमूह, कम्प्युटर ईन्जिनियर पदको खुला तथा समावेशी र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र (Paper II): Technical Subject

Section (A) : - (50% 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 Boolean algebra
   - 2.2 Design of combinatorial and sequential logic
   - 2.3 Implementation using simple gates
   - 2.4 Programmable logic devices and gate arrays
   - 2.5 Characteristics of digital integrated circuit families
   - 2.6 Analysis and design for controllers, processors, and memories
   - 2.7 Microprocessors, including components, data flow, signals, and timing
   - 2.8 Small system design, interconnection of associated devices
   - 2.9 Computer interfacing, including parallel and serial I/O, interrupts and DMA
   - 2.10 Common bus structures
3. **Computer Architecture**
   - 3.1 Architecture, programming and I/O
   - 3.2 Computer structure and typical processor architecture
   - 3.3 CPU and memory organization, buses
   - 3.4 Characteristics of I/O and storage devices
   - 3.5 Processing unit and controller design, hardwired and micro program control
   - 3.6 Instruction sets and addressing modes; assembly language programming, I/O and interrupt servicing
4. **Advanced Computer Architecture**
   - 4.1 Architecture of high speed work station and personal processors and systems
   - 4.2 Instruction set design for pipelined machines
   - 4.3 Multiple processor architectures, highly parallel machines, systolic arrays
   - 4.4 Neural networks, multitasking machines, real-time systems, interconnection of multiple processor systems
   - 4.5 Architectures for specialized purposes, array processors, vector processors.
   - 4.6 Virtual machines
5. **Principles of VLSI**
   - 5.1 Very large scale integrated circuits
   - 5.2 Simplified design rules

5.3 Static and dynamic logic, multiphase clocking
5.4 Memory elements and memory structures
5.5 Gate arrays and standard cell technology; placement and routing
5.6 Programmable logic devices
5.7 I/O devices

6. **Computer Communications**
   6.1 Data communications, including signals, modulation and reception
   6.2 Error detecting and correcting codes
   6.3 Multiplexing, including time, frequency and code division multiplexing
   6.4 Protocols: the ISO/OSI reference model, X.25
   6.5 Internetworking and router-based networks: the TCP/IP suite of protocols, routing and flow control
   6.6 Internet addressing and domain names
   6.7 Local area networks, topologies, access schemes, medium access and logic layers; CSMA/CD and token ring protocols; segmented and hubbed LANs.

7. **Artificial Intelligence and Expert Systems**
   7.1 Concepts of artificial intelligence
   7.2 Overview of knowledge-based and expert systems
   7.3 Logic programming
   7.4 Programming languages (LISP and Prolog) for AI
   7.5 Knowledge representation
   7.6 Rule-based and object-based systems

8. **Distributed Systems**
   8.1 Characteristics of distributed systems
   8.2 Networked vs. centralized systems
   8.3 Fundamental concepts and mechanisms
   8.4 Client-server systems
   8.5 Process synchronization and inter process communications
   8.6 Principles of fault tolerance
   8.7 Transaction processing techniques
   8.8 Distributed file systems
   8.9 Operating systems for distributed architectures

Section (B) : - (50% Marks)

9. **Program Design and Data Structures**
   9.1 Programming language syntax and semantics
   9.2 Design of structured and modular programs in a high-level language (C, C++)
   9.3 Basics of object-oriented programming classes
   9.4 Non-numerical processing
   9.5 Design and construction of programs involving structured data: arrays, stacks, queues, lists, trees and records

10. **Operating Systems**
    - 10.1 Operating system principles, components, and usage
    - 10.2 Design and implementation of operating systems
    - 10.3 Synchronization of concurrent processes, resource allocation, scheduling, protection, and privacy
    - 10.4 Data, task, and job management: loading, linking; I/O control
    - 10.5 Multitasking and multiprocessing
    - 10.6 Real-time aspects
    - 10.7 Basic characteristics of modern operating systems: UNIX, Windows

11. **Software Engineering**
    - 11.1 Software cycles and requirements analysis
    - 11.2 Design, implementation, test, verification and validation, documentation, quality assurance, control and life-cycle management of correct, reliable, maintainable, and cost effective software
    - 11.3 Object Oriented design
    - 11.4 Graphical design tools, design in high-level languages, and data flow driven designs
    - 11.5 Planning and management of software projects
    - 11.6 Software maintenance and configuration management
    - 11.7 Source code management

12. **Databases and File Systems**
    - 12.1 Data models, data normalization, data description languages, query facilities, data integrity and reliability, concurrency
    - 12.2 Databases: hierarchical, network and relational databases; data organization
    - 12.3 Relational query languages: relational algebra and calculus, SQL
    - 12.4 Relational database design
    - 12.5 Transaction processing, query processing, reports
    - 12.6 Security and integrity; concurrency control
    - 12.7 File organization: sequential, indexed and direct access, multiple key, and hashing
    - 12.8 File processing: records, files, compaction
    - 12.9 Sorting, merging and updating files.
    - 12.10 Algorithms for inverted lists, multilist, indexed sequential and hierarchical structures
    - 12.11 File I/O: control, utility, space allocation, and cataloging
    - 12.12 Index organization

13. **Internet Programming**
    - 13.1 Common Gateway Interface (CGI) application
    - 13.2 Input to CGI: environment variables, accessing from input
    - 13.3 Output from CGI: CGI and response headers
    - 13.4 Forms and CGI: Sending data to the server using HTML tags
    - 13.5 Executing external program and CGI program
    - 13.6 Hypermedia documents: Creating dynamic pages using CGI, PHP
    - 13.7 Introduction to JAVA: JAVA evolution, JAVA history, JAVA features, Difference between JAVA and C/C++, Simple JAVA program, JAVA program structure, JAVA Statements, JAVA virtual machine – Introduction and implementation basics

14. **Client Server Computing**
    - 14.1 Client server computing concepts: Building blocks, the state of client server architecture
    - 14.2 SQL database services: fundamentals of database servers, functions, procedures, triggers and rules
    - 14.3 SQL middleware basics: SQL API, Open SQL Gateway
    - 14.4 Concept of Data Warehouses
    - 14.5 Client server transaction processing: transaction concepts, transaction models, transaction
    - 14.6 Processing monitors, transaction management standards
    - 14.7 Caching and cache servers

15. **Cryptography and Network Security**
    - 15.1 Introduction to Cryptography: Security attacks, conventional encryption model, simplified DES, Block Cypher principle
    - 15.2 Principles of Public-Key Cryptosystems: RSA algorithm, Diffie-Hellman Key exchange, Number Theory-Prime and Relatively Prime Numbers
    - 15.3 Message Authentication and Hash function
    - 15.4 Digital Signature and authentication protocols: Digital signatures, Digital signature standards, authentication protocols
    - 15.5 Network Security: Authentication applications – Kerberos, electronic mail security
    - 15.6 Web security: Web security requirements, secure sockets layer and transport layer security, secure electronic transaction
    - 15.7 Intruders and Virus related threats
    - 15.8 Firewall design principles
    - 15.9 Introduction to Trusted systems
    - 15.10 Concept of Block Chain

16. **Basic Electricity and Electronics**

16.1 Circuit elements, series & parallel circuits, resistance, resistivity, Ohm's laws, Kirchoff's laws, Single phase & three phase circuit analysis, Measurement of current, voltage, power, energy, insulation resistance, Primary & Secondary cells, Cells in series & parallel, star & delta connections, Fundamentals of transformers, Generators and Induction motors, Electrical shock hazards, Earthing and shielding techniques for telecom equipments, Lightning protections. Diode, Zener diode, LEDs, Transistors, PNP, NPN, FET, MOSFETS, Op-Amps, Integrated circuits, NMOS, CMOS, MOSFET amplifiers, Junction field effect transistor, quadratic characteristics, JFET Amplifiers, The bipolar transistor andits configurations, Load line biasing in CE configuration, Number systems, power supplies & voltage regulators, Half wave rectifier, full wave rectifier, Bridge rectifier, Logic gates: AND, OR, NOT, NAND, NOR