नेपाल स्टक एक्सचेञ्ज लिमिटेड

प्राविधिक समूह, तह ७, आई. टी. वरिष्ठ अधिकृत पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

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

प्रथम चरण :– लिखित परीक्षा — पूर्णाङ्क :– २००

द्वितीय चरण :– (क) प्रयोगात्मक परीक्षा — पूर्णाङ्क :– ५०

(ख) अन्तर्वार्ता — पूर्णाङ्क :– ३०

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

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	Information Technology & Related Legislations	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न	५० प्रश्न x २ अङ्क	१ घण्टा
द्वितीय		१००	४०	विषयगत	छोटो उत्तर लामो उत्तर	८ प्रश्न X ५ अङ्क ४ प्रश्न X १० अङ्क	३ घण्टा
					लामो उत्तर	१ प्रश्न X २० अङ्क	

२. द्वितीय चरण : – प्रयोगात्मक परीक्षा र अन्तर्वार्ता **पूर्णाङ्क :– ८०**

विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली	समय
(क) प्रयोगात्मक परीक्षा	५०	२५	प्रयोगात्मक	१ घण्टा
(ख) अन्तर्वार्ता	३०	-	मौखिक	-

द्रष्टव्य :

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

२. प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।

३. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

४. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरु सोधिनेछ ।

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

७. 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 पाठ्क्रममा परेको सम्झनु पर्दछ ।

८. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

९. पाठ्यक्रम लागू मिति :– २०७७/११/१४

नेपाल स्टक एक्सचेञ्ज लिमिटेड

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प्रथम र द्वितीय पत्र :– Information Technology & Related Legislations

Section -A (50 Marks)

1. Introduction of Computer and Architecture

1.1 Computer System and Types of Computer.
1.2 Components and Architecture of Computers
1.3 Input Devices: Keyboard, Mouse, other input devices
1.4 Processor: ALU, CU, Registers
1.5 Memory : Primary and Secondary Memory
1.6 Storages devices: Hard Drive, USB Devices and other Storage Devices
1.7 Output devices: Monitors, Printers

2. Digital Logic and Number System

2.1 Digital and Analog Systems
2.2 Binary, Octal, Decimal and Hexadecimal Number System
2.3 Digital Circuits: Multiplexers, Demultiplexers, Decoder, BCD-to-Decimal Decoders, Seven-Segment Decoders, Encoders , Parity Generators and Checkers, Magnitude Comparators, Sequential vs. Combinational Circuits, Half Adder, Full Adder, Half Sub tractor, Full Sub tractor
2.4 Logic gates
2.5 Combinational Logic Circuits
2.6 Sequential Logic Circuits

3. Concept of Programming and Data structure

3.1 Concept of Procedural Programming, Declarative Programming, Structural Programming and Object-Oriented Programming
3.2 Concept of Algorithm, Flowchart and Pseudo code
3.3 Concept of C programming, C++ Programming
3.4 Basic Concept of control, loop, array and function
3.5 Introduction of Data structure and Abstract data Type
3.6 Linear data structures
3.7 Trees: General and binary trees, Representations and traversals
3.8 Exhaustive search, Divide and conquer
3.9 Sorting: Types of sorting: internal and external, Insertion and selection sort, Exchange sort, Merge and Redix sort, Shell sort

4. Operating system

4.1 **OS Fundamentals:** Definition of OS, Functions of OS, Components of OS, Types of Operating System, Application Software vs System Software, LINUX vs. UNIX, Primary, Extended and Logical Partition
4.2 CPU scheduling and scheduling algorithm

4.3 Deadlock detection and prevention

4.4 **Memory Management:** Memory hierarchy, Storage Placement Policies: First Fit, Best Fit, Worst Fit, Fixed Partitioning and Variable Partitioning memory management, Virtual Memory, Paging, Demand Paging, Memory Protection and Sharing, Limit Register, Swapping, Segmentation, Paging and Segmentation Combined, Concept of Thrashing, Page Replacement Algorithms, Overlays, TLBs

4.5 Windows and Linux based networking architecture

4.6 Monitoring and Troubleshooting Windows and Linux network

4.7 Users, Groups and Permission on Linux and Windows.

4.8 **Security**: Security breaches, Types of Attacks, Security Policy and Access Control, Basics of Cryptography, Protection Mechanisms, Authentication, OS Design Considerations For Security, Access Control Lists And OS Support

5. Database Management System

5.1 DBMS Fundamentals: Data Vs Information, RDBMS vs. OODBMS, Data Models, Data Abstraction and Data Independence, 3-level Architecture (ANSI/APARC Architecture), DBA, Distributed Database, Object oriented, deductive, spatial, temporal and constraint database management systems, Concepts of DDL, DML and DCL

5.2 Database Model: Relational Database Model, E-R Model

5.3 Database Design: Logical Design, Conceptual Design, Mapping Conceptual to Logical,

5.4 SQL Queries: Join (Left and Right Join), Subquery, View, Function and Stored Procedure Examples, Primary Key Constraints, Referential Integrity Constraints (on cascade update, on cascade delete)

5.5 Normalization: 1NF, 2NF, 3NF, BCNF

5.6 The relational algebra

5.7 Architecture of DBMS: Client-server, Open Architectures

5.8 Transaction Processing, Multi-User & Concurrency, and Backup & Recovery Database.

5.9 Basic SQL statement: DDL, DML,DCL

5.10 Restricting and Sorting data

5.11 Displaying Data from Multiple Tables

5.12 Creating Views and Controlling User Access

5.13 Basic Concept of major RDBMS products: Oracle, Sybase, DB2, SQL Server and MYSQL

5.14 Query Cost Estimation, Query Optimization (steps), Query Decomposition, Performance Tuning

5.15 Indexing: Hash based indexing and tree based indexing

5.16 Data Mining and Data Warehousing

5.17 Database Security, Performance Tuning, Concept of Big Data, NoSQL, Hadoop

6. Management Information System

6.1 Information Technology and Organization

6.2 Information Systems and Decision Making

6.3 Data Mining, Data Warehousing

6.4 OLAP and OLTP

Section -B (50 Marks)

7. Software Engineering

7.1 Software and Software Engineering

7.2 Software development Model: Waterfall, RAD, Spiral, RUP, Agile

7.3 System Requirement Specification (SRS)

7.4 Feasibility Analysis

7.5 Software Design: Logical vs Physical Design; UML Diagrams: Use Case Diagram, Class Diagram, Communication Diagram, State Chart Diagram, Sequence Diagram; Activity Diagram; Structure Chart, Qualified Association in Class Diagram DFD (Level-0,1,2); Software Coupling and Cohesion and its Types; User Interface Design: Wireframe Diagrams

7.6 Software Development: Software frameworks and CASE tools

7.7 Software Testing: Black Box, White Box, Gray Box, Unit, Integration Testing, Regression Testing, Software Fault Tolerance

7.8 Software maintenance types, Reverse Engineering; Refactoring and Restructuring

7.9 Software Quality: Software Quality Assurance process ;Verification vs Validation; Software Inspection; Clean Room Software Engineering, Software Reviews and FTR; Statistical software quality assurance; Software reliability; ISO Standards; CMMI model

7.10 Software Issues: Social, Legal and Ethical Issues; Business Process Engineering and Re-Engineering; Concept of Big Data

7.11 Software Configuration Management: Main software configuration management (SCM) concepts, SCM repository; SCM process; Change Management; Version and release management

8. Computer Network

8.1 Network Definition, Network Models, Network Topology, Network Addressing

8.2 Network Connectivity: Data Communication Media

8.3 The Data Package, Establishing a Connection, Reliable Delivery, Network Connectivity, Noise Control, Building Codes, Connection Devices
8.4 The OSI reference model
8.5 Common Network Protocols
8.6 TCP/IP Protocol
8.7 Network LAN Infrastructure
8.8 Remote Networking: Remote Networking, Remote Access protocols, VPN Technologies.
8.9 Network Security: Introduction, Virus Protection, Local Security, Network Access, Internet Security.
8.10 Disaster Recovery: The need for Disaster Recovery, Disaster Recovery plan, Data backup, Fault Tolerance.
8.11 Network Troubleshooting: Using Systematic Approach to Troubleshooting
8.12 Network Support Tools: Utilities, the Network Baseline
8.13 Digital Signature and Digital Certificate, HSM, Root Server and CA server, Calculations based on RSA Algorithm; Electronic Payment Gateway and e-Payment Transaction Steps, Credit Card Operation Steps; IPS, IDS, Firewalls, Hacking and Viruses
8.14 Distributed System, Cluster based system, Grid Based System; Concept of traffic analyzer: MRTG, PRTG, SNMP, Packet tracer, Wireshark
8.15 Firewall and Routers

9. Emerging Technology and Security Threat

9.1 Artificial Intelligence: Expert system, Neural Network
9.2 E-commerce: EDI, Cryptography
9.3 GIS, Remote sensing and GPS
9.4 Web 2.0 and Virtual meeting
9.5 Mobile computing
9.6 Security and privacy
9.7 Computer Virus
9.8 Cyber Crime
9.9 Social Media Threat
9.10 Computer Ethics

10. Theory of Computation

10.1 BNF, Languages, Grammars
10.2 DFA, NDFA, regular expressions, regular grammars
10.3 Closure, Pigeonhole principle
10.4 CFGs, Pushdown Automata
10.5 Turing Machines
10.6 The Chomsky hierarchy, Un-decidable problems
10.7 Complexity Theory, P and NP

11. Capital market, law and policy

11.1 Basic concept of Capital Market
11.2 Primary and Secondary Market
11.3 Role of NEPSE in Capital Market
11.4 Calculation of NEPSE Index
11.5 Trading Terminology
11.6 Securities Act, 2063
11.7 Stock Exchange Operation Regulation, 2064
11.8 Securities' Central Depository Services Regulation, 2067
11.9 Securities Listing Bylaws, 2075
11.10 Securities Trading Bylaws, 2075
11.11 CDSC Bylaws, 2068
11.12 Securities Clearing and Settlement Bylaws,2069
11.13 Electronic Transaction Act, 2063
11.14 Government Securities Transaction Bylaws of NEPSE, 2062

प्रथम पत्र (वस्तुगतको लागि)

खण्ड	अङ्कभार	प्रश्न संख्या	
		वस्तुगत	विषयगत
(क)	५०	२५ प्रश्न X २ अङ्क = ५०	—
(ख)	५०	२५ प्रश्न X २ अङ्क = ५०	

द्वितीय पत्र (विषयगतको लागि)

खण्ड	अङ्कभार	प्रश्न संख्या	
		वस्तुगत	विषयगत
(क)	५०	-	३ प्रश्न X५अङ्क = १५ २ प्रश्न X१०अङ्क = २० १ प्रश्न X१५अङ्क = १५
(ख)	५०	-	३ प्रश्न X५अङ्क = १५ २ प्रश्न X१०अङ्क = २० १ प्रश्न X१५अङ्क = १५

Part B: Practical Exam

1. Linux or Window sever Configuration
2. Web server Concept
3. LAN Network troubleshoot
4. DBMS configuration
5. Data Handling