

काठमाण्डौ उपत्यका खानेपानी लिमिटेड
 प्राविधिक सेवा, सुचना प्रविधि समुह, ७ तह, कम्प्युटर अधिकृत पदको खूला तथा समावेशी र
 आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

१. पथम चरण : लिखित परीक्षाको योजना (Examination Scheme)

पत्र	बिषय	प्रश्न संख्या x अंकभार	परीक्षा प्रणाली	समय	पूर्णाङ्क	उत्तिर्णाङ्क
प्रथम पत्र	सेवा सम्बन्धी: कम्प्युटर	५०x१=५० १०x५=५०	बस्तुगत बहुउत्तर छोटो छोटो उत्तर	३ घण्टा	१००	४०

२. द्वितीय चरण : प्रयोगात्मक

बिषय	प्रश्न संख्या x अंकभार	परीक्षा प्रणाली	समय	पूर्णाङ्क	उत्तिर्णाङ्क
कम्प्युटर संचालन सम्बन्धी				५०	२०

३. तृतीय चरण : अन्तर्वार्ताको योजना

बिषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	२०	मौखिक

द्रष्टव्य : उम्मेदवारहरूले ध्यान दिनुपर्ने कुराहरू

- लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी दुवै हुन सक्नेछ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरू मात्र द्वितीय चरणको र द्वितीय चरणको प्रयोगात्मक परीक्षाबाट छनौट भएका उम्मेदवारहरू मात्र तृतीय चरणको अन्तर्वार्तामा सम्मिलित हुन पाउनेछन् ।
- पाठ्यक्रममा भएका यथासम्भव सबै पाठ्यांशहरूबाट प्रश्न सोधिनेछ ।
- यस पाठ्यक्रममा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन, नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- यस भन्दा अगाडि लागु भएको माथि उल्लेखित समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागु मिति २०७३ आश्विन ।

प्रथम पत्र
सेवा सम्बन्धी: कम्प्युटर

1. Computer Fundamentals

- 1.1 Computers, Kinds of Computers in respect of size and function,
- 1.2 Generation of Computers,
- 1.3 Components and Architecture of Computers, Connecting the Components,
- 1.4 **Getting started:** Orientation to personal computers, The system unit, Starting the computers
- 1.5 **Input Devices:** The keyboard, The mouse, Other input devices
- 1.6 **Processing:** CPU, Memory
- 1.7 **Storages devices:** Overview of Storage Devices, The Floppy Disk Drive, The Hard Drive, The Universal Serial Bus (USB) Devices and Other Storage Devices
- 1.8 **Output devices:** Monitors, Printers, Modems, Soundboards
- 1.9 **Dos survival guide:** Using Command Prompt, Creating and using AUTOEXEC.BAT and CONFIG.SYS
- 1.10 **Windows survival guide:** The Windows Desktop, The Program Manager, Organizing the Desktop, The File Manager
- 1.11 **Application software:** Using Application Software
- 1.12 Windows Explorer, E-mails, Internet, Intranet, Extranets, Ethernet, HTTP
- 1.13 Computer Viruses, Antivirus

2. Data Structure and Algorithms

- 2.1 Fundamental of Data Structures, Abstract Data types,
- 2.2 Lists, Linked Lists, Stacks,
- 2.3 Queues, Priority Queue,
- 2.4 **Trees:** Traversal, Implementations, Binary Trees, Binary Search Trees, Balanced Search Trees, AVL Trees.
- 2.5 Indexing Methods. Hashing Trees, Suffix Trees
- 2.6 Worst-Case and Expected time Complexity.
- 2.7 Analysis of Simple Recursive and Nonrecursive Algorithms.
- 2.8 Searching, Merging and Sorting.
- 2.9 **Introductory Notions of algorithm design:** Divide-and-Conquer, Dynamic Programming, Greedy Methods, Backtracking
- 2.10 **Graph algorithms:** Depth-first Search and Breadth-first Search, Shortest Path Problems, Minimum Spanning Trees, Directed Acyclic Graphs.

3. System Analysis and Design

- 3.1 Defining the System, System Owner, System User, System Designers and system Builders, System Analysts, Variations on the System Analyst title, System life Cycle,
- 3.2 **Joint Application Development (JAD):** JAD definition, JAD purpose, JAD Philosophy, JAD Scope,
- 3.3 **Involved in a JAD:** Sponsor, Business Users, System Analyst
- 3.4 **Roles of JAD Group Member:** Project Leader, Record Keeper, Time Keeper.

- 3.5 **The System Design Environment:** Development Process, Management Process, System Structure, Basic Component of Computer based Information System, Personal/Centralized/Distribution System.
- 3.6 **Concept formations:** Introduction, Finding the Problem, Evaluating the Proposal, Technical Feasibility, Operational Feasibility, Economic Feasibility.
- 3.7 **Requirements analysis:** Representing System Analysis Model, Requirement Model, Design Model,
- 3.8 **Development Process:** Design Method.
- 3.9 **Entity Relationship Diagram (E-R Diagram):** Notations, Entities: Strong Entities, Weak Entities, Attributes: Simple and Composite, Single Valued and Multiple Valued, Null and Derived Attribute.
- 3.10 **Relationship Sets:** Degree of Relationship and Cardinality Relationship, Specialization, Generalization, Aggregation. PSC
- 3.11 **Data Flow Diagrams (DFDs):** Introductions, Data flow Diagram, Symbol, Files or data store, External entities, Data flows,
- 3.12 **Describing System by Data Flow Diagram:** Context diagram, Top level DFD, Expansion Level DFD, Conversions of Data.
- 3.13 **Object Modeling:** Object -Oriented Concept, Object Structure, Object Feature, Class and Object.
- 3.14 **Representation:** Association and Composition, Inheritance, Multiple Inheritances.
- 3.15 **Modeling:** Use Case Diagram, State Diagram, Event Flow Diagram.
- 3.16 **Documentation:** Automatic and Manual System.

4. Operating Systems

- 4.1 Define an Operating System, Trace the Developments in Operating Systems, Identify the functions of Operating Systems,
- 4.2 Describe the basic components of the Operating Systems, Understand Information Storage and Management Systems,
- 4.3 List Disk Allocation and Scheduling Methods, Identify the Basic Memory Management strategies, List the Virtual Memory Management Techniques, Define a Process and list the features of the Process Management System
- 4.4 Identify the Features of Process Scheduling; List the features of Inter-Process Communication and Deadlocks,
- 4.5 Identify the Concepts of Parallel and Distributed Processing, Identify Security Threats to Operating Systems
- 4.6 Overview of the MS-DOS Operating System
- 4.7 Introduction to the Windows Family of Products, Unix Family of Products, Linux Family of Products.
- 4.8 Introduction to Windows Networking
- 4.9 Windows Architecture, Linux Architecture
- 4.10 Troubleshooting Windows, & Linux
- 4.11 Managing Network Printing
- 4.12 Managing Hard Disks and Partitions
- 4.13 Monitoring and Troubleshooting Windows
- 4.14 Users, Groups and Permission Linux and Windows.

5. Database Management System and Design

- 5.1 Introduction, A Database Model, Relational Database Model, Integrity, RDBMS.
- 5.2 SQL and Embedded SQL
- 5.3 Writing Basic SQL SELECT Statements
- 5.4 Restricting and Sorting data
- 5.5 Single Row Functions
- 5.6 Displaying Data from Multiple Tables
- 5.7 Aggregation Data Using Group Functions
- 5.8 Sub Queries, Manipulating Data and Creating & Managing Tables
- 5.9 Creating Views and Controlling User Access
- 5.10 Using Set Operators, Date time Function
- 5.11 **Database Design:** Logical Design, Conceptual Design, Mapping Conceptual to Logical, Pragmatic issues, Physical Design, Integrity and Correctness, Relational Algebra, Relational Calculus. 5.12 Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, DKNF
- 5.13 **Architecture of DBMS:** Client-server, Open Architectures, Transaction Processing, Multi-User & Concurrency, and Backup & Recovery Database.
- 5.14 **Basic Concept of major RDBMS products:** Oracle, Sybase, DB2, SQL Server and other Databases.

6. Programming Language

- 6.1 Overview of Programming Language: History, Programming Paradigms, The role of Language translates in the Programming Process.
- 6.2 Fundamental Issues in Language Design. PSC
- 6.3 Virtual Machines, Code Generation, Loop Optimization.
- 6.4 Concept of Procedural Programming, Structural Programming, Object-Oriented Programming.
- 6.5 Concept of C programming, C++ Programming,
- 6.6 Java Programming for Declaration, Modularity and Storage Management Software Development.

7. Networking

- 7.1 **Basic Network Theory:** Network Definition, Network Models, Connectivity, Network Addressing.
- 7.2 **Network Connectivity:** The Data Package, Establishing a Connection, Reliable Delivery, Network Connectivity, Noise Control, Building Codes, Connection Devices.
- 7.3 **Advanced Network Theory:** The OSI model, Ethernet, Network Resources, Token ring, FDDI, Wireless Networking.
- 7.4 **Common Network Protocols:** Families of Protocols, NetBEUI, Bridge and Switches, The TCP/IP Protocol, Building TCP/IP Network, The TCP/IP Suite
- 7.5 **TCP/IP Services:** Dynamic Host Configuration Protocol, DNS Name Resolution, NetBIOS support, SNMP, TCP/IP Utilities, FTP
- 7.6 **Network LAN Infrastructure:** LAN Protocols on a Network, IP Routing, IP Routing Tables, Router Discovery Protocols, Data Movement in a Routed Network, Virtual LANs(VLANS)
- 7.7 **Network WAN Infrastructure:** The WAN Environment, Wan Transmission Technologies, Wan Connectivity Devices, Voice Over Data Services

- 7.8 **Remote Networking:** Remote Networking, Remote Access protocols, VPN Technologies.
- 7.9 **Computer Security:** Computer Virus, Worm, Trojan Horse.
- 7.10 **Network Security:** Introduction, Virus Protection, Local Security, Network Access, Internet Security.
- 7.11 **Disaster Recovery:** The need for Disaster Recovery, Disaster Recovery plan, Data backup, Fault Tolerance.
- 7.12 **Advanced Data Storage Techniques:** Enterprise Data Storage, Clustering, Network Attached Storage, Storage Area Networks.
- 7.13 **Network Troubleshooting:** Using Systematic Approach to Troubleshooting.
- 7.14 **Network Support Tools:** Utilities, The Network Baseline.
- 7.15 Network Access Points (NAP), Common Network Component, Common Peripheral Ports.

8. Computer Architecture & Organization

- 8.1 Evaluation of Computers, Design Methodology, Set Architecture, MIPS ISA, ALU Design.
- 8.2 **Datapath Design:** Single and Multiple Cycle Implementations, Pipelining, Memory Hierarchy, Input/Output System: Bus & Role of Operating System.

9. Compiler Design

- 9.1 Introduction to Compiling,
- 9.2 Logical Analysis, Syntax Analysis, Semantic Analysis,
- 9.3 Run Time environment,
- 9.4 Intermediate Code Generation, Code Optimization,
- 9.5 Compiler Generation Tools.

10. E-Commerce Technology 10.1 Introduction to E-Commerce.

- 10.2 Electronic Commerce Strategies.
- 10.3 Electronic Commerce Security Issues.
- 10.4 Success Models of E-Governance.
- 10.5 **E-Business:** b2b, b2c, b2e, c2c, g2g, g2c.
- 10.6 Principles of Electronic Payment, Strategies & Systems.
- 10.7 E-marketing, Reverse Engineering. PSC Page 5 9/
- 10.8 E-Banking, EDI Methods, SWIFT.
- 10.9 Encryption and Decryption Methods, XML, Layout Managers, Event Model.

11. MIS and Web Engineering

- 11.1 Information Systems, Client-Server Computing.
- 11.2 Information Systems and Decision Making.
- 11.3 Database Design issues, Data Mining, Data Warehousing
- 11.4 Knowledge Management, The strategic use of Information Technology.
- 11.5 Work Process Redesign (Reengineering) with Information Technology, Enterprise Resources Planning Systems, Information Systems Security, Information Privacy, and Global Information Technology issues.
- 11.6 Software Supported Demonstrations including advanced Spreadsheet topics, Software Component Based Systems (CBSE),
- 11.7 Multimedia

- 11.8 Object-Oriented Programming with COMS & DECOMS,
- 11.9 Group Decision Support Systems
- 11.10 Basics of Website Design.

12. IT in Nepal

- 12.1 History of IT in Nepal,
- 12.2 IT Policy of Nepal, 2057 B.S.
- 12.3 Cyber law of Nepal (Electronic Transaction Ordinance, 2061 B.S.)
- 12.4 Copy Write Act, 2022 B.S.
- 12.5 Uses of Computers and Software Development
- 12.6 Nepali Unicode, Nepali Fonts
- 12.7 Licensing Issues