

वीरगञ्ज महानगरपालिका नगर कार्यपालिकाको कार्यालयका लागि करार सेवामा पदपूर्ति गर्न प्रकाशित विज्ञापन नं. ०२०८३/२०८२/ अन्तर्गतको सूचना प्रविधि अधिकृत, सातौं तह पदको लिखित परीक्षाको पाठ्यक्रम

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, System unit, Starting the computers
- 1.5 **Input Devices:** keyboard, mouse, other input devices
- 1.6 **Processing:** CPU, Memory
- 1.7 **Storages devices:** Overview of Storage Devices, Floppy Disk Drive, Hard Drive, 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:** Windows Desktop, Program Manager, Organizing the Desktop, 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 **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

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- 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.
- 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 Definition, Developments and Functions of Operating Systems,
 - 4.2 Basic components of the Operating Systems, Understand Information Storage and Management Systems,
 - 4.3 Disk Allocation and Scheduling Methods, Basic Memory Management strategies, Virtual Memory Management Techniques, Define a Process and the features of the Process Management System
 - 4.4 Features of Process Scheduling; Features of Inter-Process Communication and Deadlocks,
 - 4.5 Concepts of Parallel and Distributed Processing, 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, 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

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- 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
 - 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, TCP/IP Protocol, Building TCP/IP Network, 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:** 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:** 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, Network Baseline
 - 7.15 Network Access Points (NAP), Common Network Component, Common Peripheral Ports

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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
- 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. Legislations and IT in Nepal

- 12.1 **The Constitution of Nepal** (From Part 1 to 5, 13, 14, 15, 16, 17, 18, 19 & 20; and Schedules)
- 12.2 History of IT in Nepal,
- 12.3 IT Policy of Nepal, 2072 B.S.
- 12.4 Electronic Transaction Act, 2063 B.S.
- 12.5 Copyright Act, 2059 B.S.
- 12.6 Uses of Computers and Software Development
- 12.7 Nepali Unicode, Nepali Fonts
- 12.8 Licensing Issues
- 12.9 Local Government Operation Act, 2074 (Provisions related to ICT)