

लोक सेवा आयोग
स्थानीय तह अन्तर्गतका प्राविधिक तर्फ विविध सेवा, छैठौं तह, कम्प्युटर अधिकृत पदको प्रतियोगितात्मक
परीक्षाको लागि पाठ्यक्रम

प्रथम र द्वितीय पत्र :- कम्प्युटर सम्बन्धी विषय

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 Tree.
 - 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)

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वस्तुगत नमूना प्रश्नहरू (Sample questions)

- 1) SCANDISK analyze and repairs damage to which of the following
A. Physical clusters B. FAT C. Lost Clusters D. All of the above

Correct Ans. (D)

- 2) DOS makes which of the special batch file named
A. AUTOEXCE.BAT B. AUTOEXE.BAT
C. AUTOEXEC.BAT D. AUTOEXC.BAT

Correct Ans. (C)

- 3) The two parts of the CPU are
A. Control unit and memory B. Addresses and ALU
C. Addresses and Registers D. Control Unit and ALU

Correct Ans. (D)

- 4) Operating is a
A. System Software B. Application Software
C. Presentation Software D. Database Software

Correct Ans. (A)

- 5) Which key is used to work with non-adjacent cells in excel?
A. Shift key B. Ctrl key C. Alt key D. Tab key

Correct Ans. (B)

- 6) The database element that represents a correspondence between the various data element is
A. Data B. Information C. Constraints D. Schema

Correct Ans. (D)

- 7) Currently the most popular database model is
A. Hierarchical B. Object-Oriented C. Relational D. Deductive

Correct Ans. (B)

- 8) When we download anything from the internet which protocol works:
A. TCP/IP B. FTP C. HTTP D. ARP

Correct Ans. (C)

- 9) What e-commerce category is the largest in terms of revenue?
A. Business to Business (B2B) B. Intra-Business (B2E)
C. Business to Consumer (B2C) D. Consumer to Consumer (C2C)

Correct Ans. (A)

- 10) How is data transferred in serial communications?
A. 10 bits at a time. B. 1 bit at a time.
C. 1 byte at a time. D. 6 bits at a time

Correct Ans. (B)

- 11) With respect to the interface network card, what does the term 10/100 refer to?
A. Protocol speed. B. A fiber network
C. Megabits per second. D. Minimum and maximum server speed

Correct Ans. (A)

- 12) A workstation has just been installed on the Ethernet LAN but cannot communicate with the network. What should you do first?

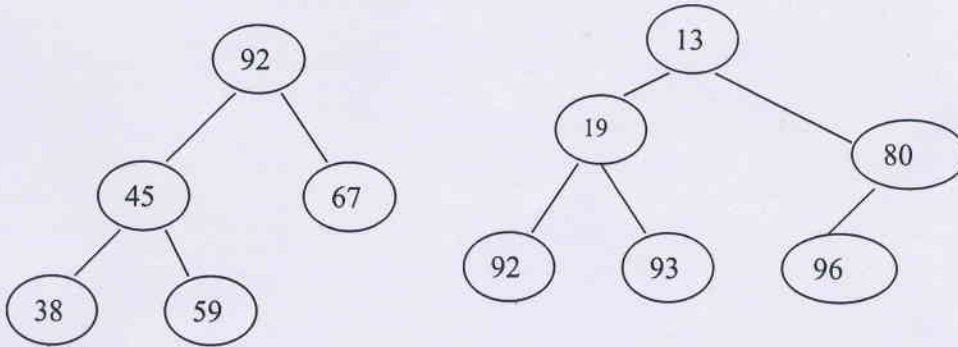
- A. Reinstall the network protocols.
B. Reinstall the network interface card driver.
C. Verify the IP configuration on the workstation.
D. Verify the link status on the computer's network card.

Correct Ans. (C)

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विषयगत नमूना प्रश्नहरू (Sample questions)

- 1) Merge operation between two heap trees



H1: A max Heap

H2: A min Heap

- 2) Preorder and postorder traversals of a binary tree given as below:

Preorder: u1 u2 u3 u4 u10 u8 u5 u9 u6 u11 u7

Postorder: u4 u10 u3 u8 u2 u9 u11 u7 u6 u5 u1

Obtained a binary tree, which resembles with traversals ?

- 3) Use the do-while loops in nested form and produces the following output in Java.

Multiple Tables

1	2	3
2	4	6
3	6	9

- 4) Using C program Draw Result

1	2
2	3
3	4
4	5

- 5) Consider the following schema:

Suppliers (sid:integer, sname:string, address:string)

Parts(pid: integer, pname: string, color: string)

Catalog (sid: integer, pid:integer, cost: real)

The key fields are underline, and the domain of each field is listed after the field name.

Thus sid is the key for suppliers, pid is the key for parts, and sid and pid together form the key Catalog. The catalog relation list the prices charged for parts by suppliers.

Write the following queries in relational algebra, SQL

- Find the Name of the suppliers who supply red part.

Solution:

a. Relational algebra

$\Pi_{sname}(\Pi_{sid}((\Pi_{pid} \sigma_{color='red'} Parts) \bowtie Catalog) \bowtie Suppliers)$

b. SQL

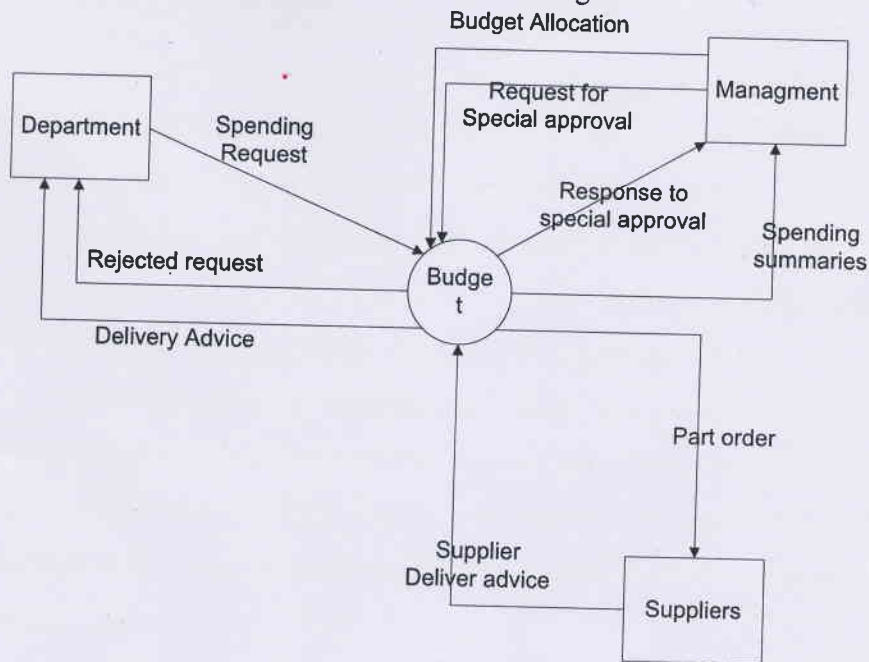
SELECT S.sname

FROM Suppliers S, Parts P, Catalog C

WHERE P.color='red' AND C.pid=P.pid AND C.sid=S.sid

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6) Develop Top level DFD from Context Diagram



७. विद्युतिय अभिलेख तथा डिजिटल हस्ताक्षर प्रभाणीकरण गर्ने निकायको इजाजत पत्र कुन कुन अवस्थामा नेपाल सरकारले रद्द गर्न सक्तछ । बुदागत व्याख्या गर्नुहोस् ।

प्रयोगात्मक परीक्षाका नमूना प्रश्नहरु

1. Get IP address from given computers which are Network.
 - a. Give privileged share only database administration.
 - b. Determine if the following address are on local or remote network.
 Node 1: 192.255.16.8
 Node2: 192.225.14.8
 Mask: 255.255.255.0
2. Create tables Student, Teacher, Course is SQL .
 Student (Sid, Sname, subject, level)
 Teacher (Tid, Tname, subject,)
 Course (Cid, Cnumber, Tname, level)
 - a. Insert 10 values
 - b. Delete first two values.
3. Given a string
 String S("123456789")
 Write a program in C++ that displays the following:
 1
 232
 34543
 4567654
 567898765

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सामूहिक परीक्षण (Group Test)

सामूहिक परीक्षण व्यक्तित्व परीक्षण (Personality Test) को एक अंश हो। निजामती सेवाको क्षेत्रविस्तार तथा कार्य पद्धति परिवर्तन समेत भैरहेको सन्दर्भमा नेपाल सरकारका नीति, योजना, कार्यक्रम आदि माथि विचार-विमर्श, छलफल गरी तिनको अझै बढी प्रभावकारी तथा कार्यान्वयन योग्य समाधान पहिल्याउने सम्बन्धमा उम्मेदवारहरुको क्षमता पहिचान गर्नु यस परीक्षणको मूल मर्म हो। यसको लागि छलफल, विचार-विमर्श गरी परिस्थिति बुझ्न सक्ने, निर्णय दिने, जनतालाई क्रियाशील बनाउने, चित्त बुझाउने, निर्धारित लक्ष्य अनुसार काम गर्ने/गराउने, जस्ता कामका लागि लेखन क्षमताका साथसाथै समस्यालाई यथार्थपरक ढंगले पहिचान गर्न सक्ने, वाकपटुता, शिष्टता, तर्कशक्तिको पनि आवश्यकता पर्दछ।

त्यसैले यस परीक्षणमा उम्मेदवारहरुको बौद्धिक क्षमता, संचार सीप, समूह गतिशिलता, व्यवहार, व्यक्तित्व, मनोवृत्ति, क्रियाशीलता, निर्णयशक्ति, समस्या समाधान क्षमता, नेतृत्व क्षमता, समय व्यवस्थापन तथा व्यक्तित्वमा भएका अन्य गुणहरुको आंकलन अर्थात परीक्षण र मूल्याङ्कन गर्नको लागि उम्मेदवारहरुलाई कुनै समसामयिक विषय/सवाल/समस्यामा सामूहिक छलफल गरी प्रभावकारी र कार्यान्वयन योग्य समाधान निकाल्न दिइन्छ।

सामूहिक छलफल (Group Discussion)

यस प्रयोजनको लागि गरिने परीक्षण १० पूर्णाङ्क र ३० मिनेट अवधिको हुनेछ जुन नेताविहिन सामूहिक छलफल (Leaderless Group Discussion) को रूपमा अवलम्बन गरिने छ। दिइएको प्रश्न वा Topic का विषयमा पालैपालोसँग निर्दिष्ट समयभित्र समूहबीच छलफल गर्दै प्रत्येक उम्मेदवारले व्यक्तिगत प्रस्तुति (Individual Presentation) गर्नु पर्नेछ। यस परीक्षणमा मूल्याङ्कनको लागि देहाय अनुसारको ३ जना भन्दा बढीको समिति रहनेछ।

आयोगका सदस्य	-	अध्यक्ष
आयोगका सदस्य	-	सदस्य
मनोविज्ञ	-	सदस्य
दक्ष/विज्ञ (१ जना)	-	सदस्य

सामूहिक छलफलमा दिइने नमुना प्रश्न वा Topic

उदाहरणको लागि - उर्जा संकट, गरीबी निवारण, स्वास्थ्य बीमा, खाद्य सुरक्षा, प्रतिभा पलायन जस्ता Topics मध्ये कुनै एक Topic मात्र दिइनेछ।