नागरिक लगानी कोष
नयाँ बानेश्वर, काठमाडौं
अधिकृत सातौ तह, डाटाबेश एडमिनिस्ट्रेटर (Database Administrator), प्राविधिक पदको खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :– लिखित परीक्षा (Written Examination) पूर्णाङ्क :– २००

द्वितीय चरण :– (क) मामिला अध्ययन तथा प्रस्तुतिकरण (Case Study Presentation) पूर्णाङ्क :– २०

(ख) अन्तर्वार्ता (Interview) पूर्णाङ्क :– ३०

१. प्रथम चरण : लिखित परीक्षा (Written Examination)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्या × अङ्क	समय
प्रथम	प्रविधि र व्यवस्थापनसँग सम्बन्धित आधारभूत ज्ञान	१००	४०	क) बस्तुगत प्रश्न (प्रविधिसँग सम्बन्धित मात्र) ख) विषयगत प्रश्न (व्यवस्थापनसँग सम्बन्धित मात्र)	क)५० प्रश्न × १ अङ्क = ५० ख)१० प्रश्न × ५ अङ्क = ५०	क) ४५ मिनेट ख) १ घण्टा ३० मिनेट
द्वितीय	सेवा सम्वन्धी (प्राविधिक विषय)	१००	४०	विषयगत	१० प्रश्न × १० अङ्क = १००	३ घण्टा

२. द्वितीय चरण : प्रस्तुतिकरण र अन्तर्वार्ता :

विषय	पूर्णाङ्क	परीक्षा प्रणाली	समय
(क) मामिला अध्ययन प्रस्तुतिकरण (Case Study Presentation)	२०	तयारी १ घण्टा ३० मिनेट प्रस्तुतिकरण २५ मिनेट	१ घण्टा ५५ मिनेट
(ख) अन्तर्वार्ता (Interview)	३०	मौखिक	

आवश्यक शैक्षिक योग्यता :-

मान्यता प्राप्त शैक्षिक संस्थाबाट कम्प्युटर ईन्जिनियरिङ्ग बिषयमा स्नातकोत्तर गरी Oracle Certified Professional (OCP) वा Data Platform वा Data Management & Analytics मा MCSE Certified ।

द्रष्टव्य :

१. यो पाठ्यक्रम योजनालाई प्रथम चरणमा लिखित परीक्षा तथा द्वितीय चरणमा मामिला अध्ययन प्रस्तुतिकरण र अन्तर्वार्ता परीक्षा गरी दुई चरणमा विभाजन गरिएको छ ।
२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
३. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
४. 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 ।

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

६. विषयगत प्रश्नका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

७. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि 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 ।

८. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका परीक्षार्थीलाई मात्र द्वितियचरणको मामिला अध्ययन प्रस्तुतिकरण र अन्तर्वार्तामा सहभागी गराईने छ ।

९. द्वितियचरणको मामिला अध्ययन प्रस्तुतिकरण (Case Study Presentation) का लागि Database Design & Management सम्बन्धि कुनै समस्या दिईनेछ र सो सम्वन्धमा उम्मेदवारले आफ्नो प्रस्तुतिकरण तयार गरी प्रस्तुत गर्नुपर्नेछ ।

➢ **पाठ्यक्रम लागू मिति :** .....

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Written Examination

Paper I
Technology and Management related Fundamental Knowledge

Total Time: 2 Hours 15 Minutes Full Marks: 100

Section A: Fundamental Technical Knowledge

Time: 45 Minutes Full Marks: 50

This part includes 50 objective (multiple choices) questions from the following topics.

1. Computer Architecture and Organization 5 Questions x 1 Mark

1.1. Basic Structures: Sequential Circuits, Design Procedure, State Table and State Diagram, Von Neumann/Harvard Architecture, RISC/CISC Architecture
1.2. Addressing Methods and Programs, Representation of Data, Arithmetic Operations, Basic Operational Concepts, Bus Structures, Instruction Cycles
1.3. Processing Unit: Instruction Formats, Arithmetic & Logical Instructions, Addressing Modes
1.4. Input Output Organization: I/O Programming, Memory Mapped I/O, Basic Interrupt System, DMA
1.5. Memory Systems
1.6. 808X and Intel Microprocessors: Programming and Interfacing

2. Operating System 5 Questions x 1 Mark

2.1. Introduction: Concept; Functions and Types of Operating System
2.2. Process and Threads: Symmetric Multiprocessing, Micro-Kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock
2.3. Scheduling
2.4. Memory Management
2.5. Input Output and Files: I/O Devices and its Organization, Principles of I/O Software and Hardware, Disks, Files & Directories Organization, File System Implementation
2.6. Distributed Systems: Distributed Message Passing, RPC, Clint/Server Computing, Clusters
2.7. Security: Authentication and Access Authorization, System Flaws and Attacks, Trusted System
2.8. Familiarity with UNIX and Windows Operating System: Understanding user and privilege management, Resource monitoring and management, Security implementations

3. Computer Networks 5 Questions x 1 Mark

3.1. Introduction: Protocols and standards, OSI model and TCP/IP Model. Protocol Stack, Switching
3.2. Link Layer: Services, Error Detection and Correction, Multiple Access Protocols, LAN Addressing and ARP (Address Resolution Protocol), Ethernet, CSMA/CD Multiple Access Protocol, Hubs, Bridges and Switches, Wireless LANs, PPP (Point to Point Protocol), Wide Area Protocols

3.3. Network Layer: Services, Datagram and Virtual Circuits, Routing Principles and Algorithms, Internet Protocols (IP), IP Addressing, IP Transport, Fragmentation and Assembly, ICMP (Internet Control Message Protocol), Routing on the Internet, RIP (Routing Information Protocol), OSPF (Open Shortest Path First), Router Internals, IPV6
3.4. Transport Layer: Principles, Multiplexing and De-multiplexing, UDP, TCP, Flow Control, Principles of Congestion Control, TCP Congestion Control
3.5. Application Layer: Web and Web Caching, FTP (File Transfer Protocol), Electronic Main, DNS (Domain Name Service), Socket Programming
3.6. Distributed System, Clusters

4. Cryptography and Network Security **5 Questions x 1 Mark**

4.1. Introduction to Cryptography: Basic Elements of Security, Security Attacks, Conventional Encryption Model, Simplified DES, Block Cipher Principle
4.2. Principles of Public-Key Cryptosystems: RSA Algorithm, Diffie-Hellman Key Exchange
4.3. Message Authentication and Hash Function
4.4. Digital Signature and Authentication Protocols: Digital Signatures, Digital Signature Standards, Authentication Protocols
4.5. Network Security: Authentication Applications– Kerberos, Electronic Mail Security
4.6. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.
4.7. Intruders and Viruses Related Threats
4.8. Firewall Design Principles
4.9. Introduction to Trusted Systems

5. Basic Concepts on Emerging Technologies **5 Questions x 1 Mark**

5.1. High Speed Networks
5.2. E-Commerce
5.3. Artificial Intelligence
5.4. Big Data Analytics, Data Mining and Warehousing
5.5. Internet of Things
5.6. Cloud and Edge Computing
5.7. Block-chain
5.8. Parallel and Distributed Computing
5.9. Social Media in Corporate Governance

6. Data Structures **5 Questions x 1 Mark**

6.1. General Concepts: Abstract Data Type, Time and Space Analysis of Algorithms, Big Oh and Theta Notation, Average, Best and Worst Case Analysis
6.2. Linear Data Structures
6.3. Trees: General and Binary Trees, Representations and Traversals, Binary Search Trees, Balancing Trees, AVL Trees, 2-3 Trees, Red-Black Trees, Self-Adjusting Trees, Splay Trees

6.4. Algorithm Design Techniques: Greedy Methods, Priority Queue Search, Exhaustive Search, Divide and Conquer, Dynamic Programming, Recursion
6.5. Hashing
6.6. Graphs and Digraphs
6.7. Sorting

7. Structured and Object-Oriented Programming **5 Questions x 1 Mark**

7.1. Data types, ADT
7.2. Operators, Variables and Assignments
7.3. Control Structures
7.4. Procedure/Functions
7.5. Class Definitions, Objects, Encapsulation, Inheritance, Polymorphism
7.6. Pattern and Framework

8. Software Engineering **5 Questions x 1 Mark**

8.1. Software Process: The Software Lifecycle Models, Risk-Driven Approaches
8.2. Software Project Management: Relationship to Lifecycle, Project Planning, Project Control, Project Organization, Risk Management, Cost Models, Configuration Management, Version Control, Quality Assurance, Metrics
8.3. Software Requirements: Requirements Analysis, Requirements Solicitation, Analysis Tools, Requirements Definition, Requirements Specification, Static and Dynamic Specifications, Requirements Review, Unified Modeling Language (UML)
8.4. Software Design: Design for Reuse, Design for Change, Design Notations, Design Evaluation and Validation
8.5. Implementation: Programming Standards and Procedures, Modularity, Data Abstraction, Static Analysis, Unit Testing, Integration Testing, Regression Testing, Tools for Testing, Fault Tolerance
8.6. Maintenance: Maintenance Problem, Nature of Maintenance, Planning for Maintenance
8.7. SE Issues: Formal Methods, Tools and Environments for Software Engineering, Role of Programming Paradigm, Process Maturity and Improvement, ISO Standards, SEI-CMM, CASE Tools

9. Database Management System (DBMS) Fundamentals 5 Questions x 1 Mark

9.1. Introduction: Concept and applications of Database Management System; Data Models, Entity Relationship Model; The Relational Model

9.2. Relational Database Design: database design process; Functional dependencies; Database Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, De-normalization

9.3. Structured Query Language (SQL): DDL, DML, and DCL statements; Single row and group functions; Joins and Subqueries

9.4. Transaction Management: Transaction Concept; Implementation of Atomicity and Durability; Serializability; Implementation of Isolation

9.5. Concurrency Control: Concurrent Execution of the User Programs; Concurrency Control Techniques- Lock based protocols; Timestamp based protocols; Validation Based Protocols

9.6. Crash Recovery: Types of Failure, Recovery Techniques

9.7. Query Processing and Optimization

9.8. Indexing: Hash Based Indexing, Tree Based Indexing

10. Advanced Database Management System 5 Questions x 1 Mark

10.1. Database System Architecture: Centralized System; Client-Server Database System; Parallel System; Distributed System

10.2. Distributed Database Systems: Distributed data storage; Distributed Transactions; Commit Protocols; Concurrency Control in Distributed Database; Distributed Query Processing

10.3. Advanced Query and Information Retrieval: Data Mining; Data Warehousing

10.4. Advanced Transaction Processing: Transaction Processing Monitors; Transactional Workflows; Main-Memory Databases; Real Time Transaction Systems; Long Duration Transactions; Transaction Management in Multi-databases

10.5. Recovery Systems: Failure Classification; Storage Structure; Recovery and Atomicity; Log Based Recovery; Shadow Paging; Recovery with Concurrent Transactions

10.6. Case Studies of DBMS Products

10.6.1. Oracle: System Architecture; Storage and Indexing; Query Processing and Optimization; Concurrency Control; Recovery; Replication and Distribution; SQL, stored procedure, Function, High Availability, Job scheduling, Performance Tuning, Familiarity with administration tools

10.6.2. Microsoft SQL Server: System Architecture; Storage and Indexing; Query Processing and Optimization; Concurrency Control; Recovery; Replication and Distribution; SQL, stored procedure, Function, High Availability, Job scheduling, Performance Tuning, Familiarity with administration tools

10.6.3. PostGreSQL: System Architecture; Storage and Indexing; Query Processing and Optimization; Concurrency Control; Recovery; Replication and Distribution; SQL, stored procedure, Function, High Availability, Job scheduling, Performance Tuning, Familiarity with administration tools

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Section B: Fundamental management and service related policies, and legal knowledge

Time: 1 Hour 30 Minutes | Full Marks: 50

Contents

1. Introduction of Management **5 Marks**

Management: concepts, meaning, levels and functions. Types of managers. Managerial roles and skills. Business environment, Business ethics, ethical standards and corporate governance, corporate social responsibility.

2. Planning and Decision Making **5 Marks**

Meaning of Planning, Levels of Planning: Strategic, Tactical and operational. Steps in Planning. Tools for planning. Decision Making: meaning, types and process.

3. Organizing **5 Marks**

Meaning, process and principles of organizing. Organization Architecture: vertical differentiation – tall versus flat hierarchies, horizontal differentiation – functional structure, multidivisional structure, geographic structure, and matrix structure. Centralization, Decentralization and Devolution: meaning, reasons, advantages and disadvantages. Staffing: concept and importance.

4. Leading **5 Marks**

Meaning and qualities of leadership. Understanding Individual differences and psychological contract. Leadership Styles: autocratic, democratic, and participative. Motivation: concept, importance and techniques. Communication: meaning, process, and networks. Types of communication, Barriers to effective communication.

5. Controlling **5 Marks**

Meaning, purpose, process and types of controls. Essentials of effective control systems. Control tools and techniques. Quality: Concept and importance. Total Quality Management: concept, components, principles, tools and techniques.

6. Service related policies, acts, rules, regulations and directives **25 Marks**

6.1. नेपालको संविधान
6.2. सूचना तथा सञ्चार प्रविधि नीति, २०७२
6.3. बिद्युतिय कारोबार ऐन, २०६३
6.4. प्रतिलिपि अधिकार ऐन, २०५९
6.5. नागरिक लगानी कोष ऐन, २०४७
6.6. नागरिक लगानी कोष (व्यवस्थापन) विनियमावली, २०४८
6.7. सार्वजनिक खरिद ऐन, २०६३ तथा नियमावली, २०६४
6.8. नागरिक लगानी कोष खरीद विनियमावली, २०७५
6.9. नागरिक लगानी कोषले सञ्चालन गरेका योजना तथा कार्यक्रमहरू (Schemes and Programs)

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Written Examination

Paper II
Service Related (Technical Subject)

Full marks: 100 Pass Marks: 40 Time: 3 Hours

Section A (50 %)

1. Computer Architecture and Organization 10 Marks

1.1. Basic Structures: Sequential Circuits, Design Procedure, State Table and State Diagram, Von Neumann/Harvard Architecture, RISC/CISC Architecture
1.2. Addressing Methods and Programs, Representation of Data, Arithmetic Operations, Basic Operational Concepts, Bus Structures, Instruction Cycles
1.3. Processing Unit: Instruction Formats, Arithmetic & Logical Instructions, Addressing Modes
1.4. Input Output Organization: I/O Programming, Memory Mapped I/O, Basic Interrupt System, DMA
1.5. Memory Systems
1.6. 808X and Intel Microprocessors: Programming and Interfacing

2. Operating System 10 Marks

2.1. Introduction: Concept; Functions and Types of Operating System
2.2. Process and Threads: Symmetric Multiprocessing, Micro-Kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock
2.3. Scheduling
2.4. Memory Management
2.5. Input Output and Files: I/O Devices and its Organization, Principles of I/O Software and Hardware, Disks, Files & Directories Organization, File System Implementation
2.6. Distributed Systems: Distributed Message Passing, RPC, Clint/Server Computing, Clusters
2.7. Security: Authentication and Access Authorization, System Flaws and Attacks, Trusted System
2.8. Familiarity with UNIX and Windows Operating System: Understanding user and privilege management, Resource monitoring and management, Security implementations

3. Computer Networks 10 Marks

3.1. Introduction: Protocols and standards, OSI model and TCP/IP Model. Protocol Stack, Switching
3.2. Link Layer: Services, Error Detection and Correction, Multiple Access Protocols, LAN Addressing and ARP (Address Resolution Protocol), Ethernet, CSMA/CD Multiple Access Protocol, Hubs, Bridges and Switches, Wireless LANs, PPP (Point to Point Protocol), Wide Area Protocols
3.3. Network Layer: Services, Datagram and Virtual Circuits, Routing Principles and Algorithms, Internet Protocols (IP), IP Addressing, IP Transport, Fragmentation and Assembly, ICMP (Internet

Control Message Protocol), Routing on the Internet, RIP (Routing Information Protocol), OSPF (Open Shortest Path First), Router Internals, IPV6

3.4. Transport Layer: Principles, Multiplexing and De-multiplexing, UDP, TCP, Flow Control, Principles of Congestion Control, TCP Congestion Control

3.5. Application Layer: Web and Web Caching, FTP (File Transfer Protocol), Electronic Main, DNS (Domain Name Service), Socket Programming

3.6. Distributed System, Clusters

4. Cryptography and Network Security **10 Marks**

4.1. Introduction to Cryptography: Basic Elements of Security, Security Attacks, Conventional Encryption Model, Simplified DES, Block Cipher Principle

4.2. Principles of Public-Key Cryptosystems: RSA Algorithm, Diffie-Hellman Key Exchange

4.3. Message Authentication and Hash Function

4.4. Digital Signature and Authentication Protocols: Digital Signatures, Digital Signature Standards, Authentication Protocols

4.5. Network Security: Authentication Applications– Kerberos, Electronic Mail Security

4.6. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

4.7. Intruders and Viruses Related Threats

4.8. Firewall Design Principles

4.9. Introduction to Trusted Systems

5. Basic Concepts on Emerging Technologies **10 Marks**

5.1. High Speed Networks

5.2. E-Commerce

5.3. Artificial Intelligence

5.4. Big Data Analytics, Data Mining and Warehousing

5.5. Internet of Things

5.6. Cloud and Edge Computing

5.7. Block-chain

5.8. Parallel and Distributed Computing

5.9. Social Media in Corporate Governance

Section B – 50 %

6. Data Structures **10 Marks**

6.1. General Concepts: Abstract Data Type, Time and Space Analysis of Algorithms, Big Oh and Theta Notation, Average, Best and Worst Case Analysis

6.2. Linear Data Structures

6.3. Trees: General and Binary Trees, Representations and Traversals, Binary Search Trees, Balancing Trees, AVL Trees, 2-3 Trees, Red-Black Trees, Self-Adjusting Trees, Splay Trees
6.4. Algorithm Design Techniques: Greedy Methods, Priority Queue Search, Exhaustive Search, Divide and Conquer, Dynamic Programming, Recursion
6.5. Hashing
6.6. Graphs and Digraphs
6.7. Sorting

7. Structured and Object-Oriented Programming **10 Marks**

7.1. Data types, ADT
7.2. Operators, Variables and Assignments
7.3. Control Structures
7.4. Procedure/Functions
7.5. Class Definitions, Objects, Encapsulation, Inheritance, Polymorphism
7.6. Pattern and Framework

8. Software Engineering **10 Marks**

8.1. Software Process: The Software Lifecycle Models, Risk-Driven Approaches
8.2. Software Project Management: Relationship to Lifecycle, Project Planning, Project Control, Project Organization, Risk Management, Cost Models, Configuration Management, Version Control, Quality Assurance, Metrics
8.3. Software Requirements: Requirements Analysis, Requirements Solicitation, Analysis Tools, Requirements Definition, Requirements Specification, Static and Dynamic Specifications, Requirements Review, Unified Modeling Language (UML)
8.4. Software Design: Design for Reuse, Design for Change, Design Notations, Design Evaluation and Validation
8.5. Implementation: Programming Standards and Procedures, Modularity, Data Abstraction, Static Analysis, Unit Testing, Integration Testing, Regression Testing, Tools for Testing, Fault Tolerance
8.6. Maintenance: Maintenance Problem, Nature of Maintenance, Planning for Maintenance
8.7. SE Issues: Formal Methods, Tools and Environments for Software Engineering, Role of Programming Paradigm, Process Maturity and Improvement, ISO Standards, SEI-CMM, CASE Tools

9. Database Management System (DBMS) Fundamentals **10 Marks**

9.1. Introduction: Concept and applications of Database Management System; Data Models, Entity Relationship Model; The Relational Model
9.2. Relational Database Design: database design process; Functional dependencies; Database Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, De-normalization
9.3. Structured Query Language (SQL): DDL, DML, and DCL statements; Single row and group functions; Joins and Subqueries
9.4. Transaction Management: Transaction Concept; Implementation of Atomicity and Durability; Serializability; Implementation of Isolation

9.5. Concurrency Control: Concurrent Execution of the User Programs; Concurrency Control Techniques- Lock based protocols; Timestamp based protocols; Validation Based Protocols
9.6. Crash Recovery: Types of Failure, Recovery Techniques
9.7. Query Processing and Optimization
9.8. Indexing: Hash Based Indexing, Tree Based Indexing

10. Advanced Database Management System 10 Marks

10.1. Database System Architecture: Centralized System; Client-Server Database System; Parallel System; Distributed System
10.2. Distributed Database Systems: Distributed data storage; Distributed Transactions; Commit Protocols; Concurrency Control in Distributed Database; Distributed Query Processing
10.3. Advanced Query and Information Retrieval: Data Mining; Data Warehousing
10.4. Advanced Transaction Processing: Transaction Processing Monitors; Transactional Workflows; Main-Memory Databases; Real Time Transaction Systems; Long Duration Transactions; Transaction Management in Multi-databases
10.5. Recovery Systems: Failure Classification; Storage Structure; Recovery and Atomicity; Log Based Recovery; Shadow Paging; Recovery with Concurrent Transactions
10.6. Case Studies of DBMS Products
    10.6.1. Oracle: System Architecture; Storage and Indexing; Query Processing and Optimization; Concurrency Control; Recovery; Replication and Distribution; SQL, stored procedure, Function, High Availability, Job scheduling, Performance Tuning, Familiarity with administration tools
    10.6.2. Microsoft SQL Server: System Architecture; Storage and Indexing; Query Processing and Optimization; Concurrency Control; Recovery; Replication and Distribution; SQL, stored procedure, Function, High Availability, Job scheduling, Performance Tuning, Familiarity with administration tools
    10.6.3. PostGreSQL: System Architecture; Storage and Indexing; Query Processing and Optimization; Concurrency Control; Recovery; Replication and Distribution; SQL, stored procedure, Function, High Availability, Job scheduling, Performance Tuning, Familiarity with administration tools

नागरिक लगानी कोष
नयाँ बानेश्वर, काठमाडौं
अधिकृत सातौ तह, डाटाबेश एडमिनिस्ट्रेटर (Database Administrator), प्राविधिक पदको खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

Case Study Presentation

Full marks: 20 **Preparation Time: 1 Hour 30 minutes**

Presentation Time: 25 minutes

Examinees will be presented with a problem related to database design and management. Examinees will analyze the given problem and propose a solution for the given problem. Basically, the problem solving will require knowledge of database design, database administration and data handling. The problem solving may also require familiarity with various DBMS products prescribed in Paper II on UNIX and Windows platforms.