प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्

पदपूर्ति समिति

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प्राविधिक तथा प्रशिक्षण सेवा, इन्जिनियरिङ्ग प्राविधिक प्रशिक्षण समूह, सूचना प्रविधि इन्जिनियरिङ्ग उपसमूह, अधिकृतस्तर तृतीय श्रेणी, **प्राविधिक अधिकृत (सूचना प्रविधि)** पदको खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र : सेवा सम्बन्धी विषय — पूर्णाङ्क - १००

1. Computer Fundamentals

1.1. Introduction to computer systems:

1.2. Hardware: Definition of Hardware

- 1.2.1. Input devices: keyboard, mouse, Scanner, etc.
- 1.2.2. CPU: Arithmetic logical unit (ALU), Control Unit (CU), Memory unit (MU)
- 1.2.3. Output devices: Monitor, Printer etc.
- 1.2.4. Storage devices: Primary and Auxiliary Memory
- 1.2.5. Others: Network card, Modem, Sound card etc.

1.3. Software: Introduction to computer software, Operating system, Programming Languages and Application software.

1.4. BIOS, Firmware and cache memory concept

1.5. Concept of computer viruses and remedies

1.6. Concept of Multimedia, Hypermedia

1.7. Troubleshooting methods

2. Programming Languages

2.1. Procedural Programming Language

- 2.1.1. Procedures and Modularity
- 2.1.2. Control Statements
- 2.1.3. Looping
- 2.1.4. Array
- 2.1.5. Pointers
- 2.1.6. Structure and Union
- 2.1.7. File Handling
- 2.1.8. Functions
- 2.1.9. Recursion
- 2.1.10. Parameter passing, Scope and Binding

2.2. Object Oriented Programming Language

- 2.2.1. Object and Classes
- 2.2.2. Method
- 2.2.3. Inheritance
- 2.2.4. Polymorphism
- 2.2.5. Modularity
- 2.2.6. Encapsulation
- 2.2.7. Abstraction
- 2.2.8. Operator Overloading
- 2.2.9. Virtual Function

3. Data Structure and Algorithms

3.1. Abstract Data Types

- 3.1.1. Arrays
- 3.1.2. Stacks
- 3.1.3. Queues
- 3.1.4. Linked Lists

3.2. Trees,

- 3.2.1. General and binary trees
- 3.2.2. Representations and traversals

3.2.3. Binary search trees
3.2.4. Balancing trees
3.2.5. AVL trees

3.3. Indexing Methods
3.3.1. Hashing Trees
3.3.2. Suffix Trees

3.4. Analysis of Algorithms
3.4.1. Asymptotic Notation
3.4.2. Notions of Space and Time Complexity
3.4.3. Worst and Average Case Analysis

3.5. Algorithm Design
3.5.1. Greedy Approach
3.5.2. Dynamic Programming
3.5.3. Divide-and-Conquer
3.5.4. Backtracking

3.6. Graph Traversals
3.6.1. Connected Components
3.6.2. Spanning Trees
3.6.3. Shortest Paths
3.6.4. Hashing
3.6.5. Sorting
3.6.6. Searching
3.6.7. Merging
3.6.8. Depth-first Search and Breadth-first Search
3.6.9. Minimum Spanning Trees
3.6.10. Directed Acyclic Graphs

4. Operating Systems

4.1. History & concepts of operating system
4.2. Resources and Sharing
4.3. Resource Management and Spooling
4.4. Single Task
4.5. Multi Tasking and Multi User
4.6. Multiprocessing
4.7. Batch Processing,
4.8. Processes and Threads
4.9. Parallel and Distributed Processing
4.10. Process Scheduling
4.11. Inter-process Communication
4.12. Concurrency
4.13. Synchronization
4.14. Deadlock
4.15. CPU Scheduling
4.16. Memory Management and Virtual Memory
4.17. Disk and File systems
4.18. I/O systems
4.19. Protection and Security
4.20. Embedded systems
4.21. Open Source
4.22. Microsoft Windows
4.23. Kernel
4.24. Real time OS
4.25. Troubleshooting Windows, & Linux
4.26. Managing Network Printing
4.27. Managing Hard Disks and Partitions
4.28. Monitoring and Troubleshooting Windows

4.29. Users, Groups and Permission Linux and Windows

5. Database Management System and Design

5.1. Introduction
- 5.1.1. A Database Model
- 5.1.2. Relational Database Model
- 5.1.3. Integrity
- 5.1.4. RDBMS

5.2. SQL and Embedded SQL
- 5.2.1. Writing Basic SQL SELECT Statements
- 5.2.2. Restricting and Sorting data
- 5.2.3. Single Row Functions
- 5.2.4. Displaying Data from Multiple Tables
- 5.2.5. Aggregation Data Using Group Functions
- 5.2.6. Sub Queries, Manipulating Data and Creating &Managing Tables
- 5.2.7. Creating Views and Controlling User Access
- 5.2.8. Using Set Operators
- 5.2.9. Date time Function

5.3. Database Design
- 5.3.1. Logical Design
- 5.3.2. Conceptual Design
- 5.3.3. Mapping Conceptual to Logical
- 5.3.4. Pragmatic issues
- 5.3.5. Physical Design
- 5.3.6. Integrity and Correctness
- 5.3.7. Relational Algebra
- 5.3.8. Relational Calculus

5.4. Normalization
- 5.4.1. 1NF
- 5.4.2. 2NF
- 5.4.3. 3NF
- 5.4.4. BCNF
- 5.4.5. 4NF
- 5.4.6. 5NF
- 5.4.7. DKNF

5.5. Architecture of DBMS
- 5.5.1. Client-server, Open Architectures
- 5.5.2. Transaction Processing
- 5.5.3. Multi-User & Concurrency and
- 5.5.4. Backup & Recovery Database.

5.6. Basic Concept of major RDBMS products
- 5.6.1. Oracle
- 5.6.2. Sybase
- 5.6.3. DB2
- 5.6.4. SQL Server and
- 5.6.5. Other Databases
- 5.6.6. Database Design issues, Data Mining, Data Warehousing

6. Computer Organization and Architecture

6.1. Basic Computer Organization and Design
6.2. Machine Instructions and Addressing Modes
6.3. ALU and Data Path
6.4. CPU Control Design
6.5. Memory interface
6.6. I/O interface
6.7. Instruction Pipelining
6.8. Cache Memory and Mapping Techniques

6.9. Main Memory
6.10. Secondary Storage and
6.11. Microprocessor

7. Theory of Computation

7.1. Regular Languages and Finite Automata
7.2. Context Free Languages and Push-down Automata
7.3. Recursively Enumerable Sets and Turing Machines
7.4. Undecidability
7.5. Completeness

8. Computer Networks and Network Security

8.1. Network Definition, Network Models, Connectivity, Network Addressing
8.2. The Data Package, Establishing a Connection, Reliable Delivery, Network Connectivity, Noise Control, Building Codes, Connection Devices
8.3. ISO/OSI Model
8.4. LAN technologies (Ethernet, Token Ring)
8.5. Flow and Error Control Techniques
8.6. Routing Algorithms, Congestion Control
8.7. TCP/IP, UDP, Sockets
8.8. IP (v4), IP (v6),
8.9. Dynamic Host Configuration Protocol
8.10. Application Layer Protocols (ICMP, DNS, SMTP, POP, FTP, http)
8.11. Basic concepts of Hubs, Switches, Gateways, and Routers LAN
8.12. Protocols on a Network, IP Routing, IP Routing Tables, Router Discovery Protocols, Data Movement in a Routed Network, Virtual LANs (VLANS)
8.13. The WAN Environment, Wan Transmission Technologies, Wan Connectivity Devices, Voice Over Data Services
8.14. Internetworking, E-mail, Internet and Intranet, Extranet
8.15. Remote Networking: Remote Networking, Remote Access protocols, VPN Technologies.
8.16. Computer Security: Computer Virus, Worm, Trojan Horse.
8.17. Network Security: Introduction, Virus Protection, Local Security, Network Access, Internet Security.
    8.17.1. Encryption, Decryption, Asymmetric / Symmetric Algorithms
    8.17.2. RSA Algorithm,
    8.17.3. Firewalls, Proxies, Intrusion Detection and Protection System
    8.17.4. Security- Confidentiality, Integrity and Authentication
8.18. Disaster Recovery: The need for Disaster Recovery, Disaster Recovery plan, Data backup, Fault Tolerance.
8.19. Advanced Data Storage Techniques: Enterprise Data Storage, Clustering, Network Attached Storage, Storage Area Networks.
8.20. Network Troubleshooting: Using Systematic Approach to Troubleshooting.
8.21. Network Support Tools: Utilities, The Network Baseline.
8.22. Network Access Points (NAP), Common Network Component, Common Peripheral Ports.

9. System Analysis and Design

9.1. Defining the System, System Owner, System User, System Designers and system Builders, System Analysts, Variations on the System Analyst title, System life Cycle,
9.2. Requirement Analysis, System Design
9.3. JAD definition, JAD purpose, JAD Philosophy, JAD Scope
9.4. Entity Relationship Diagram, Data Flow Diagram, Software Development Life Cycles, MIS
9.5. Decision Support System, Software Engineering and User-Interface Design Considerations.
9.6. Context diagram, Top level DFD, Expansion Level DFD, Conversions of Data
9.7. Object -Oriented Concept, Object Structure, Object Feature, Class and Object

9.8. Association and Composition, Inheritance, Multiple Inheritances
9.9. Use Case Diagram, State Diagram, Event Flow Diagram

10. Software Engineering

10.1. Project Management & software project planning.
10.2. Software quality assurance & risk analysis.
10.3. Software Testing Techniques
10.4. Object Oriented software engineering
10.5. Client/Server software engineering
10.6. Web engineering
10.7. Re-engineering

11. E-Commerce Technology

11.1. Introduction to E-Commerce.
11.2. Electronic Commerce Strategies.
11.3. Electronic Commerce Security Issues.
11.4. Success Models of E-Governance.
11.5. E-Business: b2b, b2c, b2e, c2c, g2g, g2c.
11.6. Principles of Electronic Payment, Strategies & Systems.
11.7. E-Banking, EDI Methods, SWIFT.

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. Copyright Act, 2022 B.S.
12.5. Software Piracy, cyber crime
12.6. Nepali Unicode, Nepali Fonts
12.7. Licensing Issues

13. Instructional Skills and Classroom Management

- Learning Domains and learning styles
- Bloom's Taxonomy
- Be a professional Technical and Vocational Education and Training (TVET) Instructor
- Occupational Safety and Health

Program Evaluation

- Conduct a CIPP Evaluation
- Conduct Goal-Free Evaluations
- Kirkpatrick's Levels of Training Evaluation
- Tyler's Goal-Based Evaluation Approach

॥समाप्त ॥