नेपाल नागरिक उड्डयन प्राधिकरण

प्राविधिक सेवा, सूचना प्रविधि (आई.टी.) समूह, आठौं तह, उपप्रबन्धक पदको खुला/आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्रः– सेवा सम्बन्धी

खण्ड (क) - ५० अङ्क

1. Computer Architecture

1.1 Architecture, programming and I/O, computer structure and typical processor architecture, processing unit and controller design, hardware and micro program control

1.2 CPU and memory organization, buses, characteristics of I/O and storage devices, Instruction sets and addressing modes, assembly language programming, I/O and interrupt servicing

1.3 Multiple processor architectures, highly parallel machines, systolic arrays, neural networks, multitasking machines, real time systems, interconnection of multiple processor systems

1.4 Architectures for specialized purposes, array processors, vector processors, and virtual machines

1.5 Very large scale integrated circuits

1.6 Simplified design rules, static and dynamic logic, multiphase clocking, memory elements and memory structures, gate arrays and standard cell technology; placement and routing, programmable logic devices

2. Digital Communications

2.1. Data communications including signals, modulation and reception, Error detecting and correcting codes, Circuit and Packet Switching

2.2. Multiplexing, including time, frequency and code division multiplexing

2.3. Digital networks: ADSL, Wi-Fi, ISDN, frame relay, ATM, MPLS

2.4. Protocols: ISO/OSI reference model X.25

2.5. Internetworking and router-based networks: TCP/IP suite of protocols, routing and flow control, Internet addressing ad domain names

2.6. Local Area Networks, Topologies, Access Schemes, Medium Access and Logic

3. Computer Network

3.1. Protocol stack, switching

3.2. Link Layer : services, error detection and correction, multiple access protocols, LAN addressing and Address Resolution Protocol (ARP), Ethernet, CSMA/CD multiple access protocol, hubs, bridges and switches, Wireless LANs, Point to Point Protocol (PPP), wide area protocols

3.3. Network Layer : services, datagram and virtual circuits, routing principles and algorithms, Internet Protocol (IP), IP addressing, IP transport, fragmentation and assembly, Internet Control Message Protocol (ICMP), Routing on the Internet, Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Router Internals, IPv6

3.4. Transport Layer : Principles, multiplexing and demultiplexing, UDP, TCP, flow control, principles of congestion control, TCP congestion control

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

3.6. Distributed System Clusters

4. Distributed Systems

4.1 Characteristics of distributed systems, Fundamental concepts and mechanisms

4.2 Networked vs. centralized systems

4.3 Client Server Systems

4.4 Process synchronization and inter process communications

4.5 Principles of fault tolerance

4.6 Transaction processing techniques
4.7 Distributed file systems
4.8 Operating systems for distributed architectures

5. Operating Systems

5.1 Processes and Threads: Symmetric Multiprocessing, Micro-kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock
5.2 Scheduling
5.3 Memory Management
5.4 Input Output and Files: I/O devices and its organization, Principles of I/O software and hardware, Disks, Files and directories organization, File System Implementation
5.5 Distributed Systems: Distributed Message passing, RPC, Client/Server Computing Clusters
5.6 Security: Authentication and Access Authorization, System Flaws and Attacks, Trusted system

6 Cryptography and Network Security

6.1 Introduction to Cryptography: Security Attacks, Conventional Encryption Model, Simplified DES, Block Cypher Principle
6.2 Principles of Public Key, Crypto Systems: RSA algorithm, Diffie-Hellman Key exchange, Number Theory – Prime and Relatively Prime Numbers
6.3 Message Authentication and Hash Function
6.4 Digital Signature and authentication Protocols: Digital Signatures, Digital Signature Standards, Authentication protocols
6.5 Network Security: Authentication Applications – Kerberos, Electronic Mail Security
6.6 Web Security: Web Security Requirements, Secure Sockets Layers and Transport Layer Security, Secure Electronic Transaction
6.7 Intruders and Viruses Related Threats
6.8 Firewall Design Principles
6.9 Introduction to Trusted Systems

खण्ड (ख) - ५० अङ्क

7 Software Engineering

7.1 Software Process: The software lifecycle models, risk-driven approaches
7.2 Software Project Management: Relationship to lifecycle, project organization, project planning, project cost models, procurement management, project implementation, project control, risk management, configuration management, version control, quality assurance metrics
7.3 Software Requirements: Requirements analysis, requirements solicitation, analyses tools, requirements definition, requirements specification, static and dynamic specifications, requirements review
7.4 Software Design: Design for reuse, design for change, design notations, design evaluation and validation.
7.5 Implementation: Programming standards and procedures, modularity, data abstraction, static analysis, unit testing, integration testing, regression testing, tools for testing, fault tolerance
7.6 Maintenance: The maintenance problem, the nature of maintenance, planning for maintenance
7.7 Software Engineering Issues: Formal methods, tools and environments for software engineering, software reengineering, role of programming paradigm, process maturity and Improvement, ISO standards, SEI-CMM, CASE tools

8 Database Management System and File System

8.1 Introduction: hierarchical, network and relational databases; data organization, properties of database, data models, Relational model, ER model
8.2 Relational query languages: relational algebra and calculus
8.3 Relational database design: data normalization, SQL, Functional dependency, data description languages, data manipulation languages, data creation languages, query facilities, data integrity and reliability, concurrency
8.4 Transaction Management and Concurrency Control: Concurrent execution of the user programs, transactions, Concurrency control techniques
8.5 Crash Recovery: Types of failure, Recovery techniques
8.6 Query Processing and Optimization
8.7 Indexing: Hash based indexing, Tree based indexing
8.8 Distributed Database Systems and Object-Oriented Database System
8.9 Security System Management
8.10 File organization: sequential indexed and direct access, multiple key and hashing
8.11 File processing: records, files, compaction, Sorting, merging and updating files

9 Client Server Computing

9.1 Client server computing concepts: Building blocks, the state of client server infrastructure
9.2 SQL database services: fundamentals of database servers, functions, procedures, triggers and rules
9.3 SQL middleware basics: SQL API, Open SQL Gateway
9.4 Data Warehouses and Data Mining
9.5 Client Server Transaction Processing: Transaction Concepts, Transaction Models, Transaction Processing Monitors, Transaction Management Standards

10 Internet Programming

10.1 Common Gateway Interface (CGI) application, input to CGI: environmental variables, accessing from input, output from CGI: CGI and response headers, Forms and CGI: Sending data to the server using HTML tags and Executing External Program and Executing external program ad CGI program
10.2 Hypermedia Documents: Creating dynamic pages using CGI, PHP
10.3 JAVA evolution, and JAVA features, Difference between JAVA and C / C++
10.4 JAVA program structure, JAVA statements, JAVA virtual machine – Introduction and implementation basics

11 Management Information Systems

11.1 Organizations and Information Systems
11.2 How information system impact organizations and business firms
11.3 The impact of IT on management decision making
11.4 Organization and Information: Classification and value, Information requirements
11.5 Development and Implementation of MIS
11.6 Management of quality in MIS
11.7 Decision support systems

12 Recent Trends and Technologies

12.1 Artificial Intelligence
12.2 Digital governance: concepts, models and services, e-government
12.3 E-commerce: concepts, models, technology behind e-commerce,
12.4 E-payment and e-transaction, ATM, Point to Sales etc.

12.5 Geographical Information System (GIS)
12.6 Advanced data storage techniques: Enterprise data storage, clustering, network attached storage (NAS), storage area networks (SAN)
12.7 Cloud Computing
12.8 Big data analytics
12.9 Blockchain technology

द्वितीय पत्रबाट निम्नानुसार प्रश्न सोधिनेछ :

द्वितीय पत्र (विषयगत)				
विषय	**खण्ड**	**अङ्कभार**	**तर्कयुक्त विश्लेषणात्मक प्रश्न**	**समस्या समाधानमूलक प्रश्न**
सेवा सम्बन्धी	**(क)**	५०	३ प्रश्न X १० अङ्क = ३०	१ प्रश्न X २० अङ्क = २०
	(ख)	५०	३ प्रश्न X १० अङ्क = ३०	१ प्रश्न X २० अङ्क = २०
जम्मा		**१००**	६ प्रश्न X १० अङ्क = ६०	२ प्रश्न X २० अङ्क = ४०