राष्ट्रिय जीवन बीमा कम्पनी लिमिटेड

प्राविधिक सेवा, सूचना प्रविधि समूह, तह ७, नायब व्यवस्थापक पदको आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

द्वितीय पत्र (Paper II)

सेवा सम्बन्धी (Service Related)

खण्ड (A) - ७० अङ्क

(७ प्रश्न × १० अङ्क)

1. **Computer Organization and Architecture**
   - 1.1. Advanced Digital System Structures, Sequential and Combinational Logic Design, State Machine Modeling Using State Tables and State Diagrams
   - 1.2. Comparative Study of Von Neumann and Harvard Architectures; Performance and Security Implications
   - 1.3. Reduced Instruction Set Computer (RISC) Vs Complex Instruction Set Computer (CISC) Architectures with Pipeline and Instruction-Level Parallelism Concepts.
   - 1.4. Advanced Addressing Methods, Instruction Execution Models, Bus Architectures and Control Signals
   - 1.5. Processing Units: Complex Instruction Formats, Arithmetic–Logic and Floating-Point Operations, Addressing Modes
   - 1.6. Input/Output (I/O) Organization: Interrupt-Driven I/O, Direct Memory Access (DMA) Architectures, Memory-Mapped I/O and Performance Optimization
   - 1.7. Arithmetic and Logic Units: Signed/Unsigned Arithmetic, Overflow Handling and Optimization Techniques
   - 1.8. Memory Systems: Cache Memory, Virtual Memory, Paging, Segmentation and Memory Hierarchy Optimization

2. **Design and Analysis of Algorithms**
   - 2.1. Abstract Data Types (ADT) and Rigorous Time–Space Complexity Analysis.
   - 2.2. Asymptotic Notations: Big-O, Big-Theta and Big-Omega with Formal Proofs.
   - 2.3. Linear Data Structures and Their Performance Trade-Offs
   - 2.4. Advanced Tree Structures: Balanced Trees, Adelson-Velsky and Landis (AVL) Trees, 2–3 Trees, Red-Black Trees
   - 2.5. Algorithm Design Paradigms: Greedy Strategies, Divide-and-Conquer, Dynamic Programming, Backtracking and Recursion
   - 2.6. Hashing Techniques: Hash Functions, Collision Resolution and Performance Evaluation
   - 2.7. Graph Algorithms: Traversal, Shortest Path, Minimum Spanning Trees and Basic Network Flow Concepts
   - 2.8. Sorting Algorithms: Internal and External Sorting with Complexity Comparison

3. **Artificial Intelligence**
   - 3.1. Informed and Uninformed Search Strategies and Heuristic Design
   - 3.2. Natural Language Processing: Syntactic and Semantic Analysis, Language Models
   - 3.3. Game Playing: Adversarial Search, Minimax and Alpha–Beta Pruning
   - 3.4. Machine Learning Fundamentals: Supervised, Unsupervised and Reinforcement Learning
   - 3.5. Automated Reasoning: Logic-Based Inference and Knowledge Representation.
   - 3.6. Planning Systems: Classical Planning, Constraint-Based Planning
   - 3.7. Computer Vision and Robotics: Perception, Motion Planning and Intelligent Agents
4. **Software Engineering Principles**

4.1. Advanced Software Process Models and Risk-Driven Development
4.2. Software Project Management: Estimation, Scheduling, Configuration Management and Metrics
4.3. Requirements Engineering: Elicitation, Specification, Validation and Traceability
4.4. Software Design: Architectural Patterns, Modularity, Reuse and Design Validation
4.5. Implementation and Testing: Coding Standards, Unit, Integration and System Testing
4.6. Maintenance Strategies and Evolution of Large-Scale Software Systems
4.7. Software Engineering Standards, Computer Added Software Engineering (CASE) Tools, Formal Methods and Process Improvement Models

5. Operating Systems

5.1. Advanced Process and Thread Management, Synchronization and Deadlock Handling
5.2. Central Processing Unit (CPU) Scheduling Algorithms and Performance Evaluation
5.3. Memory Management: Paging, Segmentation and Virtual Memory
5.4. Input/Output (I/O) Systems and File Systems: Implementation, Reliability and Performance
5.5. Distributed Systems: Remote Procedure Call (RPC), Client–Server Models, Clustering
5.6. Operating System Security: Authentication, Authorization, Trusted Systems

6. Information Security

6.1. Information Security Objectives Based on Confidentiality, Integrity and Availability (CIA Triad)
6.2. Cyber Threat Landscape: Cybercrime, Cyber Warfare, Cyber Terrorism, Espionage and Emerging Threats
6.3. Vulnerabilities: Insecure Software, Misconfigurations, Weak Authentication and Human Factors
6.4. Security Safeguards: Access Control, Auditing, Authentication, Biometrics, Cryptography, Firewalls, Intrusion Detection System/ Intrusion Prevention System (IDS/IPS), Ethical Hacking, (Denial of Service) DoS Mitigation, Security Policies and Risk Management

7. Database Systems

7.1. Advanced Relational and Entity-Relationship (ER) Modeling, Structured Query Language (SQL) Optimization and Functional Dependency Analysis
7.2. Transaction Processing and Concurrency Control Mechanisms
7.3. Crash Recovery Techniques and Logging Mechanisms
7.4. Query Processing and Optimization Strategies
7.5. Indexing Methods: Hash-Based and Tree-Based Structures
7.6. Database Security, Backup and Recovery Planning
7.7. Data Mining Concepts and Data Warehousing Architectures
7.8. Distributed and Object-Oriented Database Systems
7.9. Big Data: Introduction, Architecture, NoSQL Databases, Security, Privacy and Governance, Cloud-Based Big Data Platforms, Real-Time Data Processing, Applications and Use Cases of Big Data

8. Computer Networks

8.1. Advanced Protocol Stack Analysis and Switching Technologies
8.2. Data Link Layer Protocols, Error Control, Virtual Local Area Network (VLAN) and Wireless Standards

8.3. Network Layer: Internet Protocol (IP) Addressing, (Internet Protocol Version 6) IPv6, Routing Protocols, Multiprotocol Level Switching (MPLS) and (Quality of Service) QoS
8.4. Transport Layer: Transmission Control Protocol/User Datagram Protocol (TCP/UDP) Internals, Congestion Control and Transport Security
8.5. Application Layer Protocols, DNS and Content Delivery Mechanisms

9. E-Commerce Technology

9.1. Advanced Electronic Commerce Architectures and Platforms
9.2. Strategic and Operational Aspects of E-Commerce
9.3. Security Issues in E-Commerce and Online Transaction Protection
9.4. E-Governance Models and Digital Service Delivery
9.1. E-Business Interaction Models: Business to Business (B2B), Business to Customer (B2C), Business to Employee (B2E), Customer to Customer (C2C), Government to Government (G2G), and Government to Customer (G2C)
9.5. Electronic Payment Systems, Encryption and Secure Communication Protocols

10. Structured and Object-Oriented Programming

10.1. Advanced Data Types and Abstract Data Types (ADT)
10.2. Control Structures, Procedures and Modular Programming
10.3. Object-Oriented Principles: Encapsulation, Inheritance, Polymorphism and Composition
10.4. Design Patterns, Frameworks and Reusable Software Components

11. Emerging Technologies

11.1 Block Chain: Concept, Architecture, Consensus Mechanisms, Smart Contracts, Security, Benefits, Challenges, and Applications
11.2 Big Data: Concept, Characteristics (Volume, Velocity, Variety, Veracity, Value), Processing Frameworks, Not Only Structured Query Language (NoSQL), Security, Privacy, Governance, and Applications
11.3 Cloud Computing: Concept, Service and Deployment Models, Virtualization, Cloud Security, Scalability, Benefits, and Enterprise Applications
11.4 Cryptocurrency: Concept, Block Chain Linkage, Mining, Wallets, Security, Risks, Regulatory Aspects, And Applications
11.5 Edge Computing and Grid Computing: Concepts, Architecture, Advantages, Limitations, and Applications
11.6 Internet of Things (IoT): Architecture, Communication Protocols, Security, and Applications
11.7 Artificial Intelligence and Machine Learning: Concepts, Learning Techniques, Generative Artificial Intelligence (AI), Applications, Challenges, and Ethics
11.8 Cybersecurity: Zero Trust, IAM, Threat Intelligence, Privacy, Compliance, and Emerging Security Technologies

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खण्ड (B) - ३० अङ्क

(३ प्रश्न × १० अङ्क)

12. <u>सम्बन्धित कानूनी व्यवस्था (Relevant Legal Provisions)</u>

12.1. नेपालको संविधान: भाग १,३,४ र अनुसूची (Constitution of Nepal: Part १, २, ४ and Schedules)

12.2. बीमा ऐन, २०७९ र बीमा नियमावली, २०८१ (Insurance Act, 2079 and Insurance Regulations, 2081)

12.3. राष्ट्रिय जीवन बीमा कम्पनी लिमिटेडको प्रबन्धपत्र, नियमावली (Memorandum of Association and Articles of Association of Rastriya Jeewan Beema Company Limited)

12.4. राष्ट्रिय जीवन बीमा कम्पनी लिमिटेड कर्मचारी सेवा, शर्त तथा सुविधा सम्बन्धी विनियमावली (Employee Service, Conditions, and Facilities Bylaw, 2082 of Rastriya Jeewan Beema Company Limited)

12.5. विद्युतीय (इलेक्ट्रोनिक) कारोबार ऐन,२०६३ (Electronic Transactions Act, 2063)

12.6. सूचना तथा सञ्चार प्रविधि नीति, २०७२ (Information Technology Policy, 2015)

12.7. सम्पत्ति शुद्धीकरण (मनी लाउन्डरिङ) निवारण ऐन, २०६४ {Asset (Money) Laundering Prevention Act, 2008}

12.8. बीमकको सूचना प्रविधि मार्गदर्शन, २०७६ (Information Technology Guidelines for Insurers, 2019)

12.9. डिजिटल बीमा नीति मार्गदर्शन, २०८१ (Digital Insurance Policy Guideline, 2024)

12.10. भ्रष्टाचार निवारण ऐन, २०५९ (The Prevention of Corruption Act, 2059)

12.11. सुशासन (व्यवस्थापन तथा सञ्चालन) ऐन, २०६४ {Good Governance (Management and Operation) Act, 2064}

12.12. सार्वजनिक खरिद ऐन, २०६३ र सार्वजनिक खरिद नियमावली, २०६४ (Public Procurement Act, 2063 and Public Procurement Regulation, 2064)