

राष्ट्रिय बिमा कम्पनी लिमिटेड
सूचना प्रविधि अधिकृत (तह ६) पदको खुला तथा आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :- लिखित परीक्षा (Written Examination)

पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता (Interview)

पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण : लिखित परीक्षा (Written Examination)

पूर्णाङ्क :- २००

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या × अङ्क	समय
प्रथम	सेवा सम्बन्धित कार्य- ज्ञान (Job Based - knowledge)	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × २ अङ्क	४५ मिनेट
द्वितीय		१००	४०	विषयगत (Subjective)		१० प्रश्न × १० अङ्क	३ घण्टा

द्वितीय चरण : अन्तर्वार्ता

पत्र / विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली	समय
अन्तर्वार्ता (Interview)	३०		बोर्ड अन्तर्वार्ता (Board Interview)	-

द्रष्टव्य :

- यो पाठ्यक्रमको योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई भागमा विभाजन गरिएको छ ।
- लिखित परीक्षाको प्रश्नपत्रको माध्यम भाषा पाठ्यक्रमको विषयवस्तु जुन भाषामा दिइएको छ सोही भाषाको आधारमा नेपाली वा अंग्रेजी मध्ये कुनै एक मात्र भाषा हुनेछ । तर विषयवस्तुलाई स्पष्ट गर्नुपर्ने अवस्थामा दुवै भाषा समेत प्रयोग सकिने छ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ । तर एकैदिनमा परीक्षा लिइनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको 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 ।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षरहरू (Capital letters): A, B, C, D मा लेख्नुपर्नेछ । सानो अक्षरहरू (Small letters): a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- परीक्षामा परीक्षार्थीले मोबाइल वा यस्तै प्रकारका विद्युतीय उपकरण परीक्षा हलमा लैजान पाइने छैन ।
- विषयगत प्रश्नहरूको हकमा तोकिएको अंकको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- विषयगत प्रश्न हुनेका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोहीखण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र/विषयमा दिइए अनुसार हुनेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागु भएका माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागू मिति : -**

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प्रथम पत्र (Paper I)

1. Digital Design and Computer Architecture

1.1. Digital Design

- 1.1.1. Digital and Analog Systems
- 1.1.2. Number Systems
- 1.1.3. Logic Elements
- 1.1.4. Combinational Logic Circuits
- 1.1.5. Sequential Logic
- 1.1.6. Arithmetic Circuits
- 1.1.7. MSI Logic Circuits
- 1.1.8. Counters and Registers
- 1.1.9. IC logic families
- 1.1.10. Interfacing with Analog Devices
- 1.1.11. Memory Devices

1.2. Computer Architecture

- 1.2.1. Basic Structures : sequential circuits, design procedure, state table and state diagram, Von Neumann / Harvard architecture, RISC/CISC architecture
- 1.2.2. Addressing Methods and Programs, representation of data, arithmetic operations, basic operational concepts, bus structures, instruction cycle and excitation cycle
- 1.2.3. Processing Unit: instruction formats, arithmetic and logical instruction
- 1.2.4. Addressing modes
- 1.2.5. Input Output Organization : I/O programming , memory mapped I/O, basic interrupt system, Direct Memory Access (DMA)
- 1.2.6. Arithmetic Operations
- 1.2.7. Memory Systems

2. Operating System

- 2.1. Processes and Threads: Symmetric Multiprocessing, Micro-kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock
- 2.2. Scheduling
- 2.3. Memory Management
- 2.4. 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
- 2.5. Distributed Systems: Distributed Message passing, RPC, Client/Server Computing, Clusters
- 2.6. Security : Authentication and Access Authorization, System Flaws and Attacks, Trusted system

3. Computer Networks

- 3.1. Protocol stack, OSI and TCP/IP models
- 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 areaprotocols

- 3.3. Network Layer :services, datagram and virtual circuits, routing principles and algorithms, Internet Protocol (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 demultiplexing, UDP, TCP, flow control, principles of congestion control, TCP congestion control
- 3.5. Application Layer : Web and Web caching, FTP (File Transfer Protocol), Electronic mail, DNS (Domain Name Service), socket programming

4. Structured and Object-Oriented Programming

- 4.1. Concept of Procedural Programming, Structural Programming, Object-Oriented Programming
- 4.2. Data types, Abstract Data Types (ADT)
- 4.3. Operators, variables and assignments
- 4.4. Control structures
- 4.5. Procedure/function
- 4.6. Class definitions, encapsulation, inheritance, object composition, polymorphism
- 4.7. Concept of C programming, C++ Programming

5. Database Management System

- 5.1. The relational model, ER model
- 5.2. Structured Query Language (SQL)
- 5.3. Functional dependency, normalization and relational database design,
- 5.4. Transaction Management and Concurrency Control: Concurrent execution of the user programs, transactions, Concurrency control techniques
- 5.5. Crash Recovery : types of failure, Recovery techniques
- 5.6. Query Processing and Optimization
- 5.7. Indexing : Hash based indexing, Tree based indexing
- 5.8. Distributed Database Systems and Object oriented database system
- 5.9. Data Mining and Data Warehousing
- 5.10. Database Security

6. Software Engineering

- 6.1. Software process: The software lifecycle models, risk-driven approaches
- 6.2. Software project management: Relationship to lifecycle, project planning, project control, project organization, risk management, cost models, configuration management, version control, quality assurance, metrics
- 6.3. Software requirements: Requirements analysis, requirements solicitation, analysis tools, requirements definition, requirements specification, static and dynamic specifications, requirements review, feasibility analysis
- 6.4. Software design: Design for reuse and with reuse, design for change, design notations, design evaluation and validation

- 6.5. Implementation: Programming standards and procedures, modularity, data abstraction, static analysis, unit testing, integration testing, regression testing, tools for testing, fault tolerance
- 6.6. Maintenance: The maintenance problem, the nature of maintenance, planning for maintenance
- 6.7. SE issues: Formal methods, tools and environments for software engineering, role of programming paradigm, process maturity and Improvement, ISO standards, SEI-CMM, CASE tools

7. MIS, Web Engineering, and E-Commerce

7.1. MIS and Web Engineering

- 7.1.1. Information Systems and Decision Making; Knowledge Management.
- 7.1.2. The strategic use of Information Technology; Work Process Redesign (Reengineering) with Information Technology; Enterprise Resources Planning Systems
- 7.1.3. Information Systems Security, Information Privacy, and Global Information Technology issues
- 7.1.4. Introduction to Web Technology: Internet, Intranet, WWW, Static and Dynamic Web Page; Web Clients; Web Servers; Client Server Architecture: Single Tier, Two-Tier, Multi-Tier; HTTP: HTTP Request and Response; URL, Client Side Scripting, Server Side Scripting, Web 2.0
- 7.1.5. Hyper Text Markup Language: Introduction to HTML; Elements of HTML Document; HTML Elements and HTML Attributes, Headings, Paragraph, Division, Formatting; Image element; Anchors; Lists; Tables; Frames; Forms
- 7.1.6. Client Side Scripting with JavaScript
- 7.1.7. Basics of AJAX; Introduction to XML and its Application

7.2. E-Commerce

- 7.2.1. Introduction to E-Commerce. Business models of E-Commerce.
- 7.2.2. Business applications of E-Commerce. B2B E-Commerce and EDI.
- 7.2.3. Electronic payment system.
- 7.2.4. Security issues of E-Commerce.
- 7.2.5. Encryption and decryption methods.
- 7.2.6. PKI and digital signature.

8. Data Structure and Algorithms

- 8.1. General concepts : Abstract data Type, Time and space analysis of algorithms, Big oh and theta notations, Average, best and worst case analysis
- 8.2. Linear data structures
- 8.3. 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
- 8.4. Algorithm design techniques: Greedy methods, Priority queue search, Exhaustive search, Divide and conquer, Dynamic programming, Recursion
- 8.5. Hashing
- 8.6. Graphs and digraphs

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8.7. Sorting

9. Artificial Intelligence and Advanced Topics in IT

9.1. Artificial Intelligence

9.1.1. Search: Uninformed search techniques- depth first search, breadth first search, depth limit search, and search strategy comparison; Informed search techniques-hill climbing, best first search, greedy search

9.1.2. Learning: Supervised Learning; Unsupervised Learning; Semi-supervised Learning; Reinforcement Learning; Neural Networks; Support Vector Machine (SVM); Self Organizing Map (SOM); Genetic Algorithms; Clustering; Decision Trees.

9.1.3. Automated reasoning: FOPL; Knowledge Representation Languages. Basic Concepts of Natural Language Processing (NLP)

9.1.4. Game Playing

9.2. Advanced Topics in IT

9.2.1. Parallel and distributed computing

9.2.2. High speed networks

9.2.3. Software Architecture

9.2.4. Cryptography and network security

9.2.5. Software Project Management

9.2.6. Cloud Computing

9.2.7. Big Data Analytics

9.2.8. Internet of Things (IoT)

9.2.9. Machine Learning

10. Related Legislation and Institutions

10.1. ICT Policy, 2072

10.2. Electronic Transaction Act, 2063

10.3. Roles of IT related Institutions:

10.3.1. Ministry of Communication and Information Technology

10.3.2. Department of Information technology

10.3.3. National Information Technology Center / Government Integrated Data Center

10.4. Rastriya Beema Company Limited Prabandhapatra, 2071

10.5. Rastriya Beema Company Limited Niyamawali, 2071

यस पत्र/विषयको पाठ्यक्रमबाट यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

इकाई	१	२	३	४	५	६	७	८	९	१०	जम्मा
प्रश्न संख्या	५	५	५	५	५	५	५	५	५	५	५० प्रश्न

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द्वितीय पत्र (Paper II): Technical Subject

Section A (50 Marks)

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protocol, Hubs, Bridges, and Switches, Wireless LANs, PPP (Point to Point Protocol), Wide area protocols

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7.2.7. PKI and digital signature.

7.2.8. Encryption and decryption methods.

8. Theory of Computation

8.1. Theory of Computation

8.1.1. DFA and N DFA, regular expressions, regular grammars

8.1.2. CFGs, Parsing and ambiguity, Pushdown automata, NPDAs & CFGs

8.1.3. Turing machines

8.1.4. Recursively enumerable languages Unrestricted grammars

8.1.5. The Chomsky hierarchy, Undecidable problems, Church's Thesis

8.1.6. Complexity Theory, P and NP

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10.2. Advanced Topics in IT

- 10.2.1. Parallel and distributed computing
- 10.2.2. High speed networks
- 10.2.3. Software Architecture
- 10.2.4. Cryptography and network security
- 10.2.5. Software Project Management
- 10.2.6. Cloud Computing
- 10.2.7. Big Data Analytics
- 10.2.8. Internet of Things (IoT)
- 10.2.9. Machine Learning

Note: Questions should be asked from all units.

द्वितीय पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

पत्र	विषय	खण्ड	अङ्कभार	लामो उत्तर
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job Based-Knowledge)	(A)	५०	५ प्रश्न × १० अङ्क = ५० अङ्क
		(B)	५०	५ प्रश्न × १० अङ्क = ५० अङ्क

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