काठमाडौंउपत्यकाखानेपानीलिमिटेड

प्राबिधिक सेवा, सूचनाप्रबिधि समूह, ७ तह,इन्जिनियर पदको खुल्ला तथा समाबेशी र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रुपरेखा :– यस पाठ्यक्रमको आधारमानिम्नानुसार दुई चरणमा परीक्षालिइने छ :

प्रथम चरण :– लिखित परीक्षा   पूर्णाङ्क :– २००

द्वितीय चरण :– अन्तर्वार्ता   पूर्णाङ्क :– ३०

प्रथम चरण – लिखित परीक्षायोजना(Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्याXअङ्कभार	समय
प्रथम	कम्प्युटर इन्जिनियरिङ्ग	१००	४०	वस्तुगतबहुउत्तर (Multiple Choice)	१००X१ = १००	१ घण्टा १५मिनेट
द्वितीय		१००	४०	विषयगत (Subjective)	५x१० = ५० १०x५ = ५०	३ घण्टा

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगतअन्तर्वार्ता	३०	मौखिक

१.लिखित परीक्षाको माध्यमभाषा नेपालीवाअंग्रेजीअथवा नेपाली र अंग्रेजीदुवै हुन सक्नेछ ।

२.पाठ्यक्रमको प्रथम र द्वितीयपत्रको विषयवस्तु एउटै हुनेछ ।

३. प्रथम र द्वितीयपत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

४ प्रथमपत्रमावस्तुगतबहुउत्तर ९:गतिष्ठभि ऋजयष्ठअभ०प्रश्नहरुको उत्तर सहीदिएमाप्रत्येक सहीउत्तर बापत १ (एक) अङ्कप्रदानगरिनेछ भने गलतउत्तर दिएमाप्रत्येकगलतउत्तर बापत २० प्रतिशतअर्थात् ०.२ अङ्ककट्टागरिनेछ । तर उत्तर नदिएमा त्यस बापतअङ्कदिइने छैन र अङ्ककट्टापनिगरिने छैन ।

५प्रथमपत्रका पाठ्यक्रमकाएकाईहरुबाट सोधिने प्रश्नहरुको संख्यानिम्नानुसार हुनेछ । द्वितीयपत्रको पाठ्यक्रमकाएकाईहरुबाट सोधिने प्रश्नहरुको संख्याद्वितीयपत्रको पाठ्यक्रमउल्लेख भएअनुसार हुनेछ ।

प्रथमपत्रकाएकाई	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
प्रश्न संख्या	8	4		5	6	7	6	6	6	6	6	6	6	6	6	6	5	5

६ द्वितीयपत्रको विषयगतप्रश्नकालागि १० अङ्का५ ओटा लामो प्रश्नर५अङ्का१० ओटा छोटो प्रश्नसोधीने छन ।

द्वितीयपत्रको पाठ्यक्रमलाई ४ वटा खण्ड/एकाईमाविभाजनगरिएको छ । ४ वटा खण्ड/एकाईको लागि ४ वटै उत्तरपुस्तिकादिईनेछ र परिक्षार्थीले प्रत्येक खण्ड/एकाईका प्रश्नहरुको उत्तर सोही खण्ड/एकाईको उत्तर पुस्तिकामा लेख्नु पर्नेछ

७यस पाठ्यक्रममा जेसुकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मितिभन्दा ३ (तीन) महिना अगाडि (संशोधनभएकावा संशोधनभई हटाइएका वाथप गरी संशोधनभई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ ।

८ प्रथम चरणको लिखित परीक्षाबाट छनौट भएकाउम्मेदवारहरुलाई मात्रद्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

९ यस भन्दा अगाडि लागू भएको माथिउल्लिखित समूहको पाठ्यक्रमखारेज गरिएको छ ।

१० पाठ्यक्रमलागू मिति :– २०७४ आश्विनदेखि

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प्रथम र द्वितीयपत्र :– कम्प्युटर इञ्जिनियरिङ्ग सम्वन्धीविषय

Section A:(10x2=20 and 5x2=10)

1. Basic Electrical & Electronics
1.1 Electrical
    1.1.1 Basic Circuit Theory
    1.1.2 AC circuit Fundamentals
    1.1.3 Magnetic circuits and Transformers
    1.1.4 Transient Analysis, Filters
1.2 Electronics
    1.2.1 Semiconductors, Diodes and Diode Circuits, Transistors,
    1.2.2 Transistor modeling
    1.2.3 Biasing and Amplification
    1.2.4 Small Signal amplifiers and frequency response
    1.2.5 Large signal amplifiers, feedback amplifiers and Oscillators
    1.2.6 Operational amplifiers

2. Principles of Communications
2.1 Block Diagram of analog/ digital communication system
2.2 Analog and Digital modulation techniques
2.3 Fundamentals of Error Detection and Correction
2.4 Performance evaluation of analog and digital communication systems: SNR and BER

3. Digital Logic
3.1 Digital and Analog Systems. Number Systems.
3.2 Logic Elements
3.3 Combinational Logic Circuits
3.4 Sequential Logic
3.5 Arithmetic Circuits
3.6 MSI Logic circuits
3.7 Counters and Registers
3.8 IC logic families
3.9 Interfacing with Analog Devices
3.10 Memory Devices

काठमाडौंउपत्यकाखानेपानीलिमिटेड

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4. Computer Architecture & organization and micro-processors

4.1 Basic Structures : sequential circuits, design procedure, state table and state diagram, von Neumann, Harvard architecture, RISC/CISC architecture

4.2 Addressing Methods and Programs, representation of data, arithmetic operations, basic operational concepts, bus structures, instruction, cycle and excitation cycle.

4.3 Processing Unit: instruction formats, arithmetic and logical instruction.

4.4 Addressing modes

4.5 Input Output Organization : I/O programming , memory mapped I/O, basic interrupt system, DMA

4.6 808X and Intel microprocessors: programming and interfacing

5. Computer Networks

5.1 Protocol stack, switching 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

5.2 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)

5.3 Transport Layer: principles, multiplexing and demultiplexing, UDP, TCP, flow control, principles of congestion control, TCP congestion control

5.4 Application Layer : Web and Web caching, FTP (File Transfer Protocol), Electronic mail, DNS (Domain Name Service), socket programming)

5.5 Distributed system, Clusters

Section B: (10x2=20 and 5x2=10)
6. Structured and object oriented programming

6.1 Data types, ADT

6.2 Operators, variables and assignments, control structures

6.3 Procedure/function

6.4 Class definitions, encapsulation, inheritance, object composition, Polymorphism

6.5 Pattern and framework

काठमाडौंउपत्यकाखानेपानीलिमिटेड

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7. Data structures

7.1 General concepts : Abstract data Type, Time and space analysis of algorithms, Big oh and theta notations, Average, best and worst case analysis

7.2 Linear data structures

7.3 Trees: General and binary trees, Representations and traversals, Binary search trees, balancing trees, AVL trees, 2-3 trees, red-black trees, selfadjusting trees, Splay Trees

7.4 Algorithm design techniques: Greedy methods, Priority queue search, Exhaustive search, Divide and conquer, Dynamic programming, Recursion

7.5 Hashing

7.6 Graphs and digraphs

7.7 Sorting

8. Software Engineering principles(System analysis & design)

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.

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: The maintenance problem, the 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

9.1 Introduction : The relational model, ER model , SQL and it's uses, Functional dependency and relational database design, File structure

9.2 Transaction Management and Concurrency Control: Concurrent execution of the user programs, transactions, Concurrency control techniques

9.3 Crash Recovery : types of failure, Recovery techniques

काठमाडौंउपत्यकाखानेपानीलिमिटेड

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9.4   Query Processing and Optimization
9.5   Indexing : Hash based indexing, Tree based indexing
9.6   Distributed Database Systems and Object oriented database system
9.7   Data Mining and Data Warehousing
9.8   Security Management System

10.   Operating System
10.1   Processes and Threads: Symmetric Multiprocessing, Micro-kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock.
10.2   Scheduling
10.3   Memory Management
10.4   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.
10.5   Distributed Systems: Distributed Message passing, RPC, Client/Server Computing, Clusters.
10.6   Security : Authentication and Access Authorization, System Flaws and Attacks,   Trusted system

Section C: (10x1=10 and 5x4=20)

11.   Artificial Intelligence
11.1   Knowledege and learning
11.2   Searching and Game Playing
11.3   Machine Learning
11.4   Artificial Neural Networks
11.5   Expert Sytem
11.6   Natural Language Processing
11.7   Robotics and Computer Vision

12.   Theory of Computation
12.1   BNF, Languages, grammars
12.2   DFA and NDFA, regular expressions, regular grammars
12.3   Closure, homomorphism
12.4   Pigeonhole principle, pumping lemma
12.5   CFGs, Parsing and ambiguity, Pushdown automata, NPDAs & CFGs
12.6   Pumping lemma
12.7   Turing machines

काठमाडौंउपत्यकाखानेपानीलिमिटेड

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12.8 Recursively enumerable languages Unrestricted grammars

12.9 The Chomsky hierarchy, Undecidable problems, Church's Thesis

12.10 Complexity Theory, P and NP

13.   Compiler design

13.1 The Structure of a Compiler

13.2 Lexical Analyzer

13.3   Top down Parsing/ Bottom up Parsing

13.4 Syntax Directed Translation

13.5 Types and Type Checking

13.6 Run-Time Storage Administration

13.7 Intermediate Code generation

13.8 Data-Flow Analysis and Code Optimizations

13.9 Architecture and recent development on compilers

14.   Computer Graphics

14.1 Graphics concepts

14.2 Input devices and techniques

14.3 Basic raster graphics algorithms and primitives

14.4 Scan conversion

14.5 Graphics hardware

14.6 2D geometrical transformations and viewing

14.7 3D geometry and viewing

14.8 Hierarchical modeling

14.9   Projections

14.10 Hidden surface removal

14.11 Shading and rendering

15.   Emerging Technology

15.1 Parallel and distributed computing ,Grid computing

15.2 GIS/ Remote sensing/ GPS

15.3 Semantic web technology

15.4 Cryptography and network security

15.5 RFID technology and its usage

15.6 Li-Fi technology

15.7 IP V6 concepts

15.8 Technology behind E-payment and E-transaction – ATM, Point of Sales, Internet Transaction, Digital Signature etc.

काठमाडौंउपत्यकाखानेपानीलिमिटेड

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15.9   Bio informatics, image processing.

15.10 VSAT, G3

Section D:(5x2=10)

16. **काठमाण्डौ उपत्यकाखानेपानी लिमिटेड सम्बन्धी**

    16.1   खानेपानीमहशुलनिर्धारण आयोग

    16.2   काठमाण्डौ उपत्यकाखानेपानीव्यबस्थापनबोर्ड

    16.3   आयोजनाकार्यान्वयननिर्देशनालय

    16.4   काठमाण्डौ उपत्यकाखानेपानी लिमिटेडको ऐतिहासिक पृष्ठभुमि र सागंठनिक संरचना

    16.5   काठमाण्डौ उपत्यकाखानेपानी लिमिटेडका प्रबन्धपत्र

    16.6   काठमाण्डौ उपत्यकाखानेपानी लिमिटेडका नियमावली

    16.7   काठमाण्डौ उपत्यकाखानेपानी लिमिटेडका सेयरधनीहरु बिचको सम्फौता

    16.8   काठमाडौंउपत्यकाखानेपानी लिमिटेड र काठमाण्डौ उपत्यकाखानेपानीव्यबस्थापनबोर्ड वीचको Lease Agreement र अनुमतिपत्र

    16.9   कर्मचारी प्रशासनविनियमावली, २०६४

    16.10 आर्थिक प्रशासनविनियमावली, २०६४

17. **IT Policy of Nepal**

    17.1   ITU overview,

    17.2   ICT policy,

    17.3   Telecommunication Policy

    17.4   National Broadcasting Act & Regulation,

    17.5   Electronic Transaction Act and Cyber-law

    17.6   National Frequency Allocation Plan