त्रिभुवन विश्वविद्यालय
इन्जिनियरिङ्ग अध्ययन संस्थान डीन कार्यालय

प्राविधिक सेवा, प्राविधिक समूह, सिस्टम इन्जिनियर (प्राविधिक अधिकृत) पदको खुल्ला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

२०८२

लिखित परीक्षा योजना

लिखित परीक्षा : **पूर्णाङ्ग : १५०**

पत्र/ विषय	पूर्णाङ्ग	उत्तीर्णाङ्ग	परीक्षा प्रणाली	प्रश्न संख्या × अङ्ग	समय
प्रथम	५०	२०	वस्तुगत-वहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × १ अङ्ग	५० मिनेट
दोस्रो	१००	४०	विषयगत प्रश्न	७ प्रश्न × १० अङ्ग ६ प्रश्न × ५ अङ्ग	३ घण्टा

द्रष्टव्य :

१. लिखित परीक्षाको. लागि १५० पूर्णाङ्कका वस्तुगत तथा विषयगत पत्रहरु हुनेछन् ।
२. वस्तुगत वहुवैकल्पिक (Multiple Choice) प्रश्नको विकल्प छनौट गर्दा गलत छानेमा ऋणात्मक मूल्याङ्कन (Negative Marking) गरिने छ । अर्थात् यसरी मूल्याङ्कन गर्दा प्रत्येक गलत उत्तरको लागि २० प्रतिशत अङ्क कट्टा गरिनेछ । वहुवैकल्पिक प्रश्नको २० प्रतिशत अङ्क प्राप्ताङ्कबाट घटाइने छ । (उदाहरणका लागि परीक्षार्थीले २० अङ्कको वहुवैकल्पिक प्रश्नमा १५को सही उत्तर र ५ प्रश्नको गलत उत्तर दिएमा निजको प्राप्ताङ्क (०.२० × ५ = १.००) अर्थात् १५− १ = १४ अङ्क हुनेछ । तर उत्तर नदिएमा त्यस वापत अङ्क दिने छैन र अङ्क कट्टा पनि गरिने छैन ।
३. विषयगत प्रश्नको हकमा एउटै प्रश्नका दुई वा दुई भन्दा बढी (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरु (Short notes) सोध्न सकिने छ ।
३. प्रत्येक पत्रको उत्तीर्णाङ्क पूर्णाङ्कको ४० प्रतिशत हुनेछ ।

सिस्टम इन्जिनियर (प्राविधिक अधिकृत) तृतीय श्रेणी पदको आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र : विषयगत पश्न **(Subjective Questions)**

पूर्णाङ्क: १०० समय: ३ घण्टा

1. Computer Fundamentals

1.1. Introduction to computer systems
1.2. Computer Hardware and Software
1.3. CPU: ALU, Registers, CU
1.4. Memory and Storage devices
1.5. Input and Output devices
1.6. Operating system and application programs
1.7. Computer virus and remedies
1.8. Word processor, Spreadsheet, PowerPoint
1.9. Computer system configuration
1.10. Basic troubleshooting
1.11. Fonts, Nepali Fonts, Unicode and Unicode Fonts
1.12. Using Unicode for Nepali documents

2. Procedural and Object-oriented Programming

2.1. Concept of Procedural Programming
2.2. Programming with C
2.3. Keywords, Identifiers
2.4. Data types
2.5. Statements and Operators
2.6. Preprocessor Directives
2.7. Input/Output, Control statements, Loops
2.8. Procedure/Functions
2.9. Array, String and Pointer
2.10. Structure and Union
2.11. Files
2.12. Object Oriented Programming and Features
2.13. Objects and Classes
2.14. Operator/Function Overloading
2.15. Abstraction, Encapsulation, Inheritance, Polymorphism, Template
2.16. Exception handling

3. Data Structure and Algorithms

3.1. Data structures and Abstract data types
3.2. Stack and Queue
3.3. Lists, Linked Lists, Queues, Trees, Binary Search-Trees
3.4. Recursion
3.5. Complexity Analysis of Algorithms, Worst and Average Case Analysis
3.6. Time and Space Analysis of Algorithms
3.7. Hashing

3.8. Sorting

3.9. Searching

3.10. Graphs, Graph Traversals

4. Microprocessors and Computer Architecture

4.1. Microprocessor and Bus System of Microprocessor Based System

4.2. Intel 8085 microprocessor architecture, programming and interfacing

4.3. Intel 8086 microprocessor architecture

4.4. Assembly Language Programming with 8086

4.5. Instruction Set, Instruction Format and Addressing Modes

4.6. Interrupt System in Microprocessors

4.7. Computer Organization and Computer Architecture

4.8. Instruction Cycle and Machine Cycle, Execution of an Instruction

4.9. CPU structure and function, Arithmetic and Logic Unit, Representation of data, Arithmetic operations

4.10. Control Unit, Hardwired and Microprogrammed Control Unit

4.11. Memory Devices, Classification and Hierarchies

4.12. Cache Memory and Cache Mapping, Multi-level Cache Memory

4.13. Von Neumann and Harvard architecture, RISC & CISC architecture

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

4.15. Pipelining, Pipelining Hazards and Remedies

4.16. Multiprocessors and Multicore architecture

4.17. Operating Systems

4.18. Operating system and its functions

4.19. Types of operating systems

4.20. Basic components of the Operating Systems

4.21. Process and Threads, Process Management, Inter-Process Communication, Mutual Exclusion and Synchronization

4.22. Process Scheduling

4.23. Memory Management techniques

4.24. File System Management

4.25. I/O Management & Disk Allocation and Scheduling Methods

4.26. Deadlock

4.27. Security

4.28. Distributed Systems: Distributed Message passing, RPC, Client-server computing, Clusters

4.29. Common Operating Systems: Windows and Linux with Their typical features

5. Operating Systems

5.1. Operating system and its functions

5.2. Types of operating systems

5.3. Basic components of the Operating Systems

5.4. Process and Threads, Process Management, Inter-Process Communication, Mutual Exclusion and Synchronization

5.5. Process Scheduling

5.6. Memory Management techniques

5.7. File System Management

5.8. I/O Management & Disk Allocation and Scheduling Methods

5.9. Deadlock

5.10. Security

5.11. Distributed Systems: Distributed Message passing, RPC, Client-server computing, Clusters

5.12. Common Operating Systems: Windows and Linux with Their typical features

6. Database Management System

6.1. Database Management System and its Applications

6.2. ER modeling

6.3. Relational Languages and Relational Model

6.4. Database Constraints and Normalization

6.5. SQL queries, Views

6.6. Query Processing and Optimization

6.7. Database Storage, Indexing and Hashing

6.8. Transactions Management and Concurrency Control

6.9. Crash Recovery

6.10. Distributed Database Systems and Object-Oriented Database System

6.11. Concept of Data Warehousing

7. Computer Networks and Security

7.1. Computer Networks, Types of networks and Applications

7.2. Layered network architecture, OSI and TCP/IP model

7.3. Physical layer, Transmission media, Switching and Multiplexing, Data Encoding Techniques

7.4. Data Link Layer and its services, MAC Address, Multiple access protocols, CSMA/CD,

CSMA/CA

7.5. Network Devices: Repeaters, Hubs, Bridges, Switches, Routers, Gateways and their functions

7.6. Network Layer and its services, IP addressing, Public and Private IP address, Network

Layer Protocols, Routing Principles, Classifications of Routing Algorithms, Routing Protocols, IPv4, IPv6

7.7. IP address management, Autonomous system, Multi-homing

7.8. Transport Layer and its functions, Port number, TCP and UDP Protocols

7.9. Application Layer protocols and functions, HTTP & HTTPS, FTP, DNS, SMTP, POP, IMAP Protocols

7.10. Distributed system, Clusters, Network Security, Disaster Recovery, Data Storage Techniques: Clustering, NAS, SAN

7.11. Network Security and its Importance, Passive and Active Attacks,

7.12. Cryptography, Traditional Ciphers

7.13. Symmetric Encryption, DES and AES

7.14. Asymmetric encryption and its importance, Diffie and Hellman algorithm, RSA Algorithm

7.15. Cryptographic Hash Functions, Message Authentication Code, Digital Signature
7.16. Securing Wireless LANs, VPN, Firewalls, IDS and IPS

8. Software Engineering

8.1. Software Engineering and its importance
8.2. Software Process models
8.3. Requirement engineering
8.4. System models
8.5. Architectural design
8.6. Software Reuse
8.7. Software Testing, Verification and Validation
8.8. Software Estimation
8.9. Quality Management
8.10. Configuration Management
8.11. Software Project Management

9. MIS and Web Technologies

9.1. Information Systems and Decision making
9.2. Basics of Website Design, HTML and Content Management System
9.3. JavaScript, XML, PHP
9.4. Client server architecture
9.5. Managing a web server, Hosting a website in a server and via cloud service providers
9.6. Multimedia systems

10. Recent IT Trends and Terminology

10.1. Machine Learning and Artificial Intelligence
10.2. Computer Vision
10.3. Internet of Things (IoT)
10.4. Big Data
10.5. Block Chain
10.6. E-Governance, E-commerce
10.7. Data Center and its management
10.8. Cloud/Grid/Cluster/Edge computing
10.9. Video conferencing/Online meeting/Online class

11. Case Based Problem

Some typical scenarios or case or condition or requirement is given, and candidates need to provide the solution for the given problem.

12. Tribhuvan University

- TU Executive Council, Formation, Roles and Responsibilities
- TU Service Commission, Formation, Roles and Responsibilities
- TU Rules & Regulations, Teacher/Staff Services: Roles and Responsibilities of a TU staff, Leave & other facilities for a TU staff

सिस्टम इन्जिनियर (प्राविधिक अधिकृत) तृतीय श्रेणी पदको आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

(Specification Chart)

२०८२

प्रथम पत्र : सेवा सम्बन्धी

पूर्णाङ्क: ५०　　समय: ५० मिनेट

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
	1.	Computer Fundamentals	1	2	५० प्रश्न X १ अंक
	2.	Procedural and Object-oriented Programming	1	5	
	3.	Data Structure and Algorithms	1	5	
	4.	Microprocessors and Computer Architecture	1	5	
	5.	Operating Systems	1	5	
	6.	Database Management System	1	5	
	7.	Computer Networks and Security	1	8	
	8.	Software Engineering	1	5	
	9.	MIS and Web Technologies	1	3	
	10.	Recent IT Trends and Terminology	1	2	
	11.	Case Based Problem	1	2	
	12.	TU Rules & Regulation	1	3	
कुल जम्मा			50	50	

द्वितीय पत्र : सेवा सम्बन्धी

पूर्णाङ्क: १००　　समय: ३ घण्टा

खण्ड	एकाई	विषय शीर्षक	अङ्क	प्रश्न संख्या	प्रश्न संख्या × अङ्क भार
	1.	Computer Fundamentals	5	1	६ प्रश्न X ५ अंक ७ प्रश्न X १० अंक
	2.	Procedural and Object-oriented Programming	10	1	
	3.	Data Structure and Algorithms	10	1	
	4.	Microprocessors and Computer Architecture	10	1	
	5.	Operating Systems	10	1	
	6.	Database Management System	10	1	
	7.	Computer Networks and Security	15	1 + 1 (5+10)	
	8.	Software Engineering	10	1	
	9.	MIS and Web Technologies	5	1	
	10.	Recent IT Trends and Terminology	5	1	
	11.	Case Based Problem	5	1	
	12.	TU Rules & Regulation	5	1	
कुल जम्मा			100	13	

प्रयोगात्मक (Practical Questions)

❖ पूर्णाङ्क ३० को प्रयोगात्मक परीक्षामा प्रश्नहरु तथा अङ्कहरु निम्नानुसार हुनेछन् ।

S.N.	Topic	No. of question	Marks
1	Basic Configuration of a computer, OS & Application programs setup / removal, Connection of network/sound etc. cards, Connection of CD/DVD or hard drives (HDD/SSD), Device driver setup, Setup of local printer/network printer, Troubleshooting, Word processor, Spreadsheet, Presentation	1	6
2	Procedural & Object Oriented Programming C/C++/Python, Data structure & Algorithms	1	6
3	Computer Network setup, Cabling, Switch configuration, Router configuration, Routing protocols - IGP, VLAN, ACL. Network troubleshooting	1	6
4	Servers and Virtual machine configurations, Video conferencing, Online meeting/class hosting	1	6
5	DBMS (DDL, DML, SQL)	1	6
Total		**5**	**30**

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