बि.पि. कोइराला मेमोरियल क्यान्सर अस्पताल
प्राविधिक अन्य सेवा, हस्पिटल इन्जिनीयरिङ्ग समुह, सुचना प्रविधि उपसमुह, अधिकृत सातौं तह, इन्जिनियर (आई.टी.) पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

एवं परीक्षा योजना

कुल पूर्णाङ्क : १२०

१. प्रथम चरण : – लिखित परीक्षा					**पूर्णाङ्क :– १००**	
पत्र / विषय	**पूर्णाङ्क**	**उतीर्णाङ्क**	**परीक्षा प्रणाली**		**प्रश्नसंख्या X अङ्क**	**समय**
General Subject and Technical Subject	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न (MCQs)	१०० प्रश्न x १ अङ्क	१ घण्टा ३० मिनेट

२. द्वितीय चरण : – अन्तर्वार्ता

विषय	**पूर्णाङ्क**	**परीक्षा प्रणाली**
अन्तर्वार्ता	२०	मौखिक

द्रष्टव्य :

१. यो परीक्षा योजनालाई प्रथम चरण (लिखित परीक्षा) र द्वितीय चरण (अन्तर्वार्ता) गरी दुई चरणमा विभाजन गरिएको छ ।

२. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

३. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट देहाय बमोजिम प्रश्नहरु सोधिनेछ ।

खण्ड	**अङ्कभार**	**वस्तुगत प्रश्न संख्या**
A	१०	१० प्रश्न X १ अङ्क = १०
B	९०	९० प्रश्न X १ अङ्क = ९०

४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको 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 ।

५. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

६. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

७. पाठ्यक्रम लागू मिति :– २०७४/११/२९

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प्राविधिक अन्य सेवा, हस्पिटल इन्जिनीयरिङ्ग समुह, सुचना प्रविधि उपसमुह, अधिकृत सातौं तह, इन्जिनियर (आई.टी.) पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पत्र/विषय : **General Subject and Technical Subject**

General Subject
Section (A) – 10 Marks

1. **B.P.Koirala Memorial Cancer Hospital, Related Legislations and IT in Nepal**
   - 1.1. B.P.Koirala Memorial Cancer Hospital : History, organizational structure, functions, roles, services, problems and challenges
   - 1.2. B.P.Koirala Memorial Cancer Hospital related act and regulations
   - 1.3. History of IT in Nepal
   - 1.4. Current IT Policy of Nepal
   - 1.5. Existing Cyber law of Nepal
   - 1.6. Existing Copyright Act

Technical Subject
Section (B) – 90 Marks

1. Computer Fundamentals
- 1.1 Computers, kinds of computers in respect of size and function and generation of computers
- 1.2 Components and architecture of computers, connecting the components
- 1.3 Getting started: orientation to personal computers, system unit and starting
- 1.4 **Input devices**: keyboard, mouse, other input devices
- 1.5 **Processing**: CPU, memory
- 1.6 **Storages devices**: overview of storage devices, Floppy Disk Drive, Hard Drive, Universal Serial Bus (USB) Devices and other storage devices
- 1.7 **Output devices**: monitors, printers, modems, soundboards
- 1.8 **DOS survival guide**: using command prompt, creating and using AUTOEXEC.BAT and CONFIG.SYS
- 1.9 **Windows survival guide**: Windows Desktop, Program Manager, Desktop, File Manager
- 1.10 **Application software**: using application software
- 1.11 Windows explorer, e-mails, internet, intranet, extranets, Ethernet, HTTP
- 1.12 Computer viruses and antivirus

2. Operating Systems
- 2.1 **OS Fundamentals:** Definition of OS, Functions of OS, Components of OS, Types of Operating System, Application Software vs System Software, LINUX vs. UNIX, Primary, Extended and Logical Partition
- 2.2 **Principle of Concurrency:** Mutual Exclusion, Critical Region, Race Condition, Solution to Race Condition (Disabling Interrupts, Lock Variables, Strict Alteration, Petersons Solution, Lock Based Approach, Priority Inversion, sleep and wakeup), Semaphore and mutex, Monitors , Classical Problems of Synchronization: Readers-Writers Problem, Producer Consumer Problem, Dining Philosopher problem
- 2.3 **Process Management:** Program vs. Process, Process Life Cycle, User Bound and I/O bound process, Process Control Block, Context Switching, Concept of Multiprogramming, Concept of Threads, User level and Kernel level Threads, Process vs. Threads

2.4 **Process Scheduling:** Concept of Process Scheduling: FCFS, SPN, SRT, Round Robin, Multi level feedback

2.5 **Deadlock:** Definition, Detection, Avoidance, Prevention and Recovery examples, Livelock, Two phase locking, Starvation

2.6 **Memory Management:** Memory hierarchy, Storage Placement Policies: First Fit, Best Fit, Worst Fit, Fixed Partitioning and Variable Partitioning memory management, Virtual Memory, Paging, Demand Paging, Memory Protection and Sharing, Limit Register, Swapping, Segmentation, Paging and Segmentation Combined, Concept of Thrashing, Page Replacement Algorithms, Overlays, TLBs

2.7 **Input/output:** Block Devices and Character Devices, Concept of Device Driver and Controller, Synchronous vs. Asynchronous Transfer, Disk Scheduling Algorithms, RAID, Hard Drive Reliability, MTBF, File Organization

2.8 **Security:** Security breaches, Types of Attacks, Security Policy and Access Control, Basics of Cryptography, Protection Mechanisms, Authentication, OS Design Considerations For Security, Access Control Lists And OS Support

3. Data Structure and Algorithms

3.1 Fundamental of Data Structures, Abstract Data types

3.2 Lists, Linked Lists, Stacks

3.3 Queues, Priority Queue

3.4 Trees: Traversal, Implementations, Binary Trees, Binary Search Trees, Balanced Search Trees, AVL Trees

3.5 Indexing Methods. Hashing Trees, Suffix Trees

3.6 Worst-Case and Expected time Complexity

3.7 Analysis of Simple Recursive and Non-recursive Algorithms

3.8 Searching, Merging and Sorting.

3.9 Introductory Notions of algorithm design: Divide-and-Conquer, Dynamic Programming, Greedy Methods, Backtracking

3.10 Graph algorithms: Depth-first Search and Breadth-first Search, Shortest Path Problems, Minimum Spanning Trees, Directed Acyclic Graphs

4. System Analysis and Design

4.1 Defining the System, System Owner, System User, System Designers and System Builders, System Analysts, Variations on System Analyst title, System life Cycle

4.2 Joint Application Development (JAD): JAD definition, JAD purpose, JAD Philosophy, JAD Scope

4.3 Involved in a JAD: Sponsor, Business Users, System Analyst

4.4 Roles of JAD Group Member: Project Leader, Record Keeper, Time Keeper

4.5 System Design Environment: Development Process, Management Process, System Structure, Basic Component of Computer based Information System, Personal/ Centralized/Distribution System

4.6 Concept formations: Introduction, Finding the Problem, Evaluating the Proposal, Technical Feasibility, Operational Feasibility, Economic Feasibility

4.7 Requirements analysis: Representing System Analysis Model, Requirement Model, Design Model

4.8 Development Process: Design Method

4.9 Entity Relationship Diagram (E-R Diagram): Notations, Entities: Strong Entities, Weak Entities, Attributes: Simple and Composite, Single Valued and Multiple Valued, Null and Derived Attribute
4.10 Relationship Sets: Degree of Relationship and Cardinality Relationship, Specialization, Generalization, Aggregation
4.11 Data Flow Diagrams: Introductions, Data flow Diagram, Symbol, Files or data store, External entities, Data flows
4.12 Describing System by Data Flow Diagram: Context diagram, Top level DFD, Expansion Level DFD, Conversions of Data
4.13 Object Modeling: Object -Oriented Concept, Object Structure, Object Feature, Class and Object
4.14 Representation: Association and Composition, Inheritance, Multiple Inheritances
4.15 Modeling: Use Case Diagram, State Diagram, Event Flow Diagram
4.16 Documentation: Automatic and Manual System

5. Database Management System and Design

5.1 Introduction, A Database Model, Relational Database Model, Integrity, RDBMS
5.2 SQL and Embedded SQL
5.3 Writing Basic SQL SELECT Statements
5.4 Restricting and Sorting data
5.5 Single Row Functions
5.6 Displaying Data from Multiple Tables
5.7 Aggregation Data Using Group Functions
5.8 Sub Queries, Manipulating Data and Creating and Managing Tables
5.9 Creating Views and Controlling User Access
5.10 Using Set Operators, Date-time Function
5.11 Database Design: Logical Design, Conceptual Design, Mapping Conceptual to Logical, Pragmatic issues, Physical Design, Integrity and Correctness, Relational Algebra, Relational Calculus
5.12 Normalization: 1NF, 2NF, 3NF, BCNF, 4NF,5NF, DKNF
5.13 Architecture of DBMS: Client-server, Open Architectures, Transaction Processing, Multi-User & Concurrency, and Backup & Recovery Database.
5.14 Basic concept of major RDBMS products: Oracle, Sybase, DB2, SQL Server and other Databases

6. Programming Language

6.1 Overview of Programming Language: History, Programming Paradigms, The role of Language translates in the Programming Process
6.2 Fundamental Issues in Language Design
6.3 Virtual Machines, Code Generation, Loop Optimization
6.4 Concept of Procedural Programming, Structural Programming, Object-Oriented Programming
6.5 Concept of C programming, C++ Programming
6.6 Java Programming for Declaration, Modularity and Storage Management Software Development

7. Networking

7.1 Basic Network Theory: Network Definition, Network Models, Connectivity, Network Addressing

7.2 Network Connectivity: Data Package, Establishing Connection, Reliable Delivery, Network Connectivity, Noise Control, Building Codes, Connection Devices
7.3 Advanced Network Theory: OSI model, Ethernet, Network Resources, Token ring, FDDI, Wireless Networking
7.4 Common Network Protocols: Families of Protocols, NetBEUI, Bridge and Switches, The TCP/IP Protocol, Building TCP/IP Network, The TCP/IP Suite
7.5 TCP/IP Services: Dynamic Host Configuration Protocol, DNS Name Resolution, NetBIOS support, SNMP, TCP/IP Utilities, FTP
7.6 Network LAN Infrastructure: LAN Protocols on a Network, IP Routing, IP Routing Tables, Router Discovery Protocols, Data Movement in a Routed Network, Virtual LANs
7.7 Network WAN Infrastructure: WAN Environment, Wan Transmission Technologies, Wan Connectivity Devices, Voice Over Data Services
7.8 Remote Networking: Remote Networking, Remote Access protocols, VPN Technologies.
7.9 Computer Security: Computer Virus, Worm, Trojan Horse
7.10 Network Security: Introduction, Virus Protection, Local Security, Network Access, Internet Security
7.11 Disaster Recovery: Need for Disaster Recovery, Disaster Recovery plan, Data backup, Fault Tolerance
7.12 Advanced Data Storage Techniques: Enterprise Data Storage, Clustering, Network Attached Storage, Storage Area Networks
7.13 Network Troubleshooting: Using Systematic Approach to Troubleshooting.
7.14 Network Support Tools: Utilities, Network Baseline
7.15 Network Access Points, Common Network Component, Common Peripheral Ports

8. Computer Architecture and Organization

8.1 Evaluation of Computers, Design Methodology, Set Architecture, MIPS ISA, ALU Design
8.2 Data path Design: Single and Multiple Cycle Implementations, Pipelining, Memory Hierarchy, Input/output System: Bus and Role of Operating System

9. Complier Design

9.1 Introduction to Compiling, Logical Analysis, Syntax Analysis, Semantic Analysis
9.2 Run Time environment, Intermediate Code Generation, Code Optimization
9.3 Compiler Generation Tools

10. E-Commerce Technology

10.1 Introduction to E-Commerce
10.2 Electronic Commerce Strategies
10.3 Electronic Commerce Security Issues
10.4 Success Models of E-Governance
10.5 E-Business: b2b, b2c, b2e, c2c, g2g, g2c
10.6 Principles of Electronic Payment, Strategies & Systems
10.7 E-marketing, Reverse Engineering
10.8 E-Banking, EDI Methods, SWIFT
10.9 Encryption and Decryption Methods, XML, Layout Managers, Event Model

11. MIS and Web Engineering

11.1 Information Systems, Client-Server Computing
11.2 Information Systems and Decision Making
11.3 Database Design issues, Data Mining, Data Warehousing
11.4 Knowledge Management, The strategic use of Information Technology
11.5 Work Process Redesign (Reengineering) with Information Technology, Enterprise Resources Planning Systems, Information Systems Security, Information Privacy, and Global Information Technology issues
11.6 Software Supported Demonstrations including advanced Spreadsheet topics, Software Component Based Systems (CBSE)
11.7 Multimedia
11.8 Object-Oriented Programming with COMS & DECOMS
11.9 Group Decision Support Systems
11.10 Basics of Website Design

The questions distribution for this paper/subject shall be as follows:

Section	**Marks**	**Multiple Choice Questions**
		No. of Questions × Mark
A	10	10 Questions × 1Mark =10 Marks
B	90	90 Questions × 1Mark =90 Marks