Discrete Mathematical Structures

Year: I Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
			Theory	Practical	Theory	Practical	
3	1	-	20	-	80	-	100

Course: Master of Computer Application (MCA)

Credit: 3

Objective: The basic objective of the course is to impart knowledge to student on mathematical reasoning, combinatorial analysis, discrete structures, algorithmic thinking, and application and modeling so that students are able to learn a particular set of mathematical facts and how to apply them.

Contents:

1. Fundamentals: Sets and Subsets; Operations on sets; Sequences; Division in the integers. [5 hrs]
2. Logic: Propositions and logical operations; Conditional statements; Predicate and Quantifiers; Methods of proof; Mathematical induction. [4 hrs]
3. Counting: Permutations and combinations; Pigeonhole Principle; Recurrence relation; Solving recurrence relation by substitution; [4 hrs]
4. Relations and Digraphs: Product sets and Partitions; Relations and Digraphs; Paths in relations and diagraphs; Properties of relations; Equivalence relations; Computer representation of relations and diagraphs; Manipulation of relations. [6 hrs]
5. Functions: Functions; Composition of functions; Permutation functions. [4 hrs]
6. Graph Theory: Graphs; Special families of graphs; Matrix representation of graphs; Euler paths and circuits; Hamiltonian paths and circuits. [5 hrs]
7. Trees: Trees; Tree searching; Minimal spanning trees. [5 hrs]
8. Algebraic Structures: General properties; Semi-groups; monoids; groups; permutation groups; subgroups; homomorphism and isomorphism; group codes; error correcting codes. [8 hrs]

9. Boolean Algebra: Definition and properties; Boolean functions; representing Boolean functions; logic gates; minimization of circuits. [4 hrs]

Note: The algorithms must be discussed wherever applicable.

Text Book

1. Kolman, Busby & Ross "Discrete Mathematical Structures", PHI.

References:

2. Trembly. J . P & Manohar . P " Discrete Mathematical Structures with Applications to Computer Science", Mc Graw Hill.
3. John Truss, "Discrete Mathematical Structures for Computer Science", Addison Wesely.
4. Seymour Lipchutz, Marc Lipson, "Discrete Mathematics", Tata McGraw-Hill.

Operating Systems

Year: I Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	100
			20	20	60	-	

Course: Master of Computer Application (MCA)

Credit: 3

Objective

This course is to introduce both the fundamental principles and the advance concepts for the development of multiprogramming and multiprocessing Operating Systems. It starts from history, concepts of processes and threads and incorporates basic concepts of distributed systems and real time systems towards the end.

Course Detail

1. Introduction 3 Hours

History, Types of Operating System, Computer System Overview, Operating System Structures and Operating System Functions.

2. Processes and Threads 8 Hours

Process concepts, Threads concepts, Symmetric Multiprocessing, Micro-kernels, Concurrency: Mutual Exclusion and Synchronization (busy waiting, spin locks, semaphores, mutex locks, monitors), Deadlock (conditions, deadlock detection and recovery, avoidance and prevention)

3. Scheduling 4 Hours

Types of scheduling, Scheduling in batch, interactive and real-time systems (SJN, SJF, FIFO, LJN, round-robin, priority scheduling, and hybrid schemes). Thread scheduling.

4. Memory Management 10 Hours

Requirements of Memory Management, Basic Memory Management techniques, Paging, Swapping, Virtual Memory Management(Paging and Segmentation.)

5. Input Output and Files 8 Hours

I/O devices and its organization, Principles of I/O software and hardware, Disks, Files and directories organization, File System Implementation.

6. Distributed Systems 9 Hours

Distributed Message passing, Remote Procedure Call, Client/Server Computing, Distributed Process Management (Process Migration, Global states, Mutual Exclusion and Deadlock)

7. Security 6 Hours

Authentication, Access Authorization, System Flaws and Attacks, Trusted Systems

Recommended Text Book

1. Stallings, William, Operating Systems, 4th Edition, Pearson Education

Recommended Reference Book

2. Tanenebaum, Andrew S., Modern Operating System, 2nd Edition, Pearson Education
3. Galvin, Peter, B. Silberschatz, Abraham, Operating System Concepts, 6th Edition
4. Nutt, Gary, Operating Systems, Modern Perspective, 2nd Edition, Pearson Education
5. Ghandi, M., Shetty, T., Shah Rajiv, The C Odyssey Unix " The Open, Boundless C, BPB Publications
6. Nutt Gary, Operating System Projects using Windows NT, Pearson Education
7. Stevens, R. L., Advanced Unix Programming Environment, Pearson Education
8.Stones Richard, Matthew Neil, Beginning Linux Programming, Wrox Publications

Web Programming

Year: I Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	100
			20	20	60	-	

Course: Master of Computer Application (MCA)

Credit: 3

Course Objective

This course introduces students to advance and modern technologies being used in web solutions. This course also helps students to understand how these technologies related to each other and choose best technologies to be used for web solutions.

Course Detail

1. Introduction 6 Hours

Introduction to Internet Applications: 2- Tier, 3-Tier and N-Tier Architecture, Web browsers, Web servers (IIS, PWS and Apache), FTP (Command and Replies), HTTP (Transactions, Request Methods), Client and Server side scripting

2. XML 13 Hours

XML Introduction, Well formed XML, XML Document Type Definitions, XML Schema, CSS and Style sheet, Namespaces, XSL/XSLT, XPATH, DOM, SAX parsers

3. Server-side Scripting (PHP): 13 Hours

Introduction, Basic Syntax, Types, Variables, Constants, Operators, Control Structures, Functions, Error Handling, HTTP Authentication, Cookies, Date and Time Functions, String Functions, HTTP Functions, Database (MySQL) Functions

4. COM/DCOM 8 Hours

Introduction to Component Object Models, Advantages of COM, ActiveX and COM, COM servers, Using Components from PHP, Introduction to Distributed COM

5. Wireless Programming: 2 Hours

Wireless Internet and m-Business

6. Case Study 6 Hours

Search Engines, Digital Libraries, E-commerce Applications, Content Syndication

Recommend Text Book:

1. Internet and Worldwide Web: How to Program, H Deitel, P Deitel & GoldsBerg, Prentice Hall, Third Edition.

Recommended Reference Books

2. Webmaster in a Nutshell, S Spainhour & B Eckstein, O'Reilly, 1999, 2nd edition
3. Core PHP Programming: Using PHP to Build dynamic Web Sites, Leon Atkinson, Prentice Hall, 2nd Edition
4. COM/DCOM Unleashed, Randy Abernety, SAMS Series Books, 1st Edition

Organizational Behavior and Human Resource Management

Year: I Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	-	Theory	Practical	Theory	Practical	100
			20	-	80	-	

Course: Master of Computer Application (MCA)

Credit: 3

I. Human Resource Management (HRM)

1. Concept, roots, human resource management and personnel management, changing HRM environmental forces, new mandate for human resource management, staff vs. line function in management, organization of HRM functions.

2. HRM system, international model of HRM, concept and framework for strategic HRM, line management responsibility for HRM, HRM and organizational performance.

3. Job analysis and human resource planning: Concept, purposes of job analysis, collecting job analysis information, methods of job analysis, concept of HR planning methods and techniques of determining HR requirements.

4. Recruitment, selection and socialization: concepts, sources and methods of recruitment, selection and its process, socialization in organization.

5. Training and development: Concept of training and development, determining training needs, methods of training and development--on-the-job and off-the-job training development, evaluation of training programs.

6. Performance evaluation: concept and purposes, process, methods and feedback of evaluation.

7. Compensation: Concept, considerations, establishing pay plan, job evaluation system, steps and methods, incentives and benefit system in organization.

II. Organizational Behavior (OB)

1. concept, importance and assumptions of OB, five conceptual anchors of organizational behavior, emerging trends in organizational behavior.

2. Understanding individual behavior: concept, behavior as an input out put system, emotions, beliefs, attitudes, values, needs, motives and behavior at work.

3. Perception and personality: concepts, perceptual process, attribution theory and errors, perception and decision making, personality traits and characteristics, personality ad behavior, major personality attributes influencing organizational behavior.

4. Motivation and job satisfaction: concepts, theories of motivation –hierarchy of needs, hygiene-motivation theory, McClelland's theory, equity theory , goal setting and reinforcement theory.

5. Leadership: concept, perspective of leadership, emerging approaches of leadership.

6. Groups in organization: concept, types of groups, group processes.

7. Communication: concept, process and method, communication networks, barrier to effective communication, current issues in communication.

8. Conflict: Concept, types of conflicts, approaches to conflict management, resolving conflict.

9. Organizational change and development: concepts, forces for change, strategy for managing planned change, Lewin Force Field Model, resistance to change, reducing resistance and approaches to managing change, organizational development interventions, objectives and goals of organizational development, the organizational development process and prerequisites to organizational development.

Text books:

1. Decenzo, D. and Robbins, S. Human Resource Management, seventh edition, Wiley.
2. Arnold, H.J. and Fieldman, D.C. Organizational Behaviour, Tata McGraw-Hill, India.

3. Robbins, S. Organizational Behaviour, McMillan India.
4. Luthans, F. Organizational Behaviour, Tata McGraw Hill.
5. Adhikari, D.R. Human Resource Management, Text and Cases, Manakamana publication, Kathmandu.
6. Adhikari, D.R. Organisational Behaviour, Buddha Academy, Kathmandu.
7. Agrawal, G.R. Dynamic of Human Resource Management, M. K. Publishing.

Database Management Systems

Year: I Semester: I

Teaching Schedule Hours/Week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	1	2	Theory	Practical	Theory	Practical	100
			20	-	80	-	

Course: Master of Computer Application (MCA)

Credit: 3

Objectives: After completing the course student will be able to design and understand the thorough implementation of Database System.

CONTENTS:

1. Introduction to DBMS Implementation

Overview of a Database Management System: Data-Definition Language Commands, Overview of Query Processing, Storage-Management Overview Main-Memory Buffers and the Buffer Manager, Transaction Processing, Query Processor, Information Integration Overview

2 hrs.

2. Application Development:

Database Application Development: Accessing databases from Applications, JDBC, SQLJ, Stored Procedures

Internet Applications: HTML Documents, XML Documents, Three-Tier application architecture, The Middle-Tier 5 hrs

3. Data Storage: The memory Hierarchy, Secondary Storage, RAID, Disk Space Management, Disk Failures, Recovery From Disk Crashes

5 hrs

4. Index Structures: Index on sequential Files, Secondary Indexes, B-Trees, Hash Tables, and overview of multidimensional Indexes 6 hrs.

5. Query Execution: Algebra for Queries, Physical query plan operators, Nested-Loop Joins, Index Based Algorithms, Buffer Management 6 hrs.

6. The query Compiler: Parsing, Algebraic Laws for Improving Query Plans 2 hrs.

7. Coping With System Failures: Issues and Models for Resilient Operation, Undo Logging, Redo Logging, Protection against Media Failures 5 hrs.

8. Concurrency Control: Serial and Serializable Schedules, Conflict-Serializability, Enforcing serilizability by locks, Concurrency control by Timestamps, Concurrency Control by Validation. 6 hrs.

9. Parallel and Distributed Databases: Introduction, Architecture for Parallel Databases, Parallel Query Optimization, Distributed database architecture 2 hrs.

10. Object database Systems, 1 hrs

11. Deductive Databases, 1 hrs

12. Data Warehousing and Decision Support, 1 hrs

13. Data Mining, 1 hrs

14. Information Retrieval and XML Data, 1 hrs

15. Spatial Data Management, 1 hrs

Text Books:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, Database System Implementation, Pearson Education Asia, 2000

2. R. Ramakrishnan, J. Gehrke, Database Management Systems, 3rd Edition, McGraw-Hill