School of Mathematical & Computer Sciences

Department of Computer Sciences

Course Scheme & Syllabus

For

Master of Computer Applications (MCA) - M.Sc. Computer Science

For the year

2016, 2017 & 2018.

BABA GHULAM SHAH BADSHAH UNIVERSITY, RAJOURI,

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COURSE SCHEME & SYLLABUS FOR MCA-M.Sc. COMPUTER SCIENCE

FOR THE YEAR

2016, 2017, 2018

MCA - M.Sc. Computer Science – SEMESTER-III

Core Courses

Course Code	Course Title	Credits	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MC-341	Analysis & Design of Algorithm	4	3	40	60	100
MC-342	Data Communication & Computer Networks	4	3	40	60	100
MC-343	Relational Database Management System	4	3	40	60	100
MC-344	Java Programming	4	3	40	60	100
MC-371	Lab 5: Relational Database Management System	4	3	50	50	100
MC-372	Lab 6: Java Programming	4	3	50	50	100
Total Marks				**260**	**340**	**600**

IA – Internal Assessment
UE – University Examination

Course Code: MC-341 **Maximum Marks : 100**
Course Title : Analysis & Design of Algorithm **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:

Aim of the course is designed to acquaint the students about various algorithm design techniques, analyzing their complexities, Write rigorous proofs for algorithms, Apply important algorithmic design paradigms and methods of analysis and to Synthesize efficient algorithms in fundamental problems in computer science.

Unit-I

Introduction to Algorithms, the running times of a program. Use of the Big-Oh, Small-o, Big Omega and small Omega notations, Inequalities involving such notation, Efficiency of algorithm. Sorting Algorithms (Radix sort and Bucket sort). Introduction to algorithm design techniques.

Unit-II

Algorithm Analysis and Design Technique: Analysis framework, recursive & non-recursive algorithm (Overview). Analysis of recursive and non- recursive algorithm, Strassen's Matrix multiplication, Divide and Conquer (General methods, Merge sort, Quick Sort),

Unit-III

Greedy Techniques: Knapsack Problems, Prim's algorithm, Krushkal's algorithm, Dijkstra's method, Huffman trees
Transform & Conquer: Horner's rule & Binary Exponentiation, Problem Reduction.
Decrease & Conquer: Depth-First Search and Breadth-First Seach, Topological sorting

Unit-IV

Advanced Data Structures: Hashing & its terminology, Hash Table and Hash function, Hashing techniques, collision resolution techniques.
Dynamic programming: General methods, 0/1 knapsack problem, Travelling salesman problem, Warshal's and Floyd's Algorithm, Optional Binary Search trees.

Unit-V

Design Technique: Back-tracking (8- Queen's Problem, Hamiltonian Cycles)
P, NP and NP-Complete problems: Graph Coloring, Branch and Bound, Approximation Algorithms for NP hard problems. Limitation of Algorithm-power: Lower Bound Arguments, Decision Trees.

Note:*The assignment or presentation component of the internal evaluation should be based on implementation of algorithms using any language*

Course Code: MC-342 **Maximum Marks : 100**

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **Anany,Levitin**, "Introduction to the Design & Analysis of Algorithm", 2nd Edition, **Pearson Education,2007.**

References:

1. **Horowitz, Ellis**, "Fundamentals of Computer Algorithms", New Delhi, 2005, **Galgotia Publications**
2. **Leiserso, Cormen, Rivert**, "Introduction to Algorithms, , New Delhi, 2nd Edition, 2005, **PHI Publication**
3. **Brately Brassard** , "Fundamentals of Algorithms", New Delhi, 1996, **PHI Publication**
4. **Michael T. Goodrich, Roberto Tamassia**, "Algorithm Design", New Delhi, 2004. **Wiley Publication**

Course Title : Data Communication & Computer Networks **University Examination: 60**
Internal Assessment: 40
Credits: 4 **Duration of Examination:3 Hours**

Objective:
This course tries to cover fundamentals of data communication and give basic understanding of few protocols in important layers of OSI and introduce students to concepts involved in Computer networks including wired and wireless.

Unit-I
Signals: Concept of analog and digital signals.
Digital-to-Digital Encoding, Line Coding, unipolar, polar (NRZ-L, NRZ-I, Manchester & Differential Manchester encoding) & bipolar**,** Block Coding **(**4B/5B), Scrambling (B8ZS Scrambling).
Analog to digital encoding: Pulse Amplitude Modulation, Pulse code Modulation, Delta Modulation.

Unit-II
Digital to analog Modulation/ encoding: frequency shift keying, amplitude shift keying, phase shift keying, Quadrature amplitude modulation,
Analog-to-Analog Conversion: Amplitude Modulation, Frequency Modulation, Phase Modulation.
Multiplexing: frequency division, wavelength division, time division

Unit-III
Data Link Layer: Pure Aloha, Throughput of pure Aloha, Slotted Aloha, CSMA/CD, Media Access Control in CSMA/CD, MAC Frame Format (IEEE 802.3), Format of Ethernet (DIX) Frame, The Binary Exponential Backoff Algorithm,
Error detection: types of errors, **detection methods**: parity check, cyclic redundancy check, checksum
Error correction: forward error correction, hamming code.

Unit-IV
Introduction: Computer network, LAN, MAN, WAN, Simplex, Half duplex, Full duplex,
Transmission media: Twisted Pair cable, Coaxial cable, Fiber optics: Multi mode & single mode (overview).
Network topologies: Star topology, ring topology, bus topology, mesh topology, Client server n/w, Peer to peer n/w, Distributed n/w,
Wireless n/w: Bluetooth, 802.11a, b, c, n, ac series, comparison of 802.11ac & n
Models: OSI Model, TCP/IP reference Model, Comparison of TCP/IP & OSI model.

Unit-V

Network layer: Virtual circuits, Shortest path routing, Overview of (Flooding, Broadcast, Multicast IP addresses), IPv4 addresses, IPv4 subnetting, overview of IPv6 addresses, Overview of (Tunneling, Firewalls)

Transport layer: Quality of service, Elements of transport protocol, and Performance problems in computer networks,

Application layer: Basic overview of (FTP, Telnet, HTTP, Email, DNS, World Wide Web, Virtual terminal).

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **Tannenbaum (2004),**"Computer Networks", Fourth Edition **PHI.**

References:

1. **Behrouz A. Forouzan (2006)**, "Data communication & Networks", Fourth Edition, **TMH.**
2. **Uyless D.Black (2004)**, "Data Communication & Distributed Networks", 3rd Edition, **PHI.**

Course Code: MC-343 **Maximum Marks : 100**
Course Title : Relational Database Management System **University Examination: 60**
Internal Assessment: 40
Credits: 4 **Duration of Examination:3 Hours**

Objective:

The aim of the course is to introduce students to the fundamental concepts necessary for designing, using and implementing database systems. It emphasizes relational database modeling & design and the languages and facilities provided by the relational database management systems.

Unit-I

Database System Concepts & Architecture: Concept, Characteristics of database, Database system Vs file system, Introduction to DBMS, Advantages, Disadvantages of DBMS, Database users.

Database System Concept & Architecture: Concept, schemas and instances, DBMS architecture & data independence, Components of DBMS, Database Languages & Interfaces, Centralized & Client/Server Architectures of DBMSs.

Unit-II

Data models: Data modeling using ER-Approach (Concept, ER-Notations, Entities, Entity types, Attributes, Attribute types, Relationships Keys concept).

Conventional Data Models & Systems: Network data model concept, Hierarchical model concept.

Relational Data Model: Concept, Relational model Constraints (Entity Integrity, Referential Integrity, Key Constraints, Domain Constraints), Codd's Rules, Relational Algebra (Fundamental Operations).

Unit-III

Relational Database Design & Normalization: Concept of Functional dependencies (Fully, partial, Transitive), Normalization of relational database, Closure of Attribute Set, Canonical Cover, Norm forms (1NF, 2NF, 3NF, BCNF, 4NF), Join dependencies.

Unit-IV

Concurrency: Concept, Transaction states, Transaction properties (ACID Test), Serializability, Recoverability.

Concurrency Control & Recovery Techniques: Concurrency control concept, Concurrency control techniques, Locking (concept, types), Time stamp ordering, Granularity of data items, Dead lock & its Resolution.

Recovery Concepts, Recovery Techniques (Log based, Shadow paging, Checkpoint)

Introduction to Database Security.

Introduction to Object Oriented & Multimedia Databases.

Unit-V

PL/SQL: Introduction, Concept, Characteristics of SQL, Advantages of SQL, Data definition in SQL, literals, Operators, Specifying Constraints in SQL, Data manipulation in SQL, Views & Queries, Insert, Update & Delete Operations, Creating users, Grant and revoke object privileges. Introduction to PL/SQL: variable, constants, data types, Pl/SQL block structure, Condition and iterative control statements, Concept of cursors & trigger.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Text Books:

1. **Elmarsi, Navathe, S B (2004)**,"Fundamentals of database Systems", **Pearson Education**.
2. **Silbebschatz, A. Korth, H,F. Sudarshan ,S (2006)** ,"Database System Concepts", **TMH .**

References:

1. **Date, C J (2005)**, "An Introduction to Database Systems", **Addison Wesley**.
2. **Desai, B C (2002)**, "An introduction to database Systems", **Galgotia Publications**.
3. **Leon (2004)**, "Database Management Systems", **Vikas Publications.**
4. ***Bayross I.***, "Commercial Application Development using Oracle Developer 2000", **BPB.**

Course Code: MC-344 **Maximum Marks : 100**
Course Title : Java Programming. **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:

This course acquaints students with object oriented programming concepts and other advanced features and their implementation in Java language.

Unit-I
Introduction: An overview to Java, Comparison with other languages (C & C++), Java and Internet, Features of Java, Introduction to Java Virtual machine, Object Oriented Programming Concepts: Abstraction, Encapsulation, Inheritance and Polymorphism.
Data types: Integers, Floating point, Character type and Boolean.
Variables: Assignment, Initialization, type conversion & Casting.
Operators: Arithmetic, Assignment, Modulus, Relational, Boolean and Bitwise.

Unit-II
Arrays: Concept, Single and Multidimensional arrays.
Control statements: Conditional statements, Iteration Statements and Jump Statements.
Classes & Methods: Class Fundamentals, Declaring Objects, Creating Methods, Constructors, Command Line Arguments & Argument Passing. Static variables and methods.

Unit-III
Inheritance: Basics Of Inheritance, Super Class, Member Access, Creating a Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch & Abstract Class.
Packages & Interfaces: Defining and Importing Packages, Understanding Classpath, Access Protection, Defining and Implementing Interfaces.
Exception Handling: Fundamentals of Exceptions, Exception Types, Using Try and Catch, Throwing Exceptions, Built-In Exceptions in Java, User Defined Exceptions.

Unit-IV
Multithreaded Programming: Java Thread Model, Creating & Working with Threads, Thread Priorities, Introduction to Synchronization and Dead Locks.
String Handling: String Constructor, String Operations, Character Extraction, String Searching & Comparison, String Buffer Class, String Buffer V/s String Class.
Lang Package: Simple Type Wrappers, Runtime & Introduction To Memory Management.

Unit-V
I/O Streams: Stream Classes, Reading & Writing to Console, Accessing files & Directories, File Input and Output Stream, Byte Array Input & Output Stream.
Applets: Overview, Life cycle of an Applet, HTML tag, Parameter Passing, Applet vs. Applications.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Text Books:

1. **Schildt, H (2004),** "The Complete Reference Java-2 ", Sixth Edition, **TMH.**

References:

1. **Dietel & Dietel (2006),** "Java: How to Program Java 2", Sixth Edition, **Pearson Education.**
2. **Horstmann & Cornell (2006),** "Java2 Vol-1 & Vol-2", Seven Indian Reprint, **Pearson Education.**