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,

J&K-185234

Website: www.bgsbuniversity.org

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

FOR THE YEAR

2016, 2017, 2018

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

Course Code	Course Title (Core Courses)	Credits	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MC-141	Mathematical Foundation of Computer Science	4	3	40	60	100
MC-142	Digital Electronics	4	3	40	60	100
MC-143	Operating Systems	4	3	40	60	100
MC-144	Principles of Programming & Problem Solving using C	4	3	40	60	100
MC-171	Lab 1: PC Software	4	3	50	50	100
MC-172	Lab 2: C Programming	4	3	50	50	100
Total Marks				**260**	**340**	**600**

IA – Internal Assessment
UE – University Examination

Course Code: MC-141
Course Title : Mathematical Foundation of Computer Science
Credits: 4

Maximum Marks : 100
University Examination: 60
Internal Assessment: 40
Duration of Examination: 3 Hours

Objective:
The objective of the course is to introduce fundamentals of discrete mathematics to students for application in Computer Science & Engineering. Through examples and exercises, it will raise the student's general mathematical sophistication, i.e. the ability to deal with and create complex structures and convincing arguments.

Unit-I

Set Theory and Matrices: Basic set theory: sets, types of sets, subsets, operations on sets, Algebra of set theory, Relations, Functions: Composite Functions, Floor functions, Ceiling Functions; Mathematical Inductions, Matrices and Determinants: Addition and Multiplication of Matrices, Transpose and Inverse of Matrices, Cramer Rule, Gauss Elimination Method, Partially Ordered sets, Lattices.

Unit-II

Logic and Propositional Calculus: Propositions, Basic Logical Operations, Tautologies and Contradictions, Algebra of Proposition, Logical Implications and Equivalence, Propositional Functions, Quantifiers, Normal Forms, Rules of Inference.

Unit-III

Counting Technique: Basic Counting Principle, Permutation, Combination, Permutation with Repetitions, Pigeonhole Principle, Generating Functions, Recurrence Relations.

Unit-IV

Introduction to Graph Theory: Introduction, Graphs, Pseudographs, Subgraphs, Connected Graphs, Disconnected Graphs, Euler Graphs, Operations on Graphs, Hamiltonian Paths and Circuits, Applications of Graph theory, the Traveling Salesman Problem.

Unit-V

Spanning Trees & Planer Graphs: Trees, Spanning Trees, Fundamental Circuit, Planer Graphs, Kurtowski's Two graphs, Detection of Planarity, Euler's Formula, Matrix Representation of Graphs, Coloring and Covering of Graphs, Directed Graphs(digraphs).

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. **Seymour, L (2001)**, "Discrete Mathematics", 2nd Ed**. Tata McGraw Hill, New Delhi.**
2. **Tremblay, J. P & Manhor, R (2004)**, "Discrete Mathematical Structure with Application to Computer Science", 21st edition. **Tata McGraw Hill. New Delhi.**

References:

1. **Deo**, **N (2005)** ,"Graph Theory with applications to Engineering and Computer Science", **PHI.**
2. **Liu**,**C. L (2004)**,"Elements of Discrete Mathematics", 2ndEd. **TMH, New Delhi.**
3. **Rosen**,**K. H (2004)**, "Discrete Mathematics & its Applications", 5th Ed**. Tata McGraw Hill.**

Course Code: MC-142 **Maximum Marks : 100**
Course Title: Digital Electronics. **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:

The objective of the course is to acquaint the student the fundamentals of digital electronics and implementation of digital electronics that are essential to understand the design and working of consumer/industrial electronics, communications, embedded systems, etc.

Unit-I

Digital and Analog quantities: Introduction, Number system (Binary, Octal Decimal, Hexadecimal), Number Based Conversions, Binary Arithmetic, Compliments (1's and 2's compliments of binary numbers). Weighted and Non-weighted Codes, BCD Codes, excess-3 Codes, gray codes, ASCII codes, EBCDIC codes.

Unit-II

Boolean Algebra & Combinational Logic: Introduction, Logic Gates Logic Gates (NOT, OR, AND), Universal Gates (NAND, NOR), X-OR, X-NOR, Boolean Algebra an Logic Simplification, Boolean Operation and Expressions, Laws and rules of Boolean algebra, De-Morgan's Theorems, Simplification using Boolean Algebra, The Karnaugh Map. Half Adder, Full Adder, Half Subtarctor, Full Subtractor, BCD Adder, Basic Binary Decoder,4 bit decoder, BCD to Decimal Decoder, BCD to 7 segment decoder, Decimal to BCD Encoder, Octal to Binary Encoder, Priority Encoder.

Unit-III

Sequential Circuits: Introduction, Latches(SR Latch , D Latch) , Flip-Flops(RS,T, D, JK, Master-Slave).Conversion of Flip-Flops(SR Flip-Flop to JK Flip-Flop, JK Flip-Flop to SR Flip-Flop), Application of Flip- Flops.

Unit-IV

Counters: Introduction, Asynchronous Counters: 2-bit Asynchronous Binary Counter, 3-bit Asynchronous Binary Counter, Asynchronous Decade Counter, 4-bit Asynchronous Binary Counter. Synchronous Counters: 2-bit Synchronous Binary Counter, 3-bit Synchronous Binary Counter, 4-bit Synchronous Binary Counter, 4-bit Synchronous Decade Counter, Synchronous BCD Decade Counter, UP/DOWN Synchronous Counters.

Unit-V

Registers: Introduction, Basic Shift Register functions, Serial IN/ Serial OUT Registers, Parallel IN/ Serial OUT Registers, Parallel IN/ Serial OUT Shift Registers. Parallel IN/ Parallel OUT Shift Registers.
Logic Families: Introduction, Terminology (Threshold Voltage, Propagation Delay, Power Dissipation, Fan-in, Fan-out), Transistor Transistor Logic(TTL),Emitter –Coupled Logic

(ECL), Metal Oxide Semiconductor (MOS) Logic, Complementary Metal Oxide Semiconductor (CMOS) Logic.

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. **Floyd and Jain(2006)**, "Digital Fundamentals", First impression, **Pearson Education.**

References:

1. **Kumar A.Anand**, **"**Fundamentals of Digital circuits", **PHI.**
2. **Tocci J. Ronald**, "Digital Systems Principles & Applications", **Pearson Education.**
3. **M. Morris Mano**, "Digital Logic & Computer Design", **PHI.**
4. **M. Morris Mano**, "Digital Design",3rd Edition, **PHI.**

Course Code: MC-143 **Maximum Marks : 100**
Course Title : Operating Systems. **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:

The course aims at introducing students to the fundamental concepts of operating systems. The emphasis is on making students familiar with the principles and processes of operating systems, in context of process management, input/output, memory management and file systems.

Unit-I

Operating System: Introduction, Evolution (Serial processing, Batch Processing, Multiprogramming), Types of OS (Multi-Programming, Time-Sharing, Distributed, and Real-Time Systems), Operating System Structure (Monolithic, Layered, Kernel, Virtual Machine, Client Server Model).

Unit-II

Process Management: Process Concept, Process states, Implementation of process, PCB, Threads, CPU Scheduling, Types of Schedulers, Scheduling Criteria, Scheduling Algorithms(FCFS, SJF, Priority Based, Round Robin, Multilevel Queue).

Unit-III

Inter-process Communication & Synchronization: Race condition, Critical Section Problem, Mutual Exclusion, Synchronization Hardware, Peterson's Solution, Producer -Consumer Problem, Semaphores.
Deadlocks: Model, Prevention, Avoidance, Detection and Recovery.

Unit-IV

Memory Management-I: Basic Hardware, Address binding, Concept of Logical and Physical Addresses, Dynamic loading, Swapping, Single Process Monitor, Multiprogramming with Fixed Partition and Dynamic Partition, Paging (Basic method, Hardware support (TLB)), Segmentation (Basic method, Hardware support).

Unit-V

Memory Management-II: Virtual Memory and its Advantages, Demand Paging (Basic concept), Page Replacement algorithms (FIFO, Optimal Page Replacement, Least Recently Used).

Disk management: Concept of Files and Directories, Disk allocation methods (Contiguous, Non-contiguous, Indexed), Disk Scheduling Methods (FCFS, Shortest seek Time first, Scan Scheduling).

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. **Siberscatz A & Galvin, P (2004)**, "Operating System Concepts", **Willey Pub.**

References:

1. **Milankovic**. **M (2004)**, "Operating System Concepts & Designs", **TMH.**
2. **Tanenbaum, A. S (2000)**, "Modern Operating System", **PHI.**

Course Code: MC-144 **Maximum Marks : 100**
Course Title : Principles of Programming & Problem Solving using C. **University Examination: 60**
Internal Assessment: 40
Credits: 4 **Duration of Examination:3 Hours**

Objective:

The objective of the course is to develop logical ability and basic programming skills in students to pave the way for problem solving.

Unit-I

Problem Solving: Introduction, Steps in Problem Solving, Problem Solving Techniques (Trial & Error, Brain Storming, Divide & Conquer), Flowcharts and Algorithms (Definition, Symbols & Characteristics), Simple Examples of Flowcharts and Algorithms (Real Life Examples), Concept of Programming Languages, Categories of Languages.

Unit-II

Introduction to C- Language: History, Features, Structure & Life Cycle of a C- Program Data types and sizes, Variables, Constants, Keywords, Storage Classes, Operators (Unary, Arithmetic, logical, Bitwise, Assignment, Ternary), Expressions, Control statements (if-else, switch, break, continue, go to), Loops (for, while, do-while).

Unit-III

Arrays, Functions & Sorting: Arrays (Linear and Multi-dimensional); String handling; Functions (built-in and user defined), declaration, definition, and function call, parameter passing and return types, Recursion, Sorting: Bubble Sort, Insertion Sort and Selection Sort.

Unit-IV

Structures and Union: Declaration, Accessing structure and union elements, difference, Array of structures, Nested structures, passing Arrays and Structures to functions; Pointers, Array of pointers, Call by Value and Call by Reference.

Unit-V

File Handling: Introduction to file handling in C, File Access Modes, Text vs. Binary Files, File I/O Operations, and Error Handling in Files, Formatted Input/output, and Random Access to Files, Reading & Writing File Records with Sorting, Searching and Merging Operations, Command Line Arguments.

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. **Balagurusamy**. **E (2005)**, "Programming in ANSI C", **TMH, New Delhi**.
2. **Kanetkar Y (2004)**,"Let Us C", **BPB, New Delhi .**

References:

1. **Mulish**, **C (2004)**,"The Spirit of C", **Jaico Publications, New Delhi**.
2. **Keringhan, B. W & Ritche, D.M (2005)**, "C Programming language", **PHI New Delhi.**
3. **Schildt,H (2004)**, "A Complete Reference in C", **TMH**, **New Delhi**.
4. **Shrivastav(2002)**,"C in Depth", **BPB, New Delhi**.
5. **Gottfried (2004)**, "Programming with C", **Schaum Series, TMH, New Delhi**.