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MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Post Graduate Department of Computer Sciences,  
The University of Kashmir,  
Srinagar - 190006



Choice Based Credit System Curriculum for

Master of Computer Applications  
(MCA) Programme  
2017 – 2019

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To be effective from the year 2017

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## MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Semester-I (24 Credit unit Semester)						
Subject Code	Subject name	Subject Category	Hours / Week			Credits
			L	T	P	
<b>12 Core Credit Units</b>						
MCA17101CR	Programming in C++	Core	3	1	0	4
MCA17102CR	Database Systems	Core	3	1	0	4
MCA17103CR	C++ Lab	Core	0	0	4	2
MCA17104CR	Database Systems Lab	Core	0	0	4	2
<b>8 Discipline Centric Elective Credit Units</b>						
MCA17105DCE	Assembly Language Programming	DCE	3	0	2	4
MCA17106DCE	Discrete Mathematics	DCE	3	1	0	4
MCA17107DCE	Computer Architecture	DCE	3	0	2	4
<b>4 Generic/Open Elective Credit Units for MCA and 10 non-MCA students</b>						
MCA17108OE	Technical Communication	GOE	2	0	0	2
MCA17109OE	Latex	GOE	2	0	0	2

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# MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Subject Code: MCA17101CR

Subject Name: Programming in C++

## Unit I [12 L]

Data Types, Identifiers , Variables Constants and Literals. Arithmetic Relational Logical and Bitwise. Basic input/output statements. [2L]

Control structures: if-else statement , Nested if statement, Switch statement Loops: while loop, do while, for loop, Nested loops. [3L]

Arrays: Declaration; initialization; 2-dimensional and 3-dimensional array, passing array to function, Strings and String functions, and character arrays. [3L]

Functions; prototype, passing parameters, storage classes, identifier visibility, Recursive functions. [4L]

## Unit II [ 12 L]

Command-line arguments. Variable scope, lifetime. Multi-file programming, Introduction to macros. File processing in C . [4L]

Structures and unions: syntax and use, members, structures as function arguments passing structures and their arrays as arguments.[ 2L ]

Pointers: variables, pointers and arrays , pointers to pointers , strings , pointer arithmetic , portability issues, pointers to functions, void pointers , pointer to structure. [4L]

Introduction to object oriented programming, Abstraction, Encapsulation.[ 2L ]

## Unit III [ 8 L]

Introduction to classes and objects; Access specifiers, Constructor; destructor; Function overloading; Operator overloading; friend functions; Use of call-by-reference for efficiency. Copy constructor. [4L]

Inheritance: Single ,Multiple, and Multilevel Inheritance;[2L]

Virtual functions and Polymorphism/Dynamic binding vs Static binding; Virtual Destructors.[2L]

## Unit IV [ 8 L]

Pure virtual function; concrete implementation of virtual functions[2L]

Templates: Function Templates, Class Templates, Member Function Template and Template Arguments, namespaces , Exception Handling Concepts [4L]

Input and Output: Streams classes, Stream Errors, Disk File I/O with streams. [2L]

## Reference Books:

1. FOSTER AND FOSTER “C by discovery” RRI penram.
2. ROBERT LAFORE “Object orientation with C++ Programming” Waite Group.
3. YASHWANT KANETKAR “Let us C” PHI.
4. E. BALAGURUSWAMI “Programming in ANSI C” Tata McGraw Hill.
5. BJARNE STROUSTRUP “The C++ programming language” Pearson Education.
6. HERBERT SCHILD “C++ The complete Reference” Tata McGraw Hill.

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# MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Course No: – MCA17102CR  
Course Title: Database Systems

## Unit I

Database basics – DBMS, RDBMS, ORDBMS. Characteristics and Services of Database Management System, Advantages and Disadvantages of DBMS. Schemas, and Instances, Comparison Three Schema Architecture and Data Independence. Database Languages. DBMS architectures, Criterion for Good Database Design [3L]

Data Models: Object Based Model, Record Based Model. Codd's rules [3L].

Relational Algebra – Basic and Derived operators with examples [2L]

Database Design through Functional Dependencies & Normalization. Functional Dependencies, Lossless Join, Normal Forms: 1NF, 2NF, 3NF, 4NF (BCNF) [4L]

## Unit II

Introduction to Oracle, Tools of Oracle, Introduction to SQL, Data Types, Data Definition Language, Data Manipulation Language [4L]

Transaction Control Language, Integrity Constraints, SQL Functions, Set Operators and Joins, View, Synonym and Index [4L]

Sub Queries and Database Objects, User Management, Privileges, Locks and SQL Formatting Commands. [4L]

## Unit III

Introduction to PLSQL, Basic Architectures, Data Types, Conditional and Looping Logic [4L].

Concept of Implicit and Explicit Exception Handling, Cursors and Database Triggers, Subprograms and Packages. [4L]

## UNIT IV

Transaction Processing –Transaction Processing Basics, Transaction and Systems Concepts, Transaction Properties. [2L]

Characterizing Schedules and Recoverability, Schedules and Serializability. [2L]

Concurrency Control - Two Phase Locking, Timestamp Ordering. [2L]

Database Recovery – Basic Concepts, Transaction Rollback, Recovery based on Deferred and Immediate Update, Shadow Paging [2L]

## Reference Books:

1. Fundamentals of Database Systems, Elmasri & Navathe, Pearson Education Ltd. 2016.
2. Database System Concepts, Silberschatz, Korth, & Sudarshan, McGraw-Hill, 2011.
3. An introduction to Database Systems, Date C. J, Pearson, 2006.
4. SQL, PL/SQL: The Programming Language of Oracle, Bayross I. BPB Publications, 2009
5. Teach Yourself SQL and PL/SQL Using Oracle 8i and 9i with Sqlj, Bayross I. BPB Publications, 2003

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# MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Course No: MCA17105DCE  
Course Title: Assembly Language Programming

Credits Units = 4

LTP Scheme= (3L + 2P)/Week

## Unit I:

8086 Microprocessor: 8086 Microprocessor Architecture (BIU, EU, Instruction Queue), Software Model (General Purpose Registers, Segment Registers, Flag & Other Registers). Segmentation. [4L]

8086 Pin Functions, Minimum and Maximum Mode, The 8086 Memory System [2 L]

8086 Basic Programming: 8086 Programming Model, 8086 Instruction Formats, Addressing Modes. [4L]

The 8086 Instruction Set. [ 32L ]

## Unit II:

Assembly Language Programming: Significance, Assemblers and Linkers, TASM Directives - Data Definitions, Named-constants, User-defined, Segments, Subroutines, Macros, Modular-code. [2L ]

Programming with Data Transfer, Arithmetic and Logical Instructions: Data Transfer, Arithmetic, Logical/Bit Manipulation, [4L]

Branching and Looping : Unconditional and Conditional Jump instructions, Decision making and looping, Loop instructions, ASCII and BCD Arithmetic, Processor Control Instructions. [4L]

Shift Instructions, Rotate Instructions and String Instructions [3L]

## Unit III:

Stacks: Defining a stack, Push and Pop Instructions [2L]

Procedures: Defining and Calling procedure. CALL and RET instructions, Parameter Passing Methods, Far procedure [4L]

Macros : Working with macros, additional assembler directives [2L]

INT 21H: INT 21H Keyboard Services, Display Services, and File Manipulation Services. [3L]

Input/Output Instructions [2L]

**Text Book:** M.T. Savalia. 8086 Programming and Advanced Processor Architecture. Wiley India.

## Reference Books:

1. T.P. Skinner. An Introduction to 8086/8088 Assembly Language Programming. John Wiley .
2. W. A. Triebel, A. Singh. The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, And Applications. Pearson Education, 2007.
3. B. B. Brey, The Intel Microprocessors: Architecture, Programming and Interfacing, Merrill, 2<sup>nd</sup> Edition, 1991.

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# MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Course No: MCA17106DCE

Course Title: Discrete Mathematics

## UNIT I

Proposition, Logic, Truth tables, Propositional Equivalence, Logical Equivalence, Predicates and Quantifiers; Sets: operations on sets, Computer representation of sets, Cardinality of a Set **(5L)**

Functions: Domain, Range, One-to-One, Onto, Inverses and Composition, Sequences and summations, The growth of functions. **(5L)**

Methods of Proof: Direct Proof, Indirect Proof, Mathematical Induction for proving algorithms; Counting techniques – Permutations, Combinations, The Pigeonhole Principle. **(5L)**

## UNIT II

Discrete Probability, Advanced Counting Techniques: Inclusion-Exclusion, Applications of Inclusion-exclusion principle, recurrence relations, solving recurrence relation. **(5L)**

Relations: Relations and their properties, Binary Relations, Equivalence relations, Diagraphs, Matrix representation of relations and digraphs. **(5L)**

Computer representation of relations and digraphs; Transitive Closures, Warshall's Algorithm, Problem solving on Warshall's Algorithm. **(5L)**

## UNIT III

Partially Ordered Sets (Posets), External elements of partially ordered sets, Hasse diagram of partially ordered set, isomorphic ordered set, Lattices: Properties of Lattices, complemented Lattices. **(5L)**

Graph theory: Introduction to graphs, Graph Terminology Weighted graphs, Representing Graphs, Connectivity of Graphs: Paths and Circuits, Eulerian and Hamiltonian Paths, Matrix representation of graphs. Graph Coloring and its applications. **(5L)**

## UNIT IV

Trees: Rooted trees, Application of trees: Binary Search Trees, Decision Trees, Prefix Codes, Tree traversal, trees and sorting, spanning trees, minimal spanning trees. **(5L)**

Finite Boolean algebra, Functions on Boolean algebra, Boolean functions as Boolean polynomials. Groups and applications: Subgroups, Semigroups, Monoids Isomorphism, Homomorphism. **(5L)**

## Reference Books:

1. KENNETH H. ROSEN "Discrete Mathematics and Its Applications" The Random House/Birkhauser Mathematics series
2. LIU "Elements of Discrete Mathematics " Tata McGraw Hill
3. SCHAUMS "Discrete Mathematics " Tata McGraw Hill
4. KOLMAN/REHMAN "Discrete Mathematical Structures " Pearson Education
5. NICODEMI "Discrete Mathematics " CBS

Course No: – MCA17107DCE

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# MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

## Course Title: Computer Architecture

### Unit I

The Processor Architecture: Von-Neumann and Non-Von-Neumann Machines. Functional units. Basic Operational Concepts: Performance. Processor clock. Basic performance equation. Clock rate. CISC and RISC architectures. **[4L]**

Machine Instructions and programs: Number Representation. Addition of positive numbers. Addition and subtraction of Signed Numbers. **[2L]**

Memory locations and addresses. Byte Addressability. Big and little endian Assignment. Word Alignment. Instructions and Instruction Sequencing. Basic instruction types. Instruction execution and Straight-Line Sequencing. Branching. Condition Codes. **[4L]**

Addressing Modes. Indirection and pointers. Indexing and arrays. Relative Addressing. **[3L]**

### UNIT II

Memory hierarchy: basic structure of memory hierarchy, definitions (block, hit rate, miss rate, miss penalty); Basics of Caches (direct mapped, handling cache misses, handling writes); Design of Memory system to support caches. **[4L]**

Performance of caches: reducing cache misses by flexible block placement (fully associative and set associative); Block replacement algorithms; multilevel caches for reducing miss penalty. **[4L]**

Virtual Memory: addressing (physical address, virtual address, address translation), segmentation; Page placement and retrieval; Page faults (swap space); TLB and fast address translation. **[4L]**

Basic Processing Unit: Fundamental Concepts. Register transfers. Performing an arithmetic or logic operation. **[1L]**

### UNIT III

Multiple-Bus Organization. Execution of Branch Instructions. **[3L]**

Hardwired Control Unit. Micro programmed control unit. Microinstructions. Micro-program Sequencing. **[4L]**

Pipelining: Role of cache memory. Data hazards. Operand Forwarding. Handling Data Hazards in Software. Instruction Hazards: Unconditional Branches. Conditional Branches and Branch Prediction. **[3L]**

Data path and control considerations. Out-of-Order Execution. Superscalar Operation. Performance considerations Number of Pipeline Stages. **[3L]**

### Text Book:

“Computer Organization”, Carl Hamachar, Zvonco Vranesic and Safwat Zaky: McGraw Hill.

### References

1. “Computer Organization and Design: The Hardware/Software Interface”, David A. Patterson and John L. Hennessy: Elsevier
2. “Computer Organization and Architecture: Designing for Performance”, William Stallings: Pearson Education.

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# MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Course No: MCA17108OE

Course Title: Technical Communications

## Unit I

Basics of Technical Communication, Barriers to Communication, (3 lectures)

Technology in Communication. Communicating in the Workplace: Problem Solving in Workplace Communication, Guidelines for writing with a computer, (4 lectures)

Human factors in the communication failure, Guidelines for ethical communication. Guidelines for organizing a collaborative team, Active Listening: Introduction, types of listening, Traits of a good listener (6 lectures)

## Unit II

Defining purpose, analyzing audience and locale, organizing contents, visual aids, understanding nuances of delivery, kinesics, sample speech. (4 lectures)

Interviews: introduction, Objectives, types of interviews, Job interviews. Group Communication: Introduction, Group discussion, (3 lectures)

Sentence construction, guidelines for effectiveness, Paragraph development, Central components of a paragraph, The art of condensation, steps for effective précis writing, Reading comprehension, purpose and reading rate, reading comprehension, reasons for poor comprehension, improving comprehension skills, techniques for good comprehension. (6 lectures)

## **Reference Books:**

1. Meenakshi Raman and Sangeeta Sharma, "Technical Communication", Oxford University Press
2. William Pfeiffer, Padmaja "Technical Communication A Practical Approach" , Pearson Education.



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# MCA Syllabus –P.G. Dept. of Computer Science, University of Kashmir

Course No: MCA17109OE

Course Title: Latex

## Unit I: Basic Typesetting and Formatting

What is LATEX? Why Latex? Simple typesetting: Spaces, Quotes, Dashes, Accents, Special symbols, Text positioning; Fonts: Type Style, Type Size. **[3 Lectures]**

The Document: Document class, Font and Paper size, Page formats; Page style: Heading declarations, Page numbering, Formatting Lengths; Parts of a Document: Title, Abstract, Chapters, Sections, Subsections, Paragraph etc.; Footnotes and Endnotes. **[5 Lectures]**

Making Lists: Bulleted, Numbered, Descriptions and Definitions; Using Tabs: Rows and Columns; Creating tables using the tabular: Enhancements to the tabular, Array package, Multirow package; Using other external packages. **[5 Lectures]**

## Unit II: Advanced Typesetting, Floats and Referencing

Typesetting Mathematics: Basics, Superscripts and Subscripts, Mathematical Symbols; Custom commands and operators; Formatting Equations: Numbering and Groups; Typesetting Theorems. **[4 Lectures]**

Using Floats: The Figure environment, Creating floating figures, Figure placement; Using graphics in LATEX: Rotating and Scaling objects; The Table environment: Constructing tables, Table Style parameters. **[4 Lectures]**

Table of Contents, Index and Glossary; Bibliography: Introduction; Using natbib: basic commands and options, Selecting citation style and punctuation; Bibliographic Databases: Using external style files, creating a bibliographic database. **[5 Lectures]**

## References:

1. E. Krishnan. *LATEX Tutorials A PRIMER*. Indian TEX Users Group, Trivandrum, India, 2003