# DEPARTMENT OF COMPUTER SCIENCE

# A.P.S. UNIVERSITY, REWA, M.P.

## Syllabus For



# M.Sc. in Computer Science

### (Two year, Four Semester Fulltime Course, Under Self Supporting)

# 2008-09 Onwards

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science, A.P.S. University, Rewa (M.P.)

### Curriculum for M.Sc in Computer Science at a glance
### Session 2008-2009

| Paper Code | Nomenclature of Paper | Max (Min) (Th Prac) | Max (Min) CCE | Total |
|---|---|---|---|---|
| **MSCS (First Semester)** | | | | |
| MSCS-101 | Mathematics foundation of Computer Science I: Discrete Mathematics | 70(24) | 30(10) | 100 |
| MSCS-102 | Computer System Architecture | 70(24) | 30(10) | 100 |
| MSCS-103 | Data Structure using C | 70(24) | 30(10) | 100 |
| MSCS-104 | DBMS (Data Base Management System) | 70(24) | 30(10) | 100 |
| MSCS-105 | Numerical Methods | 70(24) | 30(10) | 100 |
| MSCS-106 | S/W Lab I-problems based on M Sc. CS 102/ MSc. CS 103 | 70(35) | 30(15) | 100 |
| MSCS-107 | S/W Lab II-problems based on M Sc. CS 104/ MSc. CS 105 | 70(35) | 30(15) | 100 |
| MSCS-108 | Application Project | - | - | 50* |
| **MSCS (Second Semester)** | | | | |
| MSCS-201 | System Software | 70(24) | 30(10) | 100 |
| MSCS-202 | Software Engineering | 70(24) | 30(10) | 100 |
| MSCS-203 | Object Oriented Programming | 70(24) | 30(10) | 100 |
| MSCS-204 | Computer Network | 70(24) | 30(10) | 100 |
| MSCS-205 | Advanced Programming Language | 70(24) | 30(10) | 100 |
| MSCS-206 | S/W Lab III-problems based on M Sc. CS 203 | 70(35) | 30(15) | 100 |
| MSCS-207 | S/W Lab IV-problems based on M.Sc. CS 205 | 70(35) | 30(15) | 100 |
| MSCS-208 | Application Project | - | - | 50* |
| **MSCS (Third Semester)** | | | | |
| MSCS-301 | Operating System | 70(24) | 30(10) | 100 |
| MSCS-302 | Computer Graphics | 70(24) | 30(10) | 100 |
| MSCS-303 | Java Programming | 70(24) | 30(10) | 100 |
| MSCS-304(B) | Mathematics foundation of Computer Science II Theory of Computation | 70(24) | 30(10) | 100 |
| Elective | | 70(24) | 30(10) | 100 |
| MSCS-305(A) | E-commerce | 70(24) | 30(10) | 100 |
| MSCS-305(B) | Digital Image Processing | 70(24) | 30(10) | 100 |
| MSCS-305(C) | Advanced Computer Architecture | 70(24) | 30(10) | 100 |
| MSCS-305(D) | Bio-informatics | 70(24) | 30(10) | 100 |
| MSCS-305(D) | Multimedia | 70(24) | 30(10) | 100 |
| MSCS-306 | S/W Lab V-problems based on M.Sc. CS 302 | 70(35) | 30(15) | 100 |
| MSCS-307 | S/W Lab VI-problems based on M.Sc. CS303 | 70(35) | 30(15) | 100 |
| MSCS-308 | Application Project | - | - | 50* |
| **MSCS (Fourth Semester)** | | | | |
| MSCS-401 | Major Project ( Six Month real life Project from Industry) (*50% for Project Reporting, 30% for Presentation & 20% for Viva-voce | | | 750* |

**Grand Total of marks = 3000**

- CCE  CONTINUOUS COMPREHENSIVE EVALUATION.
- INDIVIDUAL PASSING REQUIRED FOR THEORY AND PRACTICAL SUBJECT

Subject to the approval of higher bodies after due amendment in the ordinance, wherever necessary.

# Department of Computer Science
## A.P.S. University, Rewa (M.P.)
### Syllabus for M.Sc. Computer Science- First Semester
### (Session 2008-2019)

Paper- (MCS-101) –Mathematical foundation of Computer Science I: Discrete Mathematics

Max.Marks. 70

Time: 3 hours

Min.Marks. 24

## UNIT – I

**Mathematical Logic and Set theory:**

Intorduction. The theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the predicate Calculus, Set Theory: Introduction, Basic Concepts of Set Theory, Elementary representation of Discrete Structures: Relations and Ordering: Properties of Binary Relations in a set, Relation Matrix and the Graph of a Relation, Composition of Binary Relations, Partial Ordering, Functions: Compositon, Characteristics, Natural Numbers.

## UNIT – II

## Algebraic Structures:

Introduction, Algebraic Systems: Examples and General Properties: Definition and Examples, Some Simple Algebraic Systems and General Properties, Semigroups and Monoids: Definitions and Examples, Homomorphism of Semigroups and Monoids, Subsemigroups and Submonoids, Grammars and languages: Discussion of Grammars, Formal Definition of a Language, Notions of Syntax Analysis, Polish Expressions and Their Compilation, Groups: Definitions and Examples. Subgroups and Homomorphism, Cosets and Lagrange's Theorem, Normal subgroups, Algebraic Systems with Two Binary Operations.

## UNIT – III

## Lattices and Boolean Algebra

Introduction Lattices as Partially Ordered Sets: Definition and Examples. Some Properties of Lattices, Lattices as Algebraic Systems. Sublattices, Direct Product and Homomorphism, Some Special Lattices, Boolean Algebra. Definition and Examples, Subalgebra, Direct product and Homomorrphism. Boolean Functions Boolean Forms and Free Boolean Algebra, Values of Boolean Expressions and Boolean Functions. Representation of Boolean Functions, Minimization of Boolean Functions, Design Examples Using Boolean Algebra.

## UNIT – IV

## Graph Theory

Introduction, Basic Concepts of Graph Theory: Basic Definitions, Paths, Reachability and Connectedness, Tree and fundamental Circuits: Some Properties of trees, Pendent vertices in a tree, Distance and Centers in a tree, Rooted and Binary trees, Spanning trees, Fundamental Circuits. Matrix Representation of Graphs: Incidence Matrix, Circuit Matrix, An application to a Switching network, Path Matrix and Adjacency Matrix

**Text-Book:**
1.      Trembley J. P. & Manohar R: Discrete Mathematical Structures with Application to Computer Science, TMH
2      S. Lipchutz: "Finite Mathematics", Schaum Series, MGH.

**Reference Book:**
1      Liu. C.L. Elements of Discrete Mathematics, MGH
2      Deo N: Graph theory, PHI

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science,A.P.S. University, Rewa (M.P.)
## Syllabus for M.Sc. Computer Science- First Semester
### (Session 2008-2010)
### Paper (MCS-102) – Computer System Architecture

Max.Marks. 70
Min.Marks. 24

Time: 3 hours

## UNIT – I

**Basic Computer Organization:**
Block diagram, Evolution of computer systems, Classification of computers, Data representation in computers - Binary, Octal and Hexadecimal numbering systems and their interconversion, Binary codes - BCD, EBCDIC, Gray, Parity, Error correction codes, Concepts of Boolean Algebra: Basic Postulates, canonical form, Minimization Techniques , Karnaugh Map ,Logic gates, Flip-Flops (RS, D, JK, T),

## UNIT–II

**Basic Building Blocks of Computers:**
Registers (Shift Register), Counters (Binary, Up, Down, Ripple),Register transfer, Bus and Memory transfer, Arithmetic ,shift and logic Micro-operations, CPU: introduction, general register organization ,addressing modes, Memory organization - Memory hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Data transfer: Modes of transfer, Asynchronous and Synchronous data transfer. DMA

## UNIT–III

**Internal architecture of 8086/8088 Microprocessor:**
Software model of 8086/88, Memory Address Space and Data Organization, Data types, Segment registers and Memory Segmentation, Instruction pointer, Data registers, Pointer and Index registers, Status register, The Stack, I/O Address Space, Addressing modes of the 8086/88. Converting Assembly Language instruction to Machine Code, The IBM PC and its DEBUG program.

## UNIT–IV

**Introduction to 8086/88 programming:**
The instruction set of the 8086/88. Data transfer, Arithmetic, Logic, Shift and Rotate instructions, Flag control instructions, Compare instruction, Jump instructions. Subroutines and subroutine handling instructions. The loop and loop-handling instructions, Strings and String handling instructions. Interrupts in 8086, Introduction to DOS/BIOS interrupt programming

**Text Books:**

1. M. Moris Mano: Computer System Architecture, PHI
2. Walter A. Triebel and Avtar Singh: 8088 and 8086 microprocessors: Programming, interfacing-software, hardware and applications, PHI.

**Reference Books:**

1. John P. Hayes: Computer Architeicture and Organization, MGH
2. Andrew S. Tannenbaum: Structured Computer Organization, PHI
3. Albert Paul Malvino: Digital Principles, TMH
4. B. Ram: Microprocessors & Microcomputer, Dhanpat Rai & Sons

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

led syllabus M.Sc CS 2008-09, based on the decision taken by BOS ,Computer Science, APSU, 14.08.08, In view of the guidelines issued by M.P. Higher Education Commission.

## Department of Computer Science, A.P.S. University, Rewa (M.P.)
### Syllabus for M.Sc. Computer Science- First Semester
### (Session 2008-2010)
### Paper (MCS -103):   Data Structure using C

Max.Marks. 70
Min.Marks. 24

Time: **3 hours**

### Unit I

Programming Part I: Basics of C programming, Structure of a simple C program, Simple I/o functions, Data types in C, operators & their precedence, Control Structures: if-else statements, switch statement, Loops: while, do-while and for loop functions: User-defined functions, returning a value from a function, Local & Global variables, automatic, Static Register and External Storage class. Parameters: Type, Declaration of a function, functions with more than one parameters, recursion, Arrays: arryas (upto 2 dimensions), Declaration and initialization, the break structured, string and character arrays, operations on arrays, The C preprocessors.

### Unit II

Programming part II : String and string functions. Pointers, the concept of pointers, the address and indirection operators, passing pointers as parameters. Dynamic memory allocation, Arrays and pointers, passing by value and reference, Address arithmetic. Pointer to pointers, Structures: Initializing a structure, arrays of struecgtures, arrays within structures, structures within structures, Structures and functions, Files in C, modes for files, functions used in files (putchar, getchar, getc, putc, fopen, fclose, fscanf, fseek, ftell, fread and (write), error handling in files.

### Unit III

Data structure part I : Introduction: Algorithm analysis for time and space requirements, stocks; operations on stacks, applications of stacks, recursion, polish expressions and their manipulations, Queue; operations on queues, priority queues, priority queues, linked storage representation, linked linear lists, operations on list, circular linked list, doubly linked lists, application of linked lists, Polynomial manipulation, precision, fixed block storage allocation, dynamic storage management, first fit and best fit storage garbage collection, compaction.

### Unit IV

Data structure part II : Definitions and concepts of general trees and binary trees, representation of binary trees, binary tree, representation of general tree, binary tree traversal.       binary trees, operation on binary trees, application of trees, manipulation of arithmetic's, expressions, binary search trees, evaluation of binary search trees, Graphs and their representation, matrix representation, list structure. Breadth. first search, Depth first search, spanning trees, application of graphs, topological sorting, sorting techniques, selection sort, bubble sort, merge sort, tree sort, partition exchange sort, radix sort, heap sort, searching techniques: Linear search, binary search, hash table method, hashing function.

Text books.

1. Gottfried  Programming with C
2. E. Balagurusamy: Programming with C
3. Horowitz & Sahni: Fundamentals of Data Structures, Comp. Sc. Press
4. Tanenbaum A.S.: Data Structures using C, PHI

Reference books
1. Cooper Mullish:  The Spirit of C, Jaico Pub. House, N. Delhi
2. V. Rajaraman: Introduction to C, PHI
3. Y. Kanetkar: Let us C, BPB
4. S. Lipschutz: Schaum's outline series, Data Structures, MGH
5. J.P. Trembley & P.G. Slorenson: An Introduction to Data Structures, MGH
6. D.E. Knuth: The Art of Computer Programming, Addision Wesley
7. R. G. Dromey: How to solve it by computer

## Department of Computer Science, A.P.S. University, Rewa (M.P.)

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

## Syllabus for M.Sc. Computer Science- First Semester
## (Session 2008-2010)
### Paper (MCS – 104 ): DBMS (Database Management Systems)

Max.Marks. 70
Min.Marks. 24

Time: 3 hours

## UNIT I

**Basic Concept:**
An Introduction to database System, Basic Data System Terminology, Purpose of DBMS, Data Independence, An Architecture of DBMS: Schema, Subschema, mapping, Physical & Logical Data, Basic File Systems, File Organization: Sequential, Index Sequential, Hosting, B-Tree based index. File Organisation based on Dynamic Hashing with immediate splitting, Model of Real World, Details of E-R Model.

## UNIT II

**Three Data Models:**
An Overview of three Main Data Models i.e. Hierarchical Model, Network Model, Relational Model and their Inter comparison, Concept of Relation, Relational Algebra: Basic Operation like Union, Intersection, Difference, Product Join, The relational Calculus: Domain & Tuple Calculus, Relational Database Design: Integrity Constraints, Functional Dependency: Single Value and Multi Value Functional dependency, Normal Forms: I, II, III, Boycee Codd, & IVth Normal forms; Join Dependency.

## UNIT III

**Query Processing & Database Software:**
Query Interpretation, Equivalence of Expression, Estimation of Query Processing Cost, Query Optimization by Algebraic Manipulation, Join Algorithms, Types of Data Base Languages: Procedural and Non-procedural Language, Relational Commercial Query languages,QBE, SQL: Introduction. Basic Structure, the Power of SQL (Creation, Insertion, Deletion, Indexing & Modification of Databases in SQL), query optimization strategies.

## UNIT IV

**Management Considerations & Future Trends:**
Security & Integrity: Introduction, Access Control, Crypto Systems, Statistical DataBase Security, Concurrency Control: Transaction, Database System Architecture, Serializability, Locking, Database Recovery: Kinds of Failure, Recovery Techniques, Object, An Overview of Oriented Model, Distributed database: Structure, Tradeoffs, Design, Client Server Database, Knowledge databases.
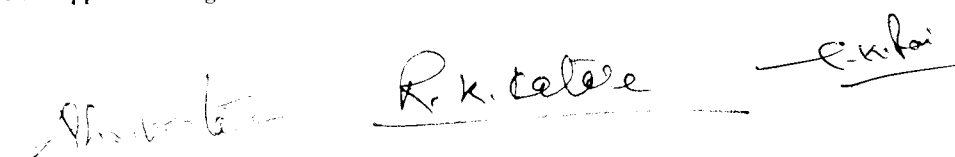
**Text Books:**
1. Henry F. Korth & A. Silbershatz: Data Base System Concepts, MGH
2. Arun K. Majumdar & P. Bhattacharya: Data Base Management System, TMH

**Reference Books**
1. Jeffrey O. Ullman : Principles of Database Systems, Galgotia Pub. Co. Ltd.
2. Bipin C. Desai: An Introduction to Database Systems, Galgotia Pub. Co. Ltd.
3. James Martin: Principles of Database Management, PHI
4. James Martin, Computer Database organization, PHI

## Department of Computer Science, A.P.S. University, Rewa (M.P.)

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

iiled syllabus M.Sc CS 2008-09, based on the decision taken by BOS ,Computer Science, APSU, .l/14.08.08, In view of the guidelines issued by M.P. Higher Education Commission.

# Syllabus for M.Sc. Computer Science- First Semester
## (Session 2008-2009)
### Paper (MCS-105) Numerical Methods

Time: 3 hours

Max.Marks. 70
Min.Marks. 24

## UNIT–I

**Statistical Methods:**

Introduction, Sampling, Frequency distribution, Measures of central tendency. Measures of dispersion, discrete probability distribution: Significance of probability, Discrete, Binomial, Poission and Normal Distribution, Curve fitting, Regression & Correlation: Linear least square fit, Nonlinear fit, Polynomial fit, Coefficient of correlation, Multiple, partial & rank Correlation. Tests of significance: chi square,     T-test & F-test

## UNIT–II

**Numerical methods 1: Solution of polynomial and Linear Equations:**

ntroduction, properties & Evaluation of polynomial Equations, Iterative methods for roots of 'quations Bisection method, False position method, Newton-Raphson method for complex roots, rate of onvergence. Muller method, fixed point method, Solution of simultaneous equation solution by limination method, Gauss elimination method, Pivotal Condensation, Gauss Seidel Method, Gauss Jordan method. Matrix Method. Gauss Jordan Matrix Inversion, Eigen values & Eigen vectors

## UNIT–III

**Numerical methods 2: Interpolation & Numerical Differentiation:**

ntroduction, Linear interpolation, polynomial interpolation, difference Tables, Gregory-Newton nterpolation, Newton divided difference interpolation, Lagrange's Interpolation (Backward and Forward), rrors in differences, Hermite interpolation, Piecewise and spline interpolation. *Numerical differentiation* ifferentiation by polynomial fit, higher order derivatives. Errors in Numerical differentiation

## UNIT–IV

**Numerical methods 3: Numerical Integration & Solution of Differential Equation :**

*Numerical Integration.* Introduction, Trapezoidal rule, Simpson's 1/3 rule, Newton's three eighth rule, Gaussian Quadrature, Solution by Euler's method, Taylor series, Predictor-corrector method, Runge-Kutta method, Numerical solution of partial differential equation, parabolic partial differential equation, Elliptical ial differential equation, Laplace equation, Poisson equation, iterative methods.

**Text Books:**

E. Balaguruswamy : Computer Oriented Statistical & Numerical Methods, MacMillan
E. V. Krishnamurthy: Numerical algorithms, computations in Sc. and Engg., Addison Wesley Publishing Company

**Reference Books:**

Jain M.K., Iyengar S.R.K. & Jain R.K.: Numerical Methods for Scientific & Engineering Computation, EWP
Desai: Fortran Programming & Numerical Methods. EWP

# Department of Computer Science, A.P.S. University, Rewa (M.P.)
## Syllabus for M.Sc. Computer Science- First Semester

t to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Syllabus for M.Sc. Computer Science- Second Semester
## (Session 2008-2010)
### Paper- (MCS-201) System Software

Time: 3 hours

Max.Marks. 70
Min.Marks. 24

## UNIT-I
**Introduction to System Software:**

The Simplified Instructional Computer (SIC): Machine structure (Memory, Register, Data formats, Instruction format, Addressing modes, Instruction set, Input/output), Assemblers: Basic Assembler Functions (A Simple SIC assembler, tables and logic), Machine-dependent Assembler Features (Instruction formats and addressing modes, Program relocation), Machine-independent Assembler Features (Literals, Symbol-defining statements, Expressions, program blocks, control sections and program linking), Assembler Design options (Two-pass assembler with overlay structure, One-pass assemblers, Multi-pass assemblers), Implementation examples.

## UNIT – II
**Loaders And Linkers:**

Basic Loader Functions, Machine dependent loader features (Relocation, Program linking, Tables and logic, a linking loader), Machine-independent loader features (Automatic library search, loader upturns, overlay program), Loader Design option (Linkage editors, Dynamic linking, Bootstrap loaders), Text editors Overview of the editing process, User interface editor structure.

## UNIT-III
**Macro Processors:**

Basic Macro Processor Functions (Macro definition and expansion, Macro processor tables and logic), Machine Independent Macro Processor Features (Concatenation of macro parameters, Generation of Union labels, conditional macro expansion, keyboard macro parameters), Macro processor Design options (Recursive macro expansion, General-purpose macro processors, Macro processing within language translators), Interactive debugging systems, Debugging function and capabilities, Relationship with other parts of the system, User-interface criteria).

## UNIT IV
**Compilers**

Basic Compiler Functions (Grammars, Lexical analysis, Syntactic analysis, Code generation), Machine-Dependent compiler Features (Intermediate form of the program, Machine-dependent code optimization), Machine-Independent compiler Features (Storage allocation, Structured Variables, Machine-independent code optimization, Block-structure languages). Compiler Design options (Division into passes, Interpreters, P-code compilers), Implementation examples.

**Text Books :**

1. Leland L. Beck: System Software (An introduction to systems programming), Addison Wesley Publishing Company
2. Alfred Jeffrey Ullman: Principles of Compiler Design, Narosa Publishing Home, New Delhi

**Reference Books :**

1. D.M. Dhamdhare: Systems Programming & Operating Systems, TMH

Subject to the approval of higher bodies after due amendment in the ordinance, wherever necessary.

# Syllabus for M.Sc. Computer Science- First Semester
## (Session 2008-2009)
### Paper (MCS-105) Numerical Methods

Time: 3 hours

Max.Marks. 70
Min.Marks. 24

## UNIT–I

**Statistical Methods:**

Introduction, Sampling, Frequency distribution, Measures of central tendency. Measures of dispersion, discrete probability distribution: Significance of probability, Discrete, Binomial, Poission and Normal Distribution, Curve fitting, Regression & Correlation: Linear least square fit, Nonlinear fit, Polynomial fit, Coefficient of correlation, Multiple, partial & rank Correlation, Tests of significance: chi square, T-test & F-test.

## UNIT–II

**Numerical methods 1: Solution of polynomial and Linear Equations:**

Introduction, properties & Evaluation of polynomial Equations, Iterative methods for roots of equations:Bisection method, False position method, Newton-Raphson method for complex roots, rate of convergence, Muller method, fixed point method, Solution of simultaneous equation: solution by elimination method, Gauss elimination method, Pivotal Condensation, Gauss Seidel Method, Gauss Jordan method, Matrix Method, Gauss Jordan Matrix Inversion, Eigen values & Eigen vectors.

## UNIT–III

**Numerical methods 2: Interpolation & Numerical Differentiation:**

Introduction, Linear interpolation, polynomial interpolation, difference Tables, Gregory-Newton interpolation, Newton divided difference interpolation, Lagrange's Interpolation (Backward and Forward). Errors in differences. Hermite interpolation, Piecewise and spline interpolation. *Numerical differentiation.* Differentiation by polynomial fit, higher order derivatives, Errors in Numerical differentiation

## UNIT–IV

**Numerical methods 3: Numerical Integration & Solution of Differential Equation :**

*Numerical Integration:* Introduction, Trapezoidal rule, Simpson's 1/3 rule, Newton's three eighth rule, Gaussian Quadrature, Solution by Euler's method, Taylor series, Predictor-corrector method. Runge-Kutta method, Numerical solution of partial differential equation, parabolic partial differential equation, Elliptical partial differential equation, Laplace equation, Poisson equation, iterative methods

**Text Books:**
1. E. Balaguruswamy : Computer Oriented Statistical & Numerical Methods, MacMillan
2. E. V. Krishnamurthy: Numerical algorithms, computations in Sc. and Engg., Addison Wesley Publishing Company

**Reference Books:**
1. Jain M.K., Iyengar S.R.K. & Jain R.K., Numerical Methods for Scientific & Engineering Computation, EWP
2. Desai: Fortran Programming & Numerical Methods. EWP

# Department of Computer Science, A.P.S. University, Rewa (M.P.)
## Syllabus for M.Sc. Computer Science- First Semester

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science, A.P.S. University, Rewa (M.P.)

## Syllabus for M.Sc. Computer Science- Second Semester
### (Session 2008-2010)
### Paper (MCS-202) Software Engineering

Time: 3 hours

Max.Marks. 70
Min.Marks. 24

## UNIT–I

Introduction: The product and the process, program vs software products, Emergence of software engineering, software development life cycle models, classical waterfall, iterative waterfall, prototyping, evolution, spiral & RAP model, comparison of various life cycle models, project management process, process management process.

## UNIT- II

Software Requirement Analysis & Specification (SRAS) : Need for software requirement specification, requirement process, requirement analysis, requirement specification, planning a software project; cost estimation, project scheduling, staffing & personnel planning, software configuration management, plans: quality assurance plan, risk management.

## UNIT-III

Software Design : Criteria for Software design, software design & design principle; module level concepts. Coupling and Cohesion, design notation & specifications, design methodology, verification, object oriented design: Basic concepts, design methodology & Metrices. object oriented vs function oriented design, detailed design

## UNIT-IV

Coding and Testing : Standard guideline for coding, programming practice, testing fundamentals, unit testing, verification vs validation, black box & white box testing, functional testing, structural testing, object oriented program testing, software reliability & quality assurance, CASE, software Maintenance.
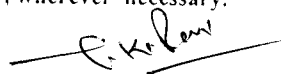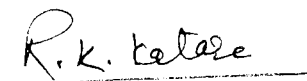
## Text Books:

1. Pankaj Jalote: An Integral Approach to Software Engineering , Narosa
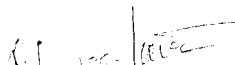2. Rogers Pressman: Software Engineering, a practitioner's appraoch, MGH

## Reference Books:

1. Rajib Mall: Fundamental of Software Engineering, PHI
2. Richard Farley: Software Engineering Concept, TMH

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

R. K. Kotare

## Department of Computer Science, A.P.S. University, Rewa (M.P.)

### Syllabus for M.Sc. Computer Science- Second Semester
(Session 2008-2010)

### Paper (MCS – 203) – Object Oriented Programing

Time: 3 hours

Max.Marks : 70
Min.Marks :24

### Unit-I

Introduction to OOP :- Procedural, Structured and Object Oriented Programming(OOP) , Basic concepts of OOP : Object, Classes, Inheritence, Polymorphism, Reusability; Benefits & applications of OOP,  $C^{++}$ and OOP : Structure of $C^{++}$ program, basic data types, user defined data types, reference variable, operators, structures, union and enum. Functions : prototypes, default arguments, const arguments in functions, Inline functions, call by reference, function overloading, friend and virtual functions.

### Unit-II

Classes and objects : Declaring a class, defining an object, data hiding and encapsulation, public and private data members & functions, constructors & destructors, parametrized constructors, multiple constructor in a class, copy constructors, arrays of object, object as function, arguments, returning objects, the this pointer, memory allocation for objects, operator overloading - unary and binary operators, type conversions, pointers to functions.

### Unit-III

Inheritence : Inheritence and derivation, single, multilevel, multiple, hierarchical & hybrid inheritence, constructors in multiple inheritence, private and protected inheritences, overriding functions, virtual methods, ambiguity resolution, pure virtual functions, virtual functions and constructors & destructors, object slicing, member classes : nesting of classes.

### Unit-IV

Streams : $C^{++}$ streams, stream classes, unformatted & formatted I/O operations, member functions of cin, manipulators, managing output with manipulators, user defined manipulators with arguments. Files : Classes for file stream operations, file I/O with streams, file modes, binary versus text files, binary I/O, random access, error handling during file operations, command line arguments, elementary database management, Templates & Execption handling

### Text Books :

1. E. Balagurusamy, Object Oriented Programming with $C^{++}$ , TMH
1. Jesse Liberty, Teach Your self ANSI $C^{++}$ , Techmedia
2. Robert Lafore, Object Oriented Programming in Turbo $C^{++}$ , Galgotia Publications

### Reference Books :

1. Stroustrup, The $C^{++}$ Programming Language, Addison Wesley.
2. Herbert Schild, $C^{++}$ Complete Reference, TMH
3. Yashwant Kanatkar, Let us $C^{++}$ , BPB

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

Detailed syllabus M.Sc CS 2008-09, based on the decision taken by BOS ,Computer Science, APSU, dt 01/14.08.08, In view of the guidelines issued by M.P. Higher Education Commission.

# Department of Computer Science
## A.P.S. University, Rewa (M.P.)

## Syllabus for M.Sc. Computer Science- Second Semester

### (Session 2008-09 )
### Paper (MCS-204) Computer Network

Max.Marks. 70
Min.Marks. 24

Time: 3 hours

## UNIT–1

**Introduction to Networks:**
Basics of Data Communications: LAN, MAN, WAN, Various LAN Topologies, OSI Reference Model, TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Models, Physical Layer: Inter-comparison of various communication media, Hardware and Software requirements for networking, Wireless communication: Radio & microwave communication, Satellites: Geostationary Satellites, Low Orbit, Satellites, overview of VSAT, Broad band ISDN.

## UNIT II

**Data Link Layer:**
Data Link Layer Design Issues: Services Provided to Network Layer, Framing Error Control, Flow Control, Error Correction Codes, Error Detection Codes, Elementary Data Link Protocols - An unrestricted simplex protocol, simplex stop-and-wail-protocol, simplex protocol for a noisy channel, Sliding Windows Protocols - One bit sliding window protocol, protocol using Go Back n Protocol using selective repeat.

## UNIT III

**Medium Access Sub-layer and the Network Layer:**
Multiple Access Methods - ALOHA, CSMA Protocols, Limited-Contention Protocols, IEEE STANDARD FOR LANs AND MANS : Standards for Ethernet, Token Bus, Token Ring, Comparison of three, Bridges from 802.x to 802.y. The Network Layer: Routing Algorithms: Shortest Path, Routing, Flooding, Flow Based, Routing, Hierarchical routing, Broad Cast-routing, General Principles of Congestion control, Flow specification, Internetworking, Tunneling, Fragmentation, IP Protocols, IP Addresses

## UNIT IV

**The Transport and Application Layers:**
Elements of Transport Protocols: Addressing, establishing connection, Releasing connection, flow control and buffering, multiplexing, crash recovery, Internet Transport Protocols: TCP service model, TCP protocol, TCP connection management, TCP congestion control, UDP, Network Security: Traditional cryptography, two fundamental cryptographic principles, secret key algorithms, public key, DNS-Domain name systems, SNMP, Electronic mail, World Wide Web

## Text Books :
1    A. S. Tanenbaum: Computer Networks, PHI

## Reference Books :
1    James Martin: Computer Networks & Distributed processing , PHI
2    Uyless Black: Computer Networks, PHI

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science
## A.P.S. University, Rewa (M.P.)

## Syllabus for M.Sc. Computer Science- Second Semester

### (Session 2008-10 )

## Paper (MCS – 205) – Advanced Programming Language

Time: 3 hours

Max.Marks : 70
Min.Marks : 24

### UNIT I

Introduction to VB: The Integrated Development environment (Menu bar, Tool box, Project Explorer, Properties window, object browser), working with forms, variables, procedure (Sub, Event, General), Control Structures (If.....Then.....Else, Select.....Case, Do While......Loop, For ....Next), Exit for and Exit Do statement, With-End with statement, Arrays, Data types, User-Defined Data Types, constants. Datatype conversion, Built-in Functions, operators.

### UNIT II

Working with controls: Classification of controls, study of various controls, (Text box, label, Command button, option button, list box, combobox Scrollbar, Flex grid & Built-In Activex controls) with respect to property, event and methods. Creating Control Array (at Design-time, at runtime), menus, mouse events and dialog boxes, OLE. OOPS in VB: Objects, working with objects, forms as object, constructors and destructors, collections (collection object, control collection), Class module.

### UNIT III

Advanced VB Programming: Database Programming: ODBC, Database Access methods in VB (DAO, ADO, ADO) Recordset, Advanced data controls (data list, data combo, data grid, Hierarchical flex grid), and the T-SQL Debugger. Overview of Data Report and Crystal Report. ActiveX Controls: Creating and Deploying ActiveX controls, Overview of COM/DCOM. ActiveX Exe and ActiveX DLL. VB Script: VBScript, objects, operators, functions, statements in VB Scripts.

### UNIT IV

Active Server Pages: Built in ASP objects: Response object (write, buffer, clear, flush, End, redirect, Expires, Expire Absolute method). Request object: Form collection (Query String, form), HTTP headers, reading the HTTP headers request. Server variables method, Environment variable. Cookies: Reading and writing cookies, Tradoffs of cookies, Session object: Session variable. Application Object: Application variable, Session vs Application object. Global as a file. ASP components. Add Rotator, Content linker and browser capabilities, Server object: Reading and writing files on the web server ASP error object.

*Text Books:*

1  VB6 Unleashed - Techmedia
2  ASP unleased - Techmedia

*Reference Books:*

1  Teach yourself VB6 in 21 days - Techmedia
2  Teach yourself ASP in 21 days - Techmedia
-  Using Visual Basic 6, Que

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science
## A.P.S. University, Rewa (M.P.)
## Syllabus for M.Sc. ( Computer Science ) - Third Semester

## (Session 2009-10)
### Paper (MCS - 301) Operating System

Max.Marks. 70
Min.Marks. 24

Time: 3 hours

## UNIT–I

**Fundamental Concepts of Operating Systems:**
Overview of Process Management, Memory Management, File Management, Device Management, Operating system services, Evolution of operating systems - Serial processing, Batch Processing, Multi - programming, Types of Operating systems - Batch operating system, Time-sharing operating systems, Real-time operating system, Distributed operating system. **Process Management :** Process concept, Scheduling concepts, CPU scheduling, Scheduling algorithms, Multiple processor scheduling.

## UNIT II

**Inter Process Synchronization:**
Concurrent processes, the critical section problem, the Critical Region and Conditional Critical Region problem, Inter process synchronization, Inter process communication, Deadlock occurrence, Deadlock characterization. Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery.

## UNIT III

**Memory Management:**
The Process Monitor, Static Partitioned memory allocation, Swapping, Relocation. Dynamic Partitioned memory allocation , Compaction. Multiple fence register. Segmentation - Address translation, Descriptor caching. Paging, Page allocation. Virtual memory, Instruction interruptability. Management of virtual memory, Page replacement, Replacement algorithms. Comparison of various memory management techniques with reference to Protection and Sharability.

## UNIT IV

**File and Device Management:**
File system organization, File operations, Access methods, Directory structure organization. File protection - Goals of protection, Access matrix model of protection, Dynamic Protection Structure, Security encryption, Device management: Dedicated, Shared and Virtual devices, Sequential Access and Direct Access devices, Channel and Control Units, I/O buffering, I/O schedulers, Spooling system.

## Text Books:

1.  Peterson & Siberschatz : Operating system concepts, Sybex.

## Reference Books :

1.  Senart E. Madnik and J.J. Donovan : Operating Systems, McGraw Hill.
2.  Milan Melankovic : Operating Systems, Concept and Design, McGraw Hill
3.  Lister Andrew : Fundamentals of Operating Systems, Macmilan Pub. Co.
4.  Delteri : An Introduction to Operating System, Addition Wesley.

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science
# A. P. S. University, Rewa (MP)

## Syllabus for M.Sc. (Computer Science) – Third Semester

## (Session 2009-10)

### Paper (MCS – 302) – Computer Graphics and Multimedia

Time: 3 hours

Max.Marks : 70
Min.Marks : 24

### UNIT I

Overview of Graphics Systems and 2D Transformaition:
Display Devices, Hardcopy devices, Interactive Input Devices, Display processors, Graphics Software. Output Primitives: Points and lines, Line drawing algorithms, Circle generating algorithms Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Reflection, Shear, Raster methods for transformations. Windowing and Clipping : Windowing concepts, Clipping algorithms, Window-to-Viewport transformation.

### UNIT II

3D Transformation , Viewing and Modeling:
Three Dimensional Transformations : Basic transformations, Rotation about an arbitrary axis, Reflections, Shears. Transformations of coordinate system. Projections, Viewing transformations, Software implementation, Hardware implementation. Hidden surface & Hidden line removal : Classification, Back face removal, Depth Buffer method, Scan line method, Hidden line elimination, Curved surfaces. Shading and color models : Modeling light intensities, Displaying light intensities, Surface shading methods, Color models Modeling methods : Basic concept, Master coordinates and modeling transformation structured play files. symbol operations.

### UNIT – III

Overview of Multimedia: Introduction, Application of multimedia, terminology, multimedia enabling technologies in digital representation, Hardware & Software requirement, multimedia standard, hypertext; History, nature, links, navigation & structure. The nature of sound, digitizing sound, processing sound, compression format, MIDI, Combining, source & picture, Video & image processing: Digitizing video, video standards video compression, digital video editing and post production, streamed video and video conferencing.

### UNIT – IV

Animation: Captured animation and image sequences, digital cel and sprite animation, key frame animation, 3D animation, Combining media: synchronization based presentation: SMIL (synchronize multimedia integration language), synchronize presentation (HTML + TIME), accessibility. knowledge base multimedia, future direction. ECMAScript syntax outline, Multimedia and network: network and transport protocols, multicasting, application protocols for multimedia: HTTP, caching; Quality of service, server side computation.

Text Books :
1. D. Hearn and Baker : Computer Graphics, Prentice Hall of India Pvt. Ltd.
2. Steven Harrington : Computer Graphics, MGH.

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

tal Multimedia, Chapman,Wiley

nce Book:
ewman and R.F. Sprouli : Principles on Interactive Computer Graphics, MGH.
v.K. Giloi : Interactive Computer Graphics, PHI.
R.A. Piastock and G. Kalley : Theory and Problems of Computer Graphics, MGH
Multimedia System; John F. Kloegel Buford

# Department of Computer Science
# A. P. S. University, Rewa (MP)

## Syllabus for M.Sc. (Computer Science) – Third Semester

## (Session 2009-10)

## Paper (MCS – 303) – JAVA PROGRAMING

Time: 3 hours

Max.Marks : 70
Min.Marks : 24

### UNIT I

Introduction: C, C++ & Java a comparison, Structure of simple Java Program, Java tokens, Statements, a virtual machine, Command line arguments, Programming style, Constants & variables, Type casting; rous Operators in Java, Conversions in expressions, Operator.. precedence and associativity . Decision ng and branching: The if statement, the switch statement, the ? operators, the while statement, the do ment. the for statement, jumps in loops, labeled loops, classes, objects and methods, Constructors, od overloading, static members, nesting of methods.

### UNIT II

Inheritance: Overriding methods, final variables and methods , final classes, abstract methods and classes. Arrays and vectors : arrays, vectors, wrapper classes, conversion from and to primitive classes, interfaces, packages. Multithreaded programming : creating threads, extending the thread class, stopping and blocking a thread, life cycle of a thread, using thread methods, thread exceptions, thread priority, synchronization, implementing the runnable interface, managing errors and exceptions, Files : I/O exceptions, creation of files. concatenating & buffering files

### UNIT III

Event : event Source, event listioner , overview of event classes (action event , adjustmentevent, itemevent, focusevent , textevent , mouseevent).handling keyboard event . **Abstract Window Tool :** windows fundamental , creating Frame window ,handling event in frame window ,displaying information within window , label , button , checkbox and textfield controls. String: string constructor, operations on string , string searching. overview of java library (math class, system class) Overview of collections.

### UNIT IV

Swing and Applets : Interface Components with swing : Swing buttons, text Input, making choices, ng radio and checkbox , scroll bars . Applets: Applet Basics, life cycle of an Applet, applet ization and termination , simple applet display method ,status window , passing parameter to applet ,

ct to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

t context interface , The Applet HTML Tags and Attributes. Servlet : basics, life cycle of servlet, a ple servlet , servlet interface , reading servlet , Handling HTTP request and responses ,handling HTTP t request ,cookies class, using Cookies, session tracking.

*Text Books :*

1. Programming with JAVA – A primers, by E. Balagurusamy, TMH
2. Core JAVA 2 Volume I – Fundamentals, Gary Cornell, C. S. Horstmann, Sun Microsystems Press.
3. Core JAVA 2 Volume II – Advanced Features, Gary Cornell, C. S. Horstmann, Sun Microsystems Press.

*Reference Books :*

1. Mastering JAVA , Techmedia Pub.
2. Learn Advanced Javascript Programming – Yehuda Shiran & Tomer Shiran, BPB.

# Department of Computer Science
# A. P. S. University, Rewa (MP)

## Syllabus for M.Sc. (Computer Science) – Third Semester
### (Session 2009-10)
### Paper ( MCS -304(B) ) : Theory Of Computation

Max.Marks. 70

Time: 3 hours

Min.Marks. 24

### UNIT–I

Automata Theory: Alphabets, strings languages, recursive definitions, regular expressions, problems on regular expressions, finite automata, transition table, transition diagram, transition graphs, different example of transition graphs, Kleen's theorem, Proof of Kleen's theorem with variety of problem's, Nondeterminism, Problem's conversion from Nondeterministics Finite Automata (NFA) to Deterministic Finite Automata (DFA). Finite automata with output, Moore machine, Mealy machine, decidability.

### UNIT-II

Pushdown Automata Theory I: Context – Free Grammars: Various example's including syntax and semantics. productions (grammatical rules), Backus normal form, Parse tree, Regular grammar's: Definition. theorems & examples, Chomsky normal form, pushdown automata, various examples.

### UNIT–III

Pushdown Automata Theory II: Context – Free Languages: Definition, Theorem, Examples, Non-Context-Free Languages, Intersection & Complement: Theorem and Definitions, Parsing: Top-Down Parsing, Backtracking, Pushdown Transducers, Decidability.

### UNIT–IV

Turning Theory: Turning machine: Definition, theorem & examples, Post Machines: Definition, theorem and examples, Minsky's theorem: Definition, theorem & examples.

Text Book:

1. I. A. Cohen: Introduction to Computer theory, John Wiely.
2. Hopcroft J.E. and Ullman J.D. : Introduction to automata theory Languages and Computation, Narosa publishing house, New-Delhi.

Reference Books:

1. Derick Wood : Theory of Computation, Harpers & row publisher New York, 1987.
2. Lewls H.R. & Papadimitriou C.H.: Elements of the theory of Computation, PHI, 1981
3. M.L. Minisky: Computations, finite infinite machines, Prentice Hall, 1967.

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science
# A. P. S. University, Rewa (MP)

### Syllabus for M.Sc. (Computer Science) – Third Semester
### (Session 2009-10)

## Paper (MCS – 305(A)) – e-Commerce

Time: 3 hours

Max.Marks : 70
Min.Marks : 24

### UNIT I

**Introduction to e-commerce :** An overview, The Laws of the e-Commerce jungle, opportunities in e-Commerce, Architectural Framework for Electronic Commerce, World Wide Web (WWW) as the Architecture, Technology behind the Web, Security and the Web. The anatomy of e-Commerce application (consumer applications, organisation applications). Interorganizational commerce and Electronic Data Interchange (EDI), EDI Applications in Business, EDI and e-Commerce.

### UNIT II

**The Electronic Infrastructure for e-Commerce:** Market forces influencing the I-Way, Components of the I-Way. Network Access Equipment, Global Information Distribution Networks, public policy issues shaping the I-Way, the Internet as a network infrastructure. Intraorganizational electronic commerce: Internal information systems, macroforces and internal commerce, workflow automation and coordination, customization and internal commerce, Supply Chain Management (SCM).

### UNIT III

**e-Marketing and e-Strategies:** Advertising and marketing on the Internet, internet marketing models, offline marketing for online business, charting the on-line marketing process, data mining, market research, e-commerce resource planning, knowledge management, consumer search and resource discovery, information search and retrieval, electronic commerce catalogues or directories, information filtering, consumer-data interface.

### UNIT IV

**Electronic Payment Systems and Network Security:**
Electronic Payment Systems: Types of electronic payment system, digital token-based electronic payment systems, smart cards and electronic payment systems, credit card-based electronic payment systems, risk and electronic payment systems, designing electronic payment systems. Network Security and Firewalls: Client-server network security, Firewalls and network security, challenge-response systems, encrypted documents and electronic mail, US government regulation and encryption.
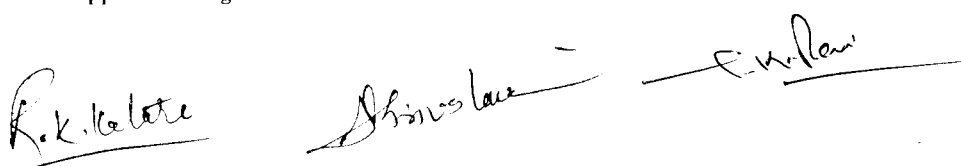
**Books Recommended:**

1. Frontiers of Electronic Commerce, Kalakota Whinston, Pearson Education Asia.

**Reference Books :**

1. e-Commerce, the complete idiot's guide, Rob Smith, Mark Speaker and Mark Thompson, PHI

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science
# A. P. S. University, Rewa (MP)

### Syllabus for M.Sc. (Computer Science) – Third Semester
### (Session 2009-10)
### Paper ( MCS -305(C) ): Advanced   Computer  Architecture

Max.Marks. 70

Min.Marks. 24

Time:  3 hours

## UNIT – I

**Parallel Processing:**
Reduced instruction set computers - CISC characteristics, RISC characteristics, overlapping register windows. The Berkley RISC1 system. Introduction to Parallel Processing: - Evolution of Computer system, parallelism is Uniprocessor systems, parallel computer structure, architectural classification schemes, parallel processing Application (Business & scientific).

## UNIT – II

**Principles of Pipelining and Vector Processing:**
Principal of linear pipelining, classification of pipeline processors, General pipelines & Reservation Tables. Interleaved memory organization, Instruction & Arithmetic pipelines; - Design of pipelined Instruction Units, Arithmetic pipelines Design Examples, Multifunction and array pipelines, Principles of designing pipelined processors, Vector processing - Vector Operations, Matrix Multiplication, Memory Interleaving, Super Computers.

## UNIT – III

**Array Processors:**
Structures and Algorithms for array processors (SIMD Array processor, Marking and Data Routing mechanisms, Inter-PE communication) SIMD Interconnection Networks (Static Versus Dynamic. Network, Mesh-Connected Iliac network, cube inter connection network) parallel algorithms for Array processors (SIMD matrix Multiplication, parallel sorting on Array processors)

## UNIT – IV

**Multiprocessor Architecture and programming:**
Functional Structures (Loosely coupled Multiprocessors, Tightly coupled Multiprocessors, Processor characteristic for Multiprocessing), Inter connection, Networks Time shared common bus, Multiport Memory, Crossbar Switch, Multistage Switching Network, Hyper Cube System, Inter Processor Arbitration (system bus, serial arbitration procedure, parallel arbitration logic, dynamic arbitration algorithms), Inter processor communication and synchronization, Cache coherence, Conditions for incoherence solution to cache coherence problem, Parallel memory organizations (Interleaved memory configurations), Multiprocessor Operating Systems (classification of Multiprocessor operating systems).

## Text Books:
1.      Kai Hwang & Faye A. Prigs:  Computers Architecture and parallel processing, MGH
2.      M. Morris Mano:  Computer System Architecture, PHI

## Reference Books:
1.      Andrew S. Tannenbaum:  Structured Computer Organization, PHI
2.      John P. Hayes:  Computer System Architecture and Organization, MGH

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.

# Department of Computer Science
## A.P.S. University, Rewa (M.P.)

## Syllabus for M.Sc. (Computer Science) – Third Semester

## (Session 2009-10)

Paper- (MCS- 306) : S/W LAB V - Problems Based on M.Sc. IT-302

Max.Marks. 70
Min.Marks. 35

Time: 3 hours

### Part-A

1. Write C program for drawing line using
   a) DDA algorithm
   b) Bresenheim's algorithm
2. a) Write a C program for drawing circle and ellipse using *Midpoint Algorithm*
   b) Use the midpoint method and symmetry consideration to plot the parabola.
   $$Y = 100 - x^2$$
   Over the interval $-10 \le x \le 10$
3. a) Write a program to fill an ellipse with solid color.
   b) Write a program to implement algorithm for flood fill of a shape.
4. a) Write a program to display a line graph for any set of data points in any selected area of screen, with the input data set scaled to fit the selected screen area. Data points are to be displayed as asterisks joined with straight-line segments and the x and y-axes are to be labeled according to input specification.
   b) Write program to plot bar graph for the above data.
   c) Write a program to plot pie chart for the above data set.

Implement an antialiasing procedure by extending Bresenheim's line algorithm to adjust period intensities in the vicinity of line path.

Subject to the approval of higher bodies after due amendment in the ordinance , wherever necessary.