

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

## SCHEME OF TEACHING & EXAMINATION

### Master of Computer Applications (MCA) II<sup>nd</sup> Semester

| Sl. No. | Board of Study        | Subject Code | SUBJECT                              | Periods Per Week |          |           | Scheme of Exam     |            |            | Total Marks | Credits L+(T+P)/2 |
|---------|-----------------------|--------------|--------------------------------------|------------------|----------|-----------|--------------------|------------|------------|-------------|-------------------|
|         |                       |              |                                      | L                | T        | P         | Theory / Practical |            |            |             |                   |
|         |                       |              |                                      |                  |          |           | ESE                | CT         | TA         |             |                   |
| 1       | Computer Applications | 521251(21)   | Operating System                     | 4                | 1        | 0         | 100                | 20         | 20         | 140         | 5                 |
| 2       | Computer Applications | 521252(21)   | Database Management System           | 4                | 1        | 0         | 100                | 20         | 20         | 140         | 5                 |
| 3       | Computer Applications | 521253(21)   | Data Structures                      | 4                | 1        | 0         | 100                | 20         | 20         | 140         | 5                 |
| 4       | Applied Maths         | 521254(14)   | Computer Oriented Numerical Analysis | 4                | 1        | 0         | 100                | 20         | 20         | 140         | 5                 |
| 5       | Management            | 521255(76)   | Introduction to Management Functions | 4                | 1        | 0         | 100                | 20         | 20         | 140         | 5                 |
| 6       | Computer Applications | 521261(21)   | Data Structures Laboratory           | 0                | 0        | 4         | 75                 | –          | 25         | 100         | 2                 |
| 7       | Computer Applications | 521262(21)   | Programming Laboratory in RDBMS      | 0                | 0        | 4         | 75                 | –          | 25         | 100         | 2                 |
| 8       | Computer Applications | 521263(21)   | Software Technology laboratory II    | 0                | 0        | 4         | 50                 | –          | 25         | 75          | 2                 |
| 9       | Humanities            | 521264(46)   | Group Discussion                     | 0                | 0        | 2         | –                  | –          | 25         | 25          | 1                 |
| 10      |                       |              | Library                              | ---              | --       | 1         | --                 | --         | --         | --          | --                |
|         |                       |              | <b>TOTAL</b>                         | <b>20</b>        | <b>5</b> | <b>15</b> | <b>700</b>         | <b>100</b> | <b>200</b> | <b>1000</b> | <b>32</b>         |

*ESE: End Semester Examination CT: Class Test TA: Teacher's Assessment L: Lecture T: Tutorial P: Practical  
 Note: Duration of End Semester Examination of all theory papers will be of Three Hours*

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Master of Computer Applications**

Subject: **Operating System**

Semester: **II**

ESE Duration: **Three Hours**

Code: **521251(21)**

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

**Maximum Marks: 100**

**Minimum Marks: 40**

## Course Objectives:

1. To provide an understanding of the functions of operating systems.
2. To provide an insight into internals and functional modules of operating systems.
3. To study the concepts underlying the design and implementation of memory management of operating systems.
4. To make student able to understand deadlocks and to recover them.
5. To make student understand the core structure, functions and design principles of distributed operating system will be introduced with this subject.

**UNIT – I Introduction to operating system:** Functions provided by operating system, Introduction to multiprogramming, Time sharing and real time systems, Introduction to file systems, Access and allocation methods of file systems, Directory structure of a file system on a disk and tape, File protection.

**UNIT – II Introduction to scheduling:** Process concept, states of process, Process control block, CPU scheduling, various types of CPU scheduling algorithms and their evaluation. Meaning of disk and drum scheduling, Various types of disk and drum scheduling algorithms like FCFS, SCAN etc., CPU protection.

**UNIT – III Introduction to memory management:** Various types of memory management schemes like paging, Segmentation etc. Concept of virtual memory, demand paging, Various page replacement algorithms, thrashing and methods to tackle it, Memory protection.

**UNIT – IV Concurrency and Deadlock:** Meaning of deadlocks, Resource allocation graphs, Deadlock Characterization, Various methods to avoid deadlocks like deadlock avoidance, Deadlock detection, Deadlock prevention, Banker's algorithm for deadlock avoidance. Introduction to concurrent processing, Precedence graphs, Critical section problem, Semaphore concept, Study of classical process co-ordination problem.

**UNIT – V Introduction to distributed systems:** I/O Subsystem Principles of I/O Hardware: I/O devices, device controllers, direct memory access. Principles of I/O Software: Goals, interrupt handlers, device drivers, device independent I/O Software. User space I/O software, I/O protection. Distributed file systems: Design, Implementation, and trends. Performance Measurement: Important trends affecting performance issues, performance measures, evaluation techniques, bottlenecks and saturation feedback loops. Case study of UNIX and DOS operating systems.

## Text Books:

1. Operating System Concepts, James L. Peterson and Abraham Silberschatz (Addison-Wesley)
2. Modern Operating System, Andrew .S. Tanenbaum, PHI

## Reference Books:

1. Operating System Concepts & Design, Milan Milenkovic (MGH)
2. An Introduction to Operating Systems, Harvey M. Dietel(Addison Wesley)

## Course Outcome:

1. The student will be able to learn the various functionalities of OS.
2. The student will be able to use the various algorithms and techniques to perform the various jobs performed by operating systems
3. The student will be able to get the overview of how operating system is designed.
4. The student will be able to demonstrate how various resources are managed by operating system

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Master of Computer Applications**

Subject: **Database  
Management System**

Semester: **II**

ESE Duration: **Three Hours**

Code: **521252(21)**

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

**Maximum Marks: 100**

**Minimum Marks: 40**

## Course Objectives:

1. To understand basic concepts of designing and building a database management system.
2. To familiarize student with syntax and implementation of Structured Query Language (SQL).
3. To make students understand the relational model and design relational database management system.
4. To provide detailed knowledge of transaction, concurrency and recovery strategies of DBMS.
5. To impart significance of normalization in DBMS and different normalization techniques.

**UNIT – I Introduction to Database:** Advantages of DBMS, Type of Data Models, Schema and Instances, DBMS Architecture and Data Independence, Entity- Relationship Model, Attributes and Keys, Relationship Types, Weak Entity set, Strong Entity Set, Enhanced E–R Modeling, Specialization , Generalization and Aggregation, Constraints on Specialization and Generalization. Structure of Files: Types of Single –Level ordered indexes, multilevel indexes, Dynamics Multilevel indexes using B-trees and B+- Trees (insertion & deletion).

**UNIT – II The Relational Data Model:** Relational data model concepts, Constraints, Relational Algebra, Relational Calculus, Tuple relational calculus SQL: DDL, DML, DCL , Types of Constraints, Defining different constraints on a table, Defining & Dropping integrity constraints in the alter table command, View, Index.

**UNIT – III Database Design:** Functional Dependencies and Normalization for Relational Databases: Informal design guidelines for relation schemes, Functional dependencies, Normal forms based on primary keys, General definitions of second and third normal forms, Boyce- Codd normal form, problem related with normal forms & solutions. Multivalued & Join Dependencies, 4th & 5th Normalization.

**UNIT – IV Query & Transaction Processing:** Query Processing: Query processing stages, Query interpretation, Query execution plan, Structure of a query optimizer. Transaction Processing: Types of failures, ACID property, schedules and recoverability, basic idea of Serializability, View and Conflict serializability, Deadlocks.

**UNIT – V Crash Recovery:** Failure classification, Different type of Recovery techniques & their comparative analysis, Deferred update, Immediate update, Shadow paging, Check points, On-line backup during database updates, Concurrency Control: Different type of concurrency control techniques & their comparative analysis, Locking techniques, Time- stamp ordering, Multi-version techniques, Optimistic techniques, Multiple granularity.

## Text Books:

1. Database system concept, Korth & Sudarshan, TMH.
2. Fundamentals of Database Systems, Elmasri&Navathe, Pearson Education.

## Reference Books:

1. Principles of Database Systems”, 2nd Edn., Ullman, J.O, Galgotia Publications.
2. Introduction to Database Systems ,C.J.Date, Pearson Education.
3. Database Design Fundamentals, Rische, PHI.

## Course Outcome:

1. Students will be able to design a database based on the given requirements.
2. Students will be able to make projects with knowledge of subject provided to them.
3. Students will be able to write Standard Query Language statements.
4. Students are expected to apply normalization techniques on given database

# Chhattisgarh Swami Vivekanand Technical University, Bilai

Name of program: **Master of Computer Applications**

Subject: **Data Structure**

Semester: **II**

ESE Duration: **Three Hours**

Code: **521253(21)**

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

**Maximum Marks: 100**

**Minimum Marks: 40**

## Course Objectives:

1. To be familiar with basic techniques of algorithm analysis.
2. To master the implementation of linked data structures such as linked lists and binary trees.
3. To be familiar with advanced data structures such as balanced search trees, hash tables, priority queues.
4. To be familiar with sorting algorithms including quick sort, merge sort and heap sort.
5. To be familiar with some graph algorithms like shortest path and minimum spanning tree etc.

- UNIT – I Stack and Queue:** Introduction to data structure, Primitive data structure, Introduction to Algorithm analysis for time and space requirement, Rate of growth and Order notation, Basic time and space analysis of an algorithm. Stacks Definition, concepts, operation and application of Stacks, Recursion and Polish notations, Queue, Priority Queue: definition concepts, operation and application of Queue, circular queue and Dequeue.
- UNIT – II General List:** Linear data structures - List and its contiguous implementation, its drawbacks, Pointers and linked allocation concepts and operations on singly linked list, circular linked list, doubly linked lists, Application of linked list, Josephus Problem, Polynomial Manipulation, Linked Stacks and Queues.
- UNIT – III Trees and Its Representation:** Terminologies related to trees, Binary Tree, complete binary tree, almost complete binary tree; Tree Traversals-preorder, in order and post order traversals, their recursive and non-recursive implementations; Expression tree-evaluation; Linked representations of binary tree, operations. Threaded binary trees; Forest, Conversion of forest into tree, Heap definition.
- UNIT – IV Searching, Hashing and Sorting:** Requirement of a search algorithms; sequential search, binary search, indexed sequential search, interpolation search, Hashing- Basics, methods, collision, resolution of collision, chaining; Internal Sorting, External sorting - Selection sort, Bubble sort, Merge sort, quick sort, shell sort, heap sort.
- UNIT – V Graphs:** Related definitions; Graph representations- adjacency matrix, adjacency list, adjacency multi-list; Traversal schemes - depth first search, breadth first search; Minimum spanning tree; Shortest path algorithm; Kruskal and Dijkstra's algorithms. Basic idea of AVL Tree; Definition, insertion and deletion operations, Basic idea of B-tree definition, order, degree, insertion and deletion operations; B+ tree-definition, comparison with B-tree.

## Text Books:

1. Data Structures and Program Design in C, Kruse R.L, PHI.
2. Data Structures using C and C++, Tanenbaum, PHI.
3. Data Structures, Schaum Series.

## Reference Books:

1. Fundamental of Data Structures, Horowitz and Sahani, Galgotia Publishers.
2. Data Structures, Bhagat Singh.
3. Data Structures - Trembley and Sorenson.

## Course Outcome:

1. Students will be able to make appropriate data structure and algorithm design decisions with respect to program size, execution speed, and storage efficiency.
2. Students will be able to understand common data structures (such as arrays, linked lists, stacks, queues, priority queues, trees, heaps, hash tables, associative containers)
3. Students will be able to write and implement various sorting, searching, and hashing algorithms.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Master of Computer Applications**

Subject: **Computer Oriented  
Numerical Analysis**

Semester: **II**

ESE Duration: **Three Hours**

Code: **521254(14)**

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

**Maximum Marks: 100**

**Minimum Marks: 40**

## Course Objectives:

1. To make students learn to solve many types of problems such as roots of equations, system of linear simultaneous equations.
2. To make students learn the differential or integral of unknown function given a set of discrete measurement from the function.
3. To make students learn to select the appropriate methods to solve problems for a specific task.
4. To make student learn the limitation of each numerical methods especially the conditions under which they fail to converge to a solution.

**UNIT – I Numerical Solution of Algebraic & Transcendental Equations** Regula Falsi Method, Bisection Method, Newton-Raphsm Method, Birge-Vieta Method, Error analysis for iterative methods, Accelerating Convergence.

**UNIT – II System of Linear Algebraic Equations**, Solution of simultaneous algebraic equations by Gaum elimination method, Gauss-Jordan method, Crout's triangularition method, Iterative methods of solutions, Jacobi method, Gaum-seidal method, relaxation method, ILL-conditional equation.

**UNIT – III Interpolation & Finite Difference.** Finite difference, Difference of polynomial Factorial notation, Other difference operator, Newton's Forward, and Backward interpolation formula, Central interpolation formula, Lagrauges & Newton's Divided difference interpolation formula.

**UNIT – IV Numerical Differentiation**, Integration & Curve fitting. Numerical differentiations, Numerical integration- Trapezoidal Rule, Simpsms Rules, Wedls Rule, Principle of least square, Curve Fitting Linear & non linear, exponential, logarithmic curve.

**UNIT – V Numerical Solution of Ordinary Differential Equation.** Picard's method, taylor's series method, Euler's method, Euler's modified method, Runge-kutta method, Predictor-corrector method, Adams, Bashforth Method, Milner's method.

## Text Books:

1. Jain , M.K. & Iyenger, R.K, " Numerical Methods for Scientific & Engg. Computation, New-Age, International Pub. 4th Edition.
2. Grawal; B.S., "Numerical Methods", Kahanna Pub.

## Reference Books:

1. Burden, Richard L., Fairs, J. Douglas Fairs, "Numerical Analysis", Thomson Asia. PTE, 7th Edition.
2. Gourdin A., Boumahrat M. "A pplied Numerical Method", PHI.
3. Rajasekaran, S. "Numerical Method in Science & Engineering, A Practical Approach", s. Chand & Co Ltd., IInd Edition.

## Course Outcome:

1. Students will be able to numerically solve many types of problems such as Roots of equations, system of linear simultaneous equations. Interpolation of values of dependent measurements .
2. Students will be able to approximating the differential or integral of unknown function given a set of discrete measurement from the function.
3. Students will be able to select from alternative methods which most appropriate to solve problems for a specific task.
4. Student will be able to understand the limitation of each numerical methods especially the conditions under which they fail to converge to a solution.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Master of Computer Applications**

Subject: **Introduction to  
Management  
Function**

Semester: **II**

ESE Duration: **Three Hours**

Code: **521255(76)**

Total Theory Periods: **40**

Total Tutorial Periods: **10**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

**Maximum Marks: 100**

**Minimum Marks: 40**

## Course Objectives:

1. To understand different aspects of management and administration
2. To understand the process and type of planning
3. To understand motivation and its theories
4. To understand importance of communication in organization.
5. To understand HRM process
6. To understand different aspects of individual behavior related to job
7. To understand different aspects of management functions such as marketing, production and financial management.
8. To understand how to make balance sheets, profit & loss and trial balance.

**UNIT – I Fundamentals of Management:** Management functions, Management and Administration, Principles of management. Planning – Nature of Planning, Types of Planning, steps in planning, advantages and limitations of planning

**UNIT – II Motivation:** Theories of Motivation, Need Hierarchy Theory, Maslow's theory, Herzberg's Theory. **Communication** – Meaning and Importance, Process of Communication, channel of communication, communication media, Communication networks, barriers to communication

**UNIT – III Financial Management:** Scope of Financial Management, Objectives of financial management, Meaning and objects of accounting, Accounting Cycle, Accounting concepts and conventions, accounting, equations, rules of journalizing, ledger posting, Cash book, preparation of trial balance, trading and profit and loss, account and balance sheet with adjustments relating to closing stock, outstanding expenses, prepaid expenses, Accrued income, depreciation, Bad debts, provision for bad debts, provision for discount on debtors and creditors

**UNIT – IV Human Resource Management** – Functions and objectives, planning process, selection process, Training process, Individual Behavior, Formal and informal relations. Job satisfaction – theories of job satisfaction, determinants of job satisfaction, job satisfaction and productivity.

**UNIT – V Concept of Marketing** - Importance of Marketing, managerial Function of marketing, marketing Mix, marketing and other functions, Nature and scope of Marketing Research. **Production Management** – Concept and scope, Production Planning, production control, organization for production planning and control, inter-relationships with other management functions,

## Text Books:

1. Organization and management : R.D. Agrawal, Tata McGraw- Hill Education
2. K. Aswathappa, "Human Resource and Personnel Management", 6<sup>th</sup> Ed. TMH
3. Bhattacharya S. K. and Dearden John, " Accounting for Management", Prentice Hall of India, New Delhi.

## Reference Books:

1. Understanding management : Richard L. Daft, Dorothy Marcic, Cengage Learning
2. M.Y. Khan, P.K. Jain, " Basic Financial Management", 2 Ed., TMH
3. Chadwick, The Essence of Financial Accounting, Prentice Hall of India, New Delhi.

## Course Outcome:

1. The student will be able to understand the theoretical understanding of management and administration.
2. The student will be able to develop insights into the step-by-step processes involved in the development of plan
3. The student will be able to adapt the concept of motivation and ways to apply motivation technique in real world.
4. The student will be able to use communication as an effective tool for management.
5. The student will be able to analyze formal and informal relation in an organization.
6. The student will be able to understand the basics of HRM
7. The student will be able to apply functional knowledge of management real world.
8. The student will be able to understand how to make balance sheets, profit & loss and trial balance.

# Chhattisgarh Swami Vivekanand Technical University, Bilai

Name of program: **Master of Computer Applications**

Subject: **Data Structure Laboratory**

Semester: **II**

Code: **521261(21)**

Total Lab Periods: **48**

**Maximum Marks: 75**

**Minimum Marks: 38**

## List of Experiments/Programmes (At least Ten are to be performed/executed by each student)

1. Write a program to implement a stack and its operations.
2. Write a program to implement a linear queue, circular queue using an array.
3. Write a program to convert an infix expression into its equivalent postfix expression using a stack.
4. Write a program to evaluate a postfix expression using a stack.
5. Write a program to create and display a linked list of integers.
6. Write a program to create a linked list and define functions to add a node (at the beginning, end and middle), delete a node, search a node and display all the nodes.
7. Write a program to create two linked list and append one list at the end of another using function.
8. Write a program to implement a stack and queue of strings using a linked list.
9. Write a program to implement a priority queue using linked list.
10. Write a program to create and display a circular linked list of integers without and with a header node.
11. Write a program to define functions to add a node (at the beginning, end and middle), delete a node, search a node and display all the nodes in a header circular linked list.
12. Write a program to implement a circular queue over a circular linked list.
13. Write a program to demonstrate the Josephus problem using a circular linked list.
14. Write a program to create and display a doubly linked list.
15. Write a program to define the following functions to add a node (at the beginning, end and middle), delete a node (from the beginning, end and middle) from a doubly linked list.
16. Write a program to create and display a doubly circular linked list.
17. Write a program to create a linked list of integers and sort the list.
18. Write programs to sort an array of integers using the techniques of Selection sort, Bubble sort, Insertion sort, Quick sort, Shell sort, Heap sort.
19. Write a program to search for a particular element in an unsorted array of integers using linear search technique.
20. Write a program to demonstrate the technique of Binary search on a sorted array of integers.
21. Write a program to create binary search tree and traverse the tree in preorder, in-order and post-order technique. (Use recursive algorithms for traversals).
22. Write a program to traverse a binary tree in preorder using a non-recursive stack based algorithm.
23. Write a program to traverse a binary tree in in-order using a non-recursive stack based algorithm.
24. Write a program to traverse a graph in Depth first technique using a Stack.
25. Write a program to traverse a graph in Breadth first technique using a Queue.
26. Write a program to implement Topological sort over a graph.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Master of Computer Applications**

Subject: **Programming Laboratory in RDBMS**

Semester: **II**

Code: **521262(21)**

Total Lab Periods: **48**

**Maximum Marks: 75**

**Minimum Marks: 38**

## List of Experiments/Programmes

1. Definition of Database (create, desc, alter, creating duplicate tables, constraints (primary key, foreign key, check, not null)
2. Creation and modification of Database (insert & interactive input, update, delete)
3. Retrieval of Database - select: where, distinct, in, between-and, like, is null, group by-having, order by, column: (format, heading, justify, wrap trunc), nested queries: (any, all, in, not in, exists), joins:(simple, self join, outer join)
4. Views(create,update,drop),sequences(create,alter,drop), synonyms(create, drop), index(create, drop)
5. Transaction control (commit, rollback, save point)
6. Data control (grant, revoke)
7. PL/SQL programming:  
(Exceptions, cursors, records, tables, triggers, procedures, functions)



# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Master of Computer Applications**

Subject: **Software Technology Laboratory – II**

Semester: **II**

Code: **521263(21)**

Total Lab Periods: **48**

**Maximum Marks: 50**

**Minimum Marks: 25**

## List of Experiments/Programmes

### **.NET Programming**

1. Visual Basic .NET – An Introduction of Console and GUI Programming technique, Explain New Project window, property Explorer, Output window, Dynamic help, Window management (Auto Hide, Dockable, Tabbed Documents, IDE navigation, favorites), win forms & web forms.
2. WAP to find the Average, Total Grade of student using if else statements (In Console).
3. WAP to input any number between (0—6) and print appropriate day, week.
4. Print the patterns using For loop.
5. WAP to input numbers in 1D array and print in ascending & descending order.
6. WAP to input number in 2D array and perform the following operations
  - a. Sum of all number
  - b. Forward Diagonal & Backward diagonal
  - c. Print Upper & Lower triangle matrix.
7. WAP to input number in 2D array and perform the following operations
  - a. Sum of two matrices.
  - b. Multiplication of two matrices.
8. WAP to explain Class, Constructor & Inheritance.

### **GUI Programming**

1. Design simple calculation to implement Addition, Subtraction and Multiplication and division.
2. Design the marks sheet of student. Which Display all details including the total marks of student and percentage.
3. Create a form using check box & option box to give the effect of fonts such as Bold, Italic, underline, strike through respectively for the text entered in the Rich Text Box.
4. Demonstrate use of Data Environment; add tables and queries, place field on form, report etc.
5. Create simple Notepad application, which contains menus, Rich Text Box, Common
6. Dialogs Box, formatted text, using toolbar and Replace text, window, status bar and scroll bar.
7. Develop three different programs which use different Data Access Components ODBC,OLE DB-ADO
8. Modify the Practical on 7 to all following Button FIND, ADD, DELETE, MODIFY, CANCEL. Give proper code to perform the activity described by the buttons.

### **Problem Based Learning:**

(Design the and develop one of the following three case studies)

1. Design a program for online examination system, which include database and record facility.
2. Develop a program for telephone bill generation, which include database and record facility.
3. Develop a program for super market, include the database and record facility.

### **List of Software required:**

1. MSDN Library
2. Database (Oracle/MS Access/ Sql. Server)

### **Recommended Books:**

1. Microsoft Visual studio .NET 2008
2. The Complete Reference Visual Basic.Net, By: Shapiro, Jeffrey R., Tata Mc Graw Hill.
3. Beginning VB.NET Database,By: Willis, Theoron, Wiley publication
4. Visual Basic .Net,By: Schneider, David I,PHI
5. Visual C++.NET How to Program: Introducing .NET framework class lib,By: Deitel, Detiel and Liperi, Pearson Education Asia
6. Programming in Visual Basic .Net,By: Bradley,Millspaugh, Tata Mc Graw Hill