Solapur University, Solapur

M. C. A. (Science Faculty)

Syllabus (Semester – I and II)

(Credit System)

With Effect from June 2011

MASTER OF COMPUTER APPLICATIONS (SCIENCE FACULTY)
DETAIL SYLLABUS OF SEMESTERS I AND II

1. Introduction: The **Master of Computer Applications (M. C. A.)** Programme has been designed with a semester approach in mind. It is a three years course and in each year there are two semesters. Courses in semester-I to semester-V are aimed at skills development in computers using various technologies. Also in each semester student has to develop a software project so that a student can become more expert in handling the programming language and the programming logic is also improved.

2. Objective: The M.C.A. program prepares students to take up positions as systems analysts, systems designers, programmers, and managers in any field related to information technology. The program, therefore, aims at imparting comprehensive knowledge with equal emphasis on theory and practice. However, the course curriculum will have enough flexibility to enable a student to undertake advance studies in Computer Science later on.

3. Intake Capacity : 60

4. Ordinances and regulations

0.MCA. S1

ELIGIBILIY : - Admission to the course is open to any graduate of this University or graduate of any other University recognized by UGC, New Delhi, satisfying the following conditions :

a) The candidate should have secured at least FIFTY PERCENT marks at the aggregate of all years of Graduation Examination .

b) The student must have taken Mathematics at XII std. or at least one of the subject from Mathematics/ statistics / Computer Science/ Computer Applications/ Computer Programming in first year of Bachelors Degree.

c) The candidate should not be employed at the time of admission and should not take employment during the tenure of course .

d) The candidate should not be above TWENTY-EIGHT years of age as on 30th June of the year of his admission.

e) Subject to the above conditions, the final admission is based solely on the merit at the entrance test. Every candidate has to appear for the entrance test conducted during the year in which he/she is seeking admission.

f) Seats are allocated as per the reservation policy of the State Government. However, 10% of the seats are reserved for the candidates from the other University. The entrance test score of the student admitted from other University should not be less then that of the last candidate admitted from Solapur University, Solapur.

0.MCA. S2

FEES STRUCTURE :- The tuition fees or laboratory fees and other fees have to be paid at the beginning of every semester. At present a student has to pay tuition fees Rs.7000 /- per semester, laboratory fee Rs.14000/-per semester

and laboratory deposit of Rs.500/- together with other fees. These fees may be revised from time to time. The fees once paid will not be refunded.

0.MCA. S3
COURSE STRUCTURE :- The MCA course is a SIX semester course. The teaching for the semesters I, III and V will be during the first half of the academic year and for the semesters II and IV will be during the second half the academic year. During the sixth semester the student has to work for the project and the project will be evaluated at the end of that semester.

0.MCA –S4
A) A student has to clear all the heads of passing of first and second semesters to be eligible for the admission to the fifth semester .
B) A candidate will be awarded a class or distinction as per the rules of other science subjects.
C) The Regulations/ Ordinance not covered in this shall be followed from the Regulations/ Ordinance laid down for the science faculty.

5. **Credit System :**

A Six Semester M. C. A Course

Semester	No. of Papers/ Practicals / Seminar	Marks	Credits
Semester I			
• Theory Papers	05	500	20
• Practical Papers	01	100	04
• Project	01	100	04
Semester II			
• Theory Papers	05	500	20
• Practical Papers	01	100	04
• Project	01	100	04
Semester III			
• Theory Papers	05	500	20
• Practical Papers	01	100	04
• Project	01	100	04
Semester IV			
• Theory Papers	05	500	20
• Practical Papers	01	100	04
• Project	01	100	04

Semester V			
• Theory Papers	05	500	20
• Practical Papers	01	100	04
• Project	01	100	04
Semester VI			
• Project	01	250	10
Total marks and credits for M.Sc. Course		**3750**	**150**

6. Structure of the Syllabus :

M. C. A. Part – I Semester-I

Paper Code	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
			Internal	**University**	**Total**	
MCA-101	Introduction to Computers	04	30	70	100	04
MCA-102	Procedural Programming Methodology	04	30	70	100	04
MCA-103	Discrete Mathematical Structures	04	30	70	100	04
MCA-104	Microprocessors	04	30	70	100	04
MCA-105	Management-I	04	30	70	100	04
MCA-106	Practical - I	02	30	70	100	04
MCA-107	Project -I	12	30	70	100	04
	Total	**34**	**210**	**490**	**700**	**28**

M. C. A. Part – I Semester-II

Paper Code	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
			Internal	**University**	**Total**	
MCA-201	Object Oriented Programming using C++	04	30	70	100	04
MCA-202	Data Structures	04	30	70	100	04
MCA-203	Numerical Techniques	04	30	70	100	04
MCA-204	Operating System	04	30	70	100	04
MCA-205	Management-II	04	30	70	100	04

MCA-206	Practical - II	02	30	70	100	04
MCA-207	Project -II	12	30	70	100	04
	Total	**34**	**210**	**490**	**700**	**28**

7. Passing Standard : Passing standard is same as that of other M.Sc. courses in the Solapur University. The candidate has to appear for internal evaluation of 30 marks and external evaluation (university exam) for 70 marks for each paper / practical / project. In case of theory papers internal examinations will be conducted by the school / department. The nature of internal evaluation of practical and project will be decided by the respective schools / departments. The internal evaluation is a process of continuous assessment.

A student who failed in Term End examination (theory) & passed in Internal assessment of a paper (subject) shall be given FC (Failed in Term End Exam.) Grade. Such student will have to appear for Term End examination only. A student who fails in Internal assessment and passed in Term End examination (Theory) shall be given FR (Failed in Internal Assessment) Grade. Such student will have to appear for Term End examination as well as internal assessment.

In case of year down candidates from the mark scheme the candidates shall appear for the same 70 marks paper of the external examination and his performance shall be scaled to 100 marks.

9. Nature of theory question paper

1) Duration of each theory paper is 3 hours.

2) Each paper contains 7 questions each carrying 14 marks.

3) Students have to attempt five questions.

4) Question No.1 is compulsory and contains 14 objective type sub-questions each carrying 1 mark.

5) Question No.2 is compulsory and contains 3 short answer / short note type sub-questions each carrying 5 or 4 marks.

6) Students have to attempt any three questions from Question No. 3 to Question No. 7.

7) Question No. 3 to Question No. 7 contains 2 sub-questions

MASTER OF COMPUTER APPLICATIONS (SCIENCE)

SEMESTER I
MCA 101 : INTRODUCTION TO COMPUTERS

1. Elements of a computer processing system :- History, Evolution and Classification of Computers, Hardware & software components, Hardware components like CPU, I/O devices, storage devices, VDU etc. Software components like system software, application software. Basic architecture of a computer system   [6]

2. Types of Computer : Mini, Super, Mainframe, Workstation, Personal, Multimedia, Super Computer   [2]

3. Number System : Decimal, Binary, Octal, Hexadecimal, 1.s and 2.s Complement, floating Point representation, Character Codes- ASCII, EBCDIC,   [8]

4. Programming languages :- Need of a programming language, Classification of languages like high level & low level, Machine language & assembly language, Higher level language with examples, Generations of programming languages with examples.   [4]

5. System Software : Overview of all system softwares : Operating system, Assembler, Compiler, Linker, Loader   [4]

6. Operating system :- Overview Different roles played by O.S., Introduction to popular O. S. like windows, Dos & Unix, Linux, DOS Commands : Internal and External commands, Unix /Linux commands : date, ls, cp, mv, pwd, mkdir, rmdir, cd, cat, rm, adduser, passwd, chmod, write, wall, mesg, talk, head, tail, ln, wc, who, vi editor [8]

7. Introduction to networking:- Need for networking, Issues involved in networking, Different networking models like LAN, WAN, client .server, distributed etc., Internet and internet working with its usage   [4]

8. Office Tools : Word, Excel, PowerPoint
   Word : Structure of a Document, Common Commands, Styles, Cross Reference.
   Excel : Concept of Spreadsheet, use of financial and statistical functions, sorting and
          searching database, linking workbooks, formula between workbooks   [8]

Reference :
1. .Computer fundamentals. Rajaraman V.
2. Computer fundamentals P.K. Sinha
3. Inside PC Peter Nortron
4. Fundamentals of Information Technology Alexis Leon, Methews Leon,
                       Vikas Publishing.

MCA 102 : Procedural Programming Methodology:

1. Algorithm Development : Problem redefinition, Writing step by step procedure, representation in terms of Flow chart/Decision Trees, Tracing, Testing. Sequential flow of Logic, Control structures, Iterative method to reach the solution. [6]

2. Solutions to the simple problems : Pseudo code generation, variables, constants and their data types, Implementation of sequential, selection and iterative structures. [10]

3. Coding : Syntax and semantics, documentation and debugging of a program, Device (Files) interfacing. [6]

4. Solutions to the complex problems : Structured programming, Modular programming, TOP DOWN / BOTTOM UP approach, Recursive algorithms, Examples, Illustrating structured program development methodology and use of block structured algorithmic language to solve specific problem. [6]

5. Advanced Data Types and their implementation : Arrays, Records, pointers, Applications in the record keeping of real life system [8]

6. Searching and Sorting: various sorts, search algorithms and their complexities [8]

Emphasis should be given on better programming styles and implementation is expected through C++ compiler.

Reference:

1) D. Ravichandran, Programming with C++ (MGH)
2) Dromey, How to solve it by computer,(HI-85).
3) Horowiz & Sahani, Fundamentals of Computer Algorithms,(Galgotia-95).
4) N. Wirth, Algorithms + Data structures = Program,(HI).
5) Wirth, Algorithms and data structures (HI)

MCA 103 : Discrete Mathematical Structures

1. Combinatorics : Permutations and combinations, Distinct and non-distinct objects, Generating functions for combinations, Enumerators for permutations, Distribution of distinct objects. [8]

2. Recurrence Relations and Solutions : Linear and with two indices, Principles of inclusions & exclusions, Formula derangement, Restrictions on relative positions. [6]

3. Mathematical Logic : Notations, Connectives, Normal forms, Theory of inference for statement calculus, Predicate calculus, Inference theory of the predicate calculus. [8]

4. Introduction to the concept of Algorithm proving and testing the correctness. [6]

5. Relations and Functions : Elementary set theory, product sets, Relations, Closure properties and related algorithm, Functions, Types of functions, Computer representation of sets, Relations, Di-graph representation of relations, functions and their manipulations, ordering functions, Recursion.[8]

6. Algebraic structures, Boolean matrices, Algebra of Boolean matrices, Groups, Lattices, Application of the Residue Arithmetic's to computers, Group Codes. Definition & examples of algebraic structures, their applications to computer science. [8]

References :

1) A.Doerr, Discrete Mathematics for Computer Science,(Galgotia-86).
2) Kolman & Busby, Discrete Mathematical Structures for Computer Science, (Prentice Hall).
3) Joshi K.D., Discrete Mathematics, (Wiely Eastern).
4) Liu C.L., Elements of Discrete Mathematics,(TMH-77).
5) S. Sahni, Concepts in Discrete Mathematics,(Camclot Publisher,USA).
6) Schaums series, Discrete Mathematics (McGraw Hill).
7) Tremblay & Manohar,Discrete Mathematical Structures with applications to the Computer Science,(TMH-77).

MCA 104: Microprocessors and Microcontrollers

1. **The 8085 Microprocessor :** Architecture of 8085, Instruction set of 8085, Addressing modes of 8085, simple programs, Buffered bus system of 8085, Timing diagrams. [8]

2. **The 8086 Microprocessor :** EU and BIU of 8086 (Architecture), Instruction set of 8086, Addressing modes of 8086, Flags in 8086, concept of memory segmentation, Buffered system bus of 8086 in Minimum and Maximum mode. [8]

3. **Interfacing Devices :** 8255: Programmable Peripheral Interface, 8279: Keyboard and Display Interface, 8257: Direct Memory Access Controller, 8253/54: Programmable Interval Timer. [8]

4. **Introduction to other 16 bit & 32 bit Microprocessors :** Intel 80186, 80286, 80386 & 80486, Pentium microprocessors. [8]

5. **Microcontroller 8051 :** Basic concept, Introduction, Architecture of MCS 8051, and Instruction set, Addressing modes, single chip Microcomputer. [8]

References:

1) Introduction to 8085/ 8080 Microprocessors: Architecture, Programming and Applications – Ramesh Gaonkar, New Age Publishers
2) Microcomputer systems 8086/8088 Architecture, Programming and Design - Liu,Gibson, PHI
3) Microprocessor and Interfacing Systems: 8086/8088 – D. V. Hall, Tata Mc. Hill Co.
4) Microprocessor and its Applications – S. Malarvizhi, Anuradha Agencies
5) Programming and Customizing the 8051 Microcontroller – Predko, TMH.

MCA105 : Management - I

1. HRD selection, Appraisal Training and Information Systems .   [6]

2. Marketing : Understand the concept of marketing MIS, Marketing MIS consists of product policy and design, pricing, choice of marketing to intermediaries, methods, of physical distributions, Use of personal selling, Advertising and sales promotion research and marketing organization.   [8]

3. Finance : Basic Accounting concepts and conventions; understanding principles of Double Entry Book keeping; subsidiary Book; Preparation of Trial Balance, P & L A/c. Balance Sheet; issues such as provision for bad debts, tax, dividends, missing information.
   Cash Book
   Cash Book with cash, bank and discount column
   Income measurement,   Revenue recognition,   Matching Cost and revenues.
   Depreciation Accounting, Intangible Asset Accounting
   Understand published annual accounts.
   Exhaustive study Accounting and taxation packages (e.g. Tally, Ex. Etc.) [10]

4. Basic cost concepts, introduction, cost classification, allocation,
   Apportionment and absorption
   Cost centers, Cost Units, Cost Analysis for management decisions
   (direct costing, break – even analysis, CVP analysis, relevant costs,
   pricing cost, fixed costs and Sunk Costs)   [8]

5. Manufacturing :
   Operations Planning and Control aggregate planning, multiple products
   Batch, production cycles, short term scheduling of job shops, setting production rates in continuous production systems activity, scheduling in projects, introduction to project time calculations through PERT & CPM, management of supply chain material management quality management _ quality concept and planning, standardization, quality circles, Emphasis Should be given on Computer Application in Functional areas of Management.   [10]

References:

1.   HRD –
         Uday Pareek & I. V. S. Raw
2.   Personnel Management
         Edwin B Philippa.
3.   Marketing – Marketing Management .
         Mrs. M. M. Kamathekar
         Electrotech Publications, Satara.
4.   Basic Marketing –
         TDM Cannon .

5. Book Keeping & Accountancy
   M. G. Patkar
   Phadke Prakashan, Kolhapur .
6. Financial Management
   N. M. Vechalekar.
   (Nirali Prakashan. Pune)
7. Advanced Accountancy
   Dr. S. K paul
   (New Central Book Agency – Calcutta)
8. Financial Management .
   S. M. Inamdar
   (Everest Publishing house, Pune)
9. Cost Accounting .
   B. K. Bhar
   (Academic Publishers, Calcutta)
10. Cost Accounting
    Jawaharlal.
    (Tata MCC New Hill Publishers Co Ltd New Delhi)

MCA106 : Practical – I

Minimum 20 Practical Assignments based on papers theory papers.

MCA107 : Project – I

Project work

SEMESTER II

MCA201 : Object Oriented Programming Using C++

1. Overview Of C++ : Object Oriented Programming, Introducing C++ Classes, Concepts of Object Oriented Programming, C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching, User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names [4]
2. Classes & Objects :Classes, Structure & Classes, Union & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes [4]
3. Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects. [6]
4. Constructor & Destructor : Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor.[4]
5. Overloading as polymorphism : Function & Operator Overloading : Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (I.E. +=,-= Etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading New & Delete, Overloading Some Special Operators, Overloading [ ], ( ), -, Comma Operator, Overloading << And . [6]
6. Namespaces: global namespace and namespace std, nested namespaces [2]
7. Inheritance : Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes . [6]
8. Virtual Functions & Polymorphism : Virtual Function, Pure Virtual Functions, Early Vs. Late Binding. [2]
9. Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler [2]
10. Templates: Reason for templates compactness and flexibility, function template examples explicit specialization, class templates, out of class definition of member functions [4]
11. The C++ I/O System Basics : C++ Streams, The Basic Stream Classes C++ Predefined Streams, Formatted I/O: Formatting Using The Ios Members, Setting

12. The Formal Flags, Clearing Format Flags, An Overloaded Form Of Setf ( ), Using Width() Precision() and Fill(), Using Manipulators to Format I/O, Creating Your own Manipulators.   [4]

REFERENCE BOOKS:
1) C++ THE COMPLETE REFERENCE BY *HERBERT SEHILDT - TMH*
2) C++ BY *BALGURUSWAMI – TATA MCGRAW HILLS*
3) C++ BY M. KUMAR, TATA MCGRAW

MCA202 : Data Structures :

1. Fundamental notions : Primitives and composite data types , choice of data structure and complexity of an algorithms. [4]

2. Arrays : Single and Multidimensional Arrays, sparse matrices. [4]

3. Linked List : Processing linked list, Circularly linked list, Doubly linked list, Multilinked lists, String and characters manipulation using arrays and linked list. [8]

4. Queues : Processing the queues, Linked list implementation, Dequeues, Priority queues and their applications. [4]

5. Stacks : Processing the stacks, Linked list implementation, Application of Stacks for expression solving, Non recursive implementation of recursive algorithms. [4]

6. Trees : Representation of hierarchical relationships, Tree processing, Binary trees, linked list implementation, traversal algorithms, Graph theoric solutions and tree traversals, Binary trees, Threaded binary trees, Height balanced trees, General Trees,. [8]

7. Design and analysis of algorithm for the implementation : Greedy methods, Dynamic programming, Backtracking, Branch and bound [6]

8. Sorting and searching : Various sorts, searching algorithms and their complexities, . Binary tree indexing, B-tree indexing, Hash indexing [6]

References :

1) Aho, Hop craft and Ulman, Data structures and algorithms (Addision - Wesley)
2) Bhagat Sing and Nap, Introduction to data structures (TMH-85).
3) Kernighan B. and Ritchie D., The C Programming Language (HI-88)
4) Tremble & Sorenson, Introduction to Data Structures with application (TMC-84).
5) Weiderberg : Data and file structures

MCA203 : Numerical Techniques

1. Computer Arithmetic : Floating point number operations, normalization and their consequences, Iterative methods, Zero of a single transcendental equation and errors of polynomials using bisection, false position, secant and Newton-Rapson method, Convergence of solution [8]

2. Solution of system of linear algebraic equations : Cramer rule, Gauss elimination and pivoting, ILL condition equations and refinements, LU-decomposition, Doo-Little reduction, Siedel, Jacobi's methods [8]

3. Unconstrained optimization techniques : Interpolation and approximation : Using Newton's finite difference method, Lagrange's formula [4]

4. Numerical integration : Methods based on interpolation, undetermined coefficient, composite integration methods, trapezoidal and Simpson's rules, Double integration (derivation, application and errors in the formulae, comparison between two formulae) [8]

5. Numerical differentiation : Methods based on interpolation, finite differences and undetermined coefficients [4]

6. Solution of differential equations : Eulers and modified Eulers methods, Taylor's series, Range-Kutta method Milne's and Adams Bash Froth's method [6]

7. Constrained optimization : Simplex and revised simplex methods, application, duality, dual simplex method, sensitivity analysis. [6]

References :

1) Balguruswamy," Computers and Numerical Methods" (TMH)
2) Gillett -"Introduction to Operations Research" (MGH)
3) Golub G.H., Charles, F. Vanloan-"Matrix computations" (John Hopkin's press,Baltimora M.A.-83)
4) Hillerand Liberman-"Introduction to Operation Research"(Holden Day Inc.)
5) Kanti Swarup, "Operation Research"

MCA204 : OPERATING SYSTEM

1. Batch System : Concept of multi – programming and time – sharing, Parallel, Distributed and real – time – sharing, Operating system structure - Operating system components and Services System Call System. [6]
2. Process Management : Process Concept, process scheduling, cooperating process, Threads, inter process communication, CPU scheduling, Criteria, scheduling algorithm, multiple processor scheduling, real Time scheduling, algorithm evaluation [8]
3. Process Synchronization and Deadlocks. : Critical Section problem, Synchronization hardware, Semaphores, Classical Problem of synchronization, Critical region, Monitors, Deadlock system model, characterization of deadlocks and deadlock Prevention, Avoidance and detection, recovery from deadlock, Combined approach to deadlock handing [10]
4. Storage management : Memory Management, Logical and physical Address Space, Swapping, Contiguous Allocation, paging,Segmentation, virtual, memory, demand paging and its performance, page replacement algorithm, allocation of frames, thrashing, page size and other consideration, demand Segmentation, File System. Secondary Storage Structure File Concept Access method, Directory Structure, Protection and consistency Semantics, File System Structure, Allocation Method, Free space Management, Directory implementation, Efficiency and performance, recovery, Disk Structure, Disk Scheduling methods, Disk Management, Swap space Management, Disk reliability, protection, goals of protection domain of protection, access matrix, implementa6ion access matrix revocation of access rights, language based protection, security problem one time password, program threats, system threats, threat monitoring Encryption. [20]

Book :
1) Operating System Principles – Abraham Silberschatz, Peter Galvin, Gerg Gagne, 7th ed., Wiley Student Edi.
2) Operating System – Bawn
3) Modern O. S. – Tanenbaum - PHI
4) Donovan Madnick, Operating System
5) Peterson, operating system .

MCA205 : Management – II

1. Finance : Tools of Financial Analysis, Ratio Analysis, Funds Flow Statement, Cash Flow Statement, Risk – return trade off   [6]

2. Management of Working Capital : Working Capital requirement, Operating Cycle approach/concept, Inventory, Accounts receivables, Cash and Accounts Payables, Introduction to material management, System and procedures for inventory management, Planning and procurement of Materials, LIFO, FIFO, Average method for pricing of issues.   [8]

3. Cost analysis for control : Standard Costing, Variances - Material, Labour, Overhead, Sales and Profit   [6]

4. Budget and Budgetary Control : Elements of budgeting, Control of manufacturing and manufg. Expenses, performance appraisal, Evaluation of Cost control system.   [8]

5. Introductions to Management Control System : Strategy Firm and its environment, Strategies and resources, Industry structure and analysis, Evaluation of corporate Strategy, strategies for growth and diversification, process of strategic planning, Goals, Strategies and Key Variables, Performances Measures, Responsibility Centers and Transfer Price, Investment Center, Reporting System, Management by Objectives, Organizational Relationship in Control, Control Dynamics, Top Management and control, strategies and Long Range Planning, Control of Services Organization, Control of Projects, Control of Non Profit Organizations, Control of Multinational Companies   [14]

References :
  1. Financial Management .
          N. M. Vechalekar.
          (Nirali Prakashan. Pune)
  2. Advanced Financial Management.
          Dr. S.KR. Paul.
          (New Central Book Agency (P) Ltd.
  3. Cost Accounting
          B. K. Bhar.
          (Academic Publishers, Calcutta)
  4. Management Accounting .
          M. G. Patkar
          (Phadke Prakashan Kolhapur)
  5. Management Systems & Control
          N/C Publications .
  6. Management Control System.
          Pradipk Kumar Sinha
          (Nirali Prakashan, Pune)

MCA206 : Practical – II

Minimum 20 Practical Assignments based on papers theory papers.

MCA207 : Project – II

Project work