Solapur University, Solapur

M. C. A. (Science Faculty)

Syllabus (Semester – I and II)

Choice Based Credit System Syllabus
(w.e.f. June 2015-16)

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 (45% in case of candidates of reserved categories) 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 than 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:

Six Semester M. C. A. Course

Semester	No. of Papers/ Practicals	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 MCA Course		**3750**	**150**

6. Structure of the Syllabus:

M. C. A. Part – I Semester-I

Paper No.	Paper Code	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
				Internal	University	Total	
I	MCA-101	Introduction to Computers	04	30	70	100	04
II	MCA-102	Programming using C	04	30	70	100	04
III	MCA-103	Discrete Mathematical Structures	04	30	70	100	04
IV	MCA-104	Digital Circuits and Microprocessors	04	30	70	100	04
V	MCA-105	Management	04	30	70	100	04
	MCA-106	Practical – I	12	30	70	100	04
	MCA-107	Project –I	02	30	70	100	04
	Total		**34**	**210**	**490**	**700**	**28**

M. C. A. Part – I Semester-II

Paper No.	Paper Code	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
				Internal	University	Total	
VI	MCA-201	Object Oriented Programming using C++	04	30	70	100	04
VII	MCA-202	Data Structures	04	30	70	100	04
VIII	MCA-203	Numerical Analysis	04	30	70	100	04
IX	MCA-204	Operating System	04	30	70	100	04
X	MCA-205	Software Engineering	04	30	70	100	04
	MCA-206	Practical – II	12	30	70	100	04
	MCA-207	Project –II	02	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 answers / 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

Paper - I
MCA 101: INTRODUCTION TO COMPUTERS

Unit – I :

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 [10]

2. Types of Computer: Mini, Super, Mainframe, Workstation, Personal, Multimedia, Super Computer [5]

Unit – II :

1. Number System: Decimal, Binary, Octal, Hexadecimal, 1's and 2's Complement, floating Point representation, Character Codes- ASCII, EBCDIC, [10]
2. 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. [5]

Unit – III :

1. System Software: Overview of all system software: Operating system, Assembler, Compiler, Linker, Loader [5]
2. 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 [10]

Unit – IV :

1. 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 [5]
2. 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 [10]

Reference Books

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.

Paper - II

MCA 102: Programming using C

Unit – I : 15

1. Introduction to problem solving: Algorithms and Flowcharts, pseudo code, Steps in problem solving.
2. Language Fundamentals : History, Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types
3. Operators : Types of operators, Precedence and Associativity, Expression, Statement and types of statements, Structure of 'C' program
4. Console based I/O and related built-in I/O function : printf( ), scanf( ), getch( ), getchar( ), putchar( )

Unit – II : 15

1. Control structures : Decision making structures (if, if-else, Nested if –else, Switch), Loop Control structures (while, do-while, for, Nested for loop), break, continue, goto, exit
2. Functions : Basic types of function, Declaration and definition, Function call, Parameter passing, Call by value, Call by reference, Scope of variables, Storage classes, Recursion.
3. Arrays : Definition, declaration and initialization of one dimensional array, Accessing array elements, Displaying array elements, Sorting arrays, Arrays and function, Two-Dimensional array, memory representation of array, row major, Column major.

Unit – III : 15

1. Pointers : Definition and declaration, Initialization, indirection operator, address of operator, pointer arithmetic, dynamic memory allocation, arrays and pointers, function and pointers
2. Strings : Definition, declaration and initialization of strings, standard library functions : strlen( ), strcpy( ), strcat( ), strcmp( ), implementation without using standard library functions
3. Structures : Definition and declaration, structure variables initialization, Accessing fields and structure operations, Nested structures, Union, Differentiate between Union and structure

Unit – IV: 15

1. Introduction C Preprocessor : Definition of Preprocessor, Macro substitution directives, File inclusion directives, Conditional compilation.
2. File handling : Definition of Files, Opening modes of files, Standard functions: fopen(), fclose( ), feof( ), fseek( ), rewind( ), fgetc( ), fputc( ), fprintf( ), fscanf( ), fread(), fwrite()
3. Command line arguments

Reference Books

1. Let us C-Yashwant Kanetkar.
2. Programming in C- Balguruswamy
3. The C programming Lang., Pearson Ecl – Dennis Ritchie
4. Pointers in C – Yashwant Kanetkar
5. How to solve it by Computer – R. G. Dromy

Paper – III
MCA 103: Discrete Mathematical Structures

Unit – I :

1. Combinatorics: Permutations and combinations, Distinct and non-distinct objects, Generating functions for combinations, Enumerators for permutations, Distribution of distinct objects. [7]

2. Matrices: Basic concepts, Types of matrices, Arithmetic operations on matrices, Scalar Multiplication, Transpose of matrix, Symmetric matrix, Inverse of matrix, Solving simultaneous equation using matrices, Boolean matrices, Eigen values, Eigen vectors, Determinant. [8]

Unit – II :

1. Mathematical Logic: Notations, Connectives, Normal forms, Theory of inference for statement calculus, Propositional logic, Predicate calculus, Inference theory of the predicate calculus. [15]

Unit – III :

1. Relations and Functions : Elementary set theory, product sets, Relations, Closure properties and related algorithm, Functions, Types of functions, Computer representation of sets, Relations, functions and their manipulations, ordering functions, Recursion.[15]

Unit – IV :

1. Graph Theory: Definition, walks, paths, trails, connected graphs, Di-graph representation of relations, regular and bipartite graphs, cycles and circuits, eccentricity of a vertex, radius and diameter of a graph, Central graphs, Hamiltonian and Eulerian graphs, and planar graphs. [8]

2. Algebraic structures: Groups, Lattices, Applications of the Residue Arithmetic's to computers, Group Codes, Definition & examples of algebraic structures their applications to computer science. [7]

Reference Books

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
8) Computer Science, (TMH-77).

Paper - IV
MCA 104: Digital Circuits and Microprocessors

Unit – I :

1. **Digital Logic and Combinational Circuits:** Logic gates: basic gates, derived gates and universal gates, Boolean algebra and Map simplification (K-map), Combinational Circuits: Half adder, Full adder, Subtracter, Flip-Flops: SR, D, JK, T, edge triggered Flip-flips. [15]

Unit – II :

1**. Digital Components**: Integrated Circuits, Decoders, Multiplexers, Register and Shift Registers, Counters. [15]

Unit – III :

1. **The 8085 Microprocessor:** Architecture of 8085, Instruction set of 8085, Addressing modes of 8085, simple programs, Buffered bus system of 8085, Timing diagrams. [15]

Unit – IV :

1. **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. [15]

Reference Books

1) Computer System Architecture – M. M. Mano, Prentice Hall
2) Introduction to 8085/ 8080 Microprocessors: Architecture, Programming and Applications – Ramesh Gaonkar, New Age Publishers
3) Microcomputer systems 8086/8088 Architecture, Programming and Design -Liu, Gibson, PHI
4) Microprocessor and its Applications – S. Malarvizhi, Anuradha Agencies

Paper - V
MCA105: Management

Unit – I :

1. **HRD**: - selection, Appraisal, Training and Information Systems, Soft skills (communication, SWOT Analysis), Quality Circle. [9]

2. **Marketing**: - Marketing Information System (MIS), Marketing Intermediaries, Advertising, Supply Chain Management. [6]

Unit – II :

1. **Finance**: - Basic Accounting concepts and conventions, understanding principles of Double Entry Book keeping, subsidiary Books, Preparation of Final Accounts, Use of Basic Ratios (Current Ratio, Liquid Ratio, Net Profit Ratio, Gross Profit Ratio, Debt Equity Ratio, Net Working Capital), Banking Transactions (Types of Accounts, Cheques, KYC Norms) [15]

Unit – III :

1. **Costing**: - Basic cost concepts, cost classification, Cost centers, Cost Units, Valuation of Inventory (FIFO, LIFO, Weighted Average), EOQ Model. [7]

2. **Budget and Budgetary Control**: - Meaning of Budget, Types of Budget, Budget Manual, Budget Committee and Steps in Budgetary Control, Advantages and Limitations of Budgetary Control. [8]

Unit – IV :

1. **Management Control System**:- Basic Concepts of Management Control System, Areas of Control, Boundaries of Management Control, Strategic Planning and task Control, Goals and Goal Congruence, Informal and Formal Factors Influencing Control System, Functions of Controller, Key Success Variables (Input Variables, Production Variables, Marketing, Asset Management, Environment Variables etc.) Performance Measures (Finance and Non Financial)

[15]

Reference Books

1) HRD - Uday Pareek & I. V. S. Raw.
2) Personnel Management- Edwin B Philippa.
3) Marketing – Marketing Management- Mrs. M. M. Kamathekar , TDM Cannon.
4) Financial Accounting- Chaudhary.
5) Management Accounting- M. G. Patkar, S. K. R. Paul.
6) Costing/ Cost Accounting- B. K. Bhar, Jawahar Lal.
7) Management Control System- Pradip Kumar Sinha (Nirali Prakashan)

MCA106: Practical – I

Minimum 20 Practical Assignments based on theory papers.

MCA107: Project – I

Project work

SEMESTER II

Paper - VI
MCA201: Object Oriented Programming Using C++

Unit – I :

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 [8]
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 [7]

Unit – II :

1. 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. [8]
2. Constructor & Destructor: Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor. [7]

Unit – III :

1. 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 . [8]
2. 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 . [7]

Unit – IV :

1. Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding. [3]
2. Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler [3]
3. Templates: Reason for templates compactness and flexibility, function template examples explicit specialization, class templates, out of class definition of member functions [4]
4. The C++ I/O System Basics: C++ Streams, The Basic Stream Classes C++ Predefined Streams, Formatted I/O: Formatting Using The Ios Members, Setting 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. [5]

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

Paper - VII
MCA202: Data Structures

Unit – I :

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. **Stacks** : Processing the stacks, Linked list implementation, Application of Stacks for expression solving, Non recursive implementation of recursive algorithms. [7]

Unit – II :

1. **Queues** : Processing the queues, Linked list implementation, Dequeues, Priority queues and their applications. [6]

2. **Linked List :** Processing linked list, Circularly linked list, Doubly linked list, Multilinked lists, String and characters manipulation using arrays and linked list. [9]

Unit – III :

1. **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]

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

Unit – IV :

1. **Sorting and searching** : Various sorts viz. Insertion, Bubble sort, Selection sort, Quick sort, Merge sort, Radix / Bucket sort, Counting sort, searching algorithms and their complexities, . Binary tree indexing, B-tree indexing, Hash indexing [15]

Reference Books

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

Paper - VIII
MCA203: Numerical Analysis

Unit – I :

Errors in numerical calculations and solution of algebraic and transcendental equations [15]

Numbers and their accuracy, Mathematical preliminaries, Errors & their computation: Absolute, relative & percentage errors, A general error formula, Error in series approximation, The iteration method & it's rate of convergence, The method of false position & its rate of convergence, Secant method & its rate of convergence, Newton Raphson method and its rate of convergence.

Unit – II :

Interppolation and Numerical Differentiation. [15]

Errors in polynomial interpolation, Finite Differences: Forward, Backward & Central Differences, Symbolic relations & separation of symbols, Newton's Formula for interpolation, Lagrange's interpolation formula and error in Lagrange's interpolation formuls, Divided differences & their properties, Newton's general interpolation formula.

Unit – III :

Numerical solutions of system of linear equations & Eigen Values. [15]

Gaussian elimination method, Method of factorization (LU decomposition), Iterative Method: Gauss Seidal Method, Eigen value problem: Householder's method, Eigen value of symmetric tridiagonal matrix, Power method for largest Eigen value

Unit – IV :

Numerical Integration and Solutions of ordinary differential equations [15]

Numerical Integration: Trapezoidal rule Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule, Errors in the above methods, Solution of differential equation by Taylor's series: Euler's method and Euler's modified method

Reference Books

1) S. S. Sastry Introductory Methods of Numerical Analysis, 3^{rd} edition, Prentice Hall of India, 2001
2) M. K. Jain, S. R. K. Iyengar, S. R. Iyenger, R. K. Jain, Numerical Methods for scientific and Engineering computation, 3^{rd} edition, wiley Eastern Ltd., 1992
3) Atkinson K. E., An Introduction to Numerical Analysis, John Wiley and Sons, N. Y., 1978.
4) Froberg C. E., Introduction to Numerical Analysis, Johns Hopkins University Press, Baltimore, 1950.

Paper – X
MCA204: OPERATING SYSTEM

UNIT-I **15**

1. **Introduction and structure of Operating System**: Concept of multi – programming, Parallel, Distributed and real – time – sharing, Operating system structure - Operating system components and Services System Call System.

UNIT-II **15**

1. **Process Management, Synchronization and Deadlocks**: Process Concept, process scheduling, cooperating process, Threads, inter process communication, CPU scheduling Criteria, scheduling algorithms-FCFS, SJF, Priority, Round Robin, Multilevel feedback queue scheduling.

2. **Process Synchronization and Deadlocks :** Critical Section problem, Synchronization hardware, Semaphores, Critical region, Monitors, Deadlock system model, characterization of deadlocks and deadlock Prevention, Avoidance and detection, recovery from deadlock.

UNIT-III **15**

1. **Memory Management:** Memory Management, Logical and physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation.

2. **Virtual, memory**: demand paging and its performance, page replacement algorithm, allocation of frames, thrashing.

UNIT-IV **15**

1. **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, Disk Structure, Disk Scheduling methods, Disk Management, Swap space Management.

2. **Security and protection:** goals of protection domain of protection, access matrix, security program threats, system threats.

   CASE Study: Network Operating System, OS Environment, Comparison of Distributed Operating System, Multiprocessor Time Sharing Systems and Network Operating System.

Reference Books :

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.

Paper XI
MCA205: Software Engineering

Unit – I :

1. Introduction: Product and Process: Evolving role of software, software characteristic and components, crisis, myths, software engineering – a layered technology, software process, linear sequential model, prototyping model, RAD model, evolutionary software process model. [10]

2. Software Process And Project Metrics: Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance. [5]

Unit – II :

1. Analysis Concepts And Principles: Requirement analysis, communication techniques, analysis principles, software prototyping & Specification. [7]

2. Analysis Modeling: Elements of the analysis model, data modeling, functional modeling, behavioral modeling, the mechanics of structured analysis, data dictionary, other classical analysis methods. [8]

Unit – III :

1. Design Concepts & Principles: Software Design and software Engineering design process, Design principles, Design concepts, Design methods-Data design, Architectural design and process, Transform and Transaction mappings, Design post processing, Architectural design optimization, Interface design, Procedural design. [15]

Unit – IV :

1. Software Testing Methods: Fundamentals, Test case design, White box testing, basis path testing, control structure testing, black box testing, Software testing strategies. [8]

2. Object Oriented Software Engineering: Object oriented concepts, Identifying the elements of an object model, Management of object-oriented software projects, Object-oriented analysis, design and testing. [7]

Reference Books

1. Roger S. Pressman, Software Engineering **,** McGraw Hill(1997).
2. Shooman, Software Engineering, McGraw Hill(1987).
3. I. Sommerville, Software Engineering, International Computer Science Series(1985).
4. Booch, Object-Oriented Design & Analysis, Benjamin / Commings.
5. Rambaugh J., Bluha M., Premerlani W., Eddly Fand Lorenen W., Object-Oriented Modeling and Design, PHI(1991).
6. Ghezzi, Etal; Fundamentals of Software Engineering, PHI.

MCA206: Practical – II

Minimum 20 Practical Assignments based on theory papers.

MCA207: Project – II

Project work