

M.C.A.  
First Year

Prospectus No. 111722

संत गाडगे बाबा अमरावती विद्यापीठ  
SANT GADGE BABA AMRAVATI UNIVERSITY  
(FACULTY OF ENGINEERING & TECHNOLOGY)

## PROSPECTUS

Prescribed for

MASTER IN COMPUTER APPLICATION  
FIRST YEAR M.C.A.  
Examination, 2010-2011  
CREDIT GRADE SYSTEM



2010

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SYLLABUS  
PRESCRIBED FOR  
THREE YEAR POST GRADUATE DEGREE COURSE  
MASTER IN COMPUTER APPLICATIONS  
FIRST YEAR  
SEMESTER : FIRST

**1 MCA 1 / 1 CS 1 COMPUTER ORGANIZATION**

- Unit I** Chapter Objectives, Evaluation of Computers and computer generations, Technological trends, Measuring performance, speed up, Amdahl's law, Von Neumann machine architecture, Functional units and components in computer organization, Program development tools, Operating systems.
- Unit II** From Electron to Bits, Binary representation of positive integers, Negative integers, Fixed point arithmetic operations on positive and signed (Negative) integers, Floating-Point numbers (IEEE 754 standard) and operations, BCD arithmetic operation, Design of ALU, Bit slice processors.
- Unit III** Concept of instruction formats and instruction set, instruction set types, types of operands and operations, Generation of memory addresses and addressing modes, Subroutine nesting using stacks to implement subroutine calls and calling conventions, Processor organizations, Register organization, Stack based organizations, Encoding of machine instructions, General features of RISC and CISC instruction sets, modern processors convergence of RISC with CISC, Processor microarchitecture-I - Fundamental concepts for data path implementation, Processor microarchitecture-II - Data path implementation, microprogrammed execution, recent innovations in execution unit design.
- Unit IV** Instruction pipeline, instruction pipeline hazards, overcoming hazards using a pipeline with forwarding paths, instruction set design influence on pipelining, example of pipelined CISC processor, example of pipelined RISC processor, VLIW (Very Long Instruction Word) processors, Vector processors, Multithreaded processors, Compilation techniques support to instruction level parallelism, Extracting parallelism.
- Unit V** Some basic concepts, memory hierarchy, internal organization of semiconductor main memory chips - RAM and ROM, semiconductor main memories - RAM, semiconductor Read-Only memories - ROMs, speed, size and cost, secondary storage magnetic ferrite core memories, optical disks CD-ROM

memories, data caches, instruction caches, and unified cache, features describing a cache, cache implementations, multilevel caches.

- Unit VI** Virtual memory organization, mapping functions for translating the program pages in virtual to physical addresses space, partitioning, segmentation (superpages or page blocks) partitioning of virtual address space in to segment and page address, demand paging and swapping, cache and virtual swapping, cache and virtual memory, inverted page tables concept, protection between programs running on the same system, accessing I/O devices, programmed I/O, interrupts, direct memory access DMA, bus arbitration, interface circuits, I/O interfaces, I/O processors, external I/O devices.

**Text Book :** Computer Architecture by Micholus Carter & Rajkamal, Schaum Series Pub.

**1 MCA 2 / 1 CS 2 PROBLEM SOLVING USING C++**

- Unit I** Objects & Classes in C++ : Declaring & using classes, Constructors, Objects as functions arguments, Copy Constructor, Static class data. Arrays of objects, C++ String class.
- Unit II** Operator overloading : Overloading unary & binary operators. Data conversion. Pitfalls of operator overloading. Pointers & arrays. Pointers & functions. new & delete operators. Pointers for objects.
- Unit III** Inheritance in C++ : Derived class & base class, Derived class constructors, Function overloading, class hierarchies, Public and private inheritance, Multiple inheritance. Containership : classes within classes.
- Unit IV** Virtual functions concepts, Abstracts classes & pure virtual functions. Virtual base classes, Friend functions, Static functions, Assignment and copy initialization, the this pointer. Dynamic type information.
- Unit V** Streams & Files in C++ : Stream classes, stream errors, disk file I/O with streams, File pointers, Error handling in file I/O. File I/O with members functions, overloading the extractions & insertion operators, Memory as a stream object, command-line arguments. Multifile programs.

Unit VI Function Template, Class templates, Exception syntax, Multiple exceptions, exception with arguments. Introduction to the Standard Template Library. Algorithms, Sequential Containers, Iterates, Specialized iterates, Associative containers. Function objects.

**Text-Book :**

1. Savitch: Problem Solving using C++ (Addison Wesley) Low-Priced Edition.

**References :**

1. Robert Lafore Object-Oriented Programming in C++ (Galgotia)
2. Herbert Schildt C++ : Complete Reference (TMH)
3. Bjarne Stroustrup C++ Programming Language (Addison-Wesley)
4. Venugopal Mastering C++ (TMH)
5. Lipmann C++ Primer (Addison-Wesley)

**IMCA3/1 CS3 COMPUTER ORIENTED STATISTICAL METHODS**

**UNIT-I :** Introduction  
 Definitions : Webster's, seccists, Gronton and Cowden definitions of statistics  
 Importance of statistics  
 Scope of statistics : Industry, Economy, Planning, medical science, Computer Science etc.  
 Limitations of statistics.  
 General principles of classification of data.  
 Construction of Frequency distribution, cumulative frequency distribution, relative frequency distribution.  
 Graphical representation of frequency distribution.  
 Diagrammatic representation : Simple bar, subdivided bar, pie diagram.  
 Numerical Problems.

**UNIT-II :** Measures of central Tendency & Measures of dispersion:  
 Concept of central tendency, criteria for good measures of central tendency.  
 Arithmetic mean for grouped and ungrouped data, properties of a m., combined mean, weighted mean, merits and demerits.  
 Median, mode, G.M., H.M. for grouped & ungrouped data with its merits & demerits.  
 Partition values : quartiles, deciles, percentiles  
 Numerical problems on central tendency.  
 Concept of dispersion criteria for good measures of dispersion.

Measures of dispersion : Range, quartile deviation, mean deviation, S.D. for grouped & ungrouped data with its merits & demerits Variance : Definition for grouped & ungrouped data, combined variance, co-efficient of Dispersion, co-efficient of variation. Numerical problems on measures of dispersion.

**UNIT-III :** Moments, measures of Skewness and Kurtosis correlation  
 Raw & Central moments : for grouped & ungrouped data (upto first four moments) & their relationships. Skewness, measures of skewness, co-efficient of skewness, empirical relation between mean, mode, median. Pearson's & Bowley's co-efficient of Skewness. Kurtosis & types of kurtic curves, co-efficient at Kurtosis based on moments.  
 Numerical problems on moments, co-efficient of skewness & co-efficient of Kurtosis.

**Unit-IV** Correlation : Concept of correlation for bivariate data, scatter diagram, positive, negative & no correlation, cause and effect relationship.  
 Karl pearson's co-efficient of correlation( $r$ ), limits at  $r$  and interpretation of  $r$ , assumption on  $r$ .  
 Effect of change of origin & scale on  $r$ , independence of variables.  
 Spearman's Rank correlation, repeated rank correlation.  
 Numerical problems on karl pearsons & spearman's rank correlation co-efficient.

**UNIT-V :** Regression :  
 Concept of regression & linear regression  
 Derivation of regression lines by method of least squares.  
 Properties of regression co-efficients.  
 Linear and Non-linear regression : Fitting of second degree curve & curve  $y=abx$  by least square method.  
 Numerical problems on linear & non-linear regression.  
 Multiple regression by yule's notations (for tri-variate data)  
 Multiple correlation & partial correlation.

**UNIT-VI :** Time series :  
 Definition of Time series & uses of time series  
 Components of Time series, Additive & multiplicative models.  
 Methods of estimating trend by moving average method graphical method, semiaverage method & by least square methods.  
 Numerical problems on Time Series.

**Text Books:**

- J.N. Kapoor : Mathematical Statistics (MCG)  
 Trivedi : Probability and Statistics with Computer Science Applications (TMH)

**References:**

1. Statistical Methods (An Introductory Text) : J. Medhi
2. Modern Elementary Statistics : J.E. Freund
3. Statistical Methods : S.P. Gupta
4. Fundamentals of Statistics : Goon, Gupta, Dasgupta

**IMCA4 / 1 CS 4 PRINCIPLES OF MANAGEMENT**

(8 hours/unit)

- UNIT I** Introduction : Definition and concepts of management, Importance of management, Various management functions & control, responsibilities, Human resources planning, Decision-making, Trade unions & collective bargaining.
- UNIT II** Organization planning, design and development: Production resources, Production planning, types of production system, production systems, production control.
- UNIT III** Product design & development : Introduction, design of the product, New product development, Material planning and control. Inventory control technique .
- UNIT IV** Maintenance and system reliability: Concepts and Objectives of maintenance. Failure analysis, Reliability Maintenance system & Classification. Maintenance planning, TQM ISO 9000 and Quality audit.
- UNIT V** Marketing management : Introduction, marketing planning. Consumer behavior, product management, Pricing & promotion decision. Financial planning. Source of finance.
- UNIT VI** Project Management: Concepts and importance of project, Project implementation, MIS. MIS meaning and objectives. Types of data, methods of data collection, analysis and presentation of data. Editing, reporting and presentation of data, Decision options.

**Text book :**

A.K. Gupta, J.K. Sharma : Management of Systems (Macmillan)

**References :**

1. Appleby : Modern Business Administration, 6/e (Macmillan)
2. Tritaphy & Reddy : Principals of Management, 2/e (TMH)
3. Gupta, Sharma et : Principales of Practices of Management (Kalyani)

**IMCA5 / 1 CS 5 COMMUNICATION SKILLS**

- Unit I:** Comprehension - word study :-  
 Synonym, antonym, meanings, matching words, adjectives, adverbs, prefix and suffix, correct forms of commonly misspelled words, understanding of the given passage.  
 Skimming for general ideas, Contextual vocabulary, Error detection, Note making and Location of argument from text, Ability to answer inferential, factual and personal response.
- Unit-II** Comprehension -- Structure study :-  
 Simple and compound sentences, types of conjunctions, singular and plural, tenses and their effect on verb forms. Use of - not only - but also, if clause, since, may, can, could, would, too etc. Active and passive forms, negative and interrogative, punctuation and capitalization.
- Unit III** Theoretical background - importance of communication, its process, model of communication its components & barriers. Types of written communication, organization of a text (Titles, summaries, headings, sequencing, signaling, cueing etc.). Important text factors (length of paragraph, sentences, words, clarification and text difficulty). Evaluation of written communication for its effectivity and subject content.
- Unit IV** Specific formats for written communication like - business correspondence, formal reports, technical proposals, research papers and articles, advertising and graphics. Format for day-to-day written communication like applications, notices, minutes, quotations, orders, enquiries etc. Letter writing, Preparation of Curriculum - Vitae, Composing messages- telegrams, telex, fax and e-mail Writing memos, agendas and notices of meetings, Preparing advertisements.
- Unit-V** Oral communications - Important objectives of interpersonal skills, Verbal communication, its significance, face to face communications, group discussion and personal interviews. Voice modulation and logical argument, Comprehension of text at normal reading speed. Listening skill and timely response, Participation and contribution to discussion, Command over language Formal and informal style of communication, Body language.

**BOOKS Recommended :**

- 1) Krishna Mohan, Meera Banerjee : Developing Communication Skills, MacMillan India Limited.

- 2) Christie Wright (Editor) : Handbook of Practical Communication Skills, Jaico Publishing House.
- 3) Curriculum Development Centre, TTTI WR, Bhopal : A Course in Technical English, Somaiya Publication Pvt. Ltd.
- 4) F.Frank Candlin : General English for Technical Students, University of London Press Ltd.

#### 1 MCA 6/1 CS 6 PROBLEM SOLVING USING C++ LAB: LIST OF PROGRAMS

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

- 1 Write a C++ program to implement a stack with its constructor and two member functions PUSH and POP
- 2 Write a C++ program to find product of two same numbers from 0 to 9 stored in an object array of 10 objects and then free the memory space occupied by an object array
- 3 Write a C++ program to overload minus operator as an unary and binary operator
- 4 Write a C++ program using friend operator function to overload plus binary operator
- 5 Write a C++ program to calculate the circumference of an earth (subclass) after getting distance of it measured from sun from planet (super class)
- 6 Write a C++ program for an inventory that stores the name of an item, the number on hand, and its cost. Include an inserter and an extractor for this class
- 7 Write a C++ program that creates an output file, writes information to it, closes the file and open it again as an input file and read the information from the file
- 8 Write a C++ program that counts number of words in a file
- 9 Write a C++ program to create an abstract class area having an abstract function get Area which will find an area of derived classes rectangle and triangle
- 10 Write a C++ program to create a generic function that swaps the values of the two variables it is called with"

#### IMCA7/1 CS 7 COMPUTER ORIENTED STATISTICAL METHODS

##### Practicals on Statistical Methods:

Minimum 12 practicals to be performed throughout the semester based on following (using C or C++ language).

- 1 Construction of frequency distribution, graphical methods & diagrammatic representation.
- 2 Problems on measures of Central Tendency.
- 3 Problems on measures of dispersion.
- 4 Problems on moments, measures of Skewness and Kurtosis.
- 5 Computation of correlation co-efficient for bivariate data.
- 6 Fitting of linear & non linear regression lines
- 7 Computation of rank correlation co-efficient
- 8 Problems on time series .

#### IMCA8/1 CS 8 COMMUNICATION SKILLS LABORATORY

##### Objective :

On completion of this laboratory the candidate should be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit the evidence of vocabulary building. Candidates should be assessed through continuous monitoring and evaluation.

The sample list of experiments is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Assignments and tests for vocabulary building
2. Technical report writing
3. Group discussions
4. Interview techniques
5. Projects and tasks such as class news letter
6. Writing daily diaries and letters
7. Interactive language laboratory experiments.

**Text Book:** Norman Lewis : Word Power Made Easy  
<http://www.teachingenglish.org.uk>

#### IMCA 9/1 CS 9 COMPUTER LABORATORY-I

This laboratory is based on the study of following software

1. The study of Windows/Linux operating systems :  
The topics to be covered include
  - 1) The study of basic commands handling files, directories, system configuration and system calls

- 2) Shell programming.
  - 3) General purpose utilities & editors
  - 4) Setting/resetting file attributes/ modes, sharing files,
  - 5) TCP/IP networking
2. The study of spreadsheets : Creating Worksheets, Formatting cells, conditional formatting of cells and data, Use of functions, Creating Macros, Creating different types of charts. (At least 6 exercises covering above mentioned features) Use MS-Excel or Calc from Open Office Under Linux.
  3. The study of DBMS : Creating Database, Tables, Views, Queries, Creating Reports (At least 6 exercises covering above mentioned features)

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## SEMESTER: SECOND

**2 MCA 1 / 2 CS 1 DATA STRUCTURES & ALGORITHMS**

- Unit-I** Data structures basics, Mathematical/algorithmic notations & functions, Complexity of algorithms, Subalgorithms. String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms.
- Unit-II** Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, Bubble sort, Linear search and Binary search algorithms. Multidimensional arrays, Pointer arrays. Record structures and their memory representation. Matrices and sparse matrices.
- Unit-III** Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion operations on linked lists. Header linked lists, Two-way linked lists.
- Unit-IV** Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, an application of stacks, Recursion. Tower of Hanoi problem. Implementation of recursive procedures by stacks, Queues. Deques. Priority queues.
- Unit-V** Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes: threads. Binary search trees, searching, inserting and deleting in binary trees. Heap and heapsort. Path length & Huffman's algorithm. General trees.
- Unit-VI** Graph theory, sequential representation of graphs, Warshall's algorithm, Linked representation, operations & traversing the graphs. Posets & Topological sorting. Insertion Sort, Selection Sort. Merging & Merge-sort, Radix sort, Hashing.

**Text Book:**

Seymour Lipschutz: "Theory & Problems of Data Structures" (TMH)

**References:**

1. Horowitz & Sahni "Data Structures" (Galgotia)
2. Trembley & Sorenson "Data Structures" (TMH)
3. Standish "Data Structures in JAVA" (Pearson)
4. Bhagat Singh & Naps "Data Structures" (TMH)

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**2 MCA 2 / 2 CS 2 OBJECT ORIENTED PROGRAMMING**

- Unit-I** Introduction, Software development, life-cycle approach, Software requirement specifications, Algorithms, VB Net projects, Designing objects, classes & applications, object relationships, Class design examples, class code in VB Net
- Unit-II** VB Net language, CLR, variables, expressions, statements, blocks, structured variables & enumerations. Classes, object orientation & variables, control structures, selection structures, repetitions, Subs, functions & parameters, errors & exception handling, scope.
- Unit-III** Data & object structures, organizing the data, arrays, other data structures, collections, inheritance in VB, code inheritance, interface inheritance, inheriting the data structures, Visual inheritance, polymorphism.
- Unit-IV** Winform applications : Structure of application, Winform basics, user interface code & the form designer, tools for creating a user interface, dialog boxes & the other user interface options, other form styles, control collection, delegates and event handlers, visual inheritance.
- Unit-V** Windows controls, accessing controls, command control, Simple input controls, list controls, manipulating the controls at runtime. Graphics in Winform programs, object modeling : application structure, real worlds object modeling with object relationships, software patterns.
- Unit-VI** Storing application data, computer files, Windows registry, file storage, structured data, Serialization. Databases in Visual Basic. Net Object oriented database systems, Net support for relational database systems, data access in a three tiered system, reading & writing data.

**Text Books:**

Alisstair McMonnies : Object Oriented Programming in Visual Basic.NET, Pearson Education.

**References:**

1. Hamilton J.P. : OOP with Visual Basic.NET, O'Reilly Media Inc.
2. Reynolds-Haertle R.A. : OOP with Visual Basic.NET & Visual C#.NET, Microsoft Press.
3. Michael Halvorson : Microsoft Visual Basic.NET Step by Step, Microsoft Press.
4. Francesco Balena : Programming Microsoft Visual Basic.NET, Microsoft Press.

**2MCA3/2CS3 SYSTEM ANALYSIS & DESIGN**

- UNIT I** Introduction : System Analysis & Design concepts. Role of system analyst. Review of System DLC. Organization as systems. Levels of management culture. Project fundamentals. Feasibility study. Activity planning & control. Managing analysis & design activities.
- UNIT II** Sampling and investigating hard data. Interviewing. Planning & conducting interview & reporting. Joint application design. Using questionnaires. Planning designing and administering the questionnaire.
- UNIT III** Coservation of a decision-makers behavior and office environment. Prototyping : User reactions. Approaches to prototyping & developing prototype. Data flow approach to requirements. Developing DFDs. Logical & Physical DFDs. Examples of DFDs.
- UNIT IV** Data dictionary concept. Data repository. Creating & using data dictionary. Overview of process specifications. Structured English, Decision tables/trees. Decision support system & decision making concepts relevant to DSS. Semi structured decisions. Multiple-criteria decision-making.
- UNIT V** System Proposal : Ascertaining hardware/software needs. Identifying & forecasting cost/benefit & comparing cost/benefit. Writing and presenting the systems proposals. Principles of Delivery.
- UNIT VI** Output Design Objectives. Designing printed output, Screen output. Input Design objectives. Form Design. Screen Design for input. Introduction to OOSAD. : Object-Oriented Analysis. Object-Oriented Design.

**Text-book :**

Kenneth E.Kendall & : "System Analysis and Design"  
Julie E.Kendall (Pearson Education) 3/e

**References :**

1. Yeates "System Analysis & Design" (Macmillan)
2. J.Fitzgerald & A.Fitzgerald. "Fundamentals of System Analysis & Design" (John-Wiley) 3/e
3. Edward "System Analysis & Design" (McGraw-Hill)
4. Whilten, Bentley, Barlow "System Analysis & Design Methods" (Galgota) 2/e.

**2MCA4/2CS4 DATA COMMUNICATIONS**

- Unit-I** : Data communication concepts, uses and applications. Telephone : Voice communication networks, Switches, PBX cellular technologies, Fax, IVR, Voice Mail.
- Unit-II** : Hardware; network architecture, Hosts, Clients, Circuits, Special purpose Communication Devices, FEP, Multiplexers, Protocol Converters, Line adapters.
- Unit-III** : Data transmission : Coding, Transmission modes, Band width, Modulation, Modem : Types and Standards, PAM & PCM techniques, Connector cables.
- Unit-IV** : OSI model, MAC protocol; Controlled & contention-based, Error control in networks, Data link Protocols : asynchronous & synchronous Transmission efficiency.
- Unit-V** : Network Layer : Topologies. Network routing. Network Standards and network protocols : TCP/IP, IPX/SPX, X.25 & GOSIP protocols.
- Unit-VI** : LANs : uses and types, LAN components. Ethernet : topology, MAC, types, Token rings : topology, MAC, types, Other types of LANs, MAP (IEEE 802.4), ArcNet, Apple Talk LAN performance improvement, selecting a LAN.

**Text Book :**

1. J.Fitzgerald & A.Denis Business Data Communication & Networking, (5/e) (John Wiley & Sons)

**References:**

1. Schweber: Data Communication (McGrawHill)
2. Miller : Digital & Data Communication (Jaico)

**2MCA 5****BUSINESS SYSTEMS**

- Unit-I** Introduction : Nature of business, objectives, components of business, environment of business system, business system and its sub-systems, forms of legal ownership : sole proprietorship, partnership organisation, company form of organisation. Social responsibilities of business.
- Unit-II** Company Management : Structure of company management, patterns and problems of company management, company meetings & resolutions, company office - its organisation and management. Business combinations, Government & business.
- Unit-III** Production functions : Plant location, factory planning, production control and cost control, Budgets and budgetary control, purchasing and storekeeping.
- Unit-IV** Personnel functions : Personnel management; definition, role of personnel manager, job evaluation, merit rating. Industrial relations, Trade Unionism, employee remunerations, wage payments, incentives & wage policies.
- Unit-V** Financial functions : Financial planning, various sources of finance, institutions of industrial finance. Securities market.
- Unit-VI** Marketing functions : Marketing & its function, transport, selling or distributions of goods, channels of distribution, salesmanship, advertising and promotion.

**Text Book :**

M.C.Shukla : Business Organisation & Management, S. Chand & Company.

**References:**

1. P. Gopalkrishnan : Materials Management, PHI.
2. Reddy & Gulshan : Business Organisation & Management, S. Chand & Company.
3. R.C.Appleby : Modern Business Administration, 6/e, Macmillan.

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**2MCA 6/2CS6 DATA STRUCTURES &  
ALGORITHMS - LABORATORY**

The sample list of program is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes. Further, C, C++ or Java may be used as the programming language.

1. Write an application to implement Tower of Hanoi Problem Algorithm.
2. Write an application to implement Abstract data type stack
3. Write a program to evaluate Post fix expression using stack
4. Write a program to implement Abstract data type queue.
5. Write a program to implement singly linked list that performs various operation such as insertion, deletion, searching a node in linear linked list.
6. Write a program to implement Preorder Traversal of a binary tree.
7. Write a Program to search a given element using Binary Search.
8. Write a Program to implement Selection Sort.
9. Write a Program to implement Merge Sort.
10. Write a Program to Perform insertion or search in a specified level of a stack implemented tree- structured symbol table.

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**2MCA 7 / 2 CS 7 Object Oriented Programming Labs:**

Minimum ten programming assignments should be completed based on above syllabus.

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**2MCA 8 / 2 CS 8 SYSTEM ANALYSIS & DESIGN LAB.**

8 to 10 Examples of SAD from text book covering each unit of syllabus, using any available SAD tool, as from one available with text book.

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**2MCA 9 COMPUTER LABORATORY-II**

In this lab, the students have to develop a mini project based on any technology they have learnt. They have to properly follow and practice the system development life cycle. They will have to prepare a project report and submit it as a completion of this lab.

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**APPENDIX-A**  
**THREE YEAR POST GRADUATE DEGREE COURSE IN MASTER IN COMPUTER APPLICATION**  
**SEMESTER PATTERN**  
**CREDIT GRADE SYSTEM**  
**FIRST YEAR SEMESTER-I**

Sr.No.	Subject Code	Teaching Scheme						Examination Scheme								
		Hours/Week				Credits	Duration of Paper (Hr.)	Theory			Practical		Total	Min. Passing Marks		
		Lecture	Tutorial	P/D	Total Hours/Week			Max. Marks Theory Paper	Max. Marks College Assessment	Total	Min. Passing Marks	Max. Marks External			Max. Marks Internal	
1	1MCA1	Computer Organization	4	0	0	4	4	3	80	20	100	40	-	-	-	-
2	1MCA2	Problem Solving Using C++	4	0	0	4	4	3	80	20	100	40	-	-	-	-
3	1MCA3	Computer Oriented Statistical Methods	4	0	0	4	4	3	80	20	100	40	-	-	-	-
4	1MCA4	Principles of Management	4	0	0	4	4	3	80	20	100	40	-	-	-	-
5	1MCA5	Communication Skills	4	0	0	4	4	3	80	20	100	40	-	-	-	-
6	1MCA6	Problem Solving Using C++-Lab.	0	0	2	2	1	-	-	-	-	-	25	25	50	25
7	1MCA7	Computer Oriented Statistical Methods-Lab	0	0	2	2	1	-	-	-	-	-	25	25	50	25
8	1MCA8	Communication Skills-Lab.	0	0	2	2	1	-	-	-	-	-	25	25	50	25
9	1MCA9	Computer Lab-I	0	0	4	4	2	-	-	-	-	-	50	50	50	50
<b>TOTAL</b>			<b>20</b>	<b>0</b>	<b>10</b>	<b>30</b>	<b>25</b>				<b>500</b>				<b>250</b>	
<b>TOTAL : 750</b>																

**APPENDIX-A**  
**THREE YEAR POST GRADUATE DEGREE COURSE IN MASTER IN COMPUTER APPLICATION**  
**SEMESTER PATTERN**  
**CREDIT GRADE SYSTEM**  
**FIRST YEAR SEMESTER-II**

Sr.No.	Subject Code	Teaching Scheme							Examination Scheme							
		Hours/Week				Credits	Duration of Paper (Hr)	Theory			Practical		Total	Min. Passing Marks		
		Lecture	Tutorial	P/D	Total Hours/Week			Max. Marks Theory Paper	Max. Marks College Assessment	Total	Min. Passing Marks	Max.Marks External			Max.Marks Internal	
1	2MCA1	Data Structure & Algorithms	4	0	0	4	4	3	80	20	100	40	-	-	-	-
2	2MCA2	Object Oriented Programming	4	0	0	4	4	3	80	20	100	40	-	-	-	-
3	2MCA3	System Analysis & Design	4	0	0	4	4	3	80	20	100	40	-	-	-	-
4	2MCA4	Data Communication	4	0	0	4	4	3	80	20	100	40	-	-	-	-
5	2MCA5	Business Systems	4	0	0	4	4	3	80	20	100	40	-	-	-	-
6	2MCA6	Data Structure & Algorithms-Lab.	0	0	2	2	1	-	-	-	-	-	25	25	50	25
7	2MCA7	Object Oriented Programming-Lab.	0	0	2	2	1	-	-	-	-	-	25	25	50	25
8	2MCA8	System Analysis & Design-Lab.	0	0	2	2	1	-	-	-	-	-	25	25	50	25
9	2MCA9	Computer Lab-II	0	0	4	4	2	-	-	-	-	-	50	50	100	50
<b>TOTAL</b>			20	0	10	30	25				500				250	
													<b>TOTAL : 750</b>			