MASTER OF COMPUTER APPLICATIONS - MCA
Course Structure and Scheme of Examination w.e.f 2007-08

Code	Name of the Subject	Credits	Periods		Exam.	Max. Marks	
			Theory	Lab.	Uty.	Sessional	Total
1st Year – 1st SEMESTER							
MCA1.1.1	Discrete Mathematical Structures	3	-	70		30	100
MCA 1.1.2	Computer Organization	3	-	70		30	100
MCA 1.1.3	Problem Solving &Programming Programming using C	3	-	70		30	100
MCA 1.1.4	Probability, Statistics &Queuing Theory	3	-	70		30	100
MCA 1.1.5	Management Accountancy	3	-	70		30	100
MCA 1.1.6	Computer Organization Lab.	-	3	50		50	100
MCA 1.1.7	C Programming Lab.	-	3	50		50	100
1st Year – 2nd SEMESTER							
MCA1. 2.1	Systems Programming	3	-	70		30	100
MCA 1.2.2	Data Structures	3	-	70		30	100
MCA 1.2.3	Principles of Programming Languages	3	-	70		30	100
MCA 1.2.4	Object Oriented Programming	3	-	70		30	100
MCA 1.2.5	Information Systems & Organizational Behavior	3	-	70		30	100
MCA 1.2.6	Object Oriented Programming Lab.	-	3	50		50	100
MCA 1.2.7	Data Structures Lab.	-	3	50		50	100
2nd Year – 1st SEMESTER							
MCA 2.1 .1	Theory of Computation	3	-	70		30	100
MCA 2.1 .2	Computer Graphics	3	-	70		30	100
MCA 2.1 .3	File Structures	3	-	70		30	100
MCA 2.1 .4	Design and Analysis of Algorithms	3	-	70		30	100
MCA 2.1 .5	Operating Systems	3	-	70		30	100
MCA 2.1 .6	Operating Systems Lab.	-	3	50		50	100
MCA 2.1 .7	File Structures Lab.	-	3	50		50	100
2ND Year – 2nd SEMESTER							
MCA2. 2.1	Data Communications & Networks	3	-	70		30	100
MCA2. 2.2	Data Base Management Systems	3	-	70		30	100

MCA 2.2.3 Operations Research		3	-	70	30	
100	3					
MCA 2.2.4 Artificial Intelligence		3	-	70	30	
100	3					
MCA 2.2.5 Elective - I		3	-	70	30	
100	3					
1. Distributed Systems 2. Image processing						
MCA 2.2.6 Visual Pro gramming Lab.		-	3	50	50	
100	2					
MCA 2.2.7 DBMS Lab.		-	3	50	50	
100	2					

3nd Year – 1st SEMESTER

MCA 3.1 .1 Information Systems Control & Audit		3	-	70	30	
100	3					
MCA 3.1 .2 Network Security		3	-	70	30	
100	3					
MCA 3.1 .3 Object Oriented Softwsre Engg.		3	-	70	30	
100	3					
MCA 3.1 .4 Elective-II		3	-	70	30	
100	3					
1.Embedded Systems,2.Neural networks & Fuzzy Systems 3.Bioinformatics						
MCA 3.1 .5 Elective - III		3	-	70	30	
100	3					
1. Data Warehousing & Data Mining 2.Computer Vision & pattern Analysis 3.Knowledge management						
MCA 3.1 .6 OOSE Lab.		-	3	50	50	
100	2					
MCA 3.1 .7 Data Comms. & Networking Lab.		-	3	50	50	
100	2					

3nd Year – 2nd SEMESTER

MCA 3.2 PROJECT		-	6	100	-	
100	15					
	TOTAL:	**75**	**36**	**2350**	**1250**	
3600	**110**					

MCA
1st SEMESTER

With effect from 2007-08 admitted batch

Syllabi

(Tentative)

Chairman
Board of Studies
(2005-08)

Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam

MASTER OF COMPUTER APPLICATIONS
Course Structure and Scheme of Examination

1st Year – 1st SEMESTER

With effect from 2007-08 admitted batch

Code	Name of the Subject	Periods		Max Marks		
		Theory	Lab	University Exam	Sessional	Total
MCA1.1.1	Discrete Mathematical Structures	3	-	70	30	100
MCA 1.1.2	Computer Organization	3	-	70	30	100
MCA 1.1.3	Problem Solving & Programming using 'C'	3	-	70	30	100
MCA 1.1.4	Probability , Statistics & Queuing Theory	3	-	70	30	100
MCA 1.1.5	Management Accountancy	3	-	70	30	100
MCA 1.1.6	Computer Organization Lab	-	3	70	30	100
MCA 1.1.7	C Programming Lab	-	3	70	30	100

MCA 1.1.1 DISCRETE MATHEMATICAL STRUCTURES

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

Introduction: Logic-Prepositional Equivalences-Truth tables-Totalogies-Predicates and Quantifiers-Sets-Operations on sets-Sequences and Summations-Growth functions-relations and their properties-n-ary relations and their applications-Representation of relations-Closures of relations-Equivalence relations-Partial Orderings.

Counting Techniques: Basics of Counting- Pigeonhole Principle- Combinations and Permutations-Generalized Per mutations and Combinations-Recurrence relations- Solving Recurrence Relations-Divide and Conquer relations- Generating Functions-Inclusion and Exclusion-Applications of Inclusion-Exclusion.

Graph Theory: Introduction to Graphs-Terminology-Relations and Directed Graphs-Representations of Graphs- Isomorphism-Connectivity- Euler and Hamiltonian Paths-Shortest Path problems- Planar Graphs- Graph Coloring- Introduction to trees-Applications of trees- Traversals-Trees and sorting-Spanning Trees-Minimum Spanning Trees.

Boolean Algebra and Models of Computation: Boolean Functions-Representing Boolean Functions-Logic Gates-Minimizations of Circuits-Languages and Grammars-Finite State Machines with and with no outout-Language Recognition-Turing Machines.

Text Book:

Discrete mathematics and its applications, Keneth. H. Rosen, Tata McGraw-Hill Publishing Company, New Delhi (Chapters: 1, **4.1, 4.2, 4.3, 4.6, 4.7**, 5, 6, 7, 8, 9, 10)

Reference Books:

1) Discrete Mathematics for computer scientists & Mathematicians, Joe L. Mott, Abraham Kandel & T. P. Baker,Prentice Hall of India Ltd, New Delhi
2) Discrete mathematics, Richard Johnsonbaug, Pearson Education, New Delhi

MCA 1.1.2 Computer Organization

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

1. Digital Logic Fundamentals
2. Instruction Set Architectures
3. Introduction to Computer Organization
4. Register Transfer Languages
5. CPU Design
6. Micro-sequence Control Unit Design
7. Computer Arithmetic
8. Memory organization
9. Input/Output Organization

Text Book:
Computer Systems Organization & Architecture, John D. Carpinelli, Addison Wesley Longman, Inc ./ Pearson Education , 1993

Reference Book:
Computer System Architecture, M. Morris Mano, Third Edition, Pearson Education, 2007
Computer Architecture and organization: Design Principles and Applications, B. Govindarajalu, TMH Publishing Company Ltd., 2004
Fundamentals of Computer organization and Design, Sivarama P. Dandamudi Springer International Edition, 200

MCA 1.1.3 PROBLEM SOLVING AND PROGRAMMING USING C

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

OBJECTIVE: The objective of this subject is to discuss the basic techniques and algorithms for attacking and solving various types of problems. The language used for wring programs is C. The emphasis should be on writing algorithms and programs in C (not merely teaching C language).

INTRODUCTION: Definition of Algorithms- Writing algorithms- top down design – Program verification- The efficiency of algorithms- Concept of Recursion- some simple example to illustrate these concepts like finding the GCD of two numbers- Swapping two variables- Summation of n given numbers- generation of Fibonocci sequence- Reversing a given number-Base conversion.

INTRODUCTION TO C: C character set- Delimiters-The C Keywords-Identifiers-Constants-Variables-Rules for Defining Variables-Data Types-Declaring Variables-Initializing Variables – Type Conversion-Priority of Operators and their Clubbing-Comma and Conditional Operator-Arithmetic Operators-Relational Operators –Logical Operators-Bitwise Operators-Input and Output in C-Formatted and Unformatted Functions-Library Functions.

MORE ABOUT C : if statement- if…else statement-various forms of if-nested if -break statement-continue statement – go to statement - switch statement - nested switch statement - for statement -while statement do while statement - arrays - working with string and standard functions.

ADVANCED CONCEPTS OF C : introduction to pointers – pointer declaration – Arithmetic Operations with pointers – pointers and arrays – pointers and two-dimensional arrays – array of pointers – pointers to pointers – pointers and strings – void pointers – function definition and declaration – proto types - types of functions – call by value and reference – functions returning more values – function as an argument – function with operators – function and decision statements – function and loop statements – function with arrays and pointers – recursion – pointer to function – storage classes.

ADDITIONALS IN C: preprocessor directives – structures and unions – bit wise operators – files – command line arguments – dynamic memory allegation – graphics in C.

PROBLEM SOVING: Reversal of an Array- Removal of duplicates in an ordered array-Partitioning of an array- Finding the k^{th} smallest of an element of an array-Finding the longest monotone subsequence of an array-Linear search- Binary search- Hash searching-Bubble sort- merge sort- Quick sort-Insertion sort-selection sort-Text processing- Towers of Honoi problem using recursion.

Text Books:

1) Ashok N. Kamthane, Programming with ANSI and Turbo C, Pearson Education, New Delhi.
2) R. G. Dromey, How to Solve it by Computer, Prentice Hall Of India Ltd, New Delhi.

Reference Books:

1) N. G. Venkateshmurthy, Programming techniques through C, Pearson Education, New Delhi.
3) Byron s Gottfried**,** Programming with C, Schaum's Outline series, Tata McGraw Hill Pub. Company, New Delhi.
4) Jacqueline A. jones & Keith Harrow, C programming with problem solving, Dreamtech publications, New Delhi

MCA1.1.4 PROBABILITY, STATISTICS & QUEUING THEORY

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks**

Probability: Definitions of probability, Addition theorem, Conditional probability, Multiplication theorem, Bayes theorem of probability and Geometric probability.

Random variables and their properties: Discrete Random variable, Continuous Random variable, Probability Distribution joint probability distributions their properties, Transformation variables, Mathematical expectations, probability generating functions.
Probability Distributions / Discrete distributions: Binomial, Poisson Negative binominal distributions and their properties. (Definition, mean, variance, moment generating function., Additive properties, fitting of the distribution.)

Continuous distributions: Uniform, Normal, exponential distributions and their properties.

Multivariate Analysis: Correlation, correlation coefficient, Rank correlation, Regression Analysis, Multiple Regression, Attributes, coefficient of Association, χ^2 – test for goodness of fit, test for independence.

Estimation: Sample, populations, statistic, parameter, Sampling distribution, standard error, unbiasedness, efficiency, Maximum likelihood estimator, notion & interval estimation.

Testing of Hypothesis: Formulation of Null hypothesis, critical region, level of significance, power of the test.

Small Sample Tests: Testing equality of .means, testing equality of variances, test of correlation coefficient, test for Regression Coefficient.

Large Sample tests: Tests based on normal distribution
Queuing theory: Queue description, characteristics of a queuing model, study state solutions of M/M/1: α Model, M/M/1 ; N Model, M/M/C: Model, M/M/C: N Model
Case studies

Text Books:
Probability & Statistics for Engineers and Scientists,Walpole, Myers, Myers, Ye. Pearson Education.
Probability, Statistics and Random Processes T.Veerarajan Tata McGraw – Hill

Reference Book:
Probability & Statistics with Reliability, Queuing and Computer Applications, Kishor S. Trivedi, Prentice Hall of India ,1999

MCA 1.1.5 MANAGEMENT ACCOUNTANCY

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam: 3 Hours **Univ-Exam-Marks:70**

Principles Of Accounting: Nature And Scope Of Accounting, Double Entry System Of Accounting, Introduction To Basic Books Of Accounts Of Sole Proprietary Concern, Closing Of Books Of Accounts And Preparation Of Trial Balance.

Final Accounts: Trading, Profit And Loss Accounts And Balance Sheet Of Sole Proprietary Concern With Normal Closing Entries. (with numerical problems)

Ratio Analysis: Meaning, Advantages, Limitations, Types Of Ratio And Their Usefulness.(Theory only) Fund Flow Statement: Meaning Of The Term Fund, Flow Of Fund, Working Capital Cycle, Preparation and Inter-preparation Of Statement.

Costing: Nature, Importance And Basic Principles.
Budget And Budgetary Control: Nature And Scope, Importance Method Of Finalization And Master Budget, Functional Budgets.

Marginal Costing: Nature, Scope, Importance, Construction Of Break Even Chart, Limitations And Uses Of Break Even Chart, Practical Applications Of Marginal Costing. (with numerical problems)

Introduction To Computerized Accounting System: Coding Logic And Codes Required, Master Files, Transaction Files, Introduction To Documents Used For Data Collection, Processing Of Different Files And Outputs Obtained.

Text Books:

Introduction to Accountancy. T.S.Grewal
Management Accountancy, S .P.Jain

Reference Book:
Introduction To Accounting, G.Agarwal.

MCA 1.1.6 COMPUTER ORGANIZATION LAB

Practical: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

I – CYCLE : Digital Logic Design Experiments :

1. TTL Characteristics and TTL IC Gates
2. Multiplexers & Decoders
3. Flip-Flops
4. Counters
5. Shift Registers
6. Binary Adders & Subtractors
7. A L U

II – CYCLE: 8085 Assembly Language Programming **:**

1. 8085 Assembly Language Programming according to theory course microprocessors-I using the following trainers :

   Keyboard Monitor of 8085µP Trainer.
   Serial Monitor of 8085µP Trainer with Terminal
   8085 Line Assembler of 8085µP Trainer with PC as Terminal
   8085 Cross Assembler using In-Circuit Emulator (ICE) with 8085µP Trainer and PC as Terminal
   Graded Problems are to be used according to the syllabus of COMPUTER ORGANIZATION

2. PENTIUM CLASS PC ARCHITECTURE FAMILIARIZATION
   HARDWARE & SOFTWARE PARTS DEMONSTRATION

MCA 1.1.7 C PROGRAMMING LAB

Practical : 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

OBJECTIVE: The objective of this lab is to make student learn techniques for attacking and writing C programs for various types of problems. The emphasis should be on writing correct and efficient programs in C. The programs should include all the ones suggested below but should not be limited to them only. The examiner need not stick to these programs only in the examination.

BASIC TECHNIQUES: Swapping of the contents of two variables- Finding the sum of digits of a given number- Reversing a given number.

DECISION MAKING: Finding the largest and the smallest of a given array- solving a quadratic equation- selecting an operation based on a menu.

LOOPING TECHNIQUES & ARRAYS: Finding the sum to n terms of a sine series- Matrix Multiplication- Transpose-Polynomial addition- Polynomial Multiplication- Sorting algorithms- Searching algorithms.

CHARACTERS AND STRING HANDLING: Finding the length of string-reversal of string- concatenation of two strings-checking whether it is a palindrome or not-converting upper case alphabets to lowercase and vice versa in a string.

POINTERS, STRUCTURES AND UNIONS: Finding the sum of all elements of an array using pointers- Swapping the contents of two variables using pointers- Finding the first and second rank holders and printing their names and roll numbers, in a class of 60 students using structures- Defining a complex number as structure and wring a program to illustrate the operations on complex numbers-Some examples of Unions.

FILES & OTHER TOPICS: Copying and concatenation of files- Bit wise operations- Command line parameters- C preprocessor directives- Macros.

Reference books:

1) M. G. Venkateshmurthy, Programming techniques through C, Pearson Education, New Delhi.
2) Ashok N. Kamthane, Programming with ANSI and Turbo C, Pearson Education, New Delhi.
3) Byron s Gottfried, Programming with C, Schaum's Outline series, Tata McGraw Hill. Publishing Company, New Delhi.

MCA
2nd SEMESTER

With effect from 2007-08 admitted batch

Syllabi

(Tentative)

Chairman
Board of Studies
(2005-08)

Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam

MASTER OF COMPUTER APPLICATIONS

Course Structure and Scheme of Examination

1st Year – 2nd SEMESTER

With effect from 2007-08 admitted batch

Code	Name of the Subject	Periods		Max Marks		
		Theory	Lab	University Exam	Sessional	Total
MCA1.2.1	Systems Programming	3	-	70	30	100
MCA 1.2.2	Data Structures	3	-	70	30	100
MCA 1.2.3	Principles of Programming Languages	3	-	70	30	100
MCA 1.2.4	Object Oriented Programming	3	-	70	30	100
MCA 1.2.5	Information Systems & Organizational Behavior	3	-	70	30	100
MCA 1.2.6	Object Oriented Programming Lab	-	3	70	30	100
MCA 1.2.7	Data Structures Lab	-	3	70	30	100

MCA1.2.1 SYSTEMS PROGRAMMING

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

Introduction to grammars, languages, finite state machines.

Introduction to Systems Programming, Introduction to Assembly Language Programming - Introduction to Instruction Formats, Data formats - Role of Base Register, Index Register.

Introduction to Assembler, databases used in assembler design, Design of Assembler - Single Pass & Double Pass.

Introduction to Macros, various types of Macros, Design of Macro Processor - Single Pass & Double Pass.

Introduction to Loaders, functions of a loader, types of Loaders, databases used in Loaders, Design of Loaders - Absolute & DLL.

Introduction to compilers: a brief discussion on various phases of compilers. Applications of FSM and grammars in compiler design

Introduction to Software Tools, Text editors, Interpreters, Program Generators, Debug Monitors.

TextBook:
Systems Programming, Donovan, Tata Mc Graw Hill

Reference :
1. System Programming, Dhamdhere (IInd Revised Edition), Tata Mc Graw Hill
2. System Software, Leland. L. Beck, Pearson Education.

MCA 1.2.2 DATA STRUCTURES

Instruction: 3 Periods /week **Sessional Marks: 30**

Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

1 Introduction to Data Structures : Abstract Data Types, Review of strings, multi-dimensional arrays, structures and pointers concepts in C.
The Stack : Specification of ADT and primitive operators, Representing Stacks in C, Applications of Stacks: Infix, Postfix and prefix expression handling.

2 Recursion: Recursion Definition and Processes, Recursion in C, Writing Recursive Programs, Simulating Recursion, Efficiency of Recursion.

3 Queues and Lists: The queues and its Sequential Representation, Linked lists, Lists in C, Circular Linked lists, Doubly linked lists.

4 Trees: Binary Trees, Binary Tree Representations, Trees and Their Applications, Searching: Basic Search Technologies, Tree Searching,

5 Graphs and Their Applications: Graphs, Graph Traversal and Spanning Forests, Prim's algorithm.

6 Sorting: General Background, Exchange Sorts, Selection and Tree Sorting, Insertion Sorts, Merge and Radix Sorts.

Text Book:

Data Structures using 'C' by Tenenbaum, Langsam, Augenstein. Pearson Education.

Reference Books;

1. Data Structures Using 'C' by Bala Guruswamy, TMH
2. Data Structures Using 'C' by Weiss , Pearson Education

MCA 1.2.3 PRINCIPLES OF PROGRAMMING LANGUAGES

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

1. **The Role of Programming Languages:-** Toward Higher-level Languages, Problems of Scale, Programming Paradigms, Language Implementation Bridging the Gap
2. **Language Description:-** Syntactic Structure: Expression Notations, Abstract Syntax Trees, Lexical Syntax, Context-Free Grammars, Grammars for Expressions, Variants of Grammars

I IMPERATIVE PROGRAMMING:

3. **Statements: Structured Programming:-** The Need for Structured Programming, Syntax-Directed Control Flow, Design Considerations: Syntax, Handling Special Cases in Loops, Programming with invariants, Proof Rules for Partial Correctness, Control flow in C.
4. **Types: Data Representation:-** The Role of Types, Basic Types, Arrays Sequences of Elements, Records: Named Fields, Unions and variant Records, Sets, Pointers: Efficiency and Dynamic Allocation, Two String Tables, Types and Error Checking.
5. **Procedure Activations:-** Introduction to Procedures, Parameter-passing Methods, Scope Rules for Names, Nested Scopes in the Source Text, Activation Records, Lexical Scope: Procedures as in C, Lexical Scope: Nested Procedures and Pascal.

II OBJECT ORIENTED PROGRAMMING:

6. **Groupings of Data and Operations:-** Constructs fro Program Structuring, Information Hiding, Program Design with Modules, Modules and Defined Types, Class Declarations in C++, Dynamic Allocation I C++, Templates: Parameterized Types, Implementation of Objects in C++.
7. **Object-Oriented Programming:-** What is an Object?, Object-Oriented Thinking, Inheritance, Object-Oriented Programming in C++, An extended C++ example, Derived Classes and information Hiding, Objects in Smalltalk, Smalltalk Objects have self.

III FUNCTIONAL PROGRAMMING:

8. **Elements of Functional Programming:-** A little Language of expressions, Types : Values and Operations, Function declarations, Approaches to Expression Evaluation, Lexical Scope, Type Checking.
9. **Functional Programming in a Typed Languages:-** Exploring a List, Function Declaration by Cases, Functions as First-Class Values, ML: Implicit Types, Data Types, Exception Handling in M, Little quit in Standard ML
10. **Functional Programming with Lists:-** Scheme, a Dialect of Lisp, The Structure of Lists, List Manipulation, A Motivating Example: Differentiation, Simplification of Expressions, Storage Allocation for Lists.

IV OTHER PARADIGMS:

11. **Logic Programming:-** Computing with Relations, Introduction to Prolog, Data Structures in Prolog, Programming techniques, Control in Prolog, Cuts.
12. **An Introduction to Concurrent Programming:-** Parallelism in Hardware, Streams: Implicit Synchronization, Concurrency as interleaving, Liveness Properties, Safe Access to Shared Data, Concurrency in Ada, Synchronized Access to Shared variables.

Text Book:

Programming Languages – Concepts & Constructs , Ravi Sethi, Pearson Education.

References:

1. Programming Languages – Design & Implementation ,Terrance W. Pratt, Marvin V. Zelkowitz, Pearson Education.
2. Concepts of Programming Languages – Robert L. Sebesta, Pearson Education.

M CA 1.2.4 OBJECT ORIENTED PROGRAMMING

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

Fundamentals of object oriented programming: lntroduction to Object Oriented Paradigm, procedural Paradigm, An overview of classes, objects and Methods, inheritance and polymorphism

Basic OF C ++: Structure of c++ program, data types and declaration, Expressions and operator precedence, Program flow control, functions, scope of variables, Inline functions and default arguments, dynamic allocation new and delete operators.
Classes as objects, user defined data types, constructors & destructors, controlling and accessibility, class members, member functions, Friend functions, this pointer, static and const member functions.

inheritance: Derived classes, syntax of derived classes, Types of Inheritance, Virtual Functions. and Virtual Base Classes.

Adhoc Polymorphism: Overloading and Function selection, Friend Functions, overloading operators such as assignment subscripting, I/O, pointer to class member, new and delete.

Templates : Generic Classes, Class Templates, Function Templates Parameterizing Vectors, STL, Containers, Iterators, Function Adapters, String Library

Exceptions : Using assert.h, signal.h, throwing exceptions, Try Blocks, handlers, Exception specification, standard exceptions and uses.

I/O streams: Output and Input class streams, Ostream, Istream, File handling, using strings as streams

UML: Basics, Use Case, Class, Object, Sequence, Activity, State Chart, Collaboration, Component and Deployment diagrams in Object oriented project design.

TEXT BOOKs:

1. Object Oriented Programming using C++, Ira Pohl, PEARSON EDUCATION
2. Object Oriented Programming in C++ , Robert Lafore
3. UML in 21 Days, Tech Media

MCA1.2.5 INFORMATION SYSTEMS & ORGANIZATIONAL BEHAVIOUR

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

Organizational Structure and Design – Managerial Communication and its barriers – Controlling – Delegation of Authority and Inter Departmental Co-ordination.

Organizational Climate and Culture – Management of Organizational Conflicts – Theories of Motivation.

Group Dynamics – Characteristics of a Leader – Leadership Styles – Analysis of Interpersonal Relations.

MIS Perspective – Information needs and its objectives – Management Information and Control Systems.

Information for Decision Making – Conceptual Foundations of Information Systems – Information Resource Management.

Suggested Books for Readings:

1. Elements of organizational Behavior, Robbins, 7th Edition, Pearson Education
2. Information Systems, Alter, Pearson Education
3. Organization and Management - R.D.Agarwal
4. Organization theory and Behaviour - L.M.Prasad
5. Practice and Management - Peter F.Drucker
6. Management Information Systems – Kanter Jerma
7. Computer and Information Management – S.C.Bhatnagar and K.V.Rama Devi

MCA1.2.6 OBJECT ORIENTED PROGRAMMING LAB

Practical: 3 Periods /week **Sessional Marks: 30**

Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

LIST OF EXPERIMENTS:

1. Illustrate passing by Reference (Programme 4.6)
2. Illustrate use of static inside a class.(Programme4.7)
3. Demonstrate – usage of Friend Function (Programme 4.9)
4. Demonstrate Friend Class (Programme 4.10)
5. Complex No.s adding and multiplying (Prog.4.13)
6. Copy constructor demo (Programme 5.8)
7. User defined copy constructor demo (Programme 5.9)
8. Operator +, * over loading (Programme 6.11, 6.12)
9. Adding Rational Numbers (Programme 6.13)
10. Overloading Auto increment operator.(Programme 6.14)
11. Interactive Constructor (Programme 7.4)
12. Real Time Digital Clock (Programme 8.9, 9.1)
13. Virtual base class Demo (Programme 9.2)
14. ' Is – a' , ' has - a' relationships (Programme 9.4, 9.5)
15. Polymorphism using Pointer to Object (programme 12.2)
16. Virtual base class Demo (Programme 12.9)
17. Binary File Demo (Programme 13.7)
18. Creating large file (Programme 13.12)
19. File split, File join (Prog13.13, 13.14)
20. Template sorting (Programme 14.4)
21. Demo of Class Template (Prog. 14.5)
22. Matrix Multiplication (Prog 15.3)
23. Linked list implementation (Prog. 15.16, 15.17, 15.18)
24. Stack simulation (Prog. 15.19)
25. Demo of using Keyword CONST (Prog. 16.8, 16.10)
26. Drawing lines (Prog. 17.4)
27. Storing image on Disk (Prog.17.9)
28. Animation (Prog.17.10)
29. Using Mouse (Prog.17.11)
30. Visual Basic form creation (Prog. 17.12)

Reference:

Object Oriented Programming with C++, M.P.Bhave and S.A. Patekar, Pearson Education

MCA1.2.7 DATA STRUCTURES LAB

Practical: 3 Periods /week **Sessional Marks: 30**

Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

LIST OF EXPERIMENTS.

1. ADT Stack implementation and use it for evaluation of post-fix expression.
2. Conversion of prefix expression into post-fix form using recursion.
3. Implementation of circular queue(using array) with menu options like insert, delete, display and exit.
4. Implementation of a priority queue (using pointers) and use it to organize student records prioritised by marks.
5. Implementation of ADT doubly linked circular list to hold strings and use it for organizing a sequence of cities constituting a tour program.
6. Implementation of a binary search tree with menu options: Construct a tree, insert a node, delete a node, traverse and display preorder , inorder and post order sequence of its nodes.
7. Implementation of di-graphs using adjacency matrix and find the transitive closure using Warshall's algorithm.
8. Implementation of a weighted graph and find minimal cost spanning tree using PRIM's Algorithm.
9. Generate 70 random integers in a given range and sort them using quick sort. Apply both binary search and Interpolation search to locate a given integer and compare the search algorithms based on the number of comparisons/probes required for a successful as well as unsuccessful search..
10. Heap Sort
11. Merge Sort.
12. Implementation of a small Real World Application illustrating DS usage

MCA
3rd SEMESTER

Ref: LII(2)/1930/MCASyl/2004, dated June, 18th 2004
With effect from 2007-08 admitted batch

Syllabi
(Tentative)

Chairman
Board of Studies
(2005-08)

Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam

MASTER OF COMPUTER APPLICATIONS

Course Structure and Scheme of Examination

2nd Year – 1st SEMESTER

With effect from 2007-08 admitted batch

Code	Name of the Subject	Periods		Max Marks		
		Theory	Lab	University Exam	Sessional	Total
MCA 2.1.1	Theory of Computation	3	-	70	30	100
MCA 2.1.2	Computer Graphics	3	-	70	30	100
MCA 2.1.3	File Structures	3	-	70	30	100
MCA 2.1.4	Design and Analysis of Algorithms	3	-	70	30	100
MCA 2.1.5	Operating Systems	3	-	70	30	100
MCA 2.1.6	Operating Systems Lab	-	3	70	30	100
MCA 2.1.7	File Structures Lab	-	3	70	30	100

MCA 2.1.1 THEORY OF COMPUTATION

Instruction: 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

1. **Introduction To Finite Automata** : Alphabets and languages- Finite Representation of Languages. Deterministic Finite Automata – Non- deterministic Finite Automata – Equivalence of Deterministic and Non-Finite Automata – Properties of the Languages Accepted by Finite Automata – Finite Automata and Regular Expressions – Proofs those Languages Are and Are Not Regular.

2. **Context free languages**: Context –Free Grammar – Regular Languages and Context-Free Grammar – Pushdown Automata – Pushdown Automata and Context-Free Grammar – Properties of Context-Free Languages – Closure Properties – Periodicity Properties – Determinism and Parsing – Deterministic Pushdown Automata and Context – Free Languages – Top- down Parsing – Bottom – Up parsing.

3. **Turing machines:** The Definition of Turing Machine – Computing with Turing Machines – Combining Turing Machines – some Examples of More Powerful Turing Machines .

4. **Church' Thesis** : Church's Thesis – The Primitive Recursive functions – Godelization – The μ-Recursive Functions – Turing – Computability of the μ-Recursive functions – Universal Turing Machines.

5. **Uncomputability**: The Halting Problem – Turing-Enumerability, Turing – Acceptability, and Turing - Decidability – Unsolved problems about Turing machines and μ-Recursive Functions - Post's correspondence problem.

6. **Computational complexity**: Time-bounded Turing Machines – Rate of Growth of functions – Time-Bounded simulations – The Classes P and *NP* – *NP*-Completeness – Some NP-complete Problems – Integer Programming – The Traveling Salesman Problem.

7. **The Prepositional Calculus** : Introduction – Syntax of the Prepositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Prepositional Calculus.

8. **The predicate calculus: Syntax of the Predicate Calculate Calculus** – Structures and Satisfiability – Equivalence – Unsolvability and NP-Completeness- Resolution in the Predicate Calculus.

Text Book:
Elemets Of The Theory Of Computation, Harry R Lewis, Cristos h. Papadimitriou, Pearson Education / Prentice-Hall of India Private Limited.
Reference:
Introduction to Automata Theory, Languages, and Computation, Hopcroft. J.E and J.D.Ullman. Addison-Wesley, Reading, Mass. 1979.

MCA 2.1.2 COMPUTER GRAPHICS

Instruction: 3 Periods /Week **Sessional Marks : 30**

Univ. Exam : 3 Hours **Univ. Exam Marks:70**

Introduction: Usage of Graphics and their applications, Presentation Graphics-Computer Aided Design- Computer Art- Entertainment- Education and Training-Visualization- Image Processing- Graphical User Interfaces

Over view of Graphics systems: Video Display Devices- Raster Scan systems-random scan systems-Graphics monitors and workstations-Input devices-hard copy devices-Graphics software

Output primitives: Points and Lines- Line Drawing Algorithms- Loading the Frame buffer- Line function- Circle- Generating Algorithms- Ellipse Generating Algorithms-Other Curves- Parallel Curve Algorithms-Curve Functions -Pixel Addressing- Filled Area Primitives-Filled Area Functions- Cell Array- Character Generation

Attributes of Output Primitives: Line and Curve Attributes-Color and Gray scale levels- Area Fill Attributes- Character Attributes-Bundled Attributes- Inquiry Functions - Antialiasing

Two Dimensional Geometric Transformations: Basic Transformations- Matrix Representations-Homogeneous Coordinates-Composite Transformations-Other Transformations-Transformations between Coordinate Systems- Affine Transformations - Transformation Functions- Raster methods for Transformations

Two Dimensional Viewing: The viewing Pipeline-Viewing Coordinate Reference Frame-Window-to-Viewport Coordinate Transformation-Two Dimensional Viewing Functions -Clipping Operations-Point Clipping-Line Clipping-Polygon Clipping-Curve Clipping- Text and Exterior Clipping

Structure And Hierarchical Modeling: Concepts of Structures and Basic models-Editing - Hierarchical Modeling with Structures-GUI and Interactive Input Methods-Windows and Icons - Virtual Reality Environments

Three Dimensional Concepts and Object representations: 3D display methods-3D Graphics-Polygon Surfaces- Curved Lines and Surfaces- Quadratic Surfaces-Super Quadrics-Blobby Objects-Spline Representations - Cubic Spline methods-Bézier Curves and Surfaces- B Spline Curves and Surfaces

Three Dimensional Geometric and Modeling Transformations: Translation-Rotation-scaling-Other Transformations-Composite Transformations -3D Transformation Functions -Modeling and Coordinate Transformations

Three Dimensional Viewing: Viewing Pipeline- Viewing Coordinates- Projections - View Volumes- General Projection Transformations -Clipping- Hardware Implementations- Three Dimensional Viewing

Text Book:

1) Computer Graphics C Version, Donald Hearn & M. Pauline Baker , Pearson Education, New Delhi, 2004 (Chapters 1 to 12 except 10-9 to 10-22)

Reference Books:

1) Procedural Elements for Computer Graphics, David F. Rogers, Tata McGraw Hill Book Company, New Delhi, 2003
2) Computer Graphics: Principles & Practice in C, J. D. Foley, S. K Feiner, A Van Dam F. H John Pearson Education, 2004
3) Computer Graphics using Open GL, Franscis S Hill Jr, Pearson Education, 2004.

MCA 2.1.3 FILE STRUCTURES

Instruction: 3 Periods /Week **Sessional Marks : 30**
Univ-Exam : 3 Hours **Univ-Exam Marks:70**

File Processing Operations
Physical and logical files, opening, reading & writing and closing files in C, seeking and special characters in files, physical devices and logical files, file-related header files in C

Secondary Storage
Disks – organization, tracks, sectors, blocks, capacity, non-data overhead, cost of a disk access, Magnetic Tape – types, performance, organization estimation of tape length and data transmission times, disk vs tape, CD-ROM – CD-ROM as a file structure, physical organization, strengths and weakness of CD-ROMS, storage hierarchy

Byte Journey and buffer Management
File manager, I/O buffer, I/O processing, buffer strategies and bottlenecks

File Structure Concepts
A stream file, field structures, reading a stream of fields, record structures and that uses a length indicator, Mixing numbers and characters – use of a hex dump, reading the variable length records from the files

Managing records in C files
Retrieving records by keys, sequential search, direct access, choosing a record structure and record length, header records, file access and file organization

Organizing files for performance
Data compression, reclaiming space – record deletion and storage compaction, deleting fixed-length records for reclaiming space dynamically, deleting variable-length records, space fragmentation, replacement strategies.

Indexing
Index, A simple index with an entry sequenced file, basic operations on an indexed, entry sequenced file, indexes that are too large to hold in memory, indexing to provide access by multiple keys, retrieval using combination of secondary keys, improving the secondary index structure – inverted lists

Indexed sequential file access and prefix B^+ Trees
Indexed sequential access, maintaining a sequence set, adding a simple index to the sequence set, the content of the index: separators instead of keys, the simple prefix B^+ tree, simple prefix B^+ tree maintenance, index set block size, internal set block size, internal structure of index set blocks: a variable order B-tree, loading a simple prefix B^+ tree

Hashing
Collisions in hashing, a simple hashing algorithms, hashing functions and record distributions, memory requirements, collision resolution by progressive overflow, buckets, deletions **Extendable hashing**
Working of extendable hashing, implementation, deletion, extendable hashing perfomance

Designing file structure for CD-ROM
Tree structure on CD-ROM, hashing files on CD-ROM, CD-ROM file structure

Implementation in C^{++}

Text Book:
File Structures – An Object Oriented Approach with C^{++}, Michael J. Folk, Bill Zoellick and Greg Riccardi, Pearson Education

MCA2.1.4 DESIGN AND ANALYSIS OF ALGORITHMS

Instruction: 3 Periods/week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

1. **Introduction:-** Notion of Algorithm – Algorithmic Problem solving (1.1, 1.2)
2. **Analysis of Algorithm Efficiency:-** Analysis framework – Asymptotic notations – Analysis of Non-recursive and recursive algorithms (2.1,2.4)
3. **Divide and Conquer: -** Merge sort – Quick Sort – Binary search – Large integer Multiplication and Strassens Matrix multiplication-closest pair and convex Hull problems (4.1 to 4.3,4.5 to 4.6)
4. **Decrease and conquer: -** DFS and BFS, Topological sorting, Decrease – by – a – Constant - factor Algorithms, variable – size – Decrease Algorithms- (5.2, 5.3, 5.5, 5.6)
5. **Transform and conquer: -** Horner's Rule and Binary Exponentiation – Problem Reduction – (6.5, 6.6)
6. **Space and Time Tradeoffs:-** Input Enhancement in String Matching (7.2)
7. Dynamic Programming:- Warshall's and Floyd's Algorithm – Optional Binary Search Trees – knapsack Problem (8.2 to 8.4)
8. **Greedy Technique:-** Prim's and kruskal's Algorithms, Dijkstra's Algorithm, Huffman Trees (9.1 to 9.4)
9. **Limitations of Algorithm Power:-** Lower Bound Arguments – Decision Trees – P,NP and NP Complete problems (10.1 to 10.3)
10. **Coping with limitations of Algorithmic Power:-** Backtracking, Branch and Bound, Approximation Algorithms for NP – hard problems (11.1 to 11.3)

Text Book:

Introduction to the design and analysis of Algorithms, Anany Levitin : Pearson Education, 2003.

Reference Books :

1. Fundamentals of Computer Algorithms,Horowitz and Sahni, Galgothia publications.
2. Introduction to Algorithms,Cormen, Leiserson and Rivest : Prentice Hall of India.

MCA2.1.5 OPERATING SYSTEMS

Instruction: 3 Periods/week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

Overview
Introduction, Computer System structures, Operating systems structures

Process Management
Processes, Threads, CPU scheduling, Process synchronization , Deadlocks

Storage Management
Memory management, Virtual memory, file system, I/O systems, Mass – storage structure

Protection and Security
Protection and Security

Text Book:
Applied Operating System Concepts, Avi Silberschatz, Peter Galvin, Grey Gagne

MCA 2.1.6 OPERATING SYSTEMS LAB

Practical : 3 Periods /Week **Sessional Marks : 30**
Univ-Exam : 3 Hours **Univ-Exam Marks:70**

1. Study of laboratory environment:
   Hardware specifications, software specifications
2. Simple Unix-C programs:
   Programs using system calls, library function calls to display and write strings on standard output device and files.
3. Programs using fork system calls.
2. Programs for error reporting using errno, perror( ) function.
3. Programs using pipes.
4. Shell programming.
5. Programs to simulate process scheduling like FCFS, Shortest Job First and Round Robin.
6. Programs to simulate page replacement algorithms like FIFO, Optimal and LRU.
7. Programs to simulate free space management.
8. Programs to simulate virtual memory.
10. Programs to simulate deadlock detection.

References:

1. Unix Systems Programming : Communication, Concurrency and Threads, Kay Robbins, 2-Edition, Pearson Education
2. Unix concepts and applications, Sumitabha Das, TMH Publications.
3. Unix programming, Stevens, Pearson Education.
4. Shell programming, Yashwanth Kanetkar.
5. Operating System Concepts, Silberschatz, and Peter Galvin.

MCA 2.1.7 FILE STRUCTURES LAB

Practical : 3 Periods /Week **Sessional Marks : 30**
Univ-Exam : 3 Hours **Univ-Exam Marks:70**

1. File Operations:
Opening, reading, writing, closing and creating of files in C^{++}

2. Study of secondary storage devices:
Tracks, sectors, block capacity of disk, tape and CDROMs

3. File Structures in C^{++}
Reading a stream of fields, record structures and its length indicators, Mixing of numbers and characters, Use of a hex dump, Retrieving records by keys using sequential search, direct access

4. File performance
Data compression, storage compacting, reclaiming space dynamically

5. Indexing and indexed sequential files
Index file, inverted file operations, usage of B and B^{++} trees

6. Hashing files
Hashing functions, algorithms, record distribution and collision resolution by progressive over flow, Extendable hashing and hashing performance

MCA
4th SEMESTER

With effect from 2007-08 admitted batch

Syllabi
(Tentative)

Chairman
Board of Studies
(2005-08)

Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam

MASTER OF COMPUTER APPLICATIONS

Course Structure and Scheme of Examination

2nd Year – 2nd SEMESTER

With effect from 2007-08 admitted batch

Code	Name of the Subject	Periods		Max Marks		
		Theory	Lab	University Exam	Sessional	Total
MCA2.2.1	Data Communications & Networks	3	-	70	30	100
MCA2.2.2	Data Base Management Systems	3	-	70	30	100
MCA 2.2.3	Operations Research	3	-	70	30	100
MCA 2.2.4	Artificial Intelligence	3	-	70	30	100
MCA 2.2.5	Elective-1	3	-	70	30	100
MCA 2.2.6	Visual Programming Lab	-	3	70	30	100
MCA 2.2.7	DBMS Lab	-	3	70	30	100

Elective-1
1. Distributed Systems
2. Image Processing

MCA 2.2.1 DATACOMMUNICATIONS AND NETWORKS

Instruction: 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

1. Introduction:
   Data communications, Networks, The Internet, Protocol & Standards
2. Network Models:
   Layered tasks, Internet model, OSI model
3. Physical layer:
   3.1 Signals: Analog and digital signals, data rate limits, Transmission impairment, Signal measurements like throughput, propagation speed and time, wave length
   3.2 Digital Transmission: Line coding, block coding, sampling, transmission mode
   3.3 Analog Transmission: Modulation digital data, telephone modem, Modulation analog signals
   3.4 Multiplexing: FDM, WDM, TDM
   3.5 Transmission Media: Guided media, unguided media
   3.6 Circuit Switching & Telephone Network: Circuit switching, telephone network
4. Data Link Layer:
   4.1 Error detection and Correction: Type of errors, detection and correction of errors
   4.2 Data Link Control & Protocol: Flow & error control, Stop-And-Wait ARQ, Go-Back-N ARQ, Select Repeat ARQ, HDLC
   4.3 Point-To-Point Access: Point-to-point protocol, PPP stack
   4.4 Local Area Network: Traditional Ethernet, fast and gigabit Ethernets
   4.5 Connecting LANs, Backbone Networks and Virtual LANs: Connecting devices, Backbone networks, Virtual LANs
5. Network Layer:
   5.1 Internetworks, Addressing, Routing
   5.2 Network Layer Protocols: ARP, IP, ICMP, IPV6
   5.3 Unicast routing, Unicast routing protocols, Multi routing, Multicast routing protocols
6. Transport Layer:
   6.1 Process-To-Process delivery, user data gram, Transmission control protocol
7. Application Layer:
   7.1 Client-Server Model: Client-Server model, Socket interface
   7.2 A brief introduction to DNS, SMTP, FTP

Text Book:
Data Communications and Networking, Behrouz A. Forouzan, 3rd Edition, Tata Mcgraw-Hill Publishing Co
Reference Book:
Understanding Data Communications and Networks, William A Shay, 2nd Edition, Vikas Publishing House

MCA 2.1.2 DATABASE MANAGEMENT SYSTEM S

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

1. Database Systems Concepts And Architecture:
   Introduction, data models, schemas and instance; three-schema architecture and data independence; database language and interface, the database system environment; centralized and client/server architecture of DBMSs; classification of DBMSs.
2. Data Modeling Using The E-R Model:
   High-level conceptual data models for database design; Entity types, entity sets, attributes and keys; relationship types, relationship sets, roles and structural constraint; weak entity types, ER diagrams, naming conventions and design issues; Notation for UML class diagrams
3. Enhanced ER And UML Modeling:
   Subclasses, super classes and inheritance; specialization and generalization; constraints and characteristics of specialization and generalization, modeling of union types using categories; representing specialization/ generalization and inheritance in UML class diagrams; relationship types of degree higher than two; data abstraction, knowledge representation and ontology concepts
4. The Relational Data Model And Relational Database Constraints:
   Relational model concepts, relational model constraints and relational database schemas; updating operations and dealing with constraints violations
5. The Relational Algebra And Relational Calculus
   Unary relational operations: SELECT and PROJECT; relational algebra operations from set theory; binary relational operations: JOIN and DIVISION; additional relational operations; the tuple relational calculus; the domain relational calculus
6. Relational Database Design By ER And EER-To-Relational Mapping:
   Relational database design using ER-to-Relational mapping; mapping EER model constructs to relations
7. Functional Dependencies And Normalization For Relational Databases:
   Informal design guidelines for relational schemas; functional dependencies; normal forms based on primary leys; general definitions of 2nd and 3rd normal forms; Boyce-Codd normal forms
8. Transaction Processing Concepts:
   Introduction to transaction processing; transaction and system concepts; desirable properties of transaction; characteristics schedule based on recoverability; characteristics schedule based on serializability.
9. Concurrency Control Techniques:
   Two phase locking techniques for concurrency control; concurrency control based on timestamp ordering; multi-version concurrency control techniques; validation(optimistic) concurrency control techniques; granularity of data items and multi granularity locking.
10. Database Recovery Techniques:
    Recovery concepts; recovery techniques based on deferred updates; recovery techniques based on immediate update; shadow paging; the ARIES recovery algorithm.

Text Book:
Fundamentals of Database Systems Ramez Elmasri and Shamkant B. Navathe, 4th edition, Pearson education.
Reference:
Database Concepts, Abraham Silberschatz, Henry F Korth, S.Sudarshan, McGraw-Hill

MCA 2.2.3 OPERATIONS RESEARCH

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

Overview of operations Research: OR models – OR Techniques

Linear Programming: Introduction – Graphical solution; Graphical sensitivity analysis – The standard form of linear programming problems – Basic feasible solutions - unrestricted variables – simplex algorithm – artificial variables – Big M and two phase method – Degeneracy - alternative optima – unbounded solutions – infeasible solutions.

Dual problems: Relation between primal and dual problems – Dual simplex method

Transportation model: starting solutions. North West corner Rule - lowest cost method –Vogels approximation method – Transportation algorithms –Assignment problem – Hungarian Method.

Network Models : Definitions – CPM and PERT – Their Algorithms
Integer Programming : Branch and Bound Algorithms cutting plan algorithm.

Dynamic Programming: Recursive nature of dynamic programming – Forward and Backward Recursion

Deterministic Inventory Models : Static EOQ Models – Dynamic EOQ models.

Game theory: Two person Zero Sum Games – Mixed strategy games and their Algorithms.

Text Books:

1. Operations Research – An Introduction, Handy A Taha – Pearson Education .
[Chapter 1,2,3,4,5 and 6.1, 6.2, 6.7, 9,10, 11, 14]

2. Operations Research Panneer Selvan Prentice Hall of India.

MCA 2.2.4 ARTIFICIAL INTELLIGENCE

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

1. **Problems and Search:** What is Artificial Intelligence?, The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success, Some General References, One Final Word.
2. **Problems, Problem Spaces, and Search:** Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Additional Problems.
3. **Heuristic Search Techniques:** Generate-and- Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.
4. **Knowledge Representation:-** Knowledge Representation Issues, Representations and Mappings, Approaches to knowledge Representation, Issues in Knowledge Representation, The Frame Problem.
5. **Using Predicate Logic:-** Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.
6. **Representing Knowledge Using Rules:-** Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back ward Reasoning, Matching, Control Knowledge.
7. **Symbolic Reasoning under Uncertainty:-** Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem solver, Implementation: Depth-First Search, Implementation: Breadth_First Search.
8. **Statstical Reasoning:-** Probability and Baye's Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.
9. **Weak Slot-and-Filler Structures:-** Semantic Nets, Frames.
10. Strong Slot-and Filler Structures: Conceptual Dependency, Scripts, CYC.
11. **Knowledge Representation Summary :-** Syntactic-Semantic Spectrum of Representation, Logic and Slot-and-Filler Structures, Other Representational Techniques, Summary of the Role of Knowledge.

Text Book:
Artificial Intelligence,Elaine Rich, Kevin Knight, Tata McGrawHill

Reference:
Artificial Intelligence – A modern approach , Stuart Russel, Peter Norwig, Pearosn Education.

MCA 2.2.5 IMAGE PROCESSING

(Elective-I)

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

1. **Fundamentals of Image Processing** : Image Acquisition, Image Model, Sampling, Quantization, Relationship between pixels, distance measures, connectivity , Image Geometry, Photographic film. Histogram: Definition, decision of contrast basing on histogram, operatio ns basing on histograms like image stretching, image sliding, Image classification. Definition and Algorithm of Histogram equalization.
2. **Image Transforms** : A detail discussion on Fourier Transform, DFT,FFT, properties A brief discussion on WALSH Transform , WFT, HADAMARD Transform, DCT.
3. **Image Enhancement**: (by SPATIAL Domain Methods)
   a Arithmetic and logical operations, pixel or point operations, size operations,
   b. Smoothing filters-Mean, Median, Mode filters – Comparative study
   c.. Edge enhancement filters – Directorial filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity & DIFF Filters, prewitt filter, Contrast Based edge enhancement techniques. – Comparative study
   d. Low Pass filters, High Pass filters, sharpening filters. – Comparative Study
   e. Comparative study of all filters
   f. Color image processing.
4. **Image enhancement** : (By FREQUENCY Domain Methods) -esign of Low pass, High pass, EDGE Enhancement, smoothening filters in Frequency Domain. Butter worth filter, Homomorphic filters in Frequency Domain Advantages of filters in frequency domain, comparative study of filters in frequency domain and spatial domain.
5. **Image compression: Definition**: A brief discussion on – Run length encoding, contour coding, Huffman code, compression due to change in domain, compression due to quantization Compression at the time of image transmission. Brief discussion on:- Image Compression standards.
6. **Image Segmentatio**n: Definition, characteristics of segmentation.
   Detection of Discontinuities, Thresholding Pixel based segmentation method. Region based segmentation methods – segmentation by pixel aggregation, segmentation by sub region aggregation, histogram based segmentation, spilt and merge technique. Use of motion in segmentation (spatial domain technique only)
7. **Morphology: -** Dilation, Erosion, Opening, closing, Hit-and-Miss transform, Boundary extraction, Region filling, connected components, thinning, Thickening, skeletons , Pruning Extensions to Gray – Scale Images Application of Morphology in I.P

Text Book:

Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods Addision Wesley

Reference books:

1. Fundamentals of Electronic Image Processing by Arthyr – R – Weeks, Jr. (PHI)
2. Image processing, Analysis, and Machine vision by Milan Sonka vaclan Halavac Roger Boyle, Vikas Publishing House.

MCA 2.2.5 DISTRIBUTED SYSTEMS

(Elective-I)

Instruction: 3 Periods /week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

1 **Characterization of Distributed Systems:-** Introduction, Examples of distributed systems, Resource sharing and the Web, Challenges.

2 **System models:-** Introduction, Architectural models, Fundamental models.

3 **Networking and Internetworking:-** Introduction, Types of network, Network principles, Internet protocols, Network case studies: Ethernet, wireless LAN and ATM.

4 **Interprocess communication:-** Introduction, The API for the Internet protocols, External data representation and marshalling, Client-server communication, Group communication, Case study: Interprocess communication in UNIX.

5 **Distributed Objects and Remote Invocation:-** Introduction, Communication between distributed objects, , Remote procedure call, Events and notifications, Java RMI case study.

6 **Distributed File Systems:-** Introduction, File service architecture, Sun Network file system, The Andrew File System, Recent advances.

7 **Name Services:-** Introduction, Name services and the Domain Name System, Directory and discovery services, Case study of the Global Name Service, Case study of the X.300 Directory Service.

8 **Time and Global States:-** Introduction, Clocks, events and process states, Synchronizing physical clocks, Logical time and logical clocks, Global states, Distributed debugging.

9 **Coordination and Agreement:-** Introduction, Distributed mutual exclusion, Elections, Multicast communication, Consensus and related problems.

10 **Transactions and Concurrency Control: -** Introduction, Transactions, Nested transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

11 **Distributed Transactions:-** Introduction, Flat and nested distributed transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

12 **Replication:-** Introduction, system model and group communication, fault-tolerant services, Highly available services, Transactions with replicated data.

Text Book:
Distributed Systems – Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Pearson Education.

Reference Book:
Distributed Systems – Principles & Paradigms, Andrew S. TenenBaum, Marten Van Steen, Pearson Education.

MCA 2.2.6 VISUAL PROGRAMMING LAB

Practical : 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

Experiments using java AWT/swing (JFC)

Reading Data From Key Board
Handling Buttons, Labels, Text Fields, Text Areas, Scroll Bar
Handling Check Boxes, Radio, List Box, Sliders
Handling Menu
Handling Swing Components Like Progress Bars
Handling Databases Using JDBC Native Driver

Experiments using VC++

Reading Data From Key Board
Handling Buttons, Labels, Text Fields
Handling Check Boxes, Radio, List Box, Sliders.
Handling Menu. Tool Bars
File Handling
Internet Programming
Creative Active X Controls

Books:
VC++, Steven Holzner , BPB publisher

MCA 2.2.7 **DBMS LAB**

Practical : 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

Course Description: This course explores database programming using both native and embedded ANSI-standard Structured Query Language (SQL). Topics include enterprise database management systems, database middleware, data definition language, data manipulation language, data control language, database queries reporting, query optimization, and database views. Student assignments include database creation, query design and programming, and database manipulation via embedded SQL calls from a programming language.

Course Goal: Successful graduates of this course should be able to:

- Understand the fundamentals of a relational database
- Understand the fundamentals of client-server and multi-tiered applications
- Understand the use of Structured Query Language (SQL) as a data definition language, data manipulation language, and data control language
- Understand and write SQL /PL_SQL queries to create, report, and update data in a relational database
- Understand the purpose of and be able to create views, scripts, triggers, and transactions
- Understand and be able to implement the fundamentals of security and permissions in SQL Server
- Design entity relationship models for a business problem and develop a normalized database structure

Using Oracle or DB2 under Windows platform and MySQL under Linux/Unix platform

Reference Books:

1. Introduction to Relational Databases and SQL Programming, Christopher Allen, Simon Chatwin, Catherine A. Vreary Tata McGraw-Hill
2. Oracle SQL and PL/SQL Hand book, John Adolph Palinski, Pearson Education
3. Oracle 9i PL/SQL Programming, Scott Urman, Tata McGraw-Hill
4. MySQL: The Complete Reference, Vikram Vaswani, Tata Mcgraw-Hill
5. MySQL Bible, Steve Suehring, Wiley

MCA
5th SEMESTER

With effect from 2007-08 admitted batch

Syllabi

(Tentative)

Chairman
Board of Studies
(2005-08)

Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
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MASTER OF COMPUTER APPLICATIONS

Course Structure and Scheme of Examination

3rd Year – 1st SEMESTER

With effect from 2007-08 admitted batch

Code	Name of the Subject	Periods		Max Marks		
		Theory	Lab	University Exam	Sessional	Total
MCA3.1.1	Information Systems control and Audit	3	-	70	30	100
MCA 3.1.2	Network Security	3	-	70	30	100
MCA 3.1.3	Object Oriented Software Engineering	3	-	70	30	100
MCA 3.1.4	Elective-II	3	-	70	30	100
MCA 3.1.5	Elective -III	3	-	70	30	100
MCA 3.1.6	OOSE Lab	-	3	70	30	100
MCA 3.1.7	Data Communications & Networking lab	-	3	70	30	100

Elective II:
1. Embedded systems
2. Neural Networks & Fuzzy Systems
3. Bioinformatics

Elective III:
1. Data Ware Housing and Data Mining
2. Computer Vision & Pattern Analysis
3. Knowledge Management

MCA 3.1.1 INFORMATION SYSTEMS CONTROL AND AUDIT

Instruction: 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

Introduction:
Overview of Information Systems auditing, Conducting an information systems Audit (Chapters 1 and 2 of Ron Weber**)**

Management Control Framework:
Top Management Controls (Chapter 3 of Ron Weber)
Systems Development Management Controls (Chapter 4 of Ron Weber)

Application Control framework:
Boundary Controls, Input Controls, Communication Controls, Processing Controls, Database Controls, Output Controls (Chapters 10 to 15 of Ron Weber)

Generalized Audit Software, Utility Software, Expert Systems, Measures of Asset Safeguarding and Data Integrity, Overview of the Effectiveness of System Evaluation Process, Evaluation Process of System Efficiency. (Chapters 16, 21, 22 and 23 beginning topics of Ron Weber)

Text Book:
Information Systems Control and Audit by Ron Weber, Pearson Education
Chapters 1, 2, 3, 4, 10 to 15 all pages, Chapter 16, pp 661-678, 682-690
Chapter 21, pp 851-855, Chapter 22, pp 888-892, Chapter 23, pp 926-931

Additional Reading: CISSP Prep Guide, Wiley-dreamtech

MCA 3.1.2 NETWORK SECURITY

Instruction: 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

INTRODUCTION: Terminology— notation-primer on networking- types of attacks-Layer and cryptography-Authorization-Key Escrow-Viruses, worms and Trojan Horses-Multi Level mode of security-legal issues.

CRYPTOGRAPHY: Introduction-Secret Key crptography-Public Key Cryptogrphy-Hash algorithm-DES -IDEA-AES-Modes of Operations-Hashes and Message Digests-MD2-MD4-MD5 and SHA-1-RSA-Diffie-Hellamn- Digital Signature Standard(DSS)-Elliptic Curve Cryptography.

AUTHENTICATION: Password based authentication-address based authentication-Cryptographic authentication Protocols-Passwords as cryptographic keys-trusted Intermediaries-certificate revocation-Multiple trusted Intermediaries-Session Key Establishment-Delegation.

STANDARDS: Kerberos V4-Kerberos V5-Public Key Infrastructure-Real Time communication Security-IPsec: AH and ESP-IPsec: IKE – SSL/TLS

ELECTRONIC MAIL: E- Mail Security-PEM & S/MIME and PGP

TEXT BOOK:

1) Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Pearson Education / Prentice Hall of India Private Ltd., New Delhi. (Chapters: 1 to 6, 9, 13 to 22)

REFERENCE BOOKS:

2) Network Security Essentials Applications and Standards, William Stallings, Pearson Education, New Delhi
3) Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., New Delhi

MCA 3.1.3 OBJECT ORIENTED SOFTWARE ENGINEERING

Instruction: 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

1. Software Engineering:
   Software related problems, software engineering, concepts, development activities
2. Modeling:
   Concepts, Modeling with UML
3. Project Organization & Communication:
   Project Organization & communication concepts and their activities
4. Requirements:
   Requirements elicitation & its activities and managing requirements elicitation
5. Analysis:
   Analysis overview, concepts, activities and managing analysis
6. System Design:
   Design overview, concepts, and activities, addressing design goals and managing system design
7. Object Design:
   Object reuse, its activities & managing reuse, Interface specification concepts & its activities and Managing object design
8. Testing;
   Testing concepts, activities and managing testing
9. Software Configuration Management:
   Configuration Management overview, concepts, activities and managing configuration management

Text Book:
Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education Asia

Reference Book:
1. Object-Oriented Software Engineering: Practical software development using UML and Java Timothy C. Lethbridge and Robert Laganiere , McGraw-Hill Higher education
2. An Introduction to Object Oriented Systems Analysis and Design with UML and the Unified Process, Stephen R Schach, Tata McGraw-Hill

MCA 3.1.4 EMBEDDED SYSTEMS

Elective –II

Instruction: 3 Periods Lec/week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

Examples of Embedded systems and Typical hardware

Hardware Fundamentals for Software Engineer and Advanced Hardware Fundamentals

Interrupts and Survey of software architectures. Introduction

to RTOS and More Operating System Services Basic Design

using RTOS

Embedded Software development tools and Debugging Techniques

Text Books:

1. An Embedded Software Primer, David A. Simon, Pearson Education, Inc., 1999
2. Embedded Real Time Systems programming, Sriram V Iyer and Pankaj Gupta, TMH, 2004

Reference Books:

1. Embedded Systems Design – A Unified Hardware/Software Introduction, Frank Vahid/ Tony Givargis, John Wiley & Sons, Inc., 2002
2. Embedded Systems, Architecture, Programming and Design, Raj Kamal, TMH, 2003

MCA 3.1.4 NEURAL NETWORKS & FUZZY SYSTEMS

Elective –II

Instruction: 3 Periods Lec/week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

1. Neural Networks and Fuzzy Systems
Neural and Fuzzy Machine Intelligence, Fuzziness as Multivalence, The Dynamical-Systems Approach to Machine Intelligence, Intelligent Behavior as Adaptive Model-Free Estimation.

2. Neural Dynamics I: Activations and Signals
Neurons as Functions, Signal Monotonicity, Biological Activations and Signals, Neuron Fields, Neuronal Dynamical Systems, Common Signal Functions, Pulse-Coded Signal Functions.

3. Neuronal Dynamics II: Activation Models
Neuronal Dynamical Systems, Additive Neuronal Dynamics, Additive Neuronal Feedback, Additive Bivalent Models, BAM Connection Matrices, Additive Dynamic and the Noise-Saturation Dilemma, General Neuronal Activations: Cohen-Grossberg and Multiplicative Models.

4. Synaptic Dynamics I: Unsupervised Learning
Learning as Encoding, Change, and Quantization, Four Unsupervised Learning Laws, Probability Spaces and Random Processes, Stochastic Unsupervised Learning and Stochastic Equilibrium, Signal Hebbian Learning, Competitive Learning, Differential Hebbian Learning, Differential Competitive Leering.

5. Synaptic Dynamics II: Supervised Learning
Supervised Function Estimation, Supervised Learning as Operant Conditioning, Supervised Learning as Stochastic Pattern Learning with known Class Memberships, Supervised Learning as stochastic Approximation, The Back propagation Algorithm.

6. Fuzziness Versus Probability
Fuzzy Sets and Systems, Fuzziness in a Probabilistic World, Randomness vs. Ambiguity: Whether vs. How much, The Universe as a Fuzzy Set, The Geometry of Fuzzy Set, The Geometry of Fuzzy Sets: Sets as Points. The Fuzzy Entropy Theorem, The Subsethood theorem. The Entropy-Subsethood Theorem.

7. Fuzzy Associative Memories
Fuzzy Systems as Between-Cube Mappings, Fuzzy and Neural Function Estimators, Fuzzy Hebb FAMs, Adaptive FAMs: Product-Space Clustering in FAM Cells.

Text Book:

Neural Networks & Fuzzy Systems, Bark Kosko, PHI

Refernce Books:

1. Neural network Design, Hagan, Demuth and Beale, Vikas Publishing House
2. Fundamentals of Artificial Neural Networks, Mohamad H Hassoum. PHI
3. Fuzzy Set Theory & its Applica tion, H.J. Zimmerman Allied Published Ltd.

MCA 3.1.4 **BIOINFORMATICS**
Elective-II

Instruction: 3 Periods /Week **Sessional Marks : 30**
Univ. Exam : 3 Hours **Univ. Exam Marks:70**

Motivation and Expectation:
Students are expected to know the fundamentals of Engineering in Medicine and biology, which is emerging as an interesting field.
Students are expected to use The Internet extensively to understand the subject.

1. **Introduction:**
   Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy.
2. **Protein Information Resources**
   Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.
3. **Genome Information Resources**
   DNA sequence databases, specialized genomic resources
4. **DNA Sequence analysis**
   Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases
5. **Pair wise alignment techniques**
   Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.
6. **Multiple sequence alignment**
   Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching
7. **Secondary database searching**
   Importance and need of secondary database searches, secondary database structure and building a sequence search protocol
8. **Analysis packages**
   Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

Text Books:
1. Introduction to Bioinformatics,T K Attwood & D J Parry-Smith, Addison Wesley Longman
Reference Books:
1. Bioinformatics- A Beginner's Guide, Jean-Michel Claveriw, Cerdric Notredame, WILEY DreamTech India Pvt. Ltd
2. Sequence Analysis in A Nutshell, Scott Markel &Darryl Leon, O'REILLY

MCA 3.1.5 DATA WARE HOUSING AND DATA MINING

(Elective-III)

Instruction: 3 Periods Lec/week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

1. **Introduction to Data Mining**:
Motivation and importance, What is Data Mining, Relational Databases, Data Warehouses, Transactional Databases, Advanced Database Systems and Advanced Database Applications, Data Mining Functionalities, Interestingness of a pattern Classification of Data Mining Systems, Major issues in Data Mining.

2. Data Warehouse and OLAP Technology for Data Mining
What is a Data Warehouse? Multi-Dimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Development of Data Cube Technology, Data Warehousing to Data Mining

3 Data Preprocessing
Why Pre-process the Data? Data Cleaning, Data Integration and Transformation
Data Reduction, Discretization and Concept Hierarchy Generation

4 Data Mining Primitives, Languages and system Architectures
Data Mining Primitives: What defines a Data Mining Task? A Data Mining query language Designing Graphical Use Interfaces Based on a Data Mining Query language Architectures of Data Mining Systems

5 Concept Description: Characterization and comparison
What is Concept Description? Data Generalization and summarization-based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between different Classes, Mining Descriptive Statistical Measures in large Databases

6 Mining Association rule in large Databases
Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

7 Classification and prediction
Concepts and Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Backpropagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods like k-Nearest Neighbor Classifiers, Case-Based Reasoning, Generic Algorithms, Rough Set Approach, Fuzzy Set Approaches, Prediction, Classifier Accuracy

8 Cluster Analysis
What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods

Text Book:
Data Mining Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufman Publications

Reference Books:
1. Introduction to Data Mining , Adriaan ,Addison Wesley Publication
2. Data Mining Techniques, A.K.Pujari ,University Press

MCA 3.1.5 COMPUTER VISION AND PATTERN ANALYSIS

(Elective-III)

Instruction: 3 Periods Lec/week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

FUNDAMENTALS OF IMAGE PROCESSING

Image Acquisition, Definitions of Pixel, Gray Value, Sampling, Quantization, Histogram, Image Sliding, Image Stretching. Distance and Connectivity. Image Smoothening Operations - Mean, Median, Mode Filters. Edge Enhancement Filters - Directional Filters, Laplacian, Sobel, Robert. Definition of Image Compression - Run Length Encoding Method, Contour Encoding Method. Definition of Segmentation - Pixel based method of segmentation.

MORPHOLOGICAL OPERATIONS

Definition of Thresholding, A few techniques of thresholding. Importance of Binary Images. Erosion, Dilation, Opening, Closing, HIT-or-MISS Transformation, Thinning, Thickening, Skeletons, Pruning, Con vex hull. Extensions to Gray - Scale Images.Applications of Gray - Scale Morphology. Applications of Morphological Operations in Pattern Analysis.

SHAPE REPRESENTATION AND DESCRIPTIONS (Part - 1)

Region Identification, Algorithms for Region Identification, Shape Representation and Description - Chain Codes, Geometric Border Representation - Boundary Length, Curvature, Bending Energy, Signature, Chord Distribution, Fourier Transforms of Boundaries, Boundary Description using Segment Sequences, B-Spline Representation, Shape invariants.

SHAPE REPRESENTATION AND DESCRIPTION (Part - 2)

Region - Based Methods - Area - Algorithms for Calculation of Area. Euler's Number, Projections, Eccentricity, Elongatedness, Rectangularity, Direction, Compactness. Detailed Discussion on - Moments. Convex hull, Algorithms related to Convex hull. Graph Representation - Algorithm for Skeleton, Algorithm for Graph Construction. Definitions of Region Decomposition, Region Neighborhood Graphs, Shape Classes.

OBJECT RECOGNITION

Knowledge Representation, Statistical Pattern Recognition, - Classification Principles, Classifier Setting, Classifier Learning. Syntactic Pattern Recognition - Grammars, and Languages, Syntactic Analysis, Syntactic Classifier. Recognition as Graph Matching - Isomorphism, Related Algorithms. Similarity of Graphs.

CLUSTER ANALYSIS

Definition, Hierarchical Clustering, - Agglomerative Clustering Algorithms, Single - Linkage Algorithm, Complete Linkage Algorithm, Average - Linkage Algorithm, Ward's Method. Partitional Clustering - Definition, Forgy's Algorithm, K - Means Algorithm, Isodata Algorithm. Applications in Pattern Analysis.

ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC IN PATTERN ANALYSIS

Introduction to ANN ,Architecture of ANN, Activation Functions, Training of ANN- Supervised, Unsupervised, Reinforced,McCulloch - Pitts Model, HEBBNET, ADELINE ,Application of ANN in Pattern Analysis.

Definition and Brief Discussion about Fuzzy Logic, Fuzzy Sets. Application in Pattern Analysis.

TEXT BOOKS :

(1) Pattern Recognition and Image Analysis, Earl Gose, Richard Johnsonbaugh, Steve Jost , PHI
(2) Image Processing, Analysis and Machine Vision, Milan Sonka,Vaclav Hlavac VIKAS

Reference Books

Introduction to Antification Neural Networks, S.N. Sivanandam, M. Paul Raj ,
VIKAS

MCA 3.1.5 KNOWLEDGE MANAGEMENT

Elective –III

Instruction: 3 Periods Lec/week **Sessional Marks: 30**
Univ.-Exam : 3 Hours **Univ-Exam-Marks:70**

1. **Introduction**
   Introduction to Knowledge Management, The Knowledge Edge , The Origins of Knowledge

2. **Implementing Knowledge Management**
   The 10-Step Knowledge Management Road Map

3. **The First Phase: Infrastructure Evaluation And Leverage**
   The Leveraged Infrastructure, Aligning Knowledge Management and Business Strategy

4. **The Second Phase: KM System Analysis, Design and Development**
   The Knowledge Management Platform , Knowledge Audit and Analysis , Designing the KM Team, Creating the KM System Blueprint, Developing the KM System

5. **The Third Phase: KMS Development**
   Prototyping and Development, Leadership and Reward Structures

6. **The Final Phase and Beyond: Measuring Real-Option Analysis for Performance**
   Real-Options Analysis for Knowledge Valuation

Text Books:

1. The Knowledge Management Toolkit , Amrit Tiwana, Pearson Education, Second Edition
2. Knowledge Management, Elias M.Awad, Hassan M. Ghaziri, Pearson Education

MCA 3.1.6 OBJECT ORIENTED SOFTWARE ENGINEERING LAB

Practical: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

The purpose of the Software Engineering Lab course is to familiarize the students with modern software engineering methods and tools, **Rational Products**. The course is realized as a project-like assignment that can, in principle, by a team of three/four students working full time. Typically the assignments have been completed during the semester requiring approximately 80-120 hours from each project team.

The goal of the Software Engineering Project is to have a walk through from the requirements, design to implementing and testing. An emphasis is put on proper documentation. Extensive hardware expertise is not necessary, so proportionate attention can be given to the design methodology.

Despite its apparent simplicity, the problem allows plenty of alternative solutions and should be a motivating and educating exercise. Demonstration of a properly functioning system and sufficient documentation is proof of a completed assignment

Projects
Term projects are projects that a group student or might take through from initial specification to implementation.

The project deliverables include:

- Documentation including
  - A problem statement
  - A requirements document
    - A Requirements Analysis Document.
    - A System Requirements Specification.
    - A Software Requirements Specification.
- A design document
  - A Software Design Description and a System Design Document.
- A test specification.
- Manuals/guides for
  - Users and associated help frames
  - Programmers
  - Administrators (installation instructions)

- A project plan and schedule setting out milestones, resource usage and estimated costs.
- A quality plan setting out quality assurance procedures
- An implementation.

References

1. Project-based software engineering: An Object-oriented approach, Evelyn Stiller, Cathie LeBlanc, Pearson Education
2. Visual Modelling with Rational Rose 2002 and UML, Terry Quatrini, Pearson Edusction
3. UML2 Toolkit, Hans-Erik Eriksson, etc; Wiley

MCA 3.1.7 DATA COMMUNICATIONS AND NETWROKING LAB.

Practical: 3 Periods /week **Sessional Marks: 30**
Univ-Exam : 3 Hours **Univ-Exam-Marks:70**

FIRST CYCLE OF EXPERIMENTS

1.1 PC-to-PC COMMUNICATIONS UNDER WIN98/WIN2000's DIRECT CABLE CONNECTION with NULL MODEM
a) Using Serial Ports and RS-232 C Cable Connection
b) Using Parallel Ports and Direct Parallel Cable Connection

1.2.1 PC-to-PC COMMUNICATIONS UNDER WIN 98/WIN2000's DIAL-UP NETWORKING with **MODEM** and 4-LINE EXCHANGE

1.3 PC-to-PC COMMUNICATIONS UNDER WIN 98/WIN2000's HYPER TERMINAL with MODEM and 4-LINE EXCHANGE

1.4 LAN WITH BUS/STAR(Switch or Hub) TOPOLOGY with a minimum of two systems i) Windows Peer-to-Peer Network ii) Windows NT Client-Server Network

1.5 LAN WITH BUS/STAR(Switch or Hub) TOPOLOGY with a minimum of two systems using NOVELL Netware

1.6 TERMINAL NETWORK WITH UNIX/LINUX SERVER and one or two Terminals using Serial Ports

1.7 TERMINAL NETWORK WITH UNIX/LINUX SERVER, 8 – port Terminal Server and one or two terminals

Reference Books:
The Complete Reference Series : WIN98/WIN2000/UNIX/RED HAT X/Networking, T M H Edition

SECOND CYCLE OF EXPERIMENTS

1. Identifying well known ports on a Remote System :
   By trying to listen to the various well known ports by opening client connections. If the exception does not occur then the remote port is active else the remote port is inactive.
2. Writing a Chat application :
   i). One-One: By opening socket connection and displaying what is written by one party to the other.
   ii). Many-Many (Broad cast): Each client opens a socket connection to the chat server and writes to the socket. Whatever is written by one party can be seen by all other parties.
3. Data retrieval from a Remote database:
   At the remote database a server listens for client connections. This server accepts SQL queries from the client, executes it on the database and sends the response to the client.
4. Mail Client:
   i). POP Client : Gives the server name , user name and password retrieve the mails and allow manipulation of mail box using POP commands.
   ii). SMTP Client : Gives the server name, send e-mail to the recipient using SMTP commands- (Core Java 2 pg:163.)
5. Simulation of Telnet:
   Provide a user interface to contact well-known ports, so that client-server interaction can be seen by the user.
6. Simple file transfer between two systems (without protocols):
   By opening socket connection to our server on one system and sending a file from one system to another.
7. TFTP- Client:
   To develop a TFTP client for file transfer. (Unix Network programming- Stevens.)
8. HTTP-Server:
   Develop a HTTP server to implement the following commands.
   GET, POST, HEAD, DELETE.
   The server must handle multiple clients.

Reference Books : 1. An Introduction to Computer Networking,
Kenneth C. Mansfield Jr and James L. Antonakos
Pearson Education Asia
2. Java Network Programming, Harold, Orielly

MCA
6th SEMESTER

With effect from 2007-08 admitted batch

Syllabi

(Tentative)

Chairman
Board of Studies
(2005-08)

Dept of Computer Science and Systems Engineering
College of Engineering
Andhra University
Visakhapatnam

MASTER OF COMPUTER APPLICATIONS
Course Structure and Scheme of Examination

3rd Year –2nd SEMESTER

With Effect from 2007-08 admitted batch

Code	**Name of the Subject**	EXTERNAL EVALUATION
MCA 3.2	**Project**	**100 Marks**

GUIDELINES for preparing the report of the Project Work

FORMAT FOR PREPARATION OF PROJECT REPORT

FOR

M C A

1. ARRANGEMENT OF CONTENTS:

The sequence in which the project report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Bonafide Certificate
3. Abstract
4. Table of Contents
5. List of Tables
6. List of Figures
7. List of Symbols, Abbreviations and Nomenclature
8. Chapters
9. Appendices
10. References

The table and figures shall be introduced in the appropriate places.

2. PAGE DIMENSION AND BINDING SPECIFICATIONS:

The dimension of the project report should be in A4 size. The project report should be bound using flexible cover of the thick white art paper. The cover should be **printed in black letters** and the text for printing should be identical.

3. PREPARATION FORMAT:

3.1 Cover Page & Title Page – A specimen copy of the Cover page & Title page of the project report are given in **Appendix 1.**

3.2 Bonafide Certificate – The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 14, as per the format in **Appendix 2.**

The certificate shall carry the supervisor's signature and shall be followed by the supervisor's name, academic designation (not any other responsibilities of administrative nature), department and full address of the institution where the supervisor has guided the student. The term **'SUPERVISOR'** must be typed in capital letters between the supervisor's name and academic designation.

3.3 Abstract – Abstract should be one page synopsis of the project report typed double line spacing, Font Style Times New Roman and Font Size 14.

3.4 Table of Contents – The table of contents should list all material following it as well as any material which precedes it. The title page and Bonafide Certificate will not find a place among the items listed in the Table of Contents but the page numbers of which are in lower case Roman letters. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents of the project report is given in **Appendix 3.**

3.5 List of Tables – The list should use exactly the same captions as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head.

3.6 List of Figures – The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head.

3.7 List of Symbols, Abbreviations and Nomenclature – One and a half spacing should be adopted or typing the matter under this head. Standard symbols, abbreviations etc. should be used.

3.8 Chapters – The chapters may be broadly divided into 3 parts (i) Introductory chapter, (ii) Chapters developing the main theme of the project work (iii) and Conclusion.

The main text will be divided into several chapters and each chapter may be further divided into several divisions and sub-divisions.

Each chapter should be given an appropriate title.

Tables and figures in a chapter should be placed in the immediate vicinity of the reference where they are cited.

Footnotes should be used sparingly. They should be typed single space and placed directly underneath in the very same page, which refers to the material they annotate.

3.9 Appendices – Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme.

Appendices should be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2, etc. Appendices, Tables and References appearing in appendices should be numbered and referred to at appropriate places just as in the case of chapters.

Appendices shall carry the title of the work reported and the same title shall be made in the contents page also.

3.10 List of References –The listing of references should be typed 4 spaces below the heading "REFERENCES" in alphabetical order in single spacing left – justified. The reference material should be listed in the alphabetical order of the first author. The name of the author/authors should be immediately followed by the year and other details.

A typical illustrative list given below relates to the citation example quoted above.

REFERENCES

1. Ariponnammal, S. and Natarajan, S. (1994) 'Transport Phonomena of Sm Sel – X Asx', Pramana – Journal of Physics Vol.42, No.1, pp.421-425.

2. Barnard, R.W. and Kellogg, C. (1980) 'Applications of Convolution Operators to Problems in Univalent Function Theory', Michigan Mach, J., Vol.27, pp.81–94.

3. Shin, K.G. and Mckay, N.D. (1984) 'Open Loop Minimum Time Control of Mechanical Manipulations and its Applications', Proc.Amer.Contr.Conf., San Diego, CA, pp. 1231-1236.

3.10.1 Table and figures - By the word Table, is meant tabulated numerical data in the body of the project report as well as in the appendices. All other non-verbal materials used in the body of the project work and appendices such as charts, graphs, maps, photographs and diagrams may be designated as figures.

4. TYPING INSTRUCTIONS:

The impression on the typed copies should be black in colour.

One and a half spacing should be used for typing the general text. The general text shall be typed in the Font style 'Times New Roman' and Font size 14.

*** * * * ***

(A typical Specimen of Cover Page & Title Page)
<Font Style Times New Roman – Bold>

TITLE OF PROJECT REPORT

<Font Size 18><1.5 line spacing>

A PROJECT REPORT
<Font Size 14>

Submitted by
<Font Size 14><Italic>

NAME OF THE CANDIDATE
<Font Size 16>

in partial fulfillment for the award of the degree of
<Font Size 14><1.5 line spacing><Italic>

MASTER OF COMPUTER APPLICATIONS
<Font Size 16>

< Emblem>

Name of the department
<Font Size 12>
Name of the college
< Font Size 14>

ANDHRA UNIVERSITY : VISAKHAPATNAM - 530003(for A.U. College)

AFFILIATED TO ANDHRA UNIVERSITY : VISAKHAPATNAM - 530003
(for A.U. affiliated College)

<Font Size 16><1.5 line spacing>

MONTH & YEAR
<Font Size 14>

SPECIMEN

SOME PERFORMANCE ASPECTS CONSIDERATIONS OF A CLASS OF ARTIFICIAL NEURAL NETWORK

A PROJECT REPORT

Submitted by

SANDHY. A

in partial fulfillment for the award of the degree of

MASTER OF COMPUTER APPLICATIONS

<Emblem>

DEPARTMENT OF COMPUTER SCIENCE AND SYSTEMS ENGINEERING

ANDHRA UNIVERSITY AUTONOMOUS COLLEGE OF ENGINEERING

ANDHRA UNIVERSITY:: VISAKHAPATNAM-530 003

MAY 2008

CERTIFICATE FOR STUDENTS WHO HAD DONE PROJECT IN THE DEPARTMENT

CERTIFICATE

This is to certify that it is a bonafide work done by Mr./Ms.Mrs. _____ during the year 200 - 200 in partial fulfillment of the requirements for the award of degree of Master of Computer Applications in the <name of the Department and College address> This work is not submitted to any University for the award of any Degree / Diploma.

Name, Designation and Signature of INTERNAL GUIDE

HEAD OF THE DEPARTMENT
<Dept./College Stamp>

CERTIFICATE FOR STUDENTS WHO HAD DONE PROJECT IN THE INDUSTRY / ORGANISATION

This is to certify that it is a bonafide record of the Dissertation work entitled "_____" done by STUDENT NAME , a student of MCA in <dept./college address> during the period 200 - 200 in partial fulfillment of the requirements for the Award of Degree of MASTER OF COMPUTER APPLICATIONS. This work is not submitted to any University for the award of any Degree / Diploma. This work is carried out in (NAME OF THE ORGANISATION) with complete address.

INTERNAL GUIDE

HEAD OF THE DEPARTMENT

CERTIFICATE FROM INDUSTRY

To Date:

Head of the Department
College Address

CERTIFICATE OF PROJECT COMPLETION

This is to certify that _____
Has completed the project in our organization as per the particulars given below.

PERIOD :

PROJECT TITLE :

SOFTWARE TOOLS USED :

SIGNATURE AND STAMP

INDUSTRY / ORGANISATION
OFFICE SEAL

FORMAT OF M.TECH. DISSERTATION

The dissertation should be in the following format. Otherwise , the submission is rejected.

- Cover / Title Page
- 1st Page=Cover Page
- Certificate(Dept.)
- Submit to the H.O.D
- Acknowledgements
- Abstract
- Table of Contents with page numbers
- Rest of the Dissertation : follow the guidelines given
- References

  REFERENCES EXAMPLE:

  1. Dias, F.J.O. , "Truth-table verification of an iterative logic array, " IEEE Tans. On Computers, Vol. C-25, PP 605-613 , June 1976.
  2. "Signature analysis, " Hewiett-Packard Journal , Vol. 28, No. 9, May 1977.
     (1) (2) are to shown in text.
- Bibliography

  BIBLIOGRAPHY EXAMPLE:

  1. (Author) (Text Book) (Publisher), Year

- Appendix

PAGE FORMAT:	Paper Size	……	A4
	Left Margin	……	1 ½''
	Right Margin	……	1''
	Top Margin	……	1''
	Bottom Margin	……	1''
	Line Space	……	1 ½"

Font-Times New Roman 12
Page Numbers at the Bottom Centre
3 Hard Bound copies are to be submitted

Students must have regular interaction with the project guide. Progress is to be submitted through guide every two months to the Department. Project submission is not allowed for those students who fail to give progress report ON TIME (every two months). Starting Day of Instruction for 6th Sem. MCA,
Last Day of Instruction for 6th Sem. MCA, Last Day of MCA Project Submission, and Commencement of MCA Project Viva Examination will be specified as per the academic calender

NOTE: The internal guide must be available during Viva-Voce Examination of the concerned student(s).

PRESENTATION MATERIAL FOR PROJECT VIVA:

Each student has to attend viva with not less than 20 and not more than 25 PPT slides covering major key points of the work. Results of the Project work should be demonstrated on a PC. Soft copy of

the code must be kept in the folder attached to the last cover page. Projects without code cannot be accepted.

MCA PROJECT GUIDE LINES

The purpose of this note is to describe how to organize the written Dissertation submitted as partial fulfillment of your MCA. Degree.

The distinguishing mark of a dissertation is an original contribution to knowledge. The dissertation is a formal document whose sole purpose is to prove that you have made an original contribution to knowledge. Failure to prove that you have made such a contribution generally leads to failure.

To this end, your dissertation mush show two important things :

1. You have identified a worthwhile problem, which has not been previously solved.
2. You have answered the question.

Your contribution to knowledge generally lies in your solution or answer.

The sole purpose of the dissertation is to prove that you have made an original and useful contribution to knowledge. The examiners need answers to the following questions:

- What is this student's research question?
- Is it a good question? (has it been answered before> is it a useful question to work on?)
- Did the student convince me that the question was adequately answered?
- Has the student made an adequate contribution to knowledge?

To prove the originality and value of your contribution, you must present a through review of the existing literature on the subject, and on closely related subjects. Then, by making direct reference to your literature review, you must demonstrate that your question.

(a) Has not been previously answered, and
(b) Is worth answering

Describing how you answered the question is usually easier to write about, since you have been intimately involved in the details over the course of your studies.

A Generic Dissertation Skeleton

1. INTRODUCTION

This is a general introduction to what the dissertation is all about-it is not just a description of the contents of each section. Briefly summarize the question (You will be stating the question in detail later), some of the reasons why it is a worthwhile question, and perhaps give an overview of you main results. This is a birds-eye view of the answers to the main questions answered in the dissertation (see above).

2. BACKGROUND INFORMATION

A brief section giving background information may be necessary, especially if your work spans two or more traditional fields. That means your readers may not have any experience with some of the material needed to follow your dissertation, so you need to give it to them. A different title than that given above is usually better; e.g., "A Brief Review of Frammis Algebra".

3. REVIEW OF THE STATE OF THE ART

Here you review the state of the art relevant to your dissertation. Again, a different title is probably appropriate; e.g., "State of the Art in Zylon Algotithm". The idea is to present (critical analysis a little bit later) the major ideas in the state of the art right up to, but not including, your own personal brilliant ideas.

You organize this section by idea, and not by author or by publication. For example if there have been three important main approachs to Zylon Algorithms to date, you might organize subsections around these three approaches, if necessary:

3.1. Interactive Approximate of Zylons
3.2. Statistical Weighting of Zylons
3.3. Graph-theoretic Approaches to Zylon Manipulation

4. PROBLEM STATEMENT

Engineering dissertation tend to refer to a "problem to be solved.

- A concise statement of the question that you dissertation tackles
- Justification, by direct reference to section3, that you question is previously unanswered.
- Discussion of why it is worthwhile to answer this question.

Item 2 above is where you analyze information which you presented in Section 3. For example, may be your problem is to "develop a Zylon algorithm capable of handling very large scale problems in reasonable time" (you would further describe what you mean by "large scale" and "reasonable time" in the problem statement). Now in your analysis of the art ou would show how each class of current

approaches fails (i.e. can handle only small problems, o taks too much time). In the last part of this section you would explain why having a large scale fast Xylon algorithm is useful; e.g., by describing applications where it can be used.

5. DESCRIBING HOW YOU SOLVED THE PROBLEM

This part of the dissertation is much more free-form. It may have one or several sections and subsections. But it all has only one purpose: to convince the examiners that you solved the problem that you set for yourself in Section 4. So show what you did that is relevant to solving the problem: if there were blind all eye and dead ends, do not include these.

6. CONCLUSIONS

You generally cover three things in the Conclusions section, and each of these usually merits a separate subsection:

a) Conclusions
b) Summary of Contributions
c) Future Research

7. REFERENCES

The list of references is closely tied to the review of the state of the art given in section 3. most examines scan your list of references looking for the important for the important works in the field, so make sure they are listed and referred to in section 3. Truth be known, most examiners also look for their own publications if they are in the topic area of the dissertation, so list these too. Besides, reading your examiner's papers usually gives you a clue as to the type of questions they are likely to ask.

All references given must be referred to in the main body of the dissertation. Note the difference from a Bibliography, which may include works that are not directly referenced in the dissertation. Organize the list of references either alphabetically by author surname (preferred), or b order of citation in the dissertation.

8. APPENDICES

What goes in the appendices? Any material which impedes the smooth development of your presentation, but which is important to justify the results of a dissertation. Generally it is material that is of too nitty-gritty a level of detail for inclusion in the main body of the dissertation, by which should be

available for perusal by the examiners to convince them sufficiently. Examples include program listings, immense tables of data, lengthy mathematical proofs or derivations, etc.,

A NOTE ON COMPUTER PROGRAMS AND OTHER PROTOTYPE

The purpose of your dissertation is to clearly document an original contribution to knowledge. You may develop computer programs, prototypes, or other tools as a means of providing your points, but remember, the dissertation is not about the tool, it is about the contribution to knowledge. Tools such as computer programs are fine and useful products, but you can't get an advanced degree just for the tool. You must use the tool to demonstrate that you have made an original contribution to knowledge; e.g., through its use, or ideas it embodies.

HOW TO WRITE AN ABSTRACT

ABSTRACT

Because on-line search databases typically contain only abstracts, it is vital to write a complete but concise description of your work to notice potential readers into obtaining a copy of the full paper. This article describes how to write a good computer architecture abstract for both conference and journal papers. Writers should follow a checklist consisting of motivation, problem statement, approach, results, and conclusions. Following this checklist should increase the chance of people taking the time to obtain and read your complete paper.

INTRODUCTION

Now that the use of on-line publication databases is prevalent, writing a really good abstract has become even more important than it was a decade ago. Abstracts have always served the function of "selling" your work, But now, instead of merely convincing the reader to keep reading the rest of the attached paper, an abstract must convince the reader to leave the comfort of an office and go hunt down a copy- of the article from a library (or worse , obtain one after a long wait through inter-library loan). In a business context , an "executive summary" is often the only piece of a report read by the people who matter ; and it should be similar in contest if not tone to a journal paper abstract.

CHECKLIST : PARTS OF AN ABSTRACT

Despite the fact that an abstract is quite belief , it must do almost as much work as the multipage paper that follows it. In a computer architecture paper, this means that it should in most cases include the following sections. Each section is typically a single sentence , although there is room for creativity. In particular , the parts may be merged or spread among a set of sentences. Use the following as a checklist for your next abstract.

- MOTIVATION

Why do we are about the problem and the results? If the problem is not obviously "interesting" it might be better to put motivation first; but if your work is incremental progress on a problem that is widely recognized as important, then it is probably better to put the problem statement first to indicate which piece of the larger problem you are breaking off to work on. This section should include the importance of your work, the difficulty of the area , and the impact it might have if successful.

- PROBLEM STATEMENT

  What problem are you trying to solve ? What is the scope of your work (a, generalized approach , or for a specific situation)? Be careful not to use too much jargon. In some cases it is appropriate to put the problem statement before the motivation, but usually this only works if most readers already understand I why the problem is important.

- RESULTS

  What's answer? Specifically , most good computer architecture papers conclude that something is so many percent faster , cheaper, smaller, or otherwise better that something else. Put the result there, in numbers. Avoid vague, hand-waving results such as "very", "small", or "significant" . If you must be vague, you are only given license to do so when you can talk about orders-of-magnitude improvement . There is a tension here in that you should not provide numbers that can be easily misinterpreted, but on the other hand you do not have room for all the caveats.

- CONCLUSIONS

  What are the implications of your answer? Is it going to change the world (unlikely), be a significant "win", be a nice hack , or simply serve as a road sign indicating that this path is a waste of time (all of the previous results are useful). Are , your results general, potentially generalizable, or specific to a particular case?

OTHER CONSIDERATIONS

An abstract must be a fully self-contained , capsule description of the paper. It can't assume (or attempt to provoke) the reader into flipping through looking for an explanation of what is meant by some vague statement. It must make sense all by itself. Some points to consider include:

* Meet the word count limitation. If your abstract runs too long, either it will be rejected or someone will take a chainsaw to it to get it down to size. Your purposes will be better served by doing the difficulty task of cutting yourself, rather that leaving it to someone else who might, be more incrested in meeting size restrictions than an representing your efforts
in the best possible manner. An abstract word limit of 150 to 200 words is common.

- Any major restrictions or limitations on the results should be stated, if only by using "weasel-words" such as "might" , "could", "may" and "seem".

- Think of a half-dozen search phrases and keywords that people looking for your work might use. Be sure that those exact phrases appears in your abstract , so that they will turn up at the top of a search result listing.

- Usually the context of a paper is set by the publication it appears in (for example , IEEE computer magazines articles are generally about computer technology). But , if you r paper appears in a some what un-traditional venue, be sure to include in the problem statement the domain or topic area that it is really applicable to.

- Some publications request "keywords" . These have two purposes. They are used to facilitate keyword index searches. Which are greatly reduced in importance now that on-line abstract text searching is commonly used. However , they are also used to assign papers to review committees or editors, which can be extremely important to your fate. So make sure that the keyword's you pick make assigning your paper to a review category obvious (for example, if there is a list of conference topics, use your chosen topic area as one of the keyword tuples).

CONCLUSION

Writing an efficient abstract is hard work, but will repay you with increased impact on the world by enticing people to read your publications. Make sure that all the components of a good abstract are included in the one you write.

FURTHER READING

Mchaelson , Herbert, How to write & publish Engineering Papers and Reports, Oryx Press, 1990. Chapter 6 discusses abstracts.
Cremmins, Edward, The art of abstracting 2nd Edition, info Resources Press , April 1996. This is an entire book about abstracting , written primarily for professional abstracts.

(A typical specimen of table of contents)
<Font Style Times New Roman>

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LIST OF SYMBOLS **xxvii**

MCA Regulations are same as M.E./M.Tech Regulations

ANDHRAUNIVERSITY

REGULATIONS RELATING TO MASTER OF ENGINEERING (M.E)/ MASTER OF TECHNOLOGY (M.TECH)/ MASTER OF PLANNING DEGREE EXAMINATIONS UNDER SEMESTER SYSTEM

(with effect from 2007 – 2008)

1. The Degree of Master of Engineering (2 - year course in 4 semesters) / Master of Technology (2 - year course in 4 semesters)/Master of Planning (2 - year course in 4 semesters) will be conferred on a candidate who satisfies the following conditions.

(i) The candidate must have passed the Bachelor of Engineering/Technology/Architecture Degree in appropriate branch of this University or an examination recognized by this University as equivalent there to and secured not less than 55% marks in aggregate.

However, candidates who have qualified themselves at the GATE examination shall be given priority in admission to M.E./M.Tech./M.Planning courses. Further, candidates seeking admission in to specified P.G. courses shall be required to appear at a separate entrance test(s) to be conducted by the University. In implementing the above regulation, the following guidelines are stipulated.

(a) Total number of candidates admitted in to a course (specialization) with or without GATE score should not exceed approved sanctioned strength.
(b) Only after all GATE qualified candidates have been considered for admission, non GATE candidates may be considered for admission in to those courses and under those categories (i.e., O.C., S.C., S.T., B.C., etc.) in which vacancies exist.

(ii) After passing B.E./B.Tech./B.Arch. Degree examination in the appropriate branch of this University or an examination recognized by this University as equivalent thereto, the candidate should have undergone a regular courses of study as here in after prescribed, for not less than four semesters (each semester of about 16 weeks duration) and passed the prescribed examination.

(iii) Candidates pursuing the courses on a part-time basis (Evening course) should be employed in any recognized local establishment or Institution or Government service and shall have a minimum of two years experience after graduation. The duration of the course for part-time students shall be six semesters.

(iv) Members of the teaching staff of the University College of Engineering and other local Engineering colleges may be permitted to undergo the course on a part-time basis (Daytime) and complete the whole course and examination in not less than six semesters taking two or three papers only in a semester.

1.1 The normal duration of the course is 2 academic years for M.E / M.Tech/M.Planning Degree.

1.2 Candidates shall have pursued a regular course of study , as detailed below, for not less than two academic years, and shall have fulfilled the academic requirements laid down and shall have passed all the prescribed examinations.

2.1 A regular course of study during an academic year/semester means a minimum attendance of 75% of all the subjects computed by totaling the number of periods conducted over the semester as specified in the schemes of instructions.

However, in special cases and for sufficient causes shown, Chairman of Board of Governors may, on the recommendation of the Principal, Dean (Academic Affairs) and Head of the Department concerned, condone the deficiency in the average attendance to an extent of 10% for reasons such as ill-health, if the

application for condonation is submitted at the time of actual illness and is supported by certificate of authorized Medical Officer approved by the Principal.

In the case of students, who participate in co- curricular, extra curricular activities like student seminars, N.S.S, N.C.C, Inter-collegiate tournaments approved by the College and any other activities conducted by Andhra University, Inter-University tournaments conducted by the Inter-University Boards and any such other activities involving the representation of the College/University with the prior approval of the Principal, the candidate may be deemed to have attended the college during the actual period of such activity, solely for the purpose of attendance.

2.2 A candidate who cannot satisfy the attendance requirements as specified in the clause 2.1, because of late admission under special circumstances, reasonable and acceptable to the College of Engineering on the basis of documents, shall attend at least 50% of the total scheduled periods during that semester and shall have attended at least 90% of the total periods of instructions held from the date of admission.

2.3 The criterion for promotion from 1st semester to 2nd semester and to the subsequent semesters is based on the requisite attendance put up by the candidate.

2.4 A candidate who fails to satisfy the regulation under the clause 2.1 or 2.2, shall not be allowed for the University examinations at the end of the semester and shall not be allowed for promotion to the next semester of study. He/ She shall be required to repeat the entire course of study of that semester.

3.1 The period of instruction shall comprise of a minimum of 15/16 weeks. The semester end examinations shall ordinarily be held after completion of 15/16 weeks.

3.2 There shall be no supplementary examinations.

4. The examinations for the M.E/M. Tech Degree shall be conducted as per the prescribed Schemes in all the branches of study offered by AU College of Engineering (Autonomous).

5. Assessment for the award of the Degree shall consist of

(i) Internal evaluation of the work done by the students during the semester for 30 marks in each theory subject and for 50 marks or such other marks prescribed in the scheme of examination, in each practical/ Industrial Training/project.

(ii) Semester end examination as detailed in the scheme of examination for 70 marks in each theory subject as given in the scheme.

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5.1 The marks for the internal evaluation shall be awarded by the concerned teachers based on class work, quiz, viva-voce, two mid-examinations out of which one may be online examination etc., according to a scheme/schedule to be notified by the Department at the beginning of the semester.

5.2 The semester end examination in each theory subject, for a maximum of 70 marks, shall be conducted by the University/College.

5.3 The semester end examination in practical/Industrial Training/ project for 50 marks or such other marks prescribed in the scheme of examination shall be conducted by the Department.

5.4 Candidates shall be required to produce complete and certified records of the work done by them in each of the practical subjects at the time of semester end practical examination, failing which they will not be allowed for such examination.

5.5 The candidate is required to obtain a minimum of 28 marks out of 70 in the semester end examination.

5.6 There is no sessional marks minimum in each subject.

5.7 THE MARKS THUS OBTAINED WILL BE CONVERTED TO GRADES ON A 10.0 POINT SCALE AND THEN TO SEMESTER GRADE POINT AVERAGE (SGPA) AND SUBSEQUENTLY CUMULATIVE GRADE POINT AVERAGE IS AWARDED AT THE END OF THE COURSE

GRADES AND GRADE POINT DETAILS

S. No	Range of Marks	Grade	Grade Points
1.	**≥ 90%**	**O**	**10.0 points**
2.	**80% - 89%**	**A**	**9.0**
3.	**70% - 79%**	**B**	**8.0**
4.	**60% - 69%**	**C**	**7.0**
5.	**55% - 59%**	**D**	**6.0**
6.	**50% - 54%**	**E**	**5.0**
7.	**< 50%**	**F (Fail)**	**0.0**
8.	**The grade W represents failure due to insufficient attendance in a year or semester**	**W**	**0.0**
9.	**Incomplete (subsequently to be changed into pass or E to O or F grade in the same semester)**	**I**	**0.0**

Further these letter grades carry points associated with them in a quantified hierarchy.

For example if a student gets the Grades in one semester A, A, B, B, B, D in the subjects having $2(s_1)$, $4(s_2)$, $4(s_3)$, $4(s_4)$, $4(s_5)$, $2(s_6)$ credits respectively,

The SGPA is calculated from the following :

SGPA = $[9(A) \times 2(s_1) + 9(A) \times 4(s_2) + 8(B) \times 4(s_3) + 8(B) \times 4(s_4) + 8(B) \times 4(s_5) + 6(D) \times 2(s_6)] / [2(s_1) + 4(s_2) + 4(s_3) + 4(s_4) + 4(s_5) + 2(s_6)]$

$=162/20 = 8.1$

If a student gets the grades in another semester D, A, B, C, A, E, A in the subjects having credits $4(s_1)$, $2(s_2)$, $4(s_3)$, $2(s_4)$, $4(s_5)$, $4(s_6)$, $2(s_7)$ respectively,

The SGPA is

SGPA = $[6(D) \times 4(s_1) + 9(A) \times 2(s_2) + 8(B) \times 4(s_3) + 7(C) \times 2(s_4) + 9(A) \times 4(s_5) + 5(E) \times 4(s_6) + 9(A) \times 2(s_7)] / [4(s_1) + 2(s_2) + 4(s_3) + 2(s_4) + 4(s_5) + 4(s_6) + 2(s_7)]$

$= 162/22 = 7.36$

The CGPA of the above two semesters is

CGPA = $(9 \times 2 + 9 \times 4 + 8 \times 4 + 8 \times 4 + 8 \times 4 + 6 \times 2 + 6 \times 4 + 9 \times 2 + 8 \times 4 + 7 \times 2 + 9 \times 4 + 5 \times 9 + 9 \times 2) / (22 + 20)$

$= 7.7$

6.1 A candidate shall be declared to have passed in any subject (theory) if he /she secures not less than **"E"** Grade in theory and practical/industrial training/project, provided that the result otherwise is withheld.

6.2 A candidate shall be deemed to have satisfied the minimum requirement for the award of the Degree;

(i) If he/she is declared to have passed all the subjects (theory and practical subjects) included in the Scheme of Examination of 4 semesters

and

(ii) If he/she secures 5.0 CGPA by the end of fourth semester.

6.3 A candidate may be permitted to improve his/her performance by reappearing for the whole of the University examinations, only in all the theory subjects of a semester , after completion of the 2 years course of study and during the four consecutive examinations only.

Such an improvement can be availed of only once, for each of the semester examinations of the course of study, provided that all the subjects of the semester shall have been passed as per the clause 6.1. When considered in its totality, better of the two performances (as a whole but not subject wise) shall be taken into consideration for the purpose of awarding First Class. There shall be no subject wise improvement permitted in any semester of study for the above purpose. In any case, no such improvement shall be permitted after completion of four academic years from the year of admission.

6.4 Candidates, who fail to satisfy clause 6.2 (ii) may be permitted to obtain 5.0 CGPA within 2 years after completing the course of study by appearing at the University examinations only of M.E/M.Tech/M.Planning subjects of their choice. Any candidate, who fails to attain the minimum CGPA of 5.0 even after such appearances, during a total of four academic years from the year of admission, shall become ineligible for the award of M.E/ M.Tech/M.Planing Degree.

6.5 There shall be no provision for the improvement of internal assessment marks in any theory or practical subject in any semester of study.

7. The viva voce examination on the dissertation or project or thesis shall be conducted by a Board of minimum four examiners consisting of

1. The Head of the Department as Chairman
2. Chairman, Board of studies of the concerned Department
3. Internal Guide and External Guide (if any)
4. External examiner (from other University/College/Institution/)

The valuation of the dissertation, project or thesis shall be as provided in the scheme of examination of each course.

8. Whenever there is a change of regulations, scheme and syllabi, a candidate who fails in any subject or who wants to improve his/her performance as per clause 6.4 , will be permitted to appear for the University examinations conducted during the subsequent 2 years only, under the previous regulations, scheme and syllabi.

9. All the candidates who have satisfied the minimum requirement as specified above, shall be arranged in two classes (first class and second class) based on the CGPA obtained in the examinations.

   (i) The First Class is awarded for those who have obtained a CGPA of 6.0 and above,

   and

   (ii) The Second Class is awarded for those who obtained a CGPA of 5.0 and above but less than 6.0.

   Candidates who pass in first class without failure in any one of the subjects in the entire course of study and obtained a CGPA of 7.0 and above shall be declared to have passed in First Class with Distinction. However, candidates who have improved their performance as per clause 6.4 shall not be eligible to be awarded First Class with Distinction.

10. The CGPA can be converted to percentage by multiplying CGPA with 10.0, in case of requirement by any other University or any other purpose.