



MCA

SYLLABUS STRUCTURE

1st Semester subjects

Paper	Subject Name	L	T	P	Credits
Theory Subjects					
CA132101	Introductory Programming (IP)	3	2	0	4
CA132102	Digital Systems (DS)	3	2	0	4
CA132103	Theory of Computer Science(TCS)	3	2	0	4
CA132104	Accounting and financial management (AFM)	3	2	0	4
CA132105	Computer oriented numerical methods(CONM)	3	2	0	4
Practical Subjects					
CA132116	Laboratory-I (LAB-1)	0	0	10	5
Total Contact Hrs : 35 ; Total Credits : 25 ;					

2nd Semester subjects

Paper	Subject Name	L	T	P	Credits
Theory Subjects					
CA132201	Data and File Structure (DFS)	3	2	0	4
CA132202	Computer Architecture and Organization (CAO)	3	2	0	4
CA132203	Computer based optimization techniques (CBOT)	3	2	0	4
CA132204	Graph Theory (GT)	3	2	0	4
CA132205	Probability and Statistics (PS)	3	2	0	4
Practical Subjects					
CA132216	Laboratory-II (LAB-2)	0	0	10	5
Total Contact Hrs : 35 ; Total Credits : 25 ;					

3rd Semester subjects

Paper	Subject Name	L	T	P	Credits
Theory Subjects					
CA132301	System Software (SS)	3	2	0	4
CA132302	Database Management Systems -(DBMS)	3	2	0	4
CA132303	Management Information System(MIS)	3	2	0	4
CA132304	Object Oriented Programming and Design (OOPD)	3	2	0	4
CA132305	Computer Graphics & Multimedia(CGM)	3	2	0	4
Practical Subjects					
CA132316	Laboratory-III (LAB-3)	0	0	10	5
Total Contact Hrs : 35 ; Total Credits : 25 ;					

4th Semester subjects

Paper	Subject Name	L	T	P	Credits
Theory Subjects					
CA132401	Operating Systems (OS)	3	2	0	4
CA132402	Software Engineering(SE)	3	2	0	4
CA132403	Database Management Systems -II(DBMS)	3	2	0	4
CA132404	Computer Network (CN)	3	2	0	4
CA132405	Design and Analysis of Algorithms (DAA)	3	2	0	4
Practical Subjects					
CA132416	Laboratory-IV (LAB-4)	0	0	10	5
Total Contact Hrs : 35 ; Total Credits : 25 ;					

5th Semester subjects

Paper	Subject Name	L	T	P	Credits
Theory Subjects					
CA132501	Data Warehousing and Data Mining(DWDM)	3	2	0	4
CA132502	Web Technology (WT)	3	2	0	4
CA132503	Artificial Intelligence(AI)	3	2	0	4
CA132504	Elective-I	3	2	0	4
CA132505	Elective-II	3	2	0	4
Practical Subjects					
CA132526	Minor Project	0	0	10	5
Total Contact Hrs : 35 ; Total Credits : 25 ;					

6th Semester subjects

Paper	Subject Name	Total Project duration and work hours	Credits
Subjects			
CA132621	System Development Project (Internal Evaluation)	15 Weeks to be devoted for the project work	10
CA132622	System Development Project (External Evaluation)		15
Total Contact Hrs : 30 ; Total Credits : 25 ;			

ELECTIVE SUBJECTS:

Elective -I (CA132504)

- Microprocessor and Embedded Design(MED)
- Distributed Systems(DS)
- Expert Systems(ES)
- Image Processing(IP)
- Biologically Implied Computing(BIC)
- Programming Language and Paradigms(PLP)

Elective-II (CA132505)

- Cryptography and Network Security (CNS)
- Information Storage and Retrieval (ISR)
- Multimedia Systems(MS)
- Simulation and Modeling(SM)
- Remote Sensing and GIS(RSG)
- Mobile Computing(MC)



MCA 1ST SEMESTER SYLLABUS

Paper : CA132101
Subject Name : INTRODUCTORY PROGRAMMING
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20);
Pre-requisite : NIL

UNIT	PARA	Content	Weeks
1		Introduction to Programming ,Programming methodology, Types of Programming Languages , Assembler, Compiler and Interpreter, Programming development steps and tools ,Structure of a C program, The C keywords, Identifiers, Constants, Variables, C Data types, dynamic initialization, type modifiers, type conversions, constant and volatile variables	2
2		Properties of Operators, Operator Priority, conditional operators, arithmetic, relational, assignment operators and expressions, logical, bitwise operators. Input and output in c: Formatted and Unformatted functions, Library functions.	1
3		Control statement: if statement, if-else, nested if else, if-else-if ladder, break, continue, got, Switch statement. Loop control statement.	1
4		Arrays: Array initialization, array terminology, characteristics of an array, 1-D array and its operations, Multi -dimensional arrays. Strings: string standard functions.	2
5		Pointers, void pointers, arithmetic operations with pointers, pointers and arrays, array of pointers, pointers to pointers, pointers and strings. Dynamic memory allocation, memory allocation functions.	2
6		Function, call by value, call by reference, and function as an argument, Functions with arrays and Pointers, Recursion-Types of Recursion, Recursion versus Iterations, Advantages and Disadvantages of Recursion, Efficiency of Recursion.	2
7		Preprocessor Statement and macros:#define, #include , #line, #finder , #error , #line , #pragma Directive.	1
8		User Define Datatypes:Structure, Enumerated Data Type, Union,Typedef.	1
9		File Handling in C: Storing, creating, retrieving, updating Sequential, relative, indexed and random access mode, Files with binary mode (Low level), performance of Sequential Files. File operation: creation, copy, delete, update, text file, binary file.	2
Books:	1.	Dromey, G.: How to solve it by computer, PHI(EEE), 1985	
	2.	Kanetkar, Let us C, BPB	
	3.	Jeri, Elliot: Problem Solving and Programming Design in C, Pearson	
	4.	Balaguruswamy: Programming in ANSI C, TMGH	
	5	Balagurusamy : Fundamentals Of Computers, TMH	
	6	Venugopal : Mastering C, TMH	

Paper : CA132102
Subject Name : DIGITAL SYSTEMS
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20);
Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1		Representation of Information: Number System: Binary, octal, hexadecimal; Positive and negative numbers; fixed point and floating point quantities. Arithmetic operations: Addition, subtraction. Character codes: ASCII and EBCDIC, Redundant coding for error detection and correction: Concept of parity codes, Hamming Codes (SEC-DEC)0 and distance.	3
2	2.1	Logic Design: Boolean algebra, Boolean variables and functions- canonical and standard forms, truth table, minimization of Boolean functions- Karnaugh map, tabulation methods..	2
	2.2	Combinational logic circuits: AND, OR, NAND, NOR and NOT gates and tri-state buffer; Implementation of Boolean functions using logic gates; Multiplexers, decoders, encoders, simple arithmetic and logic circuits.	4
3		Sequential circuits: flip-flops, shift registers and counters- synchronous and asynchronous. Concept of bus and register transfer language, state table, state diagram and state equations.	3
4		Memory Devices: Semiconductor memory - RAM, ROM; Magnetic core and surface memory- disk, drum, tape; Access time and cost considerations: Concepts of volatility, random access, serial access, direct access, online and backup storage.	2
5		Basic CPU organization: Simplified functional block diagram of a CPU; Instruction execution process.	1
Books:	1.	Mano, M.M.: Digital Logic and Computer Design, Pearson	
	2.	Rajaraman V, Radhakrishnan : An introduction to Digital Computer Design. PHI	
	3.	Mano, M.M.; Computer System Architecture, Pearson	
	4.	Hamacher, Vranesic, Zaky: Computer organization, McGraw Hill.	
	5	Uyemura . J.P.: Digital Systems Design an integrated approach, Cengage	
	6	Leach : Digital Principles & Applications,7/e, TMH	



Paper : CA132103
 Subject Name : THEORY OF COMPUTER SCIENCE
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1		Introductory Concept on Formal logic, revision of propositional and first orders predicate logic, conjunctive normal form, clausal form, Logic programming.	2
2		Functions and relation: Binary relation, types of relation , equivalence relation and equivalence class, closure of relation, function, different types of functions.	2
3		Logic: truth tables, algebra of propositions, logical arguments, predicate calculus	3
4		Concepts of Automata Theory: Automata, Computability and Complexity, Alphabets, Strings, Languages, Grammars.	1
5		Automata and Languages:	
	5.1	Finite Automata: Deterministic and non deterministic finite Automata, Equivalence of DFA & NFA, Finite Automata with Epsilon- Transitions.	2
	5.2	Regular Expression (RE) and Languages: Building RE, operators of RE, Conversion of RE to Automata and Automata to RE. Application of RE and its algebraic laws.	2
	5.3	Non Regular Languages: Pumping Lemma and its application.	1
6		Context Free Grammars and Languages:	
	6.1	Context-free Grammars: Definition and Derivation of languages. Ambiguity in Grammars and languages. CHOMSKY NORMAL FORM (CNF).	2
	6.2	Pushdown – Automata: Definition, The language of a PDA, Equivalence of PDA and CFG's.	2
	6.3	Non-Context-free Languages: Application of Pumping Lemma for non- Context free languages.	1
7		Computability Theory:	
	7.1	Turing Machines: Notations, ID for Turing Machine, i.e., recursively enumerable languages, Acceptability and Halting, Multi Traces Turing Machine. The Church- Turing Thesis.	
	7.2	Variants of Turing Machines: Multitape Turing Machine, Non-Deterministic Turing Machine, Enumerator, Equivalence of one tape and multitape Turing Machine.	
Books:	1.	Hopcroft, Motwani & Ullman: Introduction to Automata Theory, Languages and Computation. 3rd Edn. LPE.	
	2.	Theory of Computation: Michael Sipser CENCAGE Learning	
	3.	Martin : Introduction To Languages & Theory Of Computation, TMH	
	4.	Liu and Mahapatra, Discrete Mathematics, TMH	

Paper : CA132104
 Subject Name : ACCOUNTING AND FINANCIAL MANAGEMENT
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1	1.1	Accounting concepts and principles, Accounting conventions, principles of Double-entry system of accounting, objectives and advantages of accounting;	2
	1.2	Classification of Debit and Credit, cardinal Rules for Debit and credit, Journalising, Ledger postings, closing and balancing of Ledger Accounts, Subsidiary Books, types of cash Book;	3
2	3.1	Trial balance, Preparation of trading Account, Manufacturing Account, Profit and loss Account and Balance Sheet for Proprietary concerns,	3
	3.2	Capital Expenditures and revenue Expenditures, Depreciation of Fixed Assets, Simple adjustments;	2
4	4.1	Financial management- Concept and importance, its increasing role in modern times, cost accounting and its importance, standard costing and marginal costing, Break-even Analysis, ratio analyses, type of ratios & usefulness, fund flow and cash flow, working capital cycle.	3
5	5.1	Introduction to computerised accounting system, coding logic, master and transaction files, documents used for data collection, processing of different files and outputs obtained, automatic generation of profit and loss account and balance sheet.	2
Books:	1.	Chandra: Financial Management. TMH	
	2.	Shukla & Grewal, Cost Accounting	
	3.	Chawla, Juneja & Saxena Double Entry Book Keeping and Accounts	
	4.	Anole: Financial Accounting, prentice-Hall.	
	5.	Hornigren and Sundem: Introduction to Financial Accounting, PH Int.	
	6.	Murthy, U.S.; Management Finance, 2nd Edn., Vakils Fefers & Simons Ltd.	
	7.	Van Home, James, C.: Financial Management and policy, PH Inc.	
	8.	Pandey, I.M.: Financial management, Vikas publications, 1979	
	9.	Levy and Sarnat: Principles of Financial management, Prentice- Hall.	



Paper : CA132105
 Subject Name : COMPUTER ORIENTED NUMERICAL METHODS
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : MCA 1.1 and MCA 1.3

UNIT	PARA	Content	Weeks
1		Interpolation-Polynomial Interpolation, difference tables and calculations of difference.	2
2	2.1	Numerical differentiation- Newton's Interpolation, Lagrange's interpolation and Newton's divided difference formulae.	1 ½
	2.2	Numerical integration- Trapezoidal rule, Simpson's (1/3 and 3/8) rules, Gaussian Quadrature formula, Romberg integration	1 ½
3		Simultaneous linear equations- Direct methods: Gauss elimination, Jacobi's. Iterative methods: Gauss-Jordan, Gauss-Seidel	3
4		Solution of non linear equations of one variable- Iterative methods: Zeros of transcendental equation and zeros of polynomials using Bisection, Iterative, False-Position, Secant and Newton Raphson methods. Convergence of these methods	3
5		Ordinary differential equations of one and two variables- Euler's method, Modified Euler's method, Runge Kutta (2 nd and 4 th) methods, Milne's methods. Predictor – corrector methods.	4
Books:	1.	Gerald and Wheatley : Applied Numerical Analysis, Pearson	
	2.	Niyogi : Numerical Analysis and algorithm, TMGH	
	3.	Schilling and Harris : Applied numerical methods for Engineering, Cengage	
	4.	Scheid: Numerical Analysis, TMGH	
	5	Chapra : Numerical Methods For Engineers, TMH	

Paper : CA132116
 Subject Name : PROGRAMMING LABORATORY-I
 Marks : Internal Evaluation(as per regulation) : 100; External Evaluation : 100

LAB PART	PARA	Laboratory Content	Total Weeks
1 (75%)	1.1	Computer Basics, Operating Systems basics and commands	3
	1.2	Simple Programs, Conditional statements, arrays	2
	1.3	Complex programs using functions and subroutines	3
	1.4	Pointers, structures, Unions and Files	3
Books:		As given in MCA 1.1 and MCA 1.5	



MCA 2ND SEMESTER SYLLABUS

Paper : CA132201
 Subject Name : DATA AND FILE STRUCTURE
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : CA132101

UNIT	PARA	Content	Weeks
1		Fundamental Notions : Primitive and composite data types ; Time and Space Complexity of algorithms, Concept of Big-O, small-o & Big-Ω.	1
2		Data Structures : Linear List: Stacks, Queues, Arrays, Linked Lists, Circular & Doubly Linked Lists.	2
3		Trees and Graphs : Introduction to Graph & Trees. Tree: Properties of trees; Pedant vertices in a tree; center of a tree; Rooted binary trees. Concepts of trees; Extended Binary trees; Complete Binary trees; General Trees. Binary Search Trees; Weight balanced and Height balanced trees; AVL Tree; Balanced Multi-Way Trees; Threaded Binary Trees.	3
4		Graph: Concept of graph, vertex set, edge set, connected graph, etc., Adjacency matrix, Path matrix, Warshall's algorithm, Modified Warshall's algorithm, Adjacency list, Node list, Edge list. Spanning trees – Spanning tree algorithms; Fundamental circuits spanning trees of weighted graph	2
5		File Structures : Concepts of Fields, Records and Files; Concepts of Blocks, Clusters, Sectors. Sequential File Organization, Variable length Records and Text Files; Indexing Structures like B-trees; ISAM; Hashing Techniques for Direct Files; Inverted lists; Multilists	2
6		Sorting and Searching: Selection_sort, Insertion-sort, Bubble-sort, Quick-sort, Heap-sort, Merge-sort. Searching Techniques; Binary search, Linear search,	2
Books :	1	Aho, Hopcroft and Ullman , Data Structures and Algorithms, Addison Wesley Publishing Co.	
	2	Horowitz and Sahni , Fundamentals of Algorithms, Narosa Publishing House .	
	3	Cormen , Leiserson , Rivest, Introduction to Algorithms, Mil Press & McGraw - Hill Books Company.	
	4	Kunth.D., The Art of Computer Programming, Vol - 1 & 11 , Addison Wesley.	
	5	Rauthan & Patel, Expert Data Structures, Khanna Publication Co(Ltd).	
	6	Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education	

Paper : CA132202
 Subject Name : COMPUTER ARCHITECTURE AND ORGANISATION (CAO)
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : CA132102

UNIT	PARA	Content	Weeks
1		Overview: Simplified block diagram of a computer system, Instruction execution Model.	1
2	2.1	Processor Organization: Instruction set, types, formats, addressing modes; Register set; Assembly and machine language programming.	2
	2.2	Computer arithmetic: Review of addition and subtraction; Multiplication- basic, Booth's, array; Division- basic, restoring, non-restoring; Floating point arithmetic.	2
3		Data path organization, concept of a bus. Control structure: Hardware, Microprogramming.	3
4	4.1	Memory Organization: Interfacing of memory with a processor; Cache memory; Introduction to virtual memory.	2
	4.2	Input output organization: Synchronization of data transfer: strobes and handshaking, I/O mapping and control: Program controlled, Interrupt, driven, DMA, Interrupt and DMA mechanisms.	3
5		Microprocessors: Introduction to Intel 8085 microprocessor and its peripheral chips, addressing modes and simple programming examples, A RISC processor (e.g. Motorola 88000) to introduce the basic concepts of RISC architecture, SISD, SIMD, MISD, MIMD, ..	2
Books:	1.	Hamacher, Vranesic and Zaky: Computer Organization, TMGH	
	2.	Mano M.M: Computer system Architecture, PHI (EEE)	
	3.	William Stallings, Computer Organisation and architecture, Pearson	
	4	Hennessey : Computer Architecture, Elsevier	
	5	Stallings : Computer Organization & Architecture, PE	
	6	Hayes : Computer Architecture & Organization, MGH	



Paper : CA132203
 Subject Name : COMPUTER BASED OPTIMISATION TECHNIQUES
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : CA132101 and CA132105

UNIT	PARA	Content	Weeks
1	1.1	Linear Programming: Mathematical model, assumptions of linear programming, Principles of simplex method, Revised simplex method, Applications, Duality, Dual Simplex method, sensitivity analysis	3
	1.2	Special type of linear programming problems: Transportation and assignment problems.	3
2		Integer programming: introduction, Branch and bound techniques, Assignment and travelling salesman problems with algorithmic approach.	4
3		Dynamic programming: deterministic and probabilistic dynamic programming	3
4		Queueing model: Specification and measure of queueing systems, Structures of basic queueing system- Definition and classification of stochastic processes, Characteristics of a Queueing system, Interpretation of a model, Single Channel waiting line- (M/M/1) (∞ : FIFO), Single channel finite population queue (M/M/1): (C/FIFO), Multichannel Queueing problem (Infinite population) (M/M/C): (∞ : FIFO), Erlang Distribution (M/Ek/1): (∞ : FIFO).	2
Books	1	Natarajan, Balasubramani, Tamilsari : Operations Research , Pearson	
	2	Gillett, B.G.: Introduction to operations research - A Computer oriented Algorithmic approach, McGraw-Hill.	
	3	Srinath, L.S: Linear programming, East-west, New Delhi.	
	4	Hiller, F.S. and Liberman, G.J.: Introduction to Operations Research, Holden Day In	
	5	Taha: Operations Research , Pearson	

Paper : CA132204
 Subject Name : GRAPH THEORY
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : CA132101 and MCA CA132103

UNIT	PARA	Content	Weeks
1		Graph: Incidence and degree; Handshaking Lemma; Isomorphism; Sub graphs and Union of graphs; Connectedness; Walks, Paths and Circuits; Components and Connectedness; Walks, Paths and Circuits; Components and Connectedness algorithms; Shortest Path Algorithms, Eulerian graph, Fleury's algorithm and Chinese postman problem; Hamiltonian graph - necessary and sufficient conditions; Travelling salesman; Bipartite graph.	3
2		Tree: Properties of trees; Pendant vertices in a tree; Centre of a tree; Rooted binary trees; Spanning trees - Spanning tree algorithms; Fundamental circuits; Spanning trees of a weighted graph; cut-sets and cut-vertices; Fundamental cut-sets; Connectivity and separativity; network flow; max-flow min-cut theorem.	2
3	3.1	Planner graph: Combinatorial and geometric duals; Kuratowski's graph; detection of planarity; Thickness and crossings	2
	3.2	Matrix representations of graph: Incidence; Adjacency; matrices and their properties	2
4		Colourings: Chromatic number: Chromatic polynomial; The six and five colour theorems; The four colour problem.	1
5	5.1	Directed graphs: Binary relations; Directed graphs and connectedness; directed trees; Aborecence; Polish method; Touranaments.	2
	5.2	Counting of labelled trees: Cayley's theorem; Counting methods; Polya theory.	2
6		Switching and coding theory and VLSI design	1
Books	1.	Deo, N.: Graph Theory with Applications to Engineering and Computer Science	
	2	Agnarsson: Graph Theory ,Pearson	
	3	Harary : Graph Theory, PHI(EEE).	
	4	: West : Graph Theory, PHI	
	5	Chartran : Introduction To Graph Theory, TMH	



Paper : CA132205
 Subject Name : PROBABILITY AND STATISTICS
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1		Probability: Probability Theory: sample spaces; Events and probability; Discrete Probability; Union, intersection and compliment of events; conditional probability; Bay's Theorem; Random variables and Distribution: random variables, Discrete Probability Distribution - Binomial, Poisson, Geometric and Hyper geometric distributions; Density functions; Continuous probability distribution - Uniform, Exponential, Normal, Student's t , X^2 , Beta and F - static. Expectations; Characteristics Functions.	7
2		Statistics: Basic statistics: Measures of central tendencies- Mean, Median, Mode; Measures of dispersion:- Range, Variance and Standard deviation: Frequency distributions and cumulative frequency distributions and cumulative frequency	3
3		Moments and Moment generating functions: Linear correlation coefficient: Linear and Non-linear regression; Multiple correlation and multi-regression;	3
4		Sampling: Theory of sampling: Population and sample; sampling survey methods and estimation. Statistical inference; testing of hypothesis and inference. Central limit theorem.	2
Books	1	Hogg, Tanis and Rao: Probability and Statistical Inference , Pearson	
	2	Mendenhall, Beaver, Beaver , Probability and Statistics, Cengage.	
	3	Yule, U.G., Kendall, M.G: An Introduction to the Theory of statistics, Chales Griffin and Co.Ltd.	
	4	Milton : Introduction To Probability & Statistics, TMH	
	5	Das : Statistical Methods, combined edition, TMH	
	6	Leon & Garcia : Probability & Statistics, PE	

Paper : CA132216
 Subject Name : PROGRAMMING LABORATORY-II
 Marks : Internal Evaluation (as per regulation) : 100; External Evaluation : 100
 Pre – requisite : CA132201 and CA132205

LAB PART	PARA	Laboratory Content	Total Weeks
1(75%)	1.1	Concept of Object oriented programming in C++	1
	1.2	Simple link list, Stack, queues,	2
	1.3	Single, double, circular Link lists, queues	2
	1.4	graphs and trees, Several searching and sorting techniques, using Graphs and trees	3
	1.5	B Tree, B+ Trees: Insertion deletion techniques	3
2(25%)		Simple programming on Numerical Methods	4
Books		As on CA132201 and CA132205	



MCA 3RD SEMESTER SYLLABUS

Paper : CA132301
Subject Name : SYSTEM SOFTWARE
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
Pre – requisite : CA132101, CA132102, CA132102

UNIT	PARA	Content	Weeks
1		Overview: Definition and classification of system software.	1
2		Assemblers: Assembly language, Assembly process, Data structures, Macros and macroprocessors.	3
3		Linkers and loaders: Basic concepts, Static and dynamic linking, shared libraries, loaders, overlays. Case study of the Unix linking system, Windows DLLs, OLEs.	4
4		Compilers: Introduction: Phases of a compiler, Languages and grammar, Chomsky hierarchy. Lexical analysis: Finite automata, Lexical analyzer, Lexical analyzer generator (LEX). Parsing: Top-down and Bottom-up parsers, shift-reduce parser, recursive descent (operator precedence) parser, LL(1), LR parsers, Parser generator (YACC).	5
5		System Software Tools: Text Editor- Overview of editing process, user interface, editor structure, interactive debugging system, debugging functions and capabilities, relationship with other parts of the system, user interface criteria. Eg: LaTeX	2
Books:	1.	Aho,A.V., Sethi, and Ullman J.d: compiler design.	
	2.	Dhandhere, System programming and operating systems, Tata McGrawHill.	
	3.	Leland.L.Beck, System software, An introduction to System Programming, Pearson Education	
	3.	Louden, Compiler construction, Cengage	

Paper : CA132302
Subject Name : DATABASE MANAGEMENT SYSTEM-I
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
Pre – requisite : CA 132201

UNIT	PARA	Content	Weeks
1		Introduction : What is DBMS , advantage of using DBMS ,data models (object based logical models , record based logical models) , DBMS users , overall system structure	1
2		Entity Relationship models : ER diagrams , generalization , specialization , aggregation . Database models - Network model , Hierarchical model , and Relational model.	2
3		Relational Database : Underlying concepts , structure , study of relational languages (relational algebra , tuple relational calculus , domain relational calculus , SQL , QBE) , storage and file structure , file organization . Indexing : Primary and secondary , B+ tree indexed files , B - tree indexed files , static and dynamic hashing , multiple key access , grid files , partitioned hashing .	3
4		Relational Data Base Design : Integrity constraints (domain constraints , referential , assertions , triggers , functional dependencies) , Normalization (using FDs , multivalued dependencies , join dependencies) , Domain -key normal form.	2
5		Transactions : Concept , state , ACID properties , serializability and recoverability , testing for serializability . Concurrency Control : Lock - based , protocols , timestamp based protocols , validation based protocols , multiversion schemes , deadlock handling .	2
6		Recovery System : Log based recovery (deferred and immediate database modification) , checkpoints , shadow paging , recovery with concurrent with transactions , buffer managements in recovery , recovery from loss of non - volatile storage , logical undo logging , transaction rollback , restart recovery , fuzzy checkpointing.	3
Books:	1	Elmars and Navathe, fundamentals of Database Systems , Norsa publishing Company,1989	
	2	J.D . Ullman , Principles of Database Systems , Galgotia Publishing Private Limited	
	3	Silberschatz, Korth and Sudersan , Principles of Database Systems Mc GrawHill Publication	
	4	C.J .Date An Introduction to Database systems , Vol - I And Vol II Addison - Wesley Publishing Company.	



Paper : CA132303
 Subject : MANAGEMENT INFORMATION SYSTEM
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : NIL

UNIT	PARA	Content	Weeks
1.		MANAGEMENT INFORMATION SYSTEM (MIS) (20% credit): Organization and Information Systems, Changing Environment and its impact on Business - The IT/IS and its influence. The Organization: Structure, Managers and activities - Data, information and its attributes - The level of people and their information needs - Types of Decisions and information - Information System, categorization of information on the basis of nature and characteristics.	2
2		KINDS OF INFORMATION SYSTEMS (20% credit): Transaction Processing System (TPS) - Office Automation System (OAS) - Management Information System (MIS) - Decision Support System (DSS) and Group Decision Support System (GDSS) - Expert System (ES) - Executive Support System (EIS or ESS).	2
3		COMPUTER IN TELECOMMUNICATION AND NETWORKS (20% credit): Communication, Media, Modems & Channels - LAN, MAN & WAN - Network Topologies, Internet, Intranet and Extranet. Wireless technologies like Wi-Fi, Bluetooth and Wi-Max.	3
4		MANUFACTURING AND SERVICE SYSTEMS (10% credit): Information systems for Accounting, Finance, Production and Manufacturing, Marketing and HRM functions - IS in hospital, hotel, bank.	2
5		ENTERPRISE SYSTEM (10% credit): Enterprise Resources Planning (ERP): Features, selection criteria, merits, issues and challenges in Implementation - Supply Chain Management (SCM): Features, Modules in SCM - Customer Relationship Management (CRM): Phases. Knowledge Management and e-governance.	2
6		CHOICE OF IT (10% credit): Nature of IT decision - Strategic decision - Configuration design and evaluation Information technology implementation plan.	2
7		SECURITY AND ETHICAL CHALLENGES (10% credit): Ethical responsibilities of Business Professionals – Business, technology. Computer crime – Hacking, cyber theft, unauthorized use at work. Piracy – software and intellectual property. Privacy Issues and the Internet Privacy. Challenges – working condition, individuals. Health and Social Issues, Ergonomics and cyber terrorism.	2
Books	1.	“Management Information Systems”, Kenneth J Laudon, Jane P. Laudon, Pearson/PHI, 10/e, 2007	
	2.	“Management Information Systems”, W. S. Jawadekar, Tata McGraw Hill Edition, 3/e, 2004	
	3.	MIS by Ralph Stair	
Ref.		1. “Introduction to Information System”, James A. O’ Brien, Tata McGraw Hill, 12th Edition. 2. “Management Information Systems”, S.Sadagopan, PHI, 1/e, 2005 3. “Management Information Systems”, Effy Oz, Thomson Course Technology, 3/e, 2003 4. Corporate Information Strategy and Management”, Lynda M AppleGate, Robert D Austin et al, Tata McGraw Hill, 7th Edition.	

Paper : CA132304
 Subject Name : OBJECT ORIENTED PROGRAMMING AND DESIGN
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : CA132101

UNIT	PARA	Content	Weeks
1		Part - I : Object Oriented Programming Object, Class. State and Behavior of an object, Attributes and Operations of a class. Encapsulation and Data Hiding: Interface, Implementation, Access modifiers. Inheritance: Reusing, Is_a relationship, Generalization, Specialization, superclass and subclass, Abstraction. Composition: Has_a relationship, Aggregation, Association, Composition. Multiplicity and cardinality. Polymorphism, getter & setter, Operator overloading. Local attributes, Object attributes, Class attributes. Constructor: Default Constructor, Multiple Constructor, Constructor overloading. Error Handling.	6
2	2.1	Part – II : Object Oriented Design <u>Class Model</u> : Class and Object, Link and Association, Generalization and Inheritance, OCL. Enumeration, Multiplicity, Scope, Visibility, Association End Name, Ordering, Bags and Sequences, aggregation, Constraints on Objects, Generalization Sets and Links.	4
	2.2	<u>State Model</u> : Signal Events and Change Events; States, Transitions and Conditions. State Diagrams: Basic notations, One-shot State Diagrams, Activity Effects, Do-Activities, Entry and Exit Activities, Completion Transition, Sending Signals, Nested States, Concurrency and Synchronization of Concurrent Activities.	
	2.3	<u>Interaction Model</u> : Use Case Models with Include, Extend, Generalization, Sequence Models. Activity Models, sending & receiving signals, swimlanes, Object flows.	
3		Part-III : Development Stages and Life Cycles System conception, Analysis, System design, Class design, Implementation, Testing, Training, Deployment and Maintenance.	5
Books	1.	Matt Weisfeld: The Object Oriented Thought Process, Addison-Wesley.	
	2.	Rambaugh et al.: Object Oriented Modeling and Design, PHI (EEE).	
	3.	Rambaugh Booch, Jacobson : Unified Modelling Language Reference Manual.	
	4.	Barclay, Savage : Object-Oriented Design with UML and Java, Elsevier Butterworth- Heinemann	



Paper : CA132305
 Subject Name : COMPUTER GRAPHICS & MULTIMEDIA(CGM)
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre-requisite : CA132201

UNIT	PARA	Content	Weeks
1		Display Devices: Line and point plotting Systems; Raster, vector, pixel and point plotters, Continual refresh and storage displays, Digital frame buffer , Plasma panel displays, Very high resolution devices , High - speed drawing , Display processors , Character generators , Color-display techniques (Shadow mask and penetration CRT, color look - up tables , analog false colours , hard copy color printers) .	2
2		Display Description : Screen co - ordinates , user co - ordinates ; Graphical data structures (compressed incremental list, vector list, use of homogeneous co-ordinates) ; Display code generation ; Graphical functions ; The view algorithms; Two - dimensional transformation .	3
3		Interactive Graphics : Pointing and positioning devices (cursor,light pen, digitizing tablet, the mouse , track balls) , Interactive graphical techniques. Positioning , Elastic lines , Inking , zooming , panning , clipping , scissoring,windowing,censoring .	2
4		Graphic Language Primitives constants , actions , operators	2
5		3 -D Graphics: Wire - frame perspective display, Perspective depth, Projective transformations, Hidden line and surface elimination, Transparent solids Shadowing . (GKS is to be used as the standard teaching tool).	2
6		Concept of Image Processing : Techniques and applications. Multimedia : Introduction to multimedia, Concept of hypertext and hypermedia, Multimedia applications, Basics of Animation, Music and sounds, Audio basic Concepts, Digital and Analog basic concepts. MIDI hardware, MIDI messages, MIDI files, Video: Basic Concepts, Analog and digital video. Imaging and graphics, Image formats, Graphic formats, File format, Image quality and Graphic systems, Compression, Image Compression, Sound Compression, Video Compression.	3
Books:	1	Computer Graphics : Hearn ID.and Baker.P.M. PHI	
	2	Principles of Interactive computer graphics : Newman W.Sproule, R.F. McGraw Hill	

Paper : CA132316
 Subject Name : PROGRAMMING LABORATORY-III
 Marks : Internal Evaluation(as per regulation) : 100; External Evaluation : 100
 Pre – requisite : CA132216

UNIT	PARA	Laboratory Content	Total Weeks
1 (75%)	1.1	Concept of Object oriented programming in Java 2.6	2
	1.2	Example of Inheritance, Multiple inheritance, Polymorphism related programs	5
	1.3	Designing of DFD, Class Diagram with UML/SE Tools	4
2(25%)		Programs related to Computer graphics	4
Books:		As given in MCA 3.4 and MCA 3.5	



MCA 4TH SEMESTER SYLLABUS

Paper : CA132401
 Subject Name : OPERATING SYSTEMS
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : CA132202

UNIT	PARA	Content	Weeks
1		Overview: Evolution, current status and future trends. Structural overview.	1
2		Process concepts: Process states, process control block, process scheduling algorithms. Support for concurrent processes: Mutual exclusion, shared data, critical sections, busy form of waiting, lock and unlock primitives, synchronization, block and wakeup. Inter process communication issues, primitives.	5
3		System Deadlock: Prevention, detection and avoidance.	2
4		Memory management: Contiguous and non-contiguous allocation, virtual memory, segmentation, paging, page scheduling and replacement algorithms.	4
5		File Systems: Management, protection mechanisms. I/O management, disk scheduling. Design of UNIX, LINUX- a case study. An overview of network and distributed operating systems.	3
Books:	1.	Silberschatz A, Galvin P: Operating system concepts, 4th ed. AWP.	
	2.	Milenkovic M.: Operating System- Concepts and Design, MGH Tanenbaum	
	3.	Operating System- Design and Implementation, PHI (EEE).	
	4.	Bach, M.: Design of the UNIX operating system, PHI (EEE).	
	5.	Deitel, Deitel, choffnes, Operating systems, Pearson	

Paper : CA132402
 Subject name : SOFTWARE ENGINEERING.
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre-requisite : NIL

UNIT	PARA	CONTENT	Weeks
1		Overview of system analysis and design(credit): Information systems concepts, system environment, elements of a system, characteristics and types, system development life cycle.	2
2		Introduction to software engineering : (credit) Basic concepts of SE, different phases of a software development life cycle, life cycle models, planning software project.	2
3		Software requirements engineering process(credit): Functional and non functional requirements, user requirements, system requirements, the SRS document, requirements elicitation and analysis, system modelling, system modelling tools, DFD,DD,UML etc.	2
4		Software design (credit): Concept of fundamental design approaches top down and bottom up, structured, object based and object oriented design, modular design, architectural design, user interface design.	3
5		Software testing and maintenance (credit): Concepts of software testing, type of testing, testing strategies, post implementation review and software maintenance.	2
6		Software project and quality management (credit): Measures and measurements, cost estimation, cocomo model, scheduling, quality concepts, software reliability and quality standards.	1
7		Software risk management (credit):Software risks, risk strategies risk identification, risk projection, risk refinement.	2
Books		1.Awad.E.H..System analysis and design 2.Pressman. R.S..Software Engineering: A practitioner's Approach. Mc Graw-Hill	
		3.Sommerville, Software Engineering, Pearson education	
		4. Rajib Mall; Software Engineering,.	



Paper : CA132403
 Subject name : DATABASE MANAGEMENT SYSTEM-II
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre-requisite : CA132302

UNIT	PARA	Content	Weeks
1		Query Processing : Study of algorithms for selection operations , sorting , join operations , projection , set operations , aggregation ; measurement of cost , evaluation of expressions, transformation of relational expressions , optimization techniques.	3
2		Parallel Databases : Introductory concepts ,partitioning techniques , interoperation parallelism - parallel sort (range partitioning sort, parallel external sort-merge) , parallel join (partitioned join, fragment-and-replicate join, parallel hash join) , interoperation parallelism (pipelined, independent).	3
3		Distributed Databases : Replication and fragmentation, network transparency, join processing, distributed transaction processing, two-phase and three-phase commit protocols, handling failure, coordinator selection, concurrency control (locking, timestamping), deadlock handling (centralized, fully distributed), multidatabase systems.	3
4		Object Oriented Databases : Object classes, inheritance, DAG representation, object identity and persistence (brief introduction to ODMG C++), storage structure for object oriented databases. Security and Integrity : Violations, authorization, views, privileges, granting privileges, security specification in SQL.	2
5		Introductory concepts on following topics : Data mining and data warehousing, multimedia databases, distributed information systems, information retrieval systems, spatial and graphical databases, transactions processing monitors, transactional workflows, active and main memory databases. (Example and case studies from ORACLE to be discuss in the course)	3
Books :	1	Elmasari and Navathe, Fundamentals Of Database System, Narosa Publishing Company, 1989.	
	2	J.D. Ullman, principles of Database Systems, Galgotia Publishing Private Limited.	
	3	Silberschats, Kroth and Sudershan, Principles of Database Systems, McGraw Hill Publication.	
	4	C.J. Date, An Introduction to Database Systems, Vol-I and Vol-II, Addison-Wesley Publishing Company.	

Paper : CA132404
 Subject Name : COMPUTER NETWORKS
 Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
 Pre – requisite : CA132102

UNIT	PARA	Content	Weeks
1		Overview: Goals of networking, types, application, topologies, Switching techniques, Standards, performance issues. Network Architecture: ISO-OSI reference model, design philosophy, layer, protocol, interface, and service concepts. Layer-wise functionality	3
3		Physical Layer: Concepts of data transmission, modulation and multiplexing methods, modem, encoding methods, communication media, standard protocols. Medium Access Control sublayer – channel allocation, ALOHA, CSMA, CSMA/CD, token ring, token bus, Standard LAN/WAN, MAC Protocols. Protocols (IEEE 802.X), satellite networks.	3
4		Data link layer: Framing, error control techniques, data link protocols and their performance. Sliding window protocols, examples of DLL protocols.	3
5		Introduction to Network layer Overview of physical layer, data link layer & MAC. Network Layer: Routing, Congestion and deadlock control algorithms. Internetworking issues and devices, gateways, bridges and routers, IP v4/v6 & X. 25 protocols. Transport layer: Connection management, ICP, X.25. Session and presentation layer: Remote procedure call. Data Compression method. Data encryption and decryption. Application layer: Email, Remote login, File transfer, Network file system. Network security-issues, threats, attacks to networks, design of security system, recent trends in network security. Advance concepts in computer networking wireless network, ad hock networks etc.	4
Books:	1.	Tanenbaum A.S., Computer Network, PHI (EEE).	
	2.	Stalling, Data and Computer Communication, PHI (EEE).	
	3.	Stevens, UNIX Network Programming, PHI (EEE)	
	4.	Forouzan, Data communication and networking, 4 th Edn, TMGH	



Paper : CA132405 Paper
Subject Name : DESIGN AND ANALYSIS OF ALGORITHMS
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
Pre – requisite : CA132101, CA132201

UNIT	PARA	Content	Weeks
1		Algorithms: Models of Computation, Space and Time Complexity, Growth of functions, Upper and Lower bounds, Recurrences.	3
2		Paradigms: Divide -and -Conquer, Branch and Bound, Backtracking, Dynamic Programming, Greedy Method.	2
3		Analysis of sorting, Graph & Data Structures based Algorithms:	3
	3.1	Sorting algorithms: Insertion sort, Merge sort, Heap sort, Quick sort, Linear Time sorting algorithms(Count sort, Radix sort, Bucket sort)	
	3.2	Graph Algorithms: BFS, DFS, Topological sort, Spanning trees	2
	3.3	Data Structure based Algorithms : Hashing algorithms, BST, B-Trees	3
4		Introduction to NP-Completeness: The class P, The class NP, Polynomial reducibility NP-Completeness, NP-Completeness proofs. Examples of NP-Complete problems.	2
Books:	1.	Cormen, Leiserson, Rivest, Stein: Introduction to algorithms, PHI	
	2.	Manber, Udi: Introduction to Algorithms. 2/e Addison-Wesley, 1994	
	3	Aho, Hopcroft and Ullman: The Design and Analysis of Computer Algorithms, PE	
	4	G. Brassard and P. Bratley: Fundamentals of Algorithms. Prentice Hall, 1995.	
	5	Dasgupta : Algorithms, TMH	

Paper : CA132416
Subject Name : PROGRAMMING LABORATORY-IV
Marks : Internal Evaluation(as per regulation) : 100; External Evaluation : 100
Pre – requisite : CA132206

UNIT	PARA	Laboratory Content	Total Weeks
1 (75%)		Design of relational databases in SQL Server, Oracle Server, Extensive use of SQL and PL/SQL statements	11
2(25%)		Unix/Linux shell programming.	4



MCA 5TH SEMESTER SYLLABUS

Paper : CA132501
Subject Name : DATA WAREHOUSING & DATA MINING
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)

UNIT	PARA	Content	Weeks
1		Introduction to Data Warehousing: Basic Concepts: Characteristics of Data Warehouse, DSS, Differences between Data Warehouse and Database Systems, Data Warehouse architecture and its components, Metadata, Data mart, Warehouse versus Data Mining (OLTP & OLAP), OLAP tools, Data Cubes, Multidimensional Data.	2
2		Introduction to Data Mining: Basic Concepts: Data Mining, Kinds of data that can be mined, Data Mining versus Database Systems, KDD, Data Preparation, Cleaning and Visualization. Data Mining Techniques: Association Rule: What is an association rule? Mining association rules, Frequent sets and Border sets, Algorithms for mining association rules- Apriori Algorithm, Pincer-Search Algorithm, Border Algorithm, FP-Tree Growth Algorithm, generalized association rule, association rule with item constraints	3
3		Clustering: Hierarchical versus Partitional clustering, Types of data in clustering, Partitional Algorithms- K-means, K-medoids, PAM, CLARA, CLARANS. Density based clustering algorithm- DBSCAN. Hierarchical Algorithms- BIRCH, CURE. Categorical clustering Algorithms- ROCK, CACTUS	3
4		Decision Trees: Introduction, Tree construction principle, Decision tree generation algorithm- CART, ID3, C4.5	1
5		Other Techniques for Data Mining: Concepts of Genetic Algorithms, Artificial Neural Network, Rough Sets and their application in the domain of Data Mining. Introduction to Web Mining, Text Mining and Temporal Data Mining	2
6		Issues and challenges in Data mining, Data mining application areas (example with practical case studies)	1
Books :	1	Data Mining Techniques, By Arun K. Pujari (University Press)	
	2	Data Mining Concepts and Techniques, By Han and Kamber (Morgan Kaufmann and Harcourt India)	
	3	Data Mining, By Peter Adriaans, Dolf Zantinge (Pearson Education Asia)	
	4	Algorithms for Clustering Data, By K. Jain and R. C. Dukes (Prentice Hall)	
	5	Data Warehouse, from Architecture to Implementation. - by Barry Devlin (Addison Wesley language)	
	6	Data Warehousing in the Real World. By Sam Anahory, Dennis Murray (Pearson Education Asia)	

Paper : CA132502
Subject Name : WEB TECHNOLOGY
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)
Pre – requisite : CA132403

UNIT	PARA	Content	Weeks
1		Introduction to Internet Technology: Overview of Networking protocols and OSI Model. Internetworking concepts	2
2		Internet Protocols and Architecture and Background work: TCP/IP, IP, IP Addressing & Datagrams, IPv6, ARP, RARP, BOOTP, DHCP, ICMP. TCP, UDP, Ports & Sockets, TCP Connection & properties, TCP Segment format, Active & Passive Open Connections. DNS, DNS Server, Email Architecture, SMTP, POP & IMAP, FTP, TFTP. WWW, web server & web browser, HTTP commands & interaction, Architecture of Web browser, CGI, TELNET.	4
3		Web Development Technologies: Client Side Programming: Different client-side scripting: JavaScript, VBScript etc. HTML; CSS, XML, DTD; Server Side Programming: Servlets, JSP, Java beans, EJB, Struts, JSF, ASP.NET; Web Servers: IIS, Apache; RIA, Ajax; Types of web pages, ActiveX Controls, Java Applets, Tiers in web applications; Database connectivity: ODBC, JDBC.	4
4		Web Security: Confidentiality, authentication, Integrity, Non-repudiation, Access Control, and Availability. Sniffing, spoofing, phishing, pharming. Web Security: Cryptography, Cipher Text, Digital Signature, Digital Certificates. Network Security: SSL, Firewalls, IP Security, VPN.	2
5		Web Services & Middleware: Concept, RPC, CTM, Message Queuing. DCOM & CORBA: basic interface, Architecture; ORB, IDL, IIOP, RMI. Web Services.	2
6		Wireless Internet: Mobile IP, addressing and its work. WAP: Architecture, Gateway.	1
Books	1	Achyut S Godbole, Atul Kahate: Web Technologies – TCP/IP to Internet Architectures, Tata McGraw Hill.	
	2	Deitel & Deitel: Web Technology, Pearson Education	
	3	Raj Kamal: Internet and Web Technologies, Tata McGraw Hill	



Paper : CA132503
Subject Name : ARTIFICIAL INTELLIGENCE
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)

UNIT	PARA	Content	Weeks
1		Introduction to the object and goal of artificial intelligence: Aim and scope of the artificial intelligence, problem space and problem characteristics, state space representation.	1
2		Problem solving techniques: Generate and test, hill climbing , search problem reduction techniques, constraint propagation, means-end-analysis, heuristics search techniques and heuristic problem solving .	2
3		Game playing: And or graph search, game trees and associated techniques, minimax and alpha beta pruning. Some case studies.	1
4		Knowledge representation and inferencing : Procedural and deductive approaches production system formalism, predicate logic (first order and second order), Rule based system, schematics net, conceptual dependencies, conceptual path, frames, scripts associated inferencing mechanism. Resolution in predicate logic, unification , natural deduction theorem proving, forward and backward deduction.	2
5		Different techniques for reasoning under uncertainty, monotics and non monotonic reasoning. Constraint satisfaction problem	2
6		Rule based system and expert system: Domain exploration, meta language ,expertise, transfer self explaining system case studies(dendral, mycin)	2
7		Introduction to neural network: Defination and representation of artificial neuron and its analogy with biological neuron, basic concepts of three layer neural-net and learning by back propagation.	2
8		Basic syntax and semantics of lips and prolog. Programming exercise from ai in lips.	2
Books:	1	Artificial Intelligence By Patrick, Henry, Winston , Pearson Education	
	2	Introduction to Artificial Intelligence By Charniak, Mc Dermott, Pearson Education.	
	3	Artificial Intelligence By Nilson	
	4	Artificial Intelligence By Rich and Night	

Paper : CA132504
Subject :ELECTIVE-I
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)

Elective subjects :

- | | |
|--|--|
| a) Microprocessor and Embedded Design(MED) | d) Expert Systems(ES) |
| b) Distributed Systems(DS) | e) Biologically Implied Computing(BIC) |
| c) Image Processing(IP) | |

(a) MICROPROCESSOR AND EMBEDDED DESIGN(MED)

UNIT	PARA	Content	Weeks
1		Introduction(5%) : Introduction to microprocessors, its evolution, use and application.	
2		Microprocessor Architecture(25%) : 8088 MPU, Signal description, memory organization, Instruction processing in 8085/8088 MPU, 80486-SX/DX 32 bit processors architecture, addressing modes of 80386, 80486-SX/DX 32 bit processors, data types, paging and segmentation. Introduction to Pentium Processors, its difference with 80486/80386.	
3		Advanced Programming(10%) : Stack and subroutines, Data conversion, BCD arithmetic, Interrupt and Interrupt service routine, Interrupt codes of 8085/8088	
4		Peripheral and Interfacing(20%) : Basic peripherals and their interfacing with 8085/8088, Dynamic RAM interfacing, Interfacing I/O Ports, PIUO 8255 and its operation modes, Interfacing with D/A and A/D Convertors.	
5		Embedded Design(40%) : Case study - I : Introduction to Microprocessor based concept, Design of a Aluminium Smelter shell: General process Description, Normal Control electrolysis cell, Cell abnormalities in an aluminium shelter, Brief description of the control laws, salient issues in Design, Result and discussion.	
6		Introduction to Micro controllers : Intel family 8 bit Micro controllers, Architecture of 8051, Signal description of 8051, Register set of 8051, memory and I/O addressing, interrupts, Design of 8051 micro controller based length measurement system for continuity rolling cloth paper.	
BOOKS:	1	Gaonkar : Microprocessor Architecture, Programming and applications with the 8085/8080A : Latest Edition, WILEY EASTERN LIMITED	
	2	Todd D.Morton : Embedded Microcontrollers, PEARSON EDUCATION.	
	3	Mazidi Mazidi : The 8051 Microcontroller & Embedded Systems, PEARSON EDUCATION	



(b) DISTRIBUTED SYSTEMS(DS)

UNIT	PARA	Content	Weeks
1.		INTRODUCTION : Introduction to Distributed systems-examples of distributed systems, challenges-architectural models- fundamental models - Introduction to interprocess communications-external data representation and marshalling- client server communication-group communication – Case study: IPC in UNIX	3
2.		DISTRIBUTED OBJECT AND FILE SYSTEM : Introduction - Communication between distributed objects - Remote procedure call - Events and notifications - Java RMI case Study - Introduction to DFS - File service architecture - Sun network file system - Introduction to Name Services- Name services and DNS - Directory and directory services	3
3		DISTRIBUTED OPERATING SYSTEM SUPPORT: The operating system layer – Protection - Process and threads - Communication and invocation - Operating system architecture - Introduction to time and global states - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Global states - Distributed debugging – Distributed mutual exclusion.	3
4		TRANSACTION AND CONCURRENCY CONTROL – DISTRIBUTED TRANSACTIONS : Transactions – Nested transaction – Locks - Optimistic concurrency control - Timestamp ordering - Comparison of methods for concurrency control - Introduction to distributed transactions - Flat and nested distributed transactions - Atomic commit protocols - Concurrency control in distributed transactions - Distributed deadlocks - Transaction recovery	3
5.		SECURITY AND REPLICATION : Overview of security techniques - Cryptographic algorithms – Digital signatures - Cryptography pragmatics – Replication - System model and group communications – Fault tolerant services – Highly available services – Transactions with replicated data	3
Books	1.	. George Coulouris, Jean Dollimore, Tim Kindberg "Distributed Systems Concepts and Design" Third Edition – 2002- Pearson Education Asia.	
	2	Principle and paradigms,Distributed System by Tanenbaum,PHI	

(c) IMAGE PROCESSING

UNIT	PARA	Content	Weeks
1		Image digital representation. Elements of visual perception. Sampling and quantisation. Image processing system elements.	3
2		Fourier transforms. Extension to 2- D, OCR, Walsh, Hadamard transforms	3
3		Enhancement and segmentation: Histogram modification. Smoothing, sharpening. Thresholding. Edge detection. Segmentation. Point and region dependent techniques.	3
4		Image encoding: Fidelity criteria. Transform compression. KL, Fourier, DCT. Spatial compression, Run length coding. Huffman and contour coding.	3
5		Restoration: Models. Inverse filtering. Least squares filtering. Recursive filtering.	3
Books:	1.	Gonslaez, et.a1, "Digital Image Processing", Addison Wesley, Reading, M.A., 1990.	



Paper : CA132505
Subject : ELECTIVE-II
Marks : (Theory-60, Internal Evaluation – 20, Midterm Examination -20)

Elective subjects:

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|--|---|
| a) Cryptography and Network Security (CNS) | e) Multimedia Systems (MS) |
| b) Information Storage and Retrieval (ISR) | f) Simulation and Modeling (SM) |
| c) Software Project Development (SPD) | g) Remote Sensing and GIS (RSG) |
| d) Mobile Computing | h) Programming Language and Paradigms (PLP) |

(a) CRYPTOGRAPHY AND NETWORK SECURITY (CNS)

UNIT	PARA	Content	Weeks
1.		Course Introduction and terminology	1
2.		Conventional Cryptography : Definitions, Classical Cryptography, Galois Field, Unicity Distance, Entropy, Perfect Secrecy DES, AES and others symmetric cryptography.	3
3		Asymmetric Cryptography: Number Theory, public key cryptography, RSA and Elliptic Curve Cryptography, Key management using symmetric and asymmetric key.	3
4		Authentication: Message authentications and hash functions, hash algorithms, Digital Signatures and Authentication Protocols.	3
5.		Operating System security : Computer systems overview, Buffer overflow, Securing UNIX	2
6		Network and System Security: Vulnerability, Monitoring/Sniffing, Spoofing b. Firewalls, Intrusion Detection PGP, Kerberos ,IPSec, SSL	3
Books		W Stallings, " <i>Cryptography and Network Security: Principles and Practice, 4/e</i> ", Prentice Hall, 2006.	
	1	B. Schneier, <i>Applied Cryptography, 2nd</i> Ed, John Wiley & Sons, Inc., 1996.	
	2	A. Menezes, P. van Oorschot and S. Vanstone, <i>Handbook of Applied Cryptography</i> , CRC Press, 1997.	
	3	C. Kauffman, R. Perham and M. Speciner, <i>Network Security: Private Communication in a Public World</i> , Prentice-Hall, 1994.	
	4	H. C. A. van Tilborg, <i>Fundamentals of Cryptology</i> , Kluwer Academic Publishers, 2000.	

(b) INFORMATION STORAGE AND RETRIEVAL (ISR)

UNIT	PARA	Content	Weeks
1.		Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.	2
2.		Information Retrieval System Capabilities: Search, Browse, Miscellaneous. Cataloguing and Indexing: Objectives, Indexing Process, Automatic Indexing, information Extraction.	3
3		Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.	3
4		Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages	2
5.		User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.	3
6.		Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.	2
Books	1.	Kowalski, Gerald, Mark T Maybury: <i>Information Retrieval Systems: Theory and Implementation</i> , Kluwer Academic Press, 1997.	

(c) SOFTWARE PROJECT MANAGEMENT

UNIT	PARA	Content	Weeks
1		FUNDAMENTALS :Conventional Software Management – Evolution of Software Economics – Improving Software Economics – Conventional versus Modern Software Project Management.	3
2		SOFTWARE MANAGEMENT PROCESS FRAMEWORK : Lifecycle Phases – Artifacts of the Process – Model Based Software Architectures – Workflows of the Process – Checkpoints of the Process	3
3		SOFTWARE MANAGEMENT DISCIPLINES : Iterative Process Planning – Organization and Responsibilities – Process Automation – Process Control and Process Instrumentation – Tailoring the Process.	3
4		MANAGED AND OPTIMIZED PROCESS Data Gathering and Analysis – Principles of Data Gathering – Data Gathering Process – Software Measures – Data Analysis – Managing Software Quality – Defect Prevention.	3
5		CASE STUDIES : COCOMO Cost Estimation Model – Change Metrics – CCPDS–R..	3
Books:	1.	Walker Royce "Software Project Management A Unified Framework", Pearson Education, 2004	
	2	Humphrey Watts, "Managing the software process", Addison Wesley, 1989. (Unit IV)	
	3	Ramesh Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.	
	4	Bob Hughes, Mikecotterell, "Software Project Management", 3rd Edition, Tata McGraw	

Paper : CA132526
Subject Name : MINOR PROJECT
Marks : Internal Evaluation(as per regulation) : 100; External Evaluation : 100

UNIT	PARA	Content	Weeks
1.	1.	System development Project (based on data processing requirements in an organisation)	15
2.	2.	Seminar on recent state of art of technology on Computer Science	
Books	1.	E M Awad, System Analysis and Design, PHI	



MCA 6TH SEMESTER SYLLABUS

6th Semester subjects

Paper	Subject Name	Total Project duration and work hours	Credits
Subjects			
CA132621	System Development Project (Internal Evaluation)	15 Weeks to be devoted for the project work	10
CA132622	System Development Project (External Evaluation)		15
Total Contact Hrs : 30 ; Total Credits : 25 ;			