

**FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: THIRD
BRANCH: COMPUTER SCIENCE & ENGINEERING
ABBREVIATIONS**

L: Theory Lecturers
T: Tutorials
P: Practical
IA: Internal Assessment

S: Semester
CS: Computer Science
MXM: Maximum Marks
MNM: Minimum Marks

A: Paper duration in hours
B: MXM Theory
C: MXM-IA
D: Total
E: MNM Passing Marks

F: MXM EXT.
G: MXM-IA
H: Total
I: MNM Passing Marks

Sr. No.	Subject Code	Subject	TEACHING SCHEME				EXAMINATION SCHEME								
			L	T	P	Total Hrs/Week	THEORY				PRACTICAL				
							A	B	C	D	E	F	G	H	I
1	33CS1	Applied Mathematics	4	1	0	5	3	80	20	100	40	--	--	--	--
2	33CS2	Programming Fundamentals In "C"	4	1	3	8	3	80	20	100	40	25	25	50	25
3	33CS3	Digital Circuits & Fundamentals of Microprocessors	4	1	2	7	3	80	20	100	40	25	25	50	25
4	33CS4	Combinatorial Theories	4	1	0	5	3	80	20	100	40	--	--	--	--
5	33CS5	Principles of Management	4	1	0	5	3	80	20	100	40	--	--	--	--
6	33CS6	Computer Workshop	0	0	2	2	--	--	--	--	--	--	--	50	25
Total			0	0	07	32				500				150	
CREDITS: 20						16	GRAND TOTAL : 650								

**FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH
BRANCH: COMPUTER SCIENCE & ENGINEERING
ABBREVIATIONS**

L: Theory Lecturers
T: Tutorials
P: Practical
IA: Internal Assessment

S: Semester
CS: Computer Science
MXM: Maximum Marks
MNM: Minimum Marks

A: Paper duration in hours
B: MXM Theory
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Sr. No.	Subject Code	Subject	TEACHING SCHEME				EXAMINATION SCHEME								
			L	T	P	Total Hrs/Week	THEORY				PRACTICAL				
							A	B	C	D	E	F	G	H	I
1	44CS1	Discrete Math and Graph Theory	4	1	0	5	3	80	20	100	40	--	--	--	--
2	44CS2	Data Structure and Program design in "C"	4	1	3	8	3	80	20	100	40	25	25	50	25
3	44CS3	Business Data Processing	4	1	2	7	3	80	20	100	40	25	25	50	25
4	44CS4	Theoretical Foundations of Computer Science	4	1	0	5	3	80	20	100	40	--	--	--	--
5	44CS5	Computer Architecture & Organization	4	1	0	5	3	80	20	100	40	--	--	--	--
6	44CS6	Internet Technologies	0	0	2	2	--	--	--	--	--	--	--	50	25
Total			0	0	07	32				500				150	

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FIFTH
BRANCH: COMPUTER SCIENCE & ENGINEERING
ABBREVIATIONS

L: theory Lecturers
T: Tutorials
P: Practical
IA: Internal Assessment

S: semester
CS: Computer Science
MXM: Maximum Marks
MNM: Minimum Marks

A: Paper duration in hours
B: MXM Theory
C: MXM-IA
D: Total
E: MNM Passing Marks

F: MXM EXI
G: MXM-IA
H: Total
I: MNM Passing Marks

Sr. No.	Subject Code	Subject	TEACHING SCHEME				EXAMINATION SCHEME									
			L	T	P	Total Hrs/Week	THEORY					PRACTICAL				
							A	B	C	D	E	F	G	H	I	
1	55CS1	Data Communication	3	1	0	4	3	80	20	100	40	--	--	--	--	
2	55CS2	Numerical Computing	3	1	2	6	3	80	20	100	40	25	25	50	25	
3	55CS3	Object Oriented Methodologies	4	1	2	7	3	80	20	100	40	25	25	50	25	
4	55CS4	Operating Systems	4	1	0	5	3	80	20	100	40	--	--	--	--	
5	55CS5	Concepts In Programming Languages	4	1	0	5	3	80	20	100	40	--	--	--	--	
6	55CS6	Systems Programming	4	1	0	5	3	80	20	100	40	--	--	--	--	
7	55CS7	Software Technology Lab.-I	0	0	2	2	--	--	--	--	--	50	50	IA		
Total			22	06	06	34				600				150		

CREDITS: 22 + 6 = 28 GRAND TOTAL: 750

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: SIXTH
BRANCH: COMPUTER SCIENCE & ENGINEERING
ABBREVIATIONS

L: theory Lecturers
T: Tutorials
P: Practical
IA: Internal Assessment

S: Semester
CS: Computer Science
MXM: Maximum Mark
MNM: Minimum Marks

A: Paper duration in hours
B: MXM Theory
C: MXM-IA
D: Total
E: MNM Passing Marks

F: MXM EXI
G: MXM-IA
H: Total
I: MNM Passing Marks

Sr. No.	Subject Code	Subject	TEACHING SCHEME				EXAMINATION SCHEME									
			L	T	P	Total Hrs/Week	THEORY					PRACTICAL				
							A	B	C	D	E	F	G	H	I	
1	66CS1	Design & Analysis of Algorithm	4	1	0	5	3	80	20	100	40	--	--	--	--	
2	66CS2	Data Base Management System	4	1	2	7	3	80	20	100	40	25	25	50	25	
3	66CS3	Computer Networks	4	1	2	7	3	80	20	100	40	25	25	50	25	
4	66CS4	Microprocessors & Interfacing	4	1	2	7	3	80	20	100	40	25	25	50	25	
5	66CS5	Software Engineering & Project Management	4	1	2	7	3	80	20	100	40	25	25	50	25	
6	66CS6	Software Technology Lab.-II	0	0	2	2	--	--	--	--	--	50	50	IA		
Total			20	05	10	35				500				250		

CREDITS: 20 + 7.5 = 27.5 GRAND TOTAL: 750

FOUR YEAR BACHELOR OF ENGINEERING (B.E) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH COMPUTER SCIENCE & ENGINEERING

ABBREVIATIONS

L: Theory Lectures
T: Tutorials
P: Practicals
IA: Internal Asses

S: Semester
CS: Computer Science
MXM: Maximum Marks
MNM: Minimum Marks

A: Paper Duration in hours
B: MXM Theory
C:MXM-IA
D:Total
E: MNM Passing Marks

F: MXM EXT
G: MXM-IA
H:Total
I: MNM Passing Marks

Sr. No.	Subject Code	Subject	TEACHING SCHEME					EXAMINATION SCHEME									
			L	T	P	Total Hrs/Week	Theory					Practical					
							A	B	C	D	E	F	G	H	I		
1	77CS1	TCP/IP & INTERNET	4	1	2	7	3	80	20	100	40	25	25	50	25		
2	77CS2	LANGUAGE PROCESSORS	4	1	2	7	3	80	20	100	40	25	25	50	25		
3	77CS3	ELECTIVE I	4	1	0	5	3	80	20	100	40	-	-	-	-		
4	77CS4	ELECTIVE II	4	1	0	5	3	80	20	100	40	-	-	-	-		
5	77CS5	Project Seminar	0	0	2	2	-	-	-	-	-	25	25	50	25		
		Total	16	4	6	26				400				150			
Grand Total: 550																	

ELECTIVE I: Fundamentals of Multimedia, Digital Signal Processing
Elective II: Enterprise Resource Planning, Artificial Intelligence, Operation Research

FOUR YEAR BACHELOR OF ENGINEERING (B.E) DEGREE COURSE
SEMSTER: EIGHTH
BRANCH COMPUTER SCIENCE & ENGINEERING
ABBREVIATIONS

L: Theory Lectures
T: Tutorials
P: Practicals
IA: Internal Assesn

S: Semester
CS: Computer Science
MXM: Maximum Marks
MNM: Minimum Marks

A: Paper Duration in hours
B: MXM Theory
C:MXM-IA
D:Total
E: MNM Passing Marks

F: MXM EXT
G: MXM-IA
H:Total
I: MNM Passing Marks

Sr. No.	Subject Code	Subject	TEACHING SCHEME				EXAMINATION SCHEME									
			L	T	P	Total Hrs/Week	Theory					Practical				
							A	B	C	D	E	F	G	H	I	
1	88CS1	Distributed and Object Oriented Database Management	4	1	2	7	3	80	20	100	40	25	25	50	25	
2	88CS2	Computer System Security	4	1	2	7	3	80	20	100	40	25	25	50	25	
3	88CS3	Elective III	4	1	0	5	3	80	20	100	40	-	-	-	-	
4	88CS4	Elective IV	4	1	0	5	3	80	20	100	40	-	-	-	-	
5	88CS5	Project	0	0	2	2	-	-	-	-	-	75	75	150	75	
		Total	16	4	6	26				400				250		
Grand Total: 550																

ELECTIVE III: Natural Language Processing, Mobile Computing, Soft Computing, Topics In Distributed System
Elective IV: Data Warehousing & Mining, Grid Computing, Digital Image Processing, Embedded System

BE 3rd Sem CSE syllabus of RTM Nagpur University.

33CS1: Applied Mathematics

Unit 1:

Integral Transforms Fourier integral theorem, Fourier and Laplace transforms and their simple properties. Simple applications of Laplace transforms to solve ordinary differential equations including simultaneous equation Application to one dimensional partial differential equations. The z-transform definition and properties, inversion, relation with Laplace transform, Application of z-transform to solve difference equations with constant coefficients.

Unit 2:

Complex variables Analytic function, Cauchy-Riemann conditions, conjugate, functions, singularities, Cauchy's integral theorem and integral formula (Statement only) Taylor's and Laurent's theorem(statement only) Residue theorem, contour integration.

Unit 3:

Calculus of Variations Maxima and Minima of functional, variation and its properties Euler's-equation, functional dependent on first and second order derivatives, simple applications.

Unit 4:

Fourier Series Periodic function and their Fourier expansion. Even and odd function, change of interval half range expansion. Partial Differential Equation: Partial-Differential Equation of first order first degree, i.e Lagrange's form, Linear Homogeneous P.D.E. of Nth order with constant coefficient method of separation of variables.

Unit 5:

Matrices Inverse of matrix by partitioning method, Inverse of a matrix by adjoint method and its use solving - simultaneous equation, Rank of matrix, Consistency of a system of equation, Linear dependence, linear and orthogonal transformations.

Unit 6:

Matrices Characteristic equation, Eigenvalues, Eigenvectors, Reduction of a diagonal form, Statement and verification of Cayley-Hamilton theorem; Sylvester's theorem, Association of matrices with linear differential equation of second order with a constant coefficient, Determination of largest eigenvalue by iteration method.

Text Books:

- Advanced Engineering Mathematics, kreyzig
- Higher Engineering Mathematics, B.S. Grewal

Reference Books:

- Mathematics of Engineers, Chandrika Prasad
- Advance Mathematics for Engineers, Chandrika Prasad
- Applied Mathematics for Engineers, L.A. Pipes & Harville

· A Text Book of Applied Mathematics, P.N. Wartikar & J. N. Wartikar

33CS2: Programming Fundamentals In "C"

Unit 1:

Introduction to programming, programming languages, algorithms, flowcharts. C: Data types, Identifiers, Storage class, Constant, Operators, expression, Statements, console I/O statements, Selection statements: if-else, switch, Iteration Statements: for, while, do-while, Jump statements: return, go to, break, continue, comments.

Unit 2:

Function, Call by value, Call by reference, calling functions with arrays, arguments to main(), return statements, recursion, function prototypes, inline keyword, preprocessor directives. Pointers: pointer variables, pointer operator, pointer expression, array of pointers, multiple indirection, pointers to functions, dynamic allocation functions.

Unit 3:

Arrays : single dimensional arrays, two dimensional arrays, multidimensional arrays, variable length arrays. Strings, array of strings.

Unit 4:

Structures : array of structures, passing structure to function, structure pointers, structure within structures. Unions, bitfields, enumerations, size of, type def.

Unit 5:

File I/O : Streams and files, file system basics, fread, fwrite, fseek, random access I/O, fprintf(), fscanf(), standard streams.

Unit 6:

Advanced Concepts in C: Different types of pointers, ROM-BIOS functions, Elementary TSRs.

Text Books:

- The Complete Reference C (4th Edition) : Herbert Schildt [TMH]
- C How to Program, 4th Edition by H. M. Deitel & P. J. Deitel, Pearson Education.
- Writing TSRs through C : Yashwant Kanetkar (BPB)

Reference Books :

- The C Programming Language : Dennis Ritchie & Brain Kernighan [Pearson]
- Programming with C : K.R.Venugopal & S.R.Prasad [TMH]
- Let Us C : Yashwant Kanetkar [BPB]

33CS3: Digital Circuits & Fundamental of Microprocessor:

Unit 1:

Motivation for digital systems – Logic and Boolean algebra, Number System: Binary ,Hexadecimal ,Octal ,Gray. Gates & truth tables, propositions, Demorgan's law minimization of combinational circuits using Karnaugh maps.

Unit 2:

Multiplexers, Demultiplexer , Encoders ,Decoders ,Code Converters, Adders , Subtractor (Half ,Full),BCD Adder/Subtractor , ripple and carry look-ahead addition.

Unit 3:

Storage elements, Flip-flops and latches: D, T, J/K, S/R flip-flops. Master Slave Conversion of one of type of F/F to another.

Unit 4:

Counters, asynchronous and synchronous-design using state and excitation tables.

Unit 5:

Introduction to mp 8085, Addressing modes, Instruction Set of mp 8085

Unit 6:

Interrupts of 8085, Programming of mp 8085.

Text books :

- Digital Design 3rd Edition by M. Morris Mano, Pearson Education
- Digital logic and Computer Design by M. Morris Mano, Pearson Education
- Digital Circuit & Design –R.P.Jain
- Digital circuit & design- A.P.Godse
- Fundamental Of Digital Electronics- A.Anand Kumar
- 8 bit microprocessor & controller –V.J.Vibhute
- 8 bit Microprocessor – Gaonkar.

33CS4: Combinatorial Theories

Unit 1:

Combinatorics: Basic counting techniques, pigeon-hole principle, recurrence relations, generating functions. Examples using ordinary power series and exponential generating functions, general properties of such functions.

Dirichlet Series as generating functions. A general family of problems described in terms of "cards, decks and hands" with solution methods using generating functions.

Unit 2:

Generating function proofs of the sieve formula and of various combinatorial identities. Certifying combinatorial identities. Some analytical methods and asymptotic results. Polya's counting theorem. Basics of graph theory. Introduction to probabilistic method in combinatorics.

Unit 3:

Number Theory Examples of continued fractions. The study of the continued fractions. Alpha has infinite continued fraction if alpha is irrational.

Formal logic: Propositional logic: proof system, semantics, completeness, compactness. Length of proofs, polynomial size proofs, efficiency of proof systems.

Unit 4:

Alpha has periodic continued fraction if alpha is quadratic irrational.

Application to approximation of irrationals by rationals. Hurwitz's Theorem.

First order logic: models, proof system, compactness, Examples of formal proofs in say, number theory or group theory. Some advanced topics.

Unit 5:

Application to solutions of Pell's equation. Proof that means $\cos\{(p \times \pi)/q\}$, for natural numbers p and q , are irrational (apart from obvious exceptions). Example : CS application of logic, introduction to modal and temporal logics, Or formal number theory including incompleteness theorem.

Unit 6:

Liouville's Theorem on algebraic numbers. Construction of transcendental numbers.

Elements of proof theory including cut elimination, Or zero-one law for first order logic.

Text Book:

· Niven, Zuckerman and Montgomery, An Introduction to the Theory of Numbers, (5th edition), 1991, Wiley.

33CS5: Principles Of Management

Unit 1:

Nature and Functions of Management, Management yesterday and today, Planning and Decision making.

Unit 2:

Management Information System: Introduction, Conceptual Foundations, Information System Requirement.

Unit 3:

Marketing Management: Marketing concept, Indian Marketing Environment, Market segmentation, Market Planning, International Marketing.

Unit 4:

Financial Management

Unit 5:

Human Resource Management: Human Resource Planning, Recruitment, Selection, Training and development, Security, Safety and Health

Unit 6:

Organization Behavior: Organization Structure and design. Designing Effective Organization, Managing Job Stress, Organization Development

Textbooks :

- Principles of management , P C Tripathi and P N Reddy
- Management Information System,Gordan Davis and H. Olison McGraw Hill Pub.
- Human Resources and Personal Management, William Werther and Keith Davis
- Marketing Management, V S Ramaswamy and S Namakumari
- Organization Behavior, High Arnold and Daniel Feldman McGraw Hill
- Financial Management, Khanna

33CS6: Computer Workshop

Practical to be based on following topics:

• Study of PC Hardware:

- Basic computer Organization
- PC construction
- Study of BIOS and CMOS
- Working under DOS and WINDOWS operating systems:
- Internal and External DOS commands.
- Basics required for working under Windows operating System
- Study of control panel.

. Working under UNIX /LINUX Operating Systems:

- Structure: Unix Architecture
- Features of UNIX operating system
- Layered model of UNIX operating system (study of kernel and Shell)
- General file commands and Directory commands
- File structure and Directory structure

Introduction to Networking Accessories:

- Study of user connections.
- Study of communication channels.
- Study of network architecture (topologies)
- Study of Network Types.

Books to Refer:

- Computer Fundamentals – Pradeep K.Sinha
- Introduction to Computer Science by ITL ESL, Pearson Education.
- Introduction to UNIX and shell programming by M.G. Venkateshmurthy, Pearson Education
- Unix Shell programming –Yeshwant Kanetkar

BE 4th sem CSE syllabus of rtm nagpur university.

44CS1: Discrete Mathematics and Graph theory

Unit 1 :

Set Theory Operation of Sets – relation and functions, partial order, equivalence relation peano axioms and inductions.

Unit 2 :

Mathematical Logic Propositions, predicate logic, formal mathematical system, algebra, Homomorphism, Automorphism.

Unit 3 :

Groups Element of theory of some Algebras, semi group, monoid groups.

Unit 4 :

Rings Rings, fields, lattices, Boolean Algebra.

Unit 5 :

Graph Theory Graphs, Hyper Graph, Transitive Closure, Spanning Trees.

Unit 6 :

Combinatorics Generating Functions, recurrences, counting theorem and applications

Text Books:

- Discrete Mathematical Structures for computer science, Kolman / Rahman Pearson education.
- Combinatorial Mathematics, C.L.Liu (McGraw Hill)
- (Common to CS/CT/CE/IT)44CS2: Data Structures And Program Design In 'C'
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44CS2: Data Structures & Program Design

Unit 1 :

General concepts and linear data structures: Abstract data structure as an organization of data with specified properties and operations, Time and space analysis of algorithms, Big oh and theta notations and omega notations, Average, best and worst case analysis, Representation of Arrays - Single and Multi dimensional-Address calculation using column and row major ordering, Representation of Stacks and queues using arrays - Circular queues, Priority Queues, Dequeue, Application of stacks, Conversion from infix to post fix and pre-fix expressions, Evaluation of postfix expression using stacks, Multiple stacks

Unit 2 :

Linked list: Linked Lists, Simply linked list, Implementation of linked list using static and dynamic memory allocationdynamic memory allocation, operations on list linked stacks and queues, polynomial representations and manipulations are using linked list, circular linked list, doubly linked list, Generalized list.

Unit 3:

Trees: General and binary trees, Representations and traversals, General trees as binary trees, Binary search trees, Applications, The concept of balancing and its advantages, B-Trees, B+ Trees, AVL Trees, Threaded Binary Trees.

Unit 4 :

Hashing: Hash functions, Collision resolution, Expected behavior, Applications

Unit 5 :

Graphs and digraphs: Representations, Breadth and depth first searches, Connectivity algorithms, shortest path, Minimal spanning tree, The union find problem, Hamiltonian path

Unit 6 :

Sorting: Elementary sorts: selection, insertion, bubble sort, shell sort, Radix sort, Quick sort, merge sort, heapsort, Bucket sorting, External sorting, Worst case and average behavior, Lower bound for sorting using comparisons

Textbooks:

- Data Structures using C and C++ by Y. Langsam, Pearson Education
- Data Structures using C by Tenenbaum, Pearson Education
- Data Structures using C by S. K. Bandyopadhyay, Pearson Education
- S. Sahani, Data Structures in C,
- D.Samantha, Classic Data Structure, PHI Publications
- Data structures -Robert Kruse

44CS3: Business Data Processing

Unit 1 :

Structural Organization of COBOL: Character set, Words, Sentences, identification Division, Environment Division, Data Division, Data types – numerical, lphabetic & alphanumeric, Input-output sections, Working storage sections, PROCEDURE division features: ACCEPT, DISPLAY, MOVE, Arithmetic & COMPUTE verbs, levels ,Error Handling, Sample programs, PERFORM & GOTO verbs, Sample programs using PERFORM, Miscellaneous COBOL statements.

Unit 2 :

Conditional Statements & Handling: Relation conditions, Nested conditions, Class conditions, Condition-name conditions, Justified clause, Structured programming forms of program structure, Structural flow charts, Subscripting, OCCURS clause, Multidimensional tables, Table handling with PERFORM verb.

Unit 3 :

Business Files: Structured Flow charts, Operation on files, Master files, Transaction file, Report file, Batch processing, On-line processing, case studies. Sequential Access Files: Principles of magnetic storage & accessing, Blocking, Inter record gap, Label records, COBOL language instructions for sequential files.

Unit 4 :

Direct Access Files: Characteristics of disk storage & timing index, Indexed sequential files, COBOL instruction for indexed sequential files, relative file organization, Division-Remainder method, digital-analysis method, COBOL instructions for handling relative files.

Unit 5 :

Sorting, Searching & merging: Linear search sort, Merge sort, Chained record sort, Linear search, Binary search, File sorting & Merging using sequential files. Report Generation: Output layout design, Heading, Date & Detailed summaries. Control breaks, Language specifications for COBOL report writing.

Unit 6 :

Advanced Tool manipulators like STRING, UNSTRING, INSPECT & COPY verbs, COBOL Subprogram and main Program.

For Practical: 10-12 experiments on COBOL based on above syllabus.

TEXT BOOKS:

- COBOL Programming with business application – N.L.Sarda
- Information Systems through COBOL – Philippakis & Kazmier
- Structured COBOL Programming – Stern & Stern
- COBOL Programming by M. K. Roy, D. Ghosh Dastidar.

44CS4: Theoretical Foundations of Computer Science

Unit 1 :

Mathematical preliminaries – Sets, operations, relations, strings, transitive closure, countability and diagonalisation, induction and proof methods- pigeon-hole principle and simple applications – concept of language – grammars and production rules –Chomsky hierarchy.

Unit 2:

Finite State machine, regular languages, deterministic finite automata, ,conversion to deterministic automata, E-closures –regular expressions, finite automata, minimization of automata , Moore and Mealy machine and their equivalence.

Unit 3:

Pumping lemma for regular sets- closure properties of regular sets- decision properties for regular sets, equivalence between regular language and regular grammar. Context – free languages – parse trees and ambiguity , reduction of CFGS ,Chomsky and Griebach normal forms

Unit 4 :

Push – down Automata (PDA) – non Determinism – acceptance by two methods and their equivalence ,conversion of PDA to CFG CFLs and PDAs- closure and decision properties of CFLs

Unit 5 :

Turing machines – variants – recursively enumerable (r.e.) set – recursive sets
TM as computer of function – decidability and solvability – Halting Problem – reductions – Post correspondence Problem (PCP) and unsolvability of ambiguity problem of CFGs, Church's hypothesis.

Unit 6 :

Introduction to recursive function theory – primitive recursive and partial recursive functions , Parsing: top down and bottom up approach, derivation and reduction

Text Books

- Introduction to formal languages and automata – Peter Linz Norasa,2000.
- Theory Of Computer Science –Mishra and Chandrashekharan, PHI

Reference Books

- Introduction Of Automata Theory, Languages and computation- J.E. Hopcroft , J.D.Ulman, Pearson education.

44CS5: Computer Architecture & Organization

Unit 1 :

BASIC STRUCTURE OF COMPUTERS: Functional units, Basic operational concepts, Bus structures Addressing modes, subroutines: parameter passing, Instruction formats, expanding opcodes method. **BASIC PROCESSING UNIT:** bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Microprogrammed Control, microinstruction format, Bit slice concept.

Unit 2 :

ARITHMETIC: Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth's Algorithm, bit-pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

Unit 3:

THE MEMORY SYSTEM: various technologies used in memory design, higher order memory design, multimodule memories and interleaving, Associative Memory, Cache memory, Virtual Memory

Unit 4 :

INPUT/OUTPUT ORGANIZATION: I/O mapped I/O and memory mapped I/O, interrupts and interrupt handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access **COMPUTER PERIPHERALS:** I/O devices such as magnetic disk, magnetic tape, CDROM systems.

Unit 5 :

RISC philosophy, pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations,

Unit 6 :

Basic concepts in parallel processing & classification of parallel architectures. Vector Processing, Array Processors.

BOOKS:•

- V.C.Hamacher,Z.G.Vranesic and S.G.Zaky, Computer Organisation, McGraw Hill,5thed,2002.
- Computer Architecture & Organization III Ed- J.P.Hayes.
- A.S.Tanenbaum, "Structured Computer Organization" 4th Edition, Pearson Education

REFERENCES BOOKS:

- M Mano, "Computer System and Architecture", Pearson Education
- W. Stallings, "Computer Organization & Architecture",Pearson Education

44CS6: Internet Technologies

Practical to be conducted based on following topics:

- 1) HTML: Standard use for www documents on internet, GML, SGML, HTML tags, special characters, Fonts, Lists, Images, Tables, Forms and Frames.
- 2) DHTML: Introduction to CSS, Fonts in CSS, Text in CSS, Boxes in CSS, CSS positioning, Tables in CSS, Generated content and lists in CSS.
- 3) XML: XML basics, understanding markup languages, structures and syntax, valid Vr well formed XML, DTD (document type Definition) classes. Scripting XML, XML processor, parent child relationship, XML as a data, data type in XML, XML namespaces, linking with XML simple link, the HTML way, XSL with style: style sheet basics, XSL basics, XSL style sheets.
- 4) FRONTPAGE:
- 5) SECURITY:
- 6) Scripting Language: Perl Scripts, Java Scripts:
- 7) PHP

TEXT BOOKS

- XML in action web technology by William J. Pardi (PHI) Pub.
- Web Technology by Ramesh Bangia (Firewall Media)
- Programming the web using XML by Ellen Pearlman (Tata McGraw – Hill)

B.E. 5th sem CSE syllabus of RTM Nagpur University.

55CS1: Data Communication

UNIT 1:

SIGNALS: ANALOG AND DIGITAL: Analog and digital data, Analog and digital signals; PERIODIC AND APERIODIC SIGNALS, ANALOG SIGNALS: Simple analog signals; TIME AND FREQUENCY DOMAINS; COMPOSITE SIGNALS: Frequency spectrum and Bandwidth; DIGITAL SIGNALS: Decomposition of digital signal; TRANSMISSION MODES: Serial and Parallel transmission, Asynchronous and Synchronous Transmission, Simplex, Half-Duplex and Full-Duplex communication.

UNIT 2:

ENCODING AND MODULATING: DIGITAL-TO-DIGITAL CONVERSION: Unipolar, Polar, Bipolar; ANALOG-TO-DIGITAL CONVERSION: Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM), Sampling Rate, How many Bits per Sample? Bit rate; DIGITAL-TO-ANALOG CONVERSION: Aspects of Digital-to-Analog conversion, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase shift Keying (PSK), Quadrature Amplitude modulation (QAM), Bit / Baud comparison; ANALOG-TO-ANALOG CONVERSION: amplitude modulation (AM), Frequency Modulation (FM), Phase Modulation(PM);

UNIT 3:

INTERFACES AND MODEMS: DIGITAL DATA TRANSMISSION: Parallel transmission, Serial Transmission; DTEDCE INTERFACE: Data Terminal Equipment (DTE), Data Circuit-Terminating Equipment (DEC), Standards, EIA-232 Interface; OTHER INTERFACE STANDARDS: EIA-449, EIA-530, X.21; MODEMS: Transmission rate, Modem standards; 56K MODEMS: Traditional Modems, 56K Modems

UNIT 4:

COMMUNICATION MEDIA: GUIDED MEDIA: Twisted pair cable, Coaxial cable, Optical Fiber cable; UNGUIDED MEDIA: Radio frequency allocation, Propagation of Radio waves, Terrestrial microwave, Satellite communication, Cellular Telephony; TRANSMISSION IMPAIRMENTS: Attenuation, Distortion, Noise; PERFORMANCE: throughput, Propagation Speed, Propagation time;

UNIT 5:

MULTIPLEXING: FREQUENCY DIVISION MULTIPLEXING (FDM). TIME DIVISION MULTIPLEXING (TDM): Inverse Multiplexing, WAVE-DIVISION MULTIPLEXING, MULTIPLEXING APPLICATIONS: THE TELEPHONE SYSTEM: Common carrier services and hierarchies, Analog services, Digital Services; DIGITAL SUBSCRIBER LINE (DSL): ADSL, RADSL, HSDL, SDSL, VDSL; FTTC: FTTC in the Telephone Network, FTTC in the Cable TV Network.

UNIT 6:

DATA COMPRESSION: Huffman code, Run-Length Encoding, Relative Encoding, Lempel-Ziv Encoding, Image Compression, JPEG, MPEG

Text Books:

Data Communications and Networking by Behrouz A. Forouzan, 4th Edition, Tata McGraw Hill
Understanding Data Communications and Networks by William A. Shay, 2nd Edition, Vikas Publishing House.

Reference Book:

Electronic communication Systems by Kennedy.
Communication systems by Singh and Sapre.
Data communication by Fred Halsall, Pearson Education.

5CS2: Numerical Computing**Unit 1:**

Polynomial Equations: Newton-Raphson method, Regula Falsi Method, Muller method, Bairstow method, Multipoint iteration method, Convergence / Rate of Convergence of iterative method, Evaluation of Multiple & complex roots. Simultaneous equations.

Unit 2:

Linear Systems & Matrices: Gauss elimination with pivoting, Gauss-Seidal iteration, Triangularization / Cholesky method, Iterative determination of Eigen values.

Unit 3:

Interpolation & Approximation: Lagrange's bivariate interpolation, Least squares approximation, Uniform approximation, Rational Approximation, Hermite Interpolation. Differentiation /Integration: Double integrals by Trapezoidal & Simpson rule, Methods of undetermined coefficients for numerical integration, Gauss-Legendre, Gauss-Hermite formula, Romberg Integration, Approximation of derivatives, Richardson's Extrapolation.

Unit 4:

Differential Equations: Initial value problems by Euler's method, Picard's, Taylor series, Runge-Kutta methods, Predictor-Corrector methods, Boundary value problems (Second order) by finite difference methods.

Unit 5:

Related topics: Simplex method for linear programming problems, Errors & Methods of error analysis.

Text Books:

- Numerical methods for Scientific and Engg. Computations by M.K. Jain, SRK Iyengar, R. K. Jain, Wiley Eastern Ltd.
- Numerical methods for Science & Engg. By Stanton R. G., PHI
- Introductory Methods of Numerical Analysis by Sastry S. S., PHI.

55CS3: Object Oriented Methodologies

Unit 1:

The Object Oriented Paradigm What is Object Orientation? , What is Object Oriented Development? , The Object Oriented Themes; The Object modeling Technique (OMT).Object Modeling Objects and Classes; Links and Associations; Advanced Links and Associations Concepts; Generalization and Inheritance; Grouping Constructs; A Sample Object Model. Advanced Object Modeling Aggregation; Abstract and Concrete Classes; Generalization as Extension and Restriction; Multiple Inheritance; Metadata; Candidate Keys.

Unit 2:

Dynamic Modeling Events and States; Operations; Nested State Diagrams; Concurrency of States; Advanced Dynamic Modeling Concepts; A Sample Dynamic Model; Relation of Dynamic Model to Object Model. Functional Modeling The Functional Model; the Data Flow Diagrams (DFD); Properties of DFD; Construction of DFD; Specifying Operations; Constraints; A Sample Functional Model; Relationship between the Object, Dynamic and the Functional Models.

Unit 3:

Pre-Analysis The need for Pre-Analysis; Pre-Analysis Steps: Interviews, Questionnaire, Observation, Documentation and Notations; the Bus Stop Problem Domain Example. Analysis: The Analysis Overview; the Problem Statement; the ATM example; Object Modeling in ATM; Dynamic Modeling in A TM; Functional Modeling in A TM; Adding Operations; Iterating Analysis; Recording Analysis.

Unit 4:

Design How does Design differ from Analysis? The Logical and Physical Design; Qualities and Objectives of Analysis and Design; Measurable Objectives in Design; Planning for Design.System Design Overview of System Design; Breaking System into Subsystems; Identifying Concurrency; Allocating Subsystems to Processors and Tasks; Managing Data Stores; Handling Global Resources; Choosing Software Control Implementation; Handling Boundary Conditions; Setting Trade-Off Priorities; Common Architectural Frameworks; the Architecture of A TM System.

Unit 5:

The object design paradigm: Overview of Object Design; Class Specifications; Interfaces; Criteria for Good Design; Designing Algorithms; Design Optimization; Implementation of Control; Adjustment of Inheritance; Design of Associations; Integrity Constraints; Object Representations; Physical Packaging; Documenting Design Decisions.

Unit 6:

The Human Computer Interaction What is Human Computer Interaction? , Qualities of Good User Interface; Approaches to User Interface Design; the Standards and Legal requirements. The Programming Style The Object-Oriented Style; Extensibility and Robustness; Programming-in-the-Large; Late Binding and Early Binding. Reusable Components What is meant by Reuse? , Why Reuse? ,Planning Strategy for Reuse; the Reusability approaches. Software Development

Methodologies The Method and the Methodology; Why use Methodology?, the Unified Software Development Process; Participative Design Approaches; Issues in Choosing Methodology; Hard Vs Soft Methodologies.

(Practical Implementation in "C++")

Textbooks:

- Object Oriented Modeling and Design; James Rumbaugh, Michael Blaha, Pearson Education

References:

- Object Oriented System Analysis and Design using UML; Second Edition; Simon Bennett, Steve McRobb, Ray Farmer; Tata McGraw Hill; 2004.
- Object Oriented Analysis and Design with Applications; Second Edition; Grady Booch; Pearson Education.
- Object Oriented Analysis and Design; Andrew Haigh; Tata McGraw Hill; 2001.

55CS4: Operating Systems

Unit 1:

Introduction: Evolution of OS, Types of OS, Basic h/w support necessary for modern operating systems, services provided by OS, system programs and system calls, system design and implementation.

Unit 2:

File systems: File concept, Access methods, Disk space management and space allocation strategies, directory structures, Recovery, Log-structured File System, disk arm scheduling strategies.

Unit 3:

Scheduling: Process concept, process control block, Types of scheduler, context switch, threads, multithreading model, goals of scheduling and different scheduling algorithms, examples from WINDOWS 2000 & LINUX.

Unit 4:

Memory management: Contiguous allocation, Relocation, Paging, Segmentation, Segmentation with paging, demand paging , page faults and instruction restart , page replacement algorithms , working sets , Locality, Thrashing, Garbage Collection .

Unit 5:

Process cooperation and synchronization: Concurrency conditions, Critical section problem, software and hardware solution, semaphores, conditional critical regions and monitors, classical inter process communication problems.

Unit 6:

Deadlocks & Protection: Deadlock definition, Prevention, Avoidance, Detection and recovery, Goals of Protection, access matrix, implementation, Security problem.

BOOKS:

- Operating System concepts – Silberchatz & Galvin, Addison Wesley, 6th Edn.
- Modern Operating Systems – Tanenbaum, Pearson Edn. 2nd edn.

Reference Books:

- Operating System –Milan Milenkovic
- Operating Systems, 3rd Edition by Gary Nutt, Pearson Education

55CS5: Concept In Programming Language

Unit 1:

Definition of Programming language, Implementation of high-level languages, Data elements, binding time, binding identifiers to names, binding of attributes, Binding time. Concept of r-value and l-value and their implementation. Effect of Environment on a language, Language paradigms. Language translation issues.

Unit 2:

Data type, Type checking and type conversion, elements of specification and implementation of data type. Implementation of elementary data types: integer, real, character, Boolean Pointer, enumerated type Implementation of structured data types. Vectors & arrays, Sets, Files.

Unit 3:

Abstract data type, encapsulation. Implementation of new data types, Subprogram definition and activation, their Implementation, parameter passing methods, generic subprograms, Scope rules

Unit 4:

Type equivalence, type definitions with parameters, Implementation of Inheritance. Storage management issues like static and dynamic allocation , stack based allocation and management, Heap based allocation and management.

Unit 5:

Sequence control, Implicit and explicit sequence control, Sequencing with arithmetic expression, Sequence control between statements, prime programs, implementation of case statement,

Unit 6:

Subprogram sequence control, recursive and non recursive subprogram . Data control, referring environment, dynamic and static scope, static chain implementation and display implementation.

BOOKS:

- Programming Languages, 1st edition by T.W. Pratt and M .V. Zelkowitz & T. V. Gopal by Pearson Education, 2006
- Programming Languages, Ravi Sethi, Addison Wesley.

55CS6: System Programming

Unit 1:

IBM 360/370 & Assembler– Introduction to System Programming & its components, M/c Architecture , Data Formats & Register Formats , Concept of assembler, design of single pass and two pass assembler.

Unit 2:

Microprocessor- Concept of macro, macro call within macro, macro definition within macro, recursive macro calls, design of macro processor.

Unit 3 :

Linker and Loader- Concept of static and dynamic relocation, external symbols, design of linker, design of object file for different loading schemes.

Unit 4:

Common Object file format & System Utilities- Structure of object file and executable file, section or segment headers, symbol table, concept of storage class, string various, data types line insert, character, arrays structures. Source code control system, make, link editor, symbolic debugger.

Unit 5:

Unix Device Drivers- Definition , Anatomy and Types , Device programming, Installation , Incorporation of driver routines, Basic device driver operation, Implementation with Line Printer & Disk ,Comparative study between device drivers for UNIX & Windows.

Unit 6:

Compiler- Phases of Compilers ,Overview of Databases and Algorithms required for all phases. Role of lexical analyzer, recognition of tokens, Study of LEX & YACC.

Books:

- System Programming- J. J. Donovan.
- System Programming and Operating systems- D. M. Dhamdhare
- Unix system Utilities manual.
- Unix programming Environment- Keringham and Pike, Pearson Education
- Unix Device Drivers- George Pajari , Pearson Education.

B.E. 6th sem CSE syllabus of RTM Nagpur University.

66CS1: Design And Analysis Of Algorithms

Unit 1:

Mathematical foundations, summation of arithmetic and geometric series, n , n^2 , bounding summations using integration, recurrence relations, solutions of recurrence relations using technique of characteristic equation and generating functions, Complexity calculation of various standard functions, principles of designing algorithms

Unit 2:

Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortised analysis, application of amortized analysis, Sorting networks, comparison networks, biontonic sorting network, advanced data structures like Fibonacci heap, disjoint set representation, red and black trees and their applications.

Unit 3:

Divide and conquer basic strategy, binary search, quick sort, merge sort, matrix operations, Greedy method – basic strategy, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path etc.

Unit 4:

Dynamic Programming basic strategy, multistage graphs, all pairs shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem, Maximum flow networks.

Unit 5:

Basic Traversal and Search Techniques, breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen's problem, graph colouring, Hamiltonian cycles etc, Approximation algorithm and concepts based on approximation algorithms.

Unit 6:

NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, decision and optimization problems, graph based problems on NP Principle, Computational Geometry, Approximation algorithm.

Text Books:

- Thomas H. Cormen et.al. "Introduction to Algorithms", Prentice Hall of India.
- Design & Analysis of Computer Algorithms by Aho, Pearson education. Horowitz, Sahani, Rajsekharam,
- "Computer Algorithms", Galgotia Publications Pvt. Ltd. Brassard, Bratley, "Fundamentals of Algorithms", Prentice Hall

Reference Books:

- Computer Algorithms: Introduction to Design and analysis, 3rd Edition, By Sara Baase & A. V.

Gelder Pearson Education.

66CS2: Database Management Systems

Unit 1:

Database system concepts and Architecture – concept of relational database, Relational data model, Relational algebra, SQL-the relational database standard, introduction to PL/SQL

Unit 2:

Database design theory – Functional dependencies and normalization, relational database design algorithms, practical database design and demoralization, Relational constants, programmatic ways for implementing constraints, triggers..

Unit 3:

Physical database design – Concept of physical and logical hierarchy, storage structures like cluster, index organized table, partitions, various table storage parameters and block storage parameters, concept of index, B-trees, hash index, function index, bitmap index.

Unit 4:

Process and memory management in database: Various types of tasks in database, database buffer management, log buffer management code reuse, concept of two tier and N-tier architecture, data dictionary and catalog information database recovery technique. Aries Algorithm for recovery.

Unit 5:

Query optimization and performance tuning – Various techniques for query optimization, strong and weak equivalence, cost base optimization, Use of different storage structures in query optimization.

Unit 6:

Transaction Processing -Transaction and system concepts, Desirable properties of transaction, Schedules and recoverability, serializability of schedules, concurrency control, lockbase protocols and time stamp based protocols, read consistency.

BOOKS:

- Fundamentals of Database Systems – Elmasiri ,Navathe & Gupta, Pearson Education.
- Database Systems by S. K. Singh, Pearson Education.
- Principles of Database Systems – Ullman, Golgotia Publications 1998.

Reference Books

- Database System Concepts by Henry Korth and Others
- Database Systems by Connolly,3rd edition, Pearson Education.

66CS3: Computer Networks

Unit 1:

Uses of Computer Networks, Network Hardware:- LAN,WAN,MAN, Network Software-protocol hierarchies, design issues for layers, connection oriented and connection less services, service primitives, Services to protocol relationship.

Reference models- OSI and TCP/IP. Performance: Bandwidth and Latency, Delay X Bandwidth Product, High Speed Networks, Application Performance Needs.

Unit 2:

Switching and MAC Layer: Packet Switching, Circuit Switching: Multiplexing: TDM FDM. Multiple Access: Random Access, Controlled Access, Channelization, LAN: Token Ring, FDDI, Ethernet- Fast Ethernet, Gigabit Ethernet, Wireless LANs: IEEE 802.11.

Unit 3:

Data Link Layer: Error Detection and Correction, Flow Control protocols, Error control protocols, HDLC, PPP.

Unit 4:

Network Layer: Routing Algorithms –Shortest path Algorithm, Flooding, Flow based routing, Distance vector routing, Link state routing, Hierarchical routing.

Congestion Control Algorithms: Leaky bucket algorithm, Token bucket algorithm. Congestion prevention Policies, Traffic shaping, Choke packets, Load Shedding, Jitter Control.

Unit 5:

Transport Layer: The transport Service: Service Provided to upper layers, Transport Service primitives, Berkeley sockets, Elements of Transport protocols: Addressing, Connection establishment, Connection release, Flow control and buffering, Multiplexing, Crash recovery, Introduction to Internet Transport Protocols: Introduction to UDP, Remote procedure call, Introduction to TCP, Performance issues: Performance problems in Computer Network, Network performance measurement, System design for better performance, Fast TPDU processing., Protocols for Gigabit Networks.

Unit 6:

· Wide Area Networks: Packet switching principles, X.25, ATM and frame relay: ATM protocol Architecture, Cells, Cell format, Segmentation and reassembly in ATM, ATM adaptation Layer 3/4, ATM adaptation Layer5;

· Introduction to Frame relay and frame relay protocol architecture.

Text Book:

- Computer Networks: 4th ed by Andrew. S. Tanenbaum, Pearson Education.
- Data Communications and Networks: 4th ed by Behrouz A. Forouzan. Tata McGraw Hill Pub.
- Computer Networks: A systems approach by Larry L. Peterson and Bruce S. Davie, 3rd Edition, Morgan Kaufmann Publishers.
- Data & Computer Communications: William Stallings, Sixth Edition, Pearson Education Asia.

Reference Book:

- Communication Networks: By Alberto Leon-Garcia & Indra Widjaja, 2nd Edition , McGraw Hill.

66CS4: Microprocessor & Interfacing

Unit 1:

8085 based Microprocessor organization, 8085 Instruction set , Assembly language programming.

Unit 2:

Memory & I/O organization, Address decoding, , Interrupts of 8085 , Basic timing diagram of 8085.

Unit 3:

8085 Interfacing with 8255, Simple keyboard matrix interfacing with 8085, Interfacing of 7 segment LED with 8085, Introduction to DMA using HOLD/HLDA Signals.

Unit 4:

8279 keyboard/display controller, Interfacing of Stepper motor with 8085.

Unit 5:

8051 architecture, code/data memory interfacing, I/o interfacing, Address decoding logic, Interrupts.

Unit 6:

Serial data communication, UART operation, 8051 Instruction set, assembly language programming.

TEXT BOOKS:

- Microprocessor Architecture, Programming and Applications with 8085/8080 A by R.S. Gaonkar, Wiley Eastern Ltd.
- The 8051 Microcontroller & Embedded Systems. By Mazidi & Mazidi, Pearson Education
- The 8051 Microcontroller, Architecture, programming & applications, second edition by K.J.Ayala, Penram International.
- Microcontrollers: Architecture, Programming, Interfacing & System design by Rajkamal, Pearson Education.
- The 8 bit microprocessor & Microcontroller by V.J. Vibhute.

66CS5: Software Engineering and Project Management

Unit 1:

Software Engineering: Introduction Introduction to Software Engineering, Software Myths, Software Engineering-A Layered Technology, Software Process Framework, Software Process Models, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, Agile Process Models.

Unit 2:

Software Engineering Practice: An overview, Communication Practices, Planning Practices, Modeling Practices, Construction Practice & Deployment, System Engineering Hierarchy, Business Process Engineering, Product Engineering, System Modeling, Requirements Engineering.

Unit 3:

Software Engineering Analysis & Design An overview, Requirements Analysis, Analysis Modeling Approaches, Data Modeling, Object-Oriented Analysis, Scenario-Based Modeling, Flow- Oriented Modeling, Class-based Modeling, Behavioral Model. Design Engineering Concepts, Design Model, Pattern-Based Software Design.

Unit 4:

Testing Strategies and Tactics An overview, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging. Software Testing Fundamentals, Black-Box Testing, White-Box Testing.

Unit 5:

Product Metrics :An overview, Software Quality, A Framework for Product Metrics, Metrics for Analysis & Design Models, Metrics for Source Code, Metrics for Testing & Maintenance.

Unit 6:

Software Project Management: An overview, Software Measurements, Metrics for Software Quality, Software Project Estimation Techniques, Project Scheduling, Risk Management, Quality Management, Change Management, Software Reengineering.

Text Book:

· Software Engineering- A Practitioner's Approach (Sixth Edition)- Roger Pressman (TMH)

Reference Books:

- Software Engineering (Seventh Edition)- Ian Sommerville, Pearson Education.
- Software Engineering Theory and Practice by Pfleeger, Pearson Education.
- Software Engineering- Schaum's Series (TMH)

B.E. 7th sem CSE syllabus of RTM Nagpur University.

77CS1: TCP / IP & Internet

Unit 1:

Introduction and Overview. Comparison of OSI Model and TCP/IP model. Networking Technologies: LANS, WANS, Connecting Devices. Internetworking concept and Architectural model. Internet Backbones, NAP, ISP's, RFC's, Internet Standards.

Unit 2:

Internet Addresses: IP address classes, subnet mask, CIDR, ARP,RARP, Internet Protocol, Routing IP Datagrams, ICMP and IGMP.

Unit 3:

UDP, TCP, Sockets and socket Programming, Routing in Internet, Routing protocols- RIP, OSPF and BGP. Introduction to Multicasting and Multicast routing.

Unit 4:

Host Configuration: BOOTP, DHCP; Services: Domain Name System, FTP, TFTP and Electronic Mail: SMTP, MIME, IMAP, POP

Unit 5:

Network Management: SNMP, WWW: HTTP, Mobile IP. Multimedia : RTP, RTCP.

Unit 6:

Middlewares : RPC, RMI. Introduction to IPv6 and ICMPv6, Internet Security:IPSec, PGP, Firewalls, SSL.

Reference Books:

- Internetworking and TCP/IP: Principles, Protocols and Architectures, Douglas Comer, Pearson Education.
- TCP/IP Protocol suite, Behrouz A. Forouzan, Third Edition, TMH.
- Computer Networking – A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Pearson Education, Asia.
- Computer Networks: A systems approach by Larry L. Peterson and Bruce S. Davie, 3rd Edition, Morgan Kaufmann Publishers
- Stevens W. R. TCP/IP Illustrated, volume 1,2,3, Pearson education.

77CS2: Language Processors

Unit 1:

Introduction to Compilers: Compilers and translators, Phases of compiler design, cross compiler, Bootstrapping, Design of Lexical analyzer, LEX.

Unit 2:

Syntax Analysis: Specification of syntax of programming languages using CFG, Top-down parser, design of LL (1) parser, bottom up parsing technique, LR parsing algorithm, Design of SLR, LALR, CLR parsers.

Unit 3:

Syntax directed translation: Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate notations: postfix, syntax tree, TAC, translation of expression, controls structures, declarations, procedure calls, Array reference.

Unit 4:

Storage allocation & Error Handling: Run time storage administration, stack allocation, symbol table management, Error detection and recovery: lexical, syntactic, semantic.

Unit 5:

Code optimization: Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, Loop invariant computation, Induction variable removal, Elimination of Common sub expression.

Unit 6:

Code generation – Problems in code generation, Simple code generator, Register allocation and assignment, Code generation from DAG, Peephole optimization.

Text Books:

- Computer Graphics, Hearn and Baker, Pearson Education
- Procedural Elements of Computer Graphics III Edition, Rogers, McGraw Hill.
- Principles of Interactive Computer Graphics, Newman and Sproull, McGraw Hill.

Reference Books:

- Computer Graphics : Principles and Practice in “C” by J. D. Foley Pearson Education

77CS 3: Elective-I: Fundamentals of Multimedia

Unit 1:

Multimedia Authoring and Data Representations:

Introduction to Multimedia, Multimedia Authoring and Tools, Graphics and Image Data Representations.

Unit 2:

Color in Image and Video, Fundamental Concepts in Video, Basics of Digital Audio.

Unit 3:

Multimedia Data Compression: Lossless Compression Algorithms, Run-Length Coding, Variable-Length Coding (VLC), Huffman Coding, Adaptive Huffman Coding, Lossy Compression Algorithms, Quantization, Uniform Scalar Quantization, Nonuniform Scalar Quantization, Vector Quantization, Transform Coding, Discrete Cosine Transform (DCT), Image Compression Standards.

Unit 4:

Basic Video Compression Techniques, MPEG Video Coding I – MPEG-1 and 2, MPEG Video Coding II — MPEG-4, 7 and Beyond, MPEG Audio Compression.

Unit 5:

Multimedia Communication: Computer and Multimedia Networks, Multimedia Network Communications and Applications, Interactive TV (ITV) and Set-Top Box (STB), Broadcast Schemes for Video- on-Demand, Buffer Management, Further Exploration , Wireless Networks , Multimedia over Wireless Networks ,Trends in Wireless Interactive Multimedia .

Unit 6:

Multimedia Retrieval: Content-Based Retrieval in Digital Libraries, Minimum three Case studies.

Text Book:

- Fundamentals of Multimedia 1st Edition by Mark S. Drew & Ze-Nian Li, Pearson Education

Reference Books:

- Multimedia Fundamentals, Volume 1: Media Coding and Content Processing, 2nd Edition by Ralf Steinmetz, Klara Nahrstedt, Pearson Education.
- Multimedia Making Work (TMH Pub.) by Tay Vaughan.
- Advanced Multimedia Programming (McGraw Hill Pub.) – Steve Rimmer

- Digital Image Processing – Gonzalez and Woods, Pearson Education

77CS4: Elective-II:- Artificial Intelligence

Unit 1:

Introduction: Scope of AI, AI problems, AI technique, Production system Characteristics, Basics of problem solving: problem representation paradigms Defining problem as a state space representation.

Unit 2:

Search Techniques: Problem size, complexity, approximation and search; depth, breadth and best search; Heuristic Based Search: Heuristic search, Hill climbing, best-first search, branch and bound

Unit 3:

Knowledge representation: First order logic, Unification, Resolution in Predicate Logic. Structured Knowledge Representation: Semantic Nets, Frames, and Scripts. Learning: Block architecture of learning system, Types of learning, performance Measures

Unit 4:

Uncertainty Treatment: formal and empirical approaches including Bayesian theory, belief functions, certainty factors and fuzzy sets.

Unit 5:

Expert Systems: Fundamental blocks, Knowledge Engineering, Knowledge Acquisition, Need and justification for expert systems, Detailed Discussion from Example Domains – (From) Industry, Language, Medicine, Verification, Vision, Knowledge Based Systems; concept of shells.

Unit 6:

Language Machine: Introduction to Natural Language understanding. Level of knowledge in NLU, Approaches to NLU, Problems in NLU, Basic parsing techniques.

Text Books:

1. E.Rich and K. Knight, Artificial Intelligence, Tata McGraw Hill, 2008.
2. Artificial intelligence and soft computing for beginners by Anandita Das Bhattacharjee, Shroff Publishers
3. Artificial Intelligence – A Practical Approach : Patterson , Tata McGraw Hill, 3rd Edition

Reference Books:

1. Introduction to Artificial Intelligence – Charniak (Pearson Education)

77CS4: Elective-II:- Enterprise Resource Planning

Unit 1:

An overview, Accommodating variety, Integrated Management Information, Seamless Integration, Supply Chain Management, Resource Management, Integrated data model, Scope, Technology, Benefits of ERP, Evolution, ERP revised, ERP & Modern Enterprise, problems.

Unit 2:

An overview, Business Process Reengineering(BPR), Management Information System(MIS), Decision Support Systems(DSS), Executive Information Systems (EIS), Data Warehousing, Data Mining, OLAP.

Unit 3:

An overview, What is Business Engineering (BE)?

Significance of BE, Principles of BE, BPR, ERP & IT, BE with IT, ERP and Management concerns, problems.

Business Modeling: An overview, Building the Business Model, problems.

Unit 4:

An overview, Role of consultants, vendors & users, customization, precautions, ERP:Post-implementation options, ERP implementation Lifecycle, Guidelines for ERP implementation, problems. ERP & competitive strategy, problems.

Unit 5:

An overview, SAP AG, SAP R/3 Applications, Baan, Oracle, PeopleSoft, JD Edwards, Examples of Indian ERP packages, problems.

An overview, Market Dynamics & Competitive Strategy, problems.

Future Directions in ERP.

Unit 6:

Various ERP Case studies.

Textbook:

- Enterprise Resource Planning – Concepts & Practice (Second Edition) By V. K. Garg & N.K. Venkitakishnan (PHI)
- Enterprise Resource Planning- Alexis Leon (TMH)

Reference book:

- ERP Demystified – By Alexis Leon (TMH)

B.E. 8th sem CSE syllabus of RTM Nagpur University.

88CS1: Distributed And Object Oriented Database Management

Unit 1:

Distributed Databases:

Distributed Databases: What and Why? ; the Distributed Database Management Systems.

The Distributed Transparency – - the Reference Architecture for Distributed Databases, Data Fragmentation, Distributed Transparency for Read-Only and Applications, Distributed Database Access Primitives, Integrity Constraints in Distributed Databases.

Unit 2:

Distributed Database Design:

Framework for Distributed Database Design, the Database Fragmentation Design, Allocation of Fragments. Translation of Global Queries to Fragment Queries

The Equivalence Transformation for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

Unit 3:

Optimization Of Access Strategies:

Framework for Query Optimization, Join Queries – - use of Semi-Join Programs for Join Queries, the SDD-1 Algorithm, the AHY approach, Use of Join as Query Processing Tactic; General Queries – - Effect of Commuting Joins and Unions, Methods for the Optimization of General Queries. The Management of Distributed Transactions

The Framework for Transaction Management; Atomicity of Distributed Transactions; Concurrency Control for Distributed Transactions; Architectural Aspects of Distributed Transactions.

Unit 4:

Concurrency Control Foundations of Distributed Concurrency Control; Distributed Deadlocks; Concurrency Control based on Timestamps; Optimistic Methods for Concurrency Control. Distributed Database Administration Catalog Management in Distributed Databases, Authorization and Protection. The System R * The Architecture of System R*; Compilation, Execution and Recompile of Queries; Protocols for Data Definition and Authorization in R*, Transaction and Terminal Management.

Unit 5:

The Object Oriented Databases Object Oriented Databases – What and Why? ; the Object Oriented Database Management Systems; Evolution of Object Oriented Concepts; Characteristics of an Object Oriented Data Model; Object Schema; Inter-object Relationships; Late and Early Binding; Similarities and differences between Object Oriented Database Models and other Data models.

Object Oriented DBMS Architectural Approaches The Extended Relational Model Approach; Semantic Database Approach; Object Oriented Programming Language Extension Approach; DBMS Generator Approach; the Object Definition Language and the Object Query Language.

Unit 6:

The Object Oriented DBMS Architectures; Performance Issues in Object Oriented DBMS; Application Selection for Object Oriented DBMS; the Database Design for an Object Relational DBMS. The Structured Typed and ADTs; Extending the ER Model; Storage and Access Methods; Query Processing; Query Optimization; Design and Architecture of POSTGRES; Distributed Computing in CORBA and EJB.

(Practical Implementation in Oracle 8i or Oracle 9i covering both Distributed and Object Oriented Databases Features)

Textbooks:

- Distributed Databases – Principles and Systems; Stefano Ceri, Guiseppe Pelagatti; Tata McGraw Hill; 1985.
- Object Oriented Database Systems – Approaches and Architectures; C. S. R. Prabhu; Prentice Hall of India.
- Database Systems- Design, Implementation and Management; Peter Rob, Carlos Coronel; Course Technology; 2000.

Reference:

- Principles of Distributed database systems by M.T. Ozsu/S. Sridhar, Pearson education
 - Database Management Systems; Raghu RamaKrishnan, Johnaas Gehrke; Tata McGrawHill; 2000.
 - Fundamentals of Database Systems – Third Edition; Elmasri, Navathe; Addison-Wesley;2002.
 - Databases- Principles, Programming and Performance; Second Edition; Patrick O’Neil, Elizabeth O’Neil; Morgan Kaufmann; 2002.
 - Oracle 8i – DBA Handbook; Loney, Koch; Tata McGraw Hill. 5. Oracle 9i – The Complete Reference; Tata McGraw Hill- Oracle Press; 2004.
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88CS2: Computer System Security

Unit 1:

Introduction to the concepts of security : need, principles, Types of Attacks , Services , Mechanisms, A model for network security , Encryption model Classical encryption techniques: substitution techniques, Transposition techniques, Rotor Machines, Steganography. Block ciphers : simplified DES , Block cipher principles , Data encryption standard , Strength of DES , Block cipher design principles , Block cipher mode of operation, Characteristics of advanced symmetric block ciphers.

Unit 2:

Confidentiality using symmetric Encryption : Placement of encryption function , Traffic confidentiality , Key distribution , Random number generation , Public key cryptography : Principles , RSA algorithm , Key management , Diffie-Hellman key exchange

Unit 3:

Message authentication & Hash functions : Authentication requirements , Functions , Codes , Hash functions , Security of hash function & MAC's. Hash algorithms : MD5 message digest algorithm , Secure hash algorithm(SHA-I) , Digital signatures and authentication protocols : Digital signatures , Authentication protocols , Digital signature standard.

Unit 4:

Networks security practice : Authentication applications – Kerberos, X.509 directory authentication service E-mail security : Pretty good privacy , S/MIME

Unit 5:

IP security : Overview , Architecture , Authentication header , Encapsulating security payload , Combining security associations , Key management. Web security : Web security considerations, Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, SHTTP.

Unit 6:

Security systems : Intruders , Intrusion detection, viruses and related threats , Firewalls design principles , Trusted systems, Virtual private networks.

Text Books:

- Cryptography & Networks Security Principles & Practice(Pearson Education) – William Stallings.
- Networks Security Essentials Applications & Standards(Pearson Education) – William Stallings.
- Cryptography and Network Security by Atul Kahate, Tata Mc. Graw Hill

Reference Books:

- Introduction to Computer Security by Matt Bishop Pearson education
 - Security in computing by Pfleeger & Pfleeger Pearson education
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88CS3: Elective-III:- Natural Language Processing

Unit 1:

Introduction and requirement of NLP, Words and their distribution, PERL Tutorial, Corpus Processing.

Unit 2:

Language modeling and Smoothing, Part of speech tagging, Word sense disambiguation. Basic Search algorithms, Blind Graph Search algorithm, Search Space with FSM and CFG, Search space for Bi-grams and Uni-grams, Viterbi Beam Search.

Unit 3:

Classification and retrieval of information, Syntax parsing.

Unit 4:

Clustering Techniques, Machine Translation and Sentence alignment, Document Structure detection, Text normalization: Domain specific tags, Number formats.

Unit 5:

Methodologies of discourse analysis, Context Sensitive Speech conversion, Text Summarization techniques.

Unit 6:

Dialog and Question-Answering, Information Retrieval Vector Space Model – Latent semantic indexing, etc. Information Extraction

Text Books:

- “Foundations of Statistical Natural Language Processing” by Manning & Schütze
 - Natural Language understanding by James Allen, Pearson Education.
 - “Speech and Language Processing” by Jurafsky & Martin
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88CS3: Elective-III: Mobile Computing

UNIT-I

Introduction to wireless communication, wireless transmission, frequencies for radio transmission, signal propagation, multiplexing, modulation, spread spectrum, introduction to cellular system.

UNIT-II

Medium access control : Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, GSM : System architecture, protocols, localization and calling, handover.

UNIT-III

Satellite systems , Wireless LAN : IEEE 802.11

UNIT-IV

Wireless LAN : HIPERLAN, Bluetooth

UNIT-V

Mobile Network Layer : Mobile IP, dynamic host, configuration protocol, adhoc networks,.
Mobile transport layer : Traditional TCP, Indirect TCP , Snoopy TCP, mobile TCP, Transaction oriented TCP.

UNIT-VI

Security Issues in Mobile Computing

TEXT BOOKS:

- Mobile Communication 2nd edition by Jochen Schiller, Pearson education
 - Mobile Computing by Asoke Talukder, Roopa Yavagal (Tata McGraw Hill)
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88CS3: Elective-III:- Soft Computing

UNIT-I

Learning and Soft Computing: Examples of Applications in Diverse Fields, Basic Tools of Soft Computing, Basic Mathematics of Soft Computing, Learning and Statistical Approaches to Regression and Classification.

UNIT-II

Single-Layer networks: The Perceptron, Adaline and the Least Mean Square Algorithm.
Multilayer Perceptrons: The Error Backpropagation Algorithm, The Generalized Delta Rule, Heuristics or Practical Aspects of the Error Backpropagation Algorithm

UNIT-III

Radial Basis Function Networks: Ill Posed Problems and the Regularization Technique, Stabilizers and Basis Functions, Generalized Radial Basis Function Networks, Moving Centers Learning, Regularization with Nonradial Basis Functions, Orthogonal Least Squares, Optimal Subset Selection by Linear Programming.

UNIT-IV

Fuzzy Logic Systems: Basics of Fuzzy Logic Theory, Crisp and Fuzzy Sets, Basic Set Operations, Fuzzy Relations, Composition of Fuzzy Relations, Fuzzy Inference, Zadeh's Compositional Rule of Inference, Defuzzification, Mathematical Similarities between Neural Networks and Fuzzy Logic Models, Fuzzy Additive Models.

UNIT-V

Evolutionary Algorithms: Difficulties with Classical Optimization Algorithms, Genetic Algorithms, Evolution Strategies, Evolutionary Programming, Genetic Programming, Multi-Modal Function Optimization, Crowding Model, Sharing Function Model.

UNIT-VI

Non-Elitist Multi-Objective Evolutionary Algorithms: Motivation for Finding Multiple Pareto-Optimal Solutions, Early Suggestions, Example Problems, Vector Evaluated Genetic Algorithm, Vector-Optimized Evolution Strategy, Weight-Based Genetic Algorithm, Random Weighted Genetic Algorithm, Multiple Objective Genetic Algorithm, non-Dominated Sorting Genetic Algorithm, Niche-Pareto Genetic Algorithm, Predator-Prey Evolution Strategy, Other Methods. Suggestions for Assignments: Implementation of algorithms in 'C/C++/MATLAB'.

Text Book:

- Learning and Soft Computing by Vojislav Kecman, Pearson education.
- Multi-Objective Optimization using Evolutionary Algorithms by Kalyanmoy Deb, WSE Willey

Reference Books:

- Artificial Neural Networks by Robert J. Schalkoff (McGraw Hill)
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88CS3: Elective III:- Topics In Distributed Systems

UNIT-I

Motivation and goals, broad overview and advantages of distributed systems main characteristics : absence of global clock and state and possibility of large network delays. Issues in distributed systems such as transparency, scalability, security, resource management etc. theoretical foundation – Lamport's clocks Chandy-Lamport Global State recording algorithm – termination detection.

UNIT-II

Distributed mutual exclusion – Lamport, Ricart – Agrawal non-token based algorithm – token based algorithms – comparative performance analysis.

UNIT-III

Distributed deadlock detection issues – central and distributed detection algorithm – agreement protocols – model of processor failures – Byzantine agreement and other problems – solutions and applications.

UNIT-IV

Distributed file systems – design issues – case studies with emphasis on NFS-distributed shared memory – coherence and coherence protocols – design issues and case studies.

UNIT-V

Distributed scheduling – issues, load distributing algorithms – load sharing policies and case studies – task migration and issues.

UNIT-VI

Recovery: introduction and basic concepts – backward and forward error recovery, checkpointing : synchronous and asynchronous – atomic actions and commit protocols – voting protocols – reliable communication – cryptography : private and public – implementation issues, RSA algorithm- authentication in distributed systems – Kerberos case study.

BOOKS:

- Advanced concepts in Operating Systems – Singhal and Shivratri; McGraw Hill
- Distributed Systems – George Colouris, Pearson Education.

Reference books:

- Modern Operating Systems – Tanenbaum, Pearson Education
- Distributed systems: Principles and Paradigms, A. S. Tanenbaum, Paerson Education.

88CS4 : ELECTIVE –IV: Data Warehousing and Mining

UNIT – I

The Compelling Need for data warehousing: Escalating Need for strategic information, failures of Past decision -support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined

UNIT-II

Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope and content

UNIT – III

Principles of dimensional modeling: Objectives, From Requirements to data design, the STAR schema, STAR Schema Keys, Advantages of the STAR Schema Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables, families of STARS

UNIT – IV

OLAP in the Data Warehouse:

Demand for Online analytical processing, need for multidimensional analysis, fast access and powerful calculations, limitations of other analysis methods, OLAP is the answer, OLAP definitions and rules

UNIT-V

OLAP characteristics, major features and functions, general features, dimensional analysis, what are hypercubes? Drill-down and roll-up, slice-and-dice or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, ROLAP versus MOLAP, OLAP implementation considerations, Introduction to OLTP.

UNIT – VI

Data Mining Basics: What is Data Mining, Data Mining Defined, The knowledge discovery process, OLAP versus data mining, data mining and the data warehouse, Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining, applications in retail industry, applications in telecommunications industry, applications in banking and finance.

TEXT BOOKS:

- Data Mining and Data Warehousing and OLAP –Alex Berson and Smith (McGraw Gill Pub)

REFERENCES BOOKS:

- W. H. Inmon, “Building the operational data store”, 2nd Ed., John Wiley, 1999.
- Kamber and Han, “Data Mining Concepts and Techniques”, Hartcourt India P. Ltd. 2001
- 3.Paul Raj Poonia, “Fundamentals of Dat Warehousing”, John Wiley & Sons, 2004.
- Sam Anthony, “Data Warehousing in the real world: A practical guide for building decision support systems”, John Wiley, 2004

88CS4: ELECTIVE-IV :- Grid Computing

UNIT – I

Overview. Focuses on grid computing as emerging new computing paradigm for solving complex collaborative problems that require massive resources and infinite CPU cycle. The topics included: Definition of Grid; Basic Building Blocks; Issues in Management of Grid Models; Evolution of Grid Models.

UNIT – II

Architecture. Deals with grid architecture providing an anatomical look into fundamental system components and their functionalities as well as interactions. Topics: Requirements concerning abstractions, behaviors, resources, connectivity and protocols; Open grid service architectures.

UNIT – III

Environment. Talks about grid computing environments. Topics : Overview of GCE; Programming models; Middleware for building grid computing environments; Language support (MPI-G, MPI-G2, etc) for grid computing; Meta models for grid programming; Security

UNIT – IV

Applications Delas with case studies, how the global computing infrastructure has become a reality for collaborative complex data intensive computing aid for federated database services, web services, bioinformatics. It will also include among others some selection of topics from Seti project, Sun grid engine Sky server and some national grid projects.

UNIT – V

Monitoring and evaluation It will include following: Monitoring; Scheduling; Performance tuning; Debugging and performance diagnostic issues;

UNIT – VI

Computational geometry, geometric preliminaries, models of computation

Text Books:

- Grid Computing: A research monograph: D. Janakiram, Tata McGrawhill Publication.
- The Grid: Blueprint for a New Computing Infrastructure (2nd edition) by Ian Foster (Editor), Carl Kesselman (Editor) Publisher: Morgan Kaufmann; 2nd edition (November 2003) ISBN: 1-558-60933-4.
- Grid Computing: Making the Global Infrastructure a Reality by Francine Berman (Editor), Geoffrey Fox (Editor), Tony Hey (Editor) Publisher: John Wiley & Sons; (April 8, 2003) ISBN: 0-470-85319-0.
- Grid Resource Management: State of the Art and Future Trends by Jarek Nabrzyski (Editor), Jennifer M. Schopf (Editor), Jon Weglarz (Editor) Publisher: Kluwer Academic Publishers; (September 2003) ISBN: 1-402-07575-8.

88CS4: Elective-IV:- Digital Image Processing

UNIT-I

Introduction: Introduction, Fundamental steps in Image Processing, Elements of DIP systems, Element of visual perception.

Fundamentals of Image Processing: A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, Image Geometry in 2D.

UNIT-II

Image Enhancement in the Spatial Domain: Introduction to Spatial and Frequency Methods, Basic Gray Level Transformations, Histogram Equalization, Histogram Processing, Local Enhancement, Image Subtraction, Image Averaging, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

UNIT-III

Transforms:- Introduction to Fourier Transformation, Discrete Fourier Transformation, Fast Fourier Transformation, Fourier Properties, 2D FT, Inverse Fourier Transform.

UNIT-IV

Image Enhancement in the Frequency Domain: Filtering in the Frequency Domain,

Correspondence between Filtering in Spatial and Frequency Domain, Smoothing Frequency Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering, Implementation. Introduction to Color Image Processing: RGB and HIS color Models.

UNIT-V

Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Thresholding, Region-oriented Segmentation.

UNIT-VI

Representation: Chain Codes, Polygonal Approximations, Signatures, Boundary Segments, Skeleton of a Region. Description: Boundary Descriptors, Shape Numbers, Fourier Descriptors, Regional Descriptors, Simple Descriptors, Topological Descriptors. Suggestions for Assignments: Implementation of Image Processing algorithms in 'C/C++/MATLAB'.

Text Book:

- Rafel C. Gonzalez and Richard E. Woods, "Digital Image Processing", 2nd Edition, Pearson education

Reference Books:

- K. Jain, "Fundamentals of Digital Image Processing", Pearson education.
- W. K. Pratt, "Digital Image Processing", 3rd Edition, John Wiley and Sons, New York.

88CS4: ELECTIVE-IV:- Embedded Systems

UNIT I

AN INTRODUCTION TO EMBEDDED SYSTEMS

An Embedded system processor in the system. other hardware units, software embedded into a system. exemplary embedded systems, embedded system – on- chip (SOC) and in VLSI circuit. Processor and memory organization – Structural Units in a Processor. Processor selection for an embedded system, memory devices. memory selection for an embedded systems, allocation of memory to program cache and memory management links segments and blocks and memory map of a system, DMA. Interfacing processors, memories and Input Output Devices.

UNIT II

DEVICES AND BUSES FOR DEVICE NETWORKS

I/O devices timer and colmtng devices. serial communication using the "12 C' CAN. profibus foundation field bus. and advanced I/O buses between the network multiple devices. host systems or computer parallel communication between the networked I/O multiple devices using the ISA. PCL PCI-X and advanced buses.

UNIT III

DEVICE DRIVERS AND INTERRUPTS SERVICING MECHANISM Device drivers, parallel

port and serial port device drivers in a system, device drivers for internal programmable timing devices, interrupt servicing mechanism.

UNIT IV

PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++, VC++, AND JAVA

Interprocess communication and synchronization of processes, task and threads. multiple processes in an application. problem of sharing data by multiple tasks and routines, interprocess communication.

UNIT V

HARDWARE – software co-design in an embedded system, embedded system project management. embedded system design and co- design issues in system development process, design cycle in the development phase for an embedded system, use of target systems, use of software tools for development of an embedded system, use of scopes and logic analysis for system. hardware tests. Issues in embedded system design.

Text Book:

- Embedded systems: Architecture, programming and design by Rajkamal, TMH

Reference Books:

- Embedded system design by Arnold S Burger. CMP
- An embedded software primer by David Simon. PEA