Scheme of Studies
B. Tech. Degree Programme (Regular)
(Common to all Disciplines)

Sr. No	Group	Course Code	Course Name	L-T-P	Cr
1st Year THEORY (Semester -1 AND Semester -2)				
1	A	MA-101	Applied Mathematics –I	3-0-0	3
	B	MA-101	Applied Mathematics –I	3-0-0	3
2	A	PHB-101	Applied Physics	3-0-0	3
	B	ME-102	Elements of Engineering-II	3-0-0	3
3	A	CE-102	Elements of Engineering-I	3-0-0	3
	B	EL-101	Elements of Engineering-III	3-0-0	3
4	A	CSB-101	Computer Programming	3-0-0	3
	B	EC-201	Elements of Engineering-IV	3-0-0	3
5	A	CHB-101	Applied Chemistry	3-0-0	3
	B	CEA-101	Environmental Science and Ecology	2-0-0	2
6	A	ENA-101	Communication Skills-I	2-0-0	2
	B	ENA-102	Communication Skills-II	2-0-0	2
PRACTICAL/DRAWING/DESIGN				
1	A	CHB-151	Applied Chemistry Lab	0-0-2	1
	B	ME-152	Workshop Practice	0-0-4	2
2	A	PHB-151	Applied Physics Lab	0-0-2	1
	B	ME-154	Elements of Engineering Lab – II	0-0-2	1
3	A	ENA-151	Communication Skills Lab –I	0-0-2	1
	B	ENA-152	Communication Skills Lab –II	0-0-2	1
4	A	CSB-151	Computer programming Lab	0-0-2	1
	B	EC-251	EElements of Engineering Lab –IV	0-0-2	1
5	A	CE-151	Elements of Engineering Lab – I	0-0-2	1
	B	EL-151	Elements of Engineering Lab – III	0-0-2	1
6	A	ME-153	Computer Based Engineering Graphics	0-0-4	2
7	A/B	SAG/SAP –101	Club	0-0-2	1
8	A	PD-192	Porsonality Skill Development	0-0-2	1
	B	PDB-193	Corporate and Social Develpoment Skill	0-0-2	1
9	A/B	PD-191	Co-curricular Activities	0-0-2	2*

GROUP	TOTAL CONTACT HOURS	TOTAL CREDITS
A	17-0-16 (33)	25
B	16-0-14(30)	24

Scheme of Studies

B.Tech Degree Programme (Regular)
(Common to all Disciplines)

2nd Year

SEMESTER – III				
Code	**Course No.**	**Course Name**	**L-T-P**	**Cr.**
GEN	EN-201	English-III	2-0-0	2
GEN	MA-202	Applied Numerical Methods	3-0-0	3
P	EC-207	Digital Electronics	4-0-0	4
P	CS-203	Discrete Structure	3-0-0	3
P	CS-202	Programming Languages	3-0-0	3
P	CS-201	Data Structures and Algorithms	4-0-0	4
P	CS-206	Database Management Systems	3-0-0	3
GEN	MA-252	Applied Numerical Methods Lab	0-0-2	1
P	CS-251	Data Structures and Algorithms Lab	0-0-4	2
P	CS-256	Database Management Systems Lab	0-0-2	1
	HOT-201	Hands on training **	0-0-2**	2
	PD-293/PD-192	Personality Skill	0-0-2	1
	PD-291	Co-curricular Activities		1*
			22-0-8 (30)	**29+1***

SEMESTER – IV				
Code	**Course No.**	**Course Name**	**L-T-P**	**Cr.**
GEN	EN-202	English-IV	2-0-0	2
GEN	BA-225	Economics	3-0-0	3
P	EC-302	Microprocessor and Interfacing	3-0-0	3
P	CS-204	Computer Organization and Architecture	3-0-0	3
P	CS-205	Analysis and Design of Algorithms	4-0-0	4
P	IT-201	Object Oriented Programming using C++	4-0-0	4
P	CS-302	Operating System	3-0-0	3
P	EC-352	Microprocessor and Interfacing Lab	0-0-2	1
P	CS-352	Operating System Lab	0-0-2	1
P	IT-251	Object Oriented Programming using C++ Lab	0-0-2	1
P	IT-356	Web Technology Lab	0-0-4	2
	PD-293/PD-192	Intra & Inter-personal Skills	0-0-2	1
	PD-291	Co-curricular Activities		1*+1*
			22-0-10 (32)	**28+2***

**02 (TWO)Credits will be assigned to TWO WEEKS Hands on training.

Scheme of Studies
B.Tech Degree Programme (Regular)

3rd Year				

SEMESTER – V				
Code	Course No.	Course Name	L-T-P	Cr.
GEN	BA-249	Principles of Management	3-0-0	3
P	CS-303	Computer Graphics	4-0-0	4
P	IT-202	Computer Networks	4-0-0	4
P	IT-304	Software Engineering	3-0-0	3
P	EC-208	Digital and Analog Communications	3-0-0	3
P	IT-308	Core Java	4-0-0	4
P	CS-353	Computer Graphics Lab	0-0-2	1
P	IT-358	Core Java Lab	0-0-2	1
P	IT-252	Computer Networks Lab	0-0-2	1
	DP-392/PD-393	Departmental PDP/ Problem Solving Skill Intra & Inter-personal Skills	0-0-2	1
	PD-391	Co-curricular Activities		1*
			21-0-8 (29)	**25+1***

SEMESTER – VI				
Code	Course No.	Course Name	L-T-P	Cr.
P	EC-304	Principles of Digital System Design	3-0-0	3
P	IT-309	Programming Using C#	4-0-0	4
P	CS-304	Formal Languages and Compiler Design	4-0-0	4
P	IT-305	Data Mining & Data Warehousing	3-0-0	3
P	IT-402	Advance Java	4-0-0	4
	EC-354	Digital System Design Lab	0-0-2	1
P	IT-359	Programming Using C# Lab	0-0-2	1
P	IT-355	Data Mining & Data Warehousing Lab	0-0-2	1
P	IT-452	Advance Java Lab	0-0-2	1
	DP-392/PD-393	Departmental PDP/ Problem Solving Skill Intra & Inter-personal Skills	0-0-2	1
	PD-391	Co-curricular Activities		1*+1*
			21-0-10 (31)	**23+2***

Scheme of Studies
B.Tech Degree Programme (Regular)

4ᵗʰ Year

SEMESTER – VI				
Code	**Course No.**	**Course Name**	**L-T-P**	**Cr.**
	CS-483/ CS-484	Internship / Dissertation Phase	0-0-24	19
		Seminar based on Internship	0-0-0	1
				20

SEMESTER – VIII				
Code	**Course No.**	**Course Name**	**L-T-P**	**Cr.**
P	IT-422	Computer Software Testing	3-0-0	3
P	CS-402	Artificial Intelligence	4-0-0	4
P	CS-403	Soft Computing Techniques	3-0-0	3
P		Deptt Elective -1	3-0-0	3
		Deptt Elective -2	3-0-0	3
P		Open Elective	3-0-0	3
P	CS-452	Artificial Intelligence Lab	0-0-2	1
P	CS-453	Soft Computing Techniques Lab	0-0-2	1
	CS-486	Project	0-0-4	3
	CS-487	Seminar based on Project *	0-0-2	1
	PD-492	Professional Career Skill	0-0-2	1
	CSEX-485	Extended Internship		6**
	PD-491	Co-curricular Activities		2*
			19-0-12 (31)	**26 +2***

* Project based seminar and project work to be kept separate on different days.
** 6 Credit for Extended Internship based on two non core courses in 8ᵗʰ semester.

For Co-Curricular Activity throughout Degree Programme Total Credit must not exceed 4 .

Total Cr - 49 (1ˢᵗ Yr)+ 57(2ⁿᵈ Yr) + 48 (3ʳᵈ Yr)+ 46(4ᵗʰ Yr) = 200 + 4 (Co-Curricular Activity)

DETAILED SYLLABUS (2nd Year)

EN-201	ENGLISH- III	L T P	Cr
		2 0 0	2

Objective: To enhance the language proficiency, communication process and the importance of English language in the present scenario; to develop good body language; to learn the correct sentence structure and to develop the career skills.

UNIT 1: Communication process:- Language for communication; Language skills; Status of English language; Types of communication; Means of communication; process of communication; Barriers in communication; Principles of effective communication; Pronounciation with proper accent, stress, tone & intonation

UNIT 2: Comprehension: Listening & Reading Comprehension; Framing questions from passages; Framing sentences using words, phrases etc. Types of sentences

UNIT 3: Grammar:- Question tag; Conditional sentences; Use of Gerund & infinitive; Degrees of comparison; Articles; Punctuation & capitalization; Subject-verb agreement; Sentence correction

UNIT 4: Presentation Skills:- Types of presentation; Strategies of effective presentation; Merits & demerits of interactive presentation & power point presentation; Presentation on the given topic

UNIT 5: Group communication:- Non verbal Communication; Body language in GD; Leading & directing discussion; Effective interventions; Expressing opinions & disagreements; GD in the selection process;; GD on corporate issues; Conference, seminar &symposium

UNIT 6: Interview:- An introduction; Types of interview with purpose; Preparation for job interview; Types of job interview; Strategies for successful interview; Press conference

UNIT 7: Career Skills:- Job interview; Resume writing & Job Application; Group dynamics; Decision making; Leadership qualities

Prescribed Text book
1. Technical Communication Principles & Practice (2nd Ed.) by Meenakshi Raman & Sangeeta Sharma published by Oxford University
2. The Functional Aspects of Communication Skills by Dr.Prajapati Prasad published by S.K.Kataria & Sons
3. Business Communication by K.Sundar & A Kumara Raj published by Vijay Nicole Imprints Pvt Ltd. Chennai

SUGGESTED READING:
1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press
2. Common Errors in English, Abul Hashem, Ramesh Publishing House, new Delhi.
3. Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
4. Spoken English for India, R.K. Bansal & J.B. Harrison, Orient Longman, Delhi.
5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.
6. English Phonetics & Phonology, P. Roach, Cambridge University Press, London.
7. English for Engineers and Technologists: A Skill Approach, Vol. 2, Orient Longman, Delhi.
8. Business Communication, M.S. Ramesh and C.C. Pattanshetti, R.Chand and Company, Delhi
9. Group Discussion, Sudha Publications/Ramesh Publishing House, New Delhi.
10. English Grammar & Composition. By Rajinder Pal & Prem Lata Suri, Sultan Chand Pub. New Delhi.

MA-202	APPLIED NUMERICAL METHOD	L T P	Cr
		3 0 0	3

1. **ERRORS IN NUMERICAL CALCULATIONS:**
Introduction; numbers and their accuracy; absolute; relative and percentage errors and their analysis; truncation errors; general formula; error calculation for inverse problem.

2. **SOLUTION OF NON-LINEAR EQUATIONS:**
Bisection method; Regula-Falsi method; Secant method; Newton-Raphson method; fixed point method; initial approximation and convergence criteria.

3. **SOLUTION OF LINEAR SYSTEMS:** Gauss elimination method; Gauss-Jorden method; UV factorization, Jacobi's method; Gauss-Seidal method.

4. **INTERPOLATION & CURVE FITTING:**
Introduction to interpolation; Newton's forward and backward formula; Sterling formula; Lagrangian polynomials; divided differences; least squares method.

5. **NUMERICAL DIFFERENTIATION AND INTEGRATION:** Derivatives from differences tables; numerical differentiation formulas, Newton-Cotes integration formulae; trapezodial rule; Simpson's rule; Bool's rule; Weddle's rule; Romberg's rule.

6. **SOLUTION OF DIFFERENTIAL EQUATIONS:**

Taylor's series method; Euler and modified Euler's method; Runge-Kutta method; Milne's prediction corrector method, Adams–Bashforth method.

7. **SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS:** Finite difference approximation; solution of Laplace equation (standard 5 point formula) one-dimensional heat equation (Schmidt method, Cranck-Nicolson method; Dufort & Frankel method and wave equation.

TEXT BOOK

Grewal B. S., "Numerical Methods in Engineering and Sciences", Khanna Publisher

REFERENCE BOOKS

1. Curtis F, Gerald and Patrick, "Applied Numerical Analysis", 7th Edition, Addison Wesley
2. Balagurusamy E., "Numerical Methods", Tata McGraw Hill
3. Sastry S. S., "Introductory Methods of Numerical Analysis", Prentice Hall of India
4. Jain M. K., Iyenger S. R. K. and Jain R. K."Numerical Methods for Scientific and Engg. Computations", Wiley Eastern
5. Rao S. S., "The Finite Element Method in Engg.", 2nd Edition, Pregamon Press/McGraw Hill, 1989

EC-207	DIGITAL ELECTRONICS	L T P	Cr
		4 0 0	4

1. **FUNDAMENTALS OF DIGITAL TECHNIQUES**:
Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess- 3; Gray; EBCDIC; ASCII; Error detection and correction codes.

2. **COMBINATIONAL DESIGN USING GATES:**
Design using gates; Karnaugh map and Quine Mcluskey methods of simplification.

3. **COMBINATIONAL DESIGN USING MSI DEVICES:**
Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers fordisplay devices.

4. **SEQUENTIAL CIRCUITS:** Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.

5. **DIGITAL LOGIC FAMILIES:** Switching mode operation of p-n junction; bipolar and MOS. devices. Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

6. **A/D AND D/A CONVERTERS:** Sample and hold circuit; weighted resistor and R -2 R ladder D/A Converters; specifications for D/A converters. A/D converters : successive approximation; counting type.

7. **PROGRAMMABLE LOGIC DEVICES:**
ROM; PLA; PAL; PEEL; GAL; FPGA and CPLDs.

TEXT BOOK

Jain, R.P., "Modern Digital Electronics", 4th Ed.; Tata McGraw Hill, 2003

REFERENCE BOOKS

1. Taub and Schilling, "Digital Integrated Electronics" Tata McGraw Hill,1997
2. Malvino and Leach; "Digital Principles and Applications", 6th Edition, Tata McGraw Hill, 2006
3. Mano, Morris, "Digital Design", 3rd Edition, Prentice Hall of India,1994
4. Gupta and Singhal, "Digital Electronics", 2nd Edition, Dhanpat Rai and Sons, 2000.
5. Wakerly, John F, "Digital Design Principles and Practices", 4th Edition, Prentice Hall of India,2005

CS-203	DISCRETE STRUCTURE	L T P	Cr
		3 0 0	3

OBJECTIVE: To lay mathematical foundation for the fundamentals of various computational structures such as Boolean algebra, propositional logic, graph and trees.

PRE-REQUISITES: Knowledge of Data Structure

1. **SET THEORY:** Introduction to set theory; set operations; algebra of sets: duality, finite and infinite sets, classes of sets, power sets, multi sets, Cartesian product, representation of relations, types of relation, equivalence relations and partitions, partial ordering relations and lattices; function and its types, composition of function and relations; cardinality and inverse relations

2. **PROPOSITIONAL CALCULUS:** Basic operations: AND (Λ), OR (V), NOT (~), truth value of a compound statement, propositions, tautologies, contradictions.

3. **TECHNIQUES OF COUNTING:** Permutations with and without repetition, combination.

4. **RECURSION AND RECURRENCE RELATION:** Polynomials and their evaluation; sequences, introduction to AP, GP and AG series, partial fractions; linear recurrence relation with constant coefficients; homogeneous solutions, particular solutions, total solution of a recurrence relation using generating functions.

5. **ALGEBRIC STRUCTURES:** Definition and examples of a monoid, semigroup, groups and rings; homomorphism, isomorphism and automorphism; subgroups and normal subgroups; cyclic groups, integral domain and fields; co-sets; Lag range's theorem

6. **GRAPHS:** Introduction to graphs, directed and undirected graphs; homomorphic and isomorphic graphs; subgraphs; cut points and bridges; multigraph and weighted graph; paths and circuits, shortest path in weighted graphs; Eulerian path and circuits, Hamilton paths and circuits; planar graphs; Euler's formula.

7. **TREES:** Trees, spanning trees, binary trees and its traversals

TEXT BOOK

Liu C. L., ―Elements of Discrete Mathem atics‖, McGraw Hill, 1989

REFERENCE BOOKS

1. Johnson Bough R., ―Discrete Mathematics‖, 5th Edition, Pearson Education, 2001
2. Graham Ronald, Knuth Donald E. and Patashik Oren, ―Concrete Mathematics: A Foundation for Computer Science‖ , Addison-Wesley, 1989
3. Gersting Judith L., ―Mathematical Structures for Computer Science‖, Computer Science Press, 1993
4. Chtewynd A. and Diggle P,Discrete Mathem atics‖ , Modular Mathematics Series, Edward Arnold, London, 1995
5. Lipshutz S ., ―S chaums Outline series: Theory and problems of Probability‖, McGraw Hill Singapore, 1982
6. Kolm an B. and Busby R. C., ―Discrete Mathematical Structures‖, Prentice Hall of India, 1996
7. Trembley and Manohar, ―Discrete Mathematical Structures with Applications to Com puters‖, McGraw Hill, 1995

WEB REFERENCES

1. http://www.cs.odu.edu/~toida/nerzic/content/web_c ourse.html
2. http://en.wikipedia.org/wiki/Discrete_mathematics
3. http://business.vsnl.com/sasip/jaads_index.html
4. http://www.stanford.edu/class/cs103x/

CS-202	PROGRAMMING LANGUAGES	L T P	Cr
		3 0 0	3

OBJECTIVE: This subject focuses on the fundamental concepts that underlie programming language syntax and semantics through a comparative study of several languages and their features; to learn several new programming language features and paradigms.

PRE-REQUISITES: Knowledge of data structures, microprocessors and interfacing

1. **INTRODUCTION:** Syntactic and semantic rules of a Programming language; Characteristics of a good programming language; Programming language translators compiler and interpreters; Elementary data types – data objects, variable & constants, datatypes; Specification & implementation of elementary data types; Declarations; type checking & type conversions; Assignment & initialization; Numeric data types; enumerations, Booleans & characters.

2. **STRUCTURED DATA OBJECTS :** Structured data objects & data types; specification & implementation of structured data types; Declaration & type checking of data structure; vector & arrays; records; Character strings; variable size data structures; Union, pointer & programmer defined data objects; sets; files.

3. **SUBPROGRAMS AND PROGRAMMER DEFINED DATA TYPES:** Evolution of data type concept; abstraction, encapsulation & information hiding; Subprograms; type definitions; abstract data types.

4. **SEQUENCE CONTROL:** Implicit & explicit sequence control sequence; control within expressions; sequence

control within statement, Subprogram sequence control: simple call return, recursive subprograms; Exception & exception handlers; co routines; sequence control.
5. **DATA CONTROL:** Names & referencing environment; static & dynamic scope; block structure; Local data & local referencing environment; Shared data: dynamic & static scope; Parameter & parameter transmission schemes.
6. **STORAGE MANAGEMENT:** Major run time elements requiring storage; programmer and system controlled storage management & phases; Static storage management; Stack based storage management; Heap storage management; variable & fixed size elements.
7. **PROGRAMMING LANGUAGES:** Introduction to procedural, non-procedural, structured, functional and object oriented programming language; Comparison of C & C++ programming languages.

TEXTBOOK

Pratt and Zelkowitz, ―Programming Languages: Design and Implementation‖, 4th edition, Prentice   Hall, 2001

REFERENCES

1. Tucker Allen & Noonan Robert, ―Programming Languages – Principles and Paradigms‖, Tata McGraw Hill, 2006
2. Ellis Horowitz, ―Fundamentals of Programming languages‖,   Galgotia   Publications/ Springer Verlag, 1984
3. Ghezzi C., ―Programming Languages Concepts‖, 3rd ed., Wiley Publications, 1997.

WEB REFERENCES

1. http://www.personal.kent.edu/~rmuhamma/Algorit hms/algorithm .html
2. http://www.fib.upc.edu/en/infoAca/estudis/assignat ures/ADA.html

CS-201	DATA STRUCTURE AND ALGORITHMS	L T P	Cr
		4 0 0	4

OBJECTIVE: To relay the theoretical and practical fundamental knowledge of most commonly used algorithms.

PRE-REQUISITES: Knowledge of basic computer programming

1. **INTRODUCTION TO DATA STRUCTURES**: Definition of data structures and abstract data types; linear vs. non-linear data structure; primitive vs. non-primitive data structure; static and dynamic implementations; arrays, 1,2, and multi-dimensional arrays, insertion & deletion in one dimentional array; examples and real life applications.
2. **RUNNING TIME**: Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion; divide and conquer algorithm; evaluating time complexity.
3. **STACKS AND QUEUES**: Stacks: definition, array based implementation of stacks,; examples: infix, postfix, prefix representation; conversions, applications; definition of queues; array based implementation of queues
4. **LINKED LISTS:** diffenret type of linked Lists; implementation of singly linked list, linked list implementation of stacks and queues; implementation of circular and doubly linked list; priority queues; applications.
5. **TREES**: Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees;searching,insertion & deletion in binary search tree; threaded trees; balanced multi way search trees; AVL trees; implementations
6. **GRAPHS**: Definition of undirected and directed graphs and networks; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; shortest path algorithm, graph traversal: breadth first traversal, depth first traversal; hash tables, hash function; implementations and applications.
7. **SORTING AND SEARCHING ALGORITHMS**: Introduction, sorting by exchange, selection, insertions, bubble sort, straight selection sort, efficiency of above algorithms; shell sort, performance of shell sort, merge sort, merging of sorted arrays and algorithms; quick sort algorithm analysis, heap sort, searching algorithms: straight sequential search, binary search (recursive & non−recursive algorithms)

TEXT BOOK

A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
Langsam, Augentem M.J. and Tenenbaum A. M., ―Data Structures using C & C++‖, Prentice Hall of India, 2009.

REFERENCE BOOKS

1. Aho A. V., Hopcroft J. E. and Ullman T. D., ―Data Structures and Algorithms‖, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
2. Horowitz Ellis and S ahni S artaj, ―Fundamentals of Data Structures‖, Addison-Wesley Pub, 1984.
3. Horowitz, S ahni and Rajasekaran, ―Fundamentals of Computer Algorithms‖ 2007.
4. Kruse Robert, ―Data Structures and Program Design in C‖, Prentice Hall of India, 1994
5. Lipschetz Jr. Seymour, ―Theory & Problems of Data Structures‖, S chaum 's Outline, Tata McGraw Hill
6. Weiss Mark Allen, ―Data Structures and Algorithms Analysis in C‖, Pearson Education, 2000
7. Corm en T . H . et al., ―Introduction to Algorithms‖, 2nd Edition, Prentice Hall of India, 2001.
8. Dasgupta Sanjay, Christos P. and Vazirani Umesh, ―Algorithms‖, Tata McGraw Hill, 2008

WEB REFERENCES
1. 1. http://www.cs.auckland.ac.nz/software/AlgAnim/ds _ToC.html

CS-206	DATABASE MANAGEMENT SYSTEM	L T P	Cr
		3 0 0	3

OBJECTIVE
To provide knowledge about various organizations and management information systems, keeping in view the aspects of share ability, availability, evolvability and integrity

PRE-REQUISITES
Knowledge of data structures, discrete mathematical structures

1. **INTRODUCTION:** What is database, Purpose of database system; advantages of using DBMS; database concept and architecture; data abstraction; data models; instances and schema; data independence; schema architecture; database languages; database manager; database administrator; database users**.**
2. **DATA MODELING:** Entity sets attributes and keys, relationships (ER); database modeling using entity; type role and structural constraints, weak and strong entity types; enhanced entity-relationship (EER), ER diagram design of an E-R database schema; object modeling, specialization and generalization;
3. **RELATIONAL MODEL:** Relational model: relational model -basic concepts, enforcing data integrity constraints, Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators; extended relational algebra operations, Calculus: Tuple relational calculus, Domain relational Calculus; introduction on views, Codd's rules.
4. **DATABASE DESIGN:** Database design process; relational database design, relation schema, anomalies in a database; functional dependencies membership and minimal covers normal forms, multi-valued dependencies, join dependencies, inclusion dependencies; reduction of an E-R schema to tables; effect of de-normalization on database performance
5. **QUERY LANGUAGES:** Query-by-example (QBE); introduction to SQL, basic queries in SQL, advanced queries in SQL, functions in SQL; basic data retrieval, aggregation, categorization, updates in SQLs; views in SQL, different types of views, theoretical updatability of views.
6. PL/SQL: Introduction to PL, Characteristics and benefits, Procedures, functions and packages,different types of triggers and their usage, nested block and subprograms, explicit and implicit database cursors
7. **TRANSACTION PROCESSING:** Desirable properties of transactions, implementation of atomicity and durability; reconsistent model, read only and write only model; concurrent executions, schedules and recoverability; serializability of schedules concurrency control; serializability algorithms; testing for serializability; precedence graph; concurrency control, deadlock handling - detection and resolution

TEXT BOOK
  Silberschatz A., Korth H. F. and Sudarshan S., "Database System Concepts",6th edition, McGraw-Hill, International Edition, 2010
  Steven Feuerstein, Bill Pribyl , "Oracle PL/SQL", O'Reilly Media , 4th Edition, 2005

REFERENCE BOOKS
1. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
2. Elmasri R. and Navathe S. B., "Fundamentals of Database Systems", 6th edition, Addison-Wesley, Low Priced Edition, 2010
3. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition, 2003
4. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
5. Hansen G. W. and Hansen J. V., "Database Management and Design", 2nd edition, Prentice- Hall of India, Eastern Economy Edition, 1999
6. Majumdar A. K. and Bhattacharyya P., "Database Management Systems", 5th edition, Tata McGraw- Hill Publishing, 1999
7. Looms, "Data Management & File Structure", Prentice Hall of India, 1989

CS-251	DATA STRUCTURE AND ALGORITHMS LAB	L T P	Cr
		0 0 4	2

LIST OF EXPERIMENTS

1. Search an element in a two-dimensional array using linear search.
2. Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method

3. Inserting & deleting an element in the array
4. Tower of Hanoi problem using recursion
5. Perform following operations on matrices using functions only
   a) Addition b) Subtraction c) Multiplicationd) Transpose
6. Static & dynamic Implementation of stack (push & pop operation)
7. Implementation of Circular queue (insert & delelte operation)
8. Create a linear linked list & perform operations such as insert, delete, update, reverse in the link list
9. Create a circular linked list & perform operations such as insert, delete
10. Implement binary search tree. (Insertion and Deletion in Binary Search Tree)
11. Simulates the various tree traversal algorithms
12. Implementation Bubble, Insertion & selection sort.
13. Implementation of quick sort
14. Implementation of merge sort
15. Implementation of heap sort
16. Simulate various graph traversing algorithms.

REFERENCE BOOKS

1. A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
2. R. S. Salaria -Data Structure Using C
3. Kruse Robert, ―Data Structures and Program Design in C‖, Prentice Hall of India, 1994
4. Lipschitz Jr. Seymour, ―Theory & Problems of Data Structures‖, Schaum's Outline, 2nd Edition, Tata McGraw Hill

CS-256	DATABASE MANAGEMENT SYSTEMS LAB	L T P	Cr
		0 0 2	1

1. Introduction to PL/SQL
2. Write a program to carry out
   a. Creation of table
   b. Insertion of data into table
   c. Viewing of data into table: All rows and all columns, Selected columns and all rows, Selected rows and all columns, Selected rows and selected columns, Elimination of duplicates from selected statements, Sorting of data into a table.
   d. Deletion of data from given table: Removal of all rows, Removal of selected rows
   e. Updating of table contents: Updating all rows, Updating of record conditionally
   f. Modifying the structure of table: Adding new column, Modifying existing column
   g. Renaming tables
   h. Destroying tables
   i. Examining objects created by user: Finding tables created by user, Finding column details of table created
   j. Computation on table data: Arithmetic operators, Logical operators (AND, OR, NOT), Range searching (BETWEEN, NOT BETWEEN), Pattern matching (LIKE, IN, NOT IN)
3. Oracle set functions (Scalar, Group & Pattern Matching Operator): AVG, SUM, MIN, MAX, COUNT, COUNT(*), ABS, ROUND, LENGTH, SUBSTR, POWER, SQRT, LOWER, UPPER, LPAD, RPAD, LTRIM, RTRIM
4. Data constraints at column level and at table level: NULL value concept, UNIQUE constraints, Primary key constraint, Foreign key constraint, Check constraint.
5. VIEWS: Creation of views, Renaming of columns in view, Selection, Updation, Destroy
6. Grouping Data from tables in SQL
7. INDEXES
8. SEQUENCES
9. Granting and Revoking Permissions in SQL
10. CURSORS & its Applications
11. Create Function and use Cursor in Function
12. TRIGGERS
13. Hands on Exercises

REFERENCE BOOKS

1. SQL, PL/SQL the Programming Language of Oracle, Ivan Bayross
2. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
3. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
4. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition

PD-293/PD-192	PERSONALITY SKILL	L T P	Cr
		0 0 2	1

To equip the students with the understanding of human behavior, develop time management skills, and enhance personality.

1. **TRANSACTIONAL ANALYSIS**: Winners and losers; ego states; OK states; positive and negative strokes; life scripts; exercises.
2. **CREATIVE THINKING**: What is creativity; 6 thinking hats; mental blocks; Exercises.
3. **SELF DISCOVERY**: Importance of knowing yourself; SWOT analysis; benefits; strengths and weaknesses; exercises.
4. **DEVELOPING POSITIVE ATTITUDE**: Meaning; changing attitudes; power of positive thinking; overcoming negative attitude; exercises.
5. **TIME MANAGEMENT**: Features, time management matrix; tips for time management; effective scheduling; time wasters; time savers; exercises and time bound tasks.
6. **STRESS MANAGEMENT**: What is stress; causes; positive and negative stress; effects; signs; tips to overcome stress; stress busters; exercises
7. **DECISION MAKING**: Definition; models and types; skills and techniques; courses of action; steps involved in decision making; individual decision making and group decision making; exercises

REFERENCE BOOKS

1. Muriel, James and Jongeward, Dorothy, ―Born to Winǁ, Signet Publishers, 1978
2. Harris, Thomas Anthony, ―I'm OK, You're OKǁ, Galahad Books, 2004
3. Dr. Alex, K., ―Soft Skillsǁ, 2009, S. Chand, 2009
4. Adams Scott , ―Positive Attitudeǁ, Andrews Mcbeel Publishing, 2004
5. Newton Tim, ―Managing Stress – Emotion and Power at Workǁ, Sage Publications Ltd., 1995
6. Koch Richard, ―The 80/20 Principle :The Secret to Success by Achieving with Lessǁ, Broadway Business, 1999
7. Covey Stephen R., ―The 7 Habits of Highly Effective Peopleǁ , Simon & Schuster UK, 2004

NOTE: One trainer per lecture and two trainers per practical session. Classroom with board/projector for PPT and video clips will be required.

PD-291	CO-CURRICULAR ACTIVITIES	L T P	Cr
			1*

OBJECTIVE
To help the students in their all round growth and acquire attributes like team spirit, organizational ability, leadership qualities, etc.

OPERATION
The students are to take part in Co-curricular activities outside contact hours through clubs/ societies spread over all the three terms of the year. They are required to register for this course in each term and their performance will be evaluated in last term of the year.

EN-202	English-IV	L T P	Cr
		2 0 0	2

Objective: To strengthen the four language skills and to refine the presentation skills; to learn report writing and to practice the etiquettes for better personality.

UNIT 1: Semantics:- Phrasal verbs & idioms, their usage in sentences; foreign words & phrases, their meaning and sentence formation; abbreviations & acronyms

UNIT 2: Remedial grammar:- Types of verb; Active voice & passive voice; Types of sentences based on mood and structure; Reported speech; Sentence correction based on tense, voice & reported speech

UNIT 3:- Listening & Reading Skills: Listening & hearing; Barriers in listening; Effective listening; Listening exercises; Types of reading; Reading with correct tone & intonation; Reading comprehension; Paraphrasing; Summarizing the passage

UNIT 4: Oral communication:- Presentation; Self introduction in front of the Interview board; Public speaking tips; Effective PPt. Presentation on topics of current importance

UNIT 5: Writing skills & Internal communication:- Meeting; Agenda; Minutes; Notice; Memo; Memorandum; Circular:- Paragraph writing; Job application & Resume; Introduction to Report writing; Structure & objective of different types of reports; Report writing; Press report

UNIT 6: Business Correspondence: Note-Making, Precis writing; Types of Business letters; Letter of Appointment; Resignation Letter; Formal Invitation

UNIT 7: Professional skills:- Interpersonal skill; Job interview; Team work; Leadership qualities; Case studies on the above professional skills

Prescribed Text book
1. Technical Communication Principles & Practice (2nd Ed.) by Meenakshi Raman & Sangeeta Sharma published by Oxford University
2. The Functional Aspects of Communication Skills by Dr.Prajapati Prasad published by S.K.Kataria & Sons
3. Business Communication by K.Sundar & A Kumara Raj published by Vijay Nicole Imprints Pvt Ltd. Chennai

SUGGESTED READING:
1. Language in Use (Upper intermediate Level, Adrian Doff Christopher Jones, Cambridge University Press
2. Common Errors in English, Abul Hashem, Ramesh Publishing House, new Delhi.
3. Objective English, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
4. Spoken English for India, R.K. Bansal & J.B. Harrison, Orient Longman, Delhi.
5. The sounds of English, Veena Kumar, Makaav Educational Software, New Delhi.
6. English Phonetics & Phonology, P. Roach, Cambridge University Press, London.
7. English for Engineers and Technologists: A Skill Approach, Vol. 2, Orient Longman, Delhi.
8. Business Communication, M.S. Ramesh and C.C. Pattanshetti, R.Chand and Company, Delhi
9. Group Discussion, Sudha Publications/Ramesh Publishing House, New Delhi.
10. English Grammar & Composition. By Rajinder Pal & Prem Lata Suri, Sultan Chand Pub. New Delhi.

BA-225	ECONOMICS	L T P	Cr
		3 0 0	3

1. **INTRODUCTION:** Definition of economics; difference between micro and macro economics; central problems of economy including PP curve; factors of production

2. **UTILITY:** concept and measurement of utility; Law of Diminishing Marginal Utility (DMU); derivation of Law of Demand from Law of DMU; Law of Equimarginal Utility (EMU) – its practical applications

3. **DEMAND:** What is demand and supply; shift in demand and extension of demand; law of demand and law of supply; demand function; demand schedule; elasticity of demand; measurement of elasticity of demand; factors affecting elasticity of demand; role of demand and supply in price determination and effect of changes in demand and supply on prices

4. **PRODUCTION FUNCTIONS:** Meaning of production and production functions; Law of Variable Proportion; returns to scale, internal and external economies and diseconomies of scale.

5. **COSTS:** Various concepts of costs: fixed cost, variable cost, average cost, marginal cost, opportunity cost; shape of average cost, marginal cost, total cost etc. in short run and long run.

6. **MARKET STRUCTURES:** What is market; main features of perfect competition; monopoly; oligopoly; monopolistic competition.

7. **MACRO ECONOMICS:** Macro economics: brief concepts of GDP, GNP, NI, per capita income; inflation; privatization; globalization (merits & demerits)**;** elementary concepts of VAT, WTO, GATT and TRIPS

TEXT BOOK
Hirshey M., "Managerial Economics", Thomson Learning, 2007

REFERENCE BOOKS
1. Monroe Kent B., "Pricing Making Profitable Decisions", McGraw Hill, New York, 2006
2. Keat Paul B., and Young Philip K. Y., "Managerial Economics - Economic Tools for Today's Decision Makers", Pearson Education, 2003

EC-302	MICROPROCESSOR AND INTERFACING	L T P	Cr
		3 0 0	3

OBJECTIVE
This subject introduces the concept of Microprocessors to the students. It covers 8 bit (8085) and 16-bit (8086) Microprocessors: their architecture, assembly language programming and interfacing with peripheral devices

PRE-REQUISITES
Knowledge of Boolean algebra, number systems and basic digital circuitry

1. **THE 8085 PROCESSOR:** Introduction to microprocessor; 8085 microprocessor: Architecture; Pin Diagram; instruction set; interrupt structure; Addressing modes and assembly language programming.
2. **THE 8086 MICROPROCESSOR ARCHITECTURE:** Architecture; block diagram of 8086 with details of sub-blocks; memory segmentation and physical address computations; program relocation; addressing modes; pin diagram and description of various signals; Interrupt Structure.
3. **INSTRUCTION SET OF 8086:** Data transfer instructions; arithmetic instructions; branch instructions; looping instructions; NOP and HLT instructions; flag manipulation instructions; logical instructions; shift and rotate instructions; directives; programming examples.
4. **INTERFACING DEVICE:** The 8255 PPI chip: Architecture; control words and modes; interfacing and programming with 8085.
5. **DMA:** Introduction to DMA process; 8257 pin diagram; architecture; operation; command words; interfacing and programming with 8085.
6. **PROGRAMMABLE INTERRUPT CONTROLLER:** 8259 pin diagram; architecture; initialization command words; operational command wards.
7. **PROGRAMMABLE INTERVAL TIMER:** 8253 pin diagram; architecture; modes.

TEXT BOOK

Gaonkar, Ramesh S., "Microprocessor Architecture: Programming and Applications with 8085", 5th Edition, Prentice Hall of India, 1995

REFERENCE BOOKS

1. Brey,"The Intel Microprocessors 8086- Pentium Processor", 4th Edition, 2005
2. Hall, "Microprocessors and interfacing", Tata McGraw Hill, 3nd Edition, 2003
3. Liu Yu-Chang and Gibson Glenn A., "Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design", Prentice Hall of India, 2003
4. Ray A. K. and Burchandi, "Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing", Tata McGraw Hill, 2002
5. Rafiquzzman, "Microprocessor based System Design UBS" Wiley-Interscience, 5th Edition, 2005

CS-204	COMPUTER ORGANIZATION AND ARCHITECTURE	L T P	Cr
		3 0 0	3

OBJECTIVE: To provide basic knowledge of internals of microprocessor, its architecture, components, terminologies, etc. at minute level and ultimately about the working of a digital computer hardware as a whole

PRE-REQUISITES: Knowledge of data structures, microprocessors and interfacing

1. **GENERAL SYSTEM ARCHITECTURE**: Functions and block diagram of computer, store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; performance metrics; MIPS, MFLOPS, GFLOPS and TFLOPS.
2. **DIGITAL LOGIC:** Computer registers, basics of logic design, accumulator logic, Boolean algebra and logic gates, combinational logic blocks (adders, multiplexers, encoders, de-coder), sequential logic blocks (latches, flip-flops, registers, counters).
3. **INSTRUCTION SET ARCHITECTURE**: Instruction codes, instruction set formats (fixed, variable, hybrid); types of instructions, memory reference, register reference, I/O reference; addressing modes: register, immediate, direct, indirect, indexed; operations in the instruction set; arithmetic and logical, data transfer, control flow; types of interrupts; timing and control; instruction set based classification of processors (RISC, CISC, and their comparison).
4. **BASIC NON PIPELINED CPU ARCHITECTURE**: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, fetch-decode-execute cycle (typically 3 to 5 stage); micro-instruction formats, implementation of control unit: hardwired and micro-programmed, control memory, microinstruction sequencing.
5. **MEMORY HIERARCHY & I/O TECHNIQUES:** Need for a memory hierarchy (Locality of Reference Principle, memory hierarchy in practice: cache, main memory and secondary memory, memory parameters: access/

cycle time, cost per bit); main memory (semiconductor RAM & ROM organization, memory expansion, static & dynamic memory types); cache memory: associative & direct mapped cache organizations.

6. **INTRODUCTION TO PARALLELISM**: Goals of parallelism (exploitation of concurrency, throughput enhancement); Amdahl's law; instruction level parallelism (pipelining, super scaling-basic features); processor level parallelism (multiprocessor systems overview).

7. **PROCESSOR ARCHITECTURE:** Clock speed; processing power and buses of a microprocessor, components of microprocessor; I/O ports; 16-bit (80286) architecture, 32-bit (80486) architecture; super scalar architecture in Pentium processors; 64-bit (Pentium dual-core) architecture.

TEXT BOOK

Carpinelli, ―Computer Organization & Architecture‖ Tata McGraw Hill, 2001

REFERENCE BOOKS
1. Stallings. W, ―Computer Organization & Architecture: Designing For Performance‖, 6th Edition, Prentice Hall of India, 2002/ Pearson Education Asia, 2003
2. Mano M Morris, ―Computer System Architecture‖, 3rd Edition, Prentice Hall of India Publication, 2001 / Pearson Education Asia, 2003
3. J otwani, ―Computer System Org anisation‖, T ata McGraw Hill, 2000.
4. Rajaraman V. and Radhakrishnan T, ―Introduction to Digital Computer Design‖, 4th Edition, Prentice Hall of India 2004.
5. Stalling William, ―Computer Organization and Architecture‖, 7th Edition, Prentice Hall of India, 2005.
6. Brey Barry, ―Intel Micro Processors‖, Pearson US Imports & PHIPEs,1998

WEB REFERENCES
1. http://www.cs.umsl.edu/~sanjiv/classes/cs312/
2. http://www.dlhoffman.com/classnotes/csci330-f03/
3. http://www.cs.wvu.edu/~jdm/classes/cs455/

CS-205	ANALYSIS AND DESIGN OF ALGORITHMS	L T P	Cr
		4 0 0	4

OBJECTIVE: To relay the theoretical and practical aspects of design of algorithms
PRE-REQUISITES: Knowledge of fundamentals of basic computer programming for implementing algorithms

1. **BRIEF REVIEW:** Graphs, sets and disjoint sets; union, sorting and searching algorithms and their analysis in terms of space and time complexity.
2. **DIVIDE AND CONQUER:** General method; binary search; merge sort; quick sort; selection sort; Strassen's matrix multiplication algorithms and analysis of algorithms for these problems.
3. **GREEDY METHOD:** General method; knapsack problem, job sequencing with deadlines; minimum spanning trees; single source paths and analysis of these problems.
4. **DYNAMIC PROGRAMMING:** General method; optimal binary search trees; O/I knapsack; the traveling salesperson problem.
5. **BACK TRACKING:** General method; 8 queens' problem; graph colouring; Hamiltonian cycles; analysis of these problems.
6. **BRANCH AND BOUND:** Method; O/I knapsack and traveling salesperson problem; efficiency considerations; Techniques for algebraic problems; some lower bounds on parallel computations.
7. **NP HARD AND NP COMPLETE PROBLEMS:** Basic concepts; Cook's theorem; NP hard graph and NP scheduling problems; some simplified NP hard problems.

TEXT BOOK

Horowitz Ellis and Sahni Sartaj, ―Fundamental of Computer Algorithms‖, Galgotia Publications, 1978

REFERENCE BOOKS
1. Cormen Thomas H., Leiserson Charles E. and Rivest Ronald L., ―Introduction to Algorithms‖, Tata McGraw Hill, 1990
2. Aho A. V. and H opcroft J. E., ―The Design and Analysis of Computer Algorithm ‖, Addison Wesley, 1974
3. Berlion P., and Bizard P., Algorithms – The Construction, Proof and Analysis of Programs, John Wiley & Sons, 1986.
4. Bentley J. L., ―Writing Efficient Programs‖, Prentice Hall of India, June 1982.
5. Goodman S . E. and H edetnieni, ―Introduction to Design and Analysis of Algorithm‖, McGraw Hill, 1997
6. Trembley Jean Paul and Bunt Richard B., ―Introduction to Computers Science - An Algorithms Approach‖, Tata McGraw Hill, 2002
7. Knuth Donald E., ―Fundamentals of Algorithms: The Art of Computer Prog ram m ing ‖, Vol. l, Naresh Publications, 1985
8. Goodrich Michael T. and Roberto Tamassia, ―Algorithm Design: Foundations, Analysis & Internet Examples‖ , Wiley Student Ed., 2002

WEB REFERENCE

1. http://www.personal.kent.edu/~rmuhamma/Algo rithms/algorithm.html
2. http://www.fib.upc.edu/en/infoAca/estudis/assig natures/ADA.html

IT-201	OBJECT ORIENTED PROGRAMMING USING C++	L T P	Cr
		4 0 0	4

OBJECTIVE: Providing a sound conceptual understanding of the fundamental concepts of computing hardware, software, networking and services; build programming logic and thereby developing skills in problem solving using C++ programming language; Introduce the concept of object orientation and on how to handle data in different forms; Emphasize the concepts and constructs rather than on language features.

1. **INTRODUCTION TO C++:** C++ standard library, basics of a typical C++ environment; preprocessors directives; illustrative simple C++ programs; header files and namespaces, library files.
2. **OBJECT ORIENTED CONCEPTS**: Introduction to objects and object oriented programming; encapsulation (information hiding); access modifiers: controlling access to a class; method, or variable (public, protected, private, package); other modifiers; Polymorphism: overloading, inheritance, overriding methods, abstract classes, reusability, class' behaviors.
3. **CLASSES AND DATA ABSTRACTION:** Introduction; structure definitions; accessing members of structures; class scope and accessing class members; separating interface from implementation; controlling access function and utility functions, initializing class objects: constructors, usingdefault arguments with constructors; using destructors; classes : const(constant) object and const member functions, object as member of classes, friend function and friend classes; using this pointer, dynamic memory allocation with new and delete; static class members; container classes and integrators; proxy classes; function overloading.
4. **OPERATOR OVERLOADING:** Introduction; fundamentals of operator overloading; restrictions on operators overloading; operator functions as class members vs. as friend functions; overloading, <<; >> overloading unary operators; overloading binary operators.
5. **INHERITANCE, VIRTUAL FUNCTIONS AND POLYMORPHISM:** Introduction, inheritance: base classes and derived classes, protected members; casting base-class pointers to derived-class pointers; using member functions; overriding base–class members in a derived class; public, protected and private inheritance; using constructors and destructors in derived classes; implicit derived–class object to base-class object conversion; composition vs. inheritance; virtual functions; abstract base classes and concrete classes; polymorphism; new classes and dynamic binding; virtual destructors; polymorphism; dynamic binding.
6. **FILES AND I/O STREAMS:** Files and streams; creating a sequential access file; reading data from a sequential access file; updating sequential access files, random access files; creating a random access file; writing data randomly to a random access file; reading data sequentially from a random access file; stream input/output classes and objects; stream output; stream input; unformatted I/O (with read and write); stream manipulators; stream format states; stream error states.
7. **TEMPLATES & EXCEPTION HANDLING:** Function templates; overloading template functions; class template; class templates and non- type parameters; templates and inheritance; templates and friends; templates and static members; basics of C++ exception handling: try, throw, catch, throwing an exception, catching an exception, re-throwing an exception, exception specifications, processing unexpected exceptions; stack unwinding; constructors, destructors and exception handling; exceptions and inheritance.

TEXT BOOK

S childt, Herbert —C++: The Complete Reference‖, Tata McGraw Hill, 3rd Ed, 2008

REFERENCE BOOKS
1. Kamthane, —Object Oriented Programming with ANSI and Turbo C++‖, Pearson Education
2. Lafore, Robert, —Object Oriented Programming in Turbo C++‖, The WAITE Group Press, 1994
3. Balagurusam y , E., —Object Oriented Programming with C++‖, Prentice Hall of India, 2008
4. Bhave, —Object Oriented Programming with C++‖, Pearson Education.

CS-302	OPERATING SYSTEM	L T P	Cr
		3 0 0	3

To provide the knowledge of internals, different types and purpose of operating systems

PRE-REQUISITES: Knowledge of computer organization and architecture, programming skills

1. **INTRODUCTION:** Introduction to operating system concepts (including multitasking, multiprogramming, multi user, multithreading, etc).; types of operating systems: batch operating system, time-sharing systems, distributed OS, network OS, real time OS, embedded and smart card OS; various operating system

services, architecture, system programs and calls.

2. **ROCESS MANAGEMENT AND THREADS:** Process concept, Life cycle and implementation of process, Thread usage and implementation in user space and in kernel, process scheduling, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), priority scheduling, Round Robin (RR), multilevel queue scheduling.

3. **MEMORY MANAGEMENT:** Logical & physical address space; swapping; contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging; virtual memory management - demand paging & page- replacement algorithms; demand segmentation.

4. **FILE SYSTEM:** Different types of files and their access methods, directory structures; various allocation methods; disk scheduling and management and its associated algorithms; introduction to distributed file system.

5. **PROCESS-SYNCHRONIZATION& DEADLOCKS:** Critical section problems, mutual exclusion with busy waiting, semaphores; methods for handling deadlocks: deadlock prevention, avoidance and detection; deadlock recovery; Classical IPC problems: dining philosophers' problem, readers-writers problem.

6. **I/O SYSTEMS:** I/O hardware, device controllers, interrupt handlers, device drivers, application I/O interface, kernel, transforming I/O requests, performance issues.

7. **LINUX/UNIX SYSTEM:** LINUX/UNIX architecture; UNIX system calls for processes and file system management; basic commands of LINUX/UNIX; shell interpreter, shell scripts.

TEXT BOOK

Silberchatz et al, ―Operating System Concepts‖, 5th edition, Addison-Wesley, 1998

REFERENCE BOOKS
1. Tanenbaum A., ―Modern Operating Systems‖, Prentice-Hall, 1992
2. Stallings William, ―Operating Systems Internals and Design P rinciples‖ , 4th edition, Prentice-Hall, 2001
3. Dhamdhere D. M., ―Operating System‖, 2nd Edition, Tata McGraw Hill, 1999
4. Kernighan Brian and Pike Rob, ―The Unix Programming Environment‖, Prentice Hall of India, 1984
5. Bach Maurich, ―Design of the Unix Operating System ‖, Prentice Hall of India, 1986
6. Muster John, ―Introduction to UNIX and LINUX‖, Tata McGraw Hill, 2003
7. Ritchie Colin, ―Operating System Incorporating Unix & Windows‖, Tata McGraw Hill, 1974
8. Madnick Stuart and Donovan John, ―Operating Systems‖, Tata McGraw Hill, 2001
9. Deitel, ―Operating Systems‖, Addison-Wesley, 1990
10. S ing hal Mukesh and S hivaratri N.G., ―Operating Systems‖, Tata McGraw Hill, 2003

WEB REFERENCES
1. http://en.wikipedia.org/wiki/Operating_system
2. http://search.techrepublic.com.com/search/ibm+lot us+notes+and+operating+systems.html

EC-352	MICROPROCESSOR AND INTERFACING LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Familiarization with theoperation of 8085 Microprocessor kit.
2. Write a program using 8085 for:
a) Addition of two 8-bit numbers. b) Addition of two 16-bit numbers
3. Write a program using 8085 for :
a) 8-bit subtraction b) 16-bit subtraction
4. Write a program using 8085 for
a) Multiplication of two 8- bit numbers b) Division of two 8- bit numbers
5. Write a program using 8085 to arrange an array of 10 Nos in-
a) Ascending order b) Descending order
6. Familiarization with the operation of 8086 microprocessor kit
7. Write a program using 8086 for copying 12 bytes of data from source to destination.
8. Write a program using 8086 for:
a) Finding the largest number from an array. b) Finding the smallest number from an array.
9. Write a program using 8086 for arranging an array of numbers in descending order and ascending order
10. Write a program for finding square of a number using look-up table and verify.
11. Write a program to interface a two digit number using seven-segment LEDs. Use 8085 microprocessor and 8255 PPI.

CS-352	OPERATING SYSTEM LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS
1. Study of Windows 2003 Operating System, Various services available in Windows 2003 Server and Internal/system commands for network and system monitoring in Windows 2003 Server,
2. Difference between the Windows 2003 Server and Windows 2003 Client software.
3. Study of Linux Operating System (Linux kernel, shell, basic commands like make, pipe and filter and Simple programs to display process group Ids: PID, PPID, GID), Internal/system commands for network and system monitoring in Linux.
4. Display "Linux Programming Lab" N times using library function calls and system calls
5. Programs using system calls that provides error checking
6. Programs using Processes.
7. Administration of Linux Operating System (connecting users, connectivity across LAN and WAN; Mounting and un-mounting of devices, taking backups, restoring data from backups
8. Writing of Shell Scripts
9. AWK programming
10. Study of MacOS features, Internal/system commands for network and system monitoring in MacOS
11. Study of differences between Windows 2003 Server, Linux and MacOS
12. Programs using Command Line Arguments.
13. Programs for Simple Shell and Complex Shell with cd command, editor command, etc.
14. Programs for Primitive Communications.
15. Programs using Pipes: Unnamed Pipes, Names Pipes
16. Programs using Message Queues.

REFERENCE BOOKS
1. Bach Maurich, ―Design of the Unix Operating System‖, Prentice Hall of India, 1986
2. Prato Stephen, ―Advanced Unix Programmer's Guide‖, BPB Publications, 2006
3. Das Sumitabha, ―Unix- Concept and Applications‖, Tata McGraw Hill, 2002

IT-251	OBJECT ORIENTED PROGRAMMING USING C++ LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS
1. Find the greatest among three numbers
2. Swap two numbers using call by value and call by reference.
3. Print the Fibonacci series and calculate factorial of a number.
4. print the numbers in ascending order using array.
5. Create a record for a student using Structure and class.
6. Find volume of cube, cylinder and cuboid using function overloading.
7. Calculate largest of two entered numbers using nested member function.
8. Count number of objects using static data members.
9. Calculate the interest using friend function.
10. Calculate the area using constructor and destructor.
11. Use static member function.
12. Find the eldest of two persons using this pointer.
13. Omplement single inheritance, multiple level inheritance, hybrid inheritance.
14. Implement Unary operator.
15. Implement binary operator.
16. Implement overload + operator using friend function.
17. Implement virtual function and pure virtual function.
18. Implement function template and fuction template overloading.
19. Implement class template.
20. Create files with constructor and open function.
21. Perform input/output operations on characters.

REFERENCE BOOKS
1. S childt, Herbert ―C++: The Complete Reference‖, Tata McGraw Hill, 3rd Ed, 2008
2. Lafore, Robert, ―Object Oriented Programming in Turbo C++‖, The WAITE Group Press, 1994
3. Balagurusamy, E., ―Object Oriented Programming with C++‖, Prentice Hall of India, 2008
4. Bhave, ―Object Oriented Programming with C++‖, Pearson Education

IT-356	WEB TECHNOLOGY LAB	L T P	Cr
		0 0 4	2

LIST OF EXPERIMENTS

1. Design a web page using Text level and Block level elements in HTML
2. Design a web page using
    2.1 Ordered List
    2.2 Unordered Lists
    2.3 Nested Lists
    2.4 Definition List
3. Design a web page to show the use of image tag and its attributes.
4. Design a web page to show the use of tables and its attributes and in HTML.
5. Design a web page to use text, image and tables as a hyperlinks.
6. Show the working of other HTML tags e.g. <div>, <span>, <meta> and special characters.
7. Design a student registration or any form using HTML tags.
8. Introduction to HTML 5, working with some new introduced tags and form elements in HTML5.
9. Write a CSS rule to show the working of :
    9.1 Embedded CSS
    9.2 External CSS
    9.3 Inline CSS
    9.4 Imported CSS
10. Write a CSS rule to represent working of different types of selectors e.g. Child selector, Descendent , Pseudo – Classes, Pseudo – Elements and different properties of selectors.
11. Write a Program in Javascript :
    11.1 To print if the no is even or odd.
    11.2 To Input a number and find the difference of the sum of factors and non-factors.
12. Write a program to
    12.1 To accept an Array of 10 numbers and display the sum of elements.
    12.2 To find greatest of all elements of an array
14. Write a Javascript program to show the working of methods and properties of String, Date, Window and Document Object.
15. Write a Javascript program to show the working of Event handling in Javascript.
16. Design a web-page to show different validation checking using Java Script
17. Write a program in PHP
    17.1 To Calculate factorial of a no
    17.2 To print the table of any number entered by the user.
18. Write a program to show database connectivity using PHP and Mysql.
19. Write a program in PHP to show the form handling using PHP.
20. Write a program to show how cookies are created, maintained and destroyed using PHP.

PD-293/PD-192	INTRA & INTER-PERSONAL SKILLS	L T P	Cr
		0 0 2	1

OBJECTIVE
To acquaint the students with the understanding of self development through good inter-personal skills for effective social communication in order to succeed in maintaining relationships in professional and social environments. This module will also help at learning group discussions and interview skills to enable employability and professional fit.

1. **SELF AWARNESS:** Development of our self image; social comparison; significant others; self esteem; self confidence.
2. **ASSERTIVENESS & CONFIDENCE**: Assertiveness; being confident; strategies to make assertive NO easier; dealing with emotions; difference between being aggressive and being assertive.
3. **TEAM BUILDING & TEAM WORK**: The team concept; elements of team work; stages of team formation; effective team; essential building blocks of effective teams; team player's style; team tasks; exercises.
4. **LEADERSHIP SKILLS**: Leadership skills and styles; motivating people; understanding abilities; delegating tasks; managing people; overcoming hurdles; exercises.
5. **INTERVIEW SKILLS**: Why an interview; the first step to a successful interview; resumes that make an impact; the interview process; the interview preparation checklist; interviewing skills; putting your best foot forward; common interview mistakes; one on one HR interviews (two for each student).
6. **GROUP DISCUSSION SKILLS**: Meaning of a GD; types; role of a moderator; do's and don'ts; mock GDs on general, knowledge based and abstract topics.
7. **THE ART OF CONVERSATION**: Skills to strike a conversation; sustaining conversation; communicating across cultures; conflict management.

REFERENCE BOOKS

1. Haddon, F . Peter, ‖Mastering Personal and Interpersonal S kills‖ , Viva Books Pvt. Ltd., 2003
2. Schuller, Robert H., ―Tough Times Never Last But Tough People Do‖, Orient Paperbooks, 1988
3. Bolton, Robert, ―People Skills‖, Touchstone Books, 1986
4. Jansaz, De Suzanne, ‖ Interpersonal Skills in Organizations‖, 3rd Edition, McGraw Hill Education (Asia), 2009
5. Fontana,   David,   ―Social Skills at Work‖,
   Universities Press, 2000
6. Burns, James Mac Gregor, ―Leadership‖, Harper Perennial, 1982
7. Harris, Godfrey, ‖Art of Conversation‖, J aico Publishing House, 2002
8. Ganguly, Anand, ‖Group Discussions and Interviews‖, Ramesh Publishing House, 2008

PD-291	CO-CURRICULAR ACTIVITIES	L T P	Cr
			1*

OBJECTIVE

To help the students in their all round growth and acquire attributes like team spirit, organizational ability, leadership qualities, etc.

OPERATION

The students are to take part in Co-curricular activities outside contact hours through clubs/ societies spread over all the three terms of the year. They are required to register for this course in each term and their performance will be evaluated in last term of the year.

DETAILED SYLLABUS (3rd Year)

BA-249	PRINCIPLES OF MANAGEMENT	L T P	Cr
		3 0 0	3

OBJECTIVE
To acquaint the students with various concepts of management which will be very basic to appreciate the subject.

1. **INTRODUCTION:** Meaning of management, definitions of management, characteristics of management, management vs. administration; management: art, science and profession; importance of management; Fayol's principles of management ; the management functions; interrelationship of managerial functions.
2. **FORMS:** Forms of organizational structure (line, line & staff, functional); delegation of authority; centralization & decentralization.
3. **GROUPS:** Formal & informal groups; stages in team development, empowerment concept, significance; changing nature of managerial work; outsourcing.
4. **CORPORATE SOCIAL RESPONSIBILITY:** Corporate social responsibility – meaning; responsibility towards different stakeholders; ethics in management – meaning; factors effecting ethical choices.
5. **STAFFING:** Nature and significance of staffing; human resource management - functions of human resource management; human resource planning; process of human resource planning; recruitment, selection; promotion-seniority vs. merit.
6. **MARKETING MANAGEMENT:** Marketing management – definition of marketing, marketing concept, objectives and functions of marketing; marketing mix (basics of 4Ps of marketing); difference between goods and services; steps of personal selling.
7. **FINANCIAL MANAGEMENT:** Introduction of financial management; objectives of financial management; functions and importance of financial management; brief introduction to the concept of capital structure and various sources of finance.

TEXT BOOK
Chhabra T. N., ―Principles and Practice of Management‖, Dhanpat Rai Publishers, 2008

REFERENCE BOOKS
1. Aggarwal R. D., ―Organization and Managem ent‖, Tata McGraw Hill, 1995
2. Prasad L. M., ―Principles and Practice of Manag em ent‖, Sultan Chand & Sons, 2005
3. Harold, Koontz and O'Doneell Cyril, ―Managem ent‖, McGraw Hill, 1968
4. S herlekar S . A., ―Marketing Manag em ent‖, Himalaya Publishing House, 2009
5. Pandey I. M., ―Financial Management‖, Vikas Publishing House, New Delhi, 2005
6. Stoner James A. F. and Freemann R. Edward, ―Manag em ent‖, 6th Edition, Prentice Hall of India, 2000
7. P rasad L. M., ―Organizational Behavior‖, Sultan Chand & Sons, 2008
8. Singh & Chhabra, ―Business Organization & Manag em ent‖, Dhanpat Rai Publishers

CS-303	COMPUTER GRAPHICS	L T P	Cr
		4 0 0	4

OBJECTIVE
Students completing this course are expected to be able to:
- Write programs that utilize the OpenGL graphics environment.
- Use polygonal and other modeling methods to describe scenes.
- Understand and be able to apply geometric transformations.
- Create basic animations.
- Understand scan-line, ray-tracing, and radiosity rendering methods

PRE-REQUISITES
Knowledge of computer programming, 2D and 3D geometry

1. **INTRODUCTION:** What is computer graphics, computer graphics applications, computer graphics hardware and software, two dimensional graphics primitives: points and lines, line drawing algorithms: DDA, Bresenham 's; circle drawing algorithms: using polar coordinates, Bresenham's circle drawing, mid point circle drawing algorithm; polygon filling algorithm, boundary filled algorithm, scan-line algorithm, flood fill algorithm.
2. **TWO DIMENSIONAL VIEWING**: The 2-D viewing pipeline, windows, viewports, window to view port

mapping; clipping: point, clipping line (algorithms): 4 bit code algorithm, Sutherland- Cohen algorithm, parametric line clipping algorithm (Cyrus Beck).

3. **POLYGON CLIPPING ALGORITHM:** Sutherland Hodgeman polygon clipping algorithm, homogeneous coordinates system, two dimensional transformations: transformations, translation, scaling, rotation, reflection, shearing, transformation, composite transformation.

4. **THREE DIMENSIONAL GRAPHICS:** Three dimensional graphics concept, matrix representation of 3-D transformations, composition of 3-D transformation; viewing in 3D: projections, types of projections; the mathematics of planner geometric projections; coordinate systems.

5. **HIDDEN SURFACE REMOVAL**: Introduction to hidden surface removal; the Z- buffer algorithm, scan-line algorithm, area sub-division algorithm.

6. **REPRESENTING CURVES AND SURFACES**: Parametric representation of curves: Bezier curves, B-Spline curves; parametric representation of surfaces; interpolation method.

7. **ILLUMINATION, SHADING, IMAGE MANIPULATION:** Illumination models, shading models for polygons, shadows, transparency; what is an image, filtering, image processing, geometric transformation of images

TEXT BOOK

Foley James D., van Dam Andeies, Feiner Stevan K. and Hughes J ohb F., ―Computer Graphics Principles and P ractices‖, 2nd Edition, Addision Wesley, 2000

REFERENCE BOOKS

1. Hearn Donald and Baker M. Pauline, ―Computer Graphics‖, 2nd Edition, Prentice Hall of India, 1999
2. Rogers David F., ―Procedural Elements for
   Computer Graphics‖ , 2nd Edition, Tata McGraw Hill, 2001
3. Watt Alan, ―Fundamentals of 3-Dimensional Computer Graphics‖, Addision Wesley, 1999
4. John Corrig n, ―Computer Graphics: Secrets and Solutions‖, BP B Publications, 1994
5. Krishanmurthy N., ―Introduction to Computer Graphics‖, Tata McGraw Hill, 2002

WEB REFERENCES

1. http://en.wikipedia.org/wiki/Computer_graphics
2. http://www.cgw.com/ME2/Default.asp
3. http://www.graphics.cornell.edu/online/tutorial/
4. http://graphics.stanford.edu/

IT-202	COMPUTER NETWORKS	L T P	Cr
		4 0 0	4

OBJECTIVE

To have a fundamental understanding of the design, performance and state of the art of wireless communication systems, Topics covered include state of the art wireless standards and research and thus changes substantially form one offering of this course to the next

PRE-REQUISITES: Knowledge of computers hardware and software

1. **OSI REFERENCE MODEL AND NETWORK ARCHITECTURE**: Introduction to computer networks, example networks: ARPANET, Internet, private networks; network topologies: bus-, star-, ring-, hybrid tree-, complete-, irregular –topology.

2. **TYPES OF NETWORKS:** Local area networks, metropolitan area networks, wide area networks; layering architecture of networks, OSI model, Functions of each layer, services and protocols of each layer

3. **TCP/IP**: Introduction, history of TCP/IP; layers of TCP/IP; Protocols: Internet Protocol,Transmission Control Protocol, User Datagram Protocol; IP Addressing, IP address classes,subnet addressing; Internet control protocols: ARP, RARP, ICMP; application layer, domain name system; Email – SMTP, POP, IMAP; FTP, NNTP, HTTP; Overview of IP version 6.

4. **LOCAL AREA NETWORKS:** Introduction to LANs, Features of LANs, Components of LANs, Usage of LANs; LAN standards, IEEE 802 standards; Channel Access Methods: Aloha, CSMA, CSMA/CD, Token Passing, Ethernet; Layer 2 & 3 switching; fast Ethernet and gigabit Ethernet, token ring; LAN interconnecting devices: hubs, switches, bridges, routers, gateways.

5. **WIDE AREA NETWORKS**: Introduction of WANs, routing, congestion control, WAN Technologies; Distributed Queue Dual Bus (DQDB); Synchronous Digital Hierarchy (SDH) / Synchronous Optical Network (SONET);Asynchronous Transfer Mode (ATM); frame relay; wireless links.

6. **INTRODUCTION TO NETWORK MANAGEMENT:** Remote monitoring techniques: polling, traps, performance management; class of service, quality of service; security management: firewalls, VLANs, proxy servers; introduction to network operating systems: client-server infrastructure, Windows NT/2000.

7. **SOCKET PROGRAMMING:** Introduction to socket, Client side and Sever side programming, byte ordering, Implementation of socket, Socket Interface.

TEXT BOOK
Tanenbaum Andrew S, ―Computer Networks‖, 4th Edition, Pearson Education/Prentice Hall of India, 2003.

REFERENCE BOOKS
1. Forouzan Behrouz A., ―Data Communications and Networking‖, Tata McGraw Hill 2006.
2. Stallings William, ―Data and Computer Com munication‖ , 5th Edition, Prentice Hall of India, 1997.
3. Fred H alsall, ―Data Communications, Computer Networks and Open Systems‖, 4th edition, Addison Wesley, Low Price Edition, 2000
4. Fitzgerald Jerry, ―Business Data Communications‖, Wiley, 2009.
5. Peterson Larry L. and Davie Bruce S., ―Computer Networks – A System Approach‖, 3rd Edition, Morgan Kaufmann, 2003.
6. Tittel E. D., ―Computer Networking‖, Tata McGraw Hill, 2002
7. Kurose James F. and Ross Keith W., ―Computer Networking: A Top-Down Approach Featuring the Internet‖, 2nd Edition, Pearson Education, 2003.
8. Keshav S., ―An Engineering Approach to Computer Networking‖, Addison-Wesley, 1997.
9. Comer D. E., ―Internetworking with TCP/IP‖, Volume 1, 3rd Edition, Prentice Hall of India, 1995.

WEB REFERENCES
1. http://en.wikipedia.org/wiki/Computer_network
2. http://www.comsoc.org/dl/pcm/index.html
3. http://compnetworking.about.com/od/basicnetworkingconcepts/Networking_Basics_Key_Concepts_in _Computer_Networking.htm
4. http://www.protocols.com/hot.htm

IT-304	SOFTWARE ENGINEERING	L T P	Cr
		3 0 0	3

To provide basic knowledge of properties of software and its development processes, software quality, CASE tools, etc.

PRE-REQUISITES: Knowledge of computer programming, principles of management

1. **INTRODUCTION:** Definition and Emergence of Software Engineering, Evolving Role of Software, Software LifeCycle Models, Software Characteristics, Applications, Software Product, Software Process, Software Crisis, Software Myths.
2. **SOFTWARE PROJECT MANAGEMENT:** Project management concepts, software process and project metrics project planning, project size estimation metrics, project estimation techniques, empirical estimation techniques, COCOMO- a heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking.
3. **REQUIREMENTS ANALYSIS AND SPECIFICATION:** Requirements engineering, system modeling and simulation, analysis principles: modeling, partitioning, software, prototyping: methods and tools; specification principles,representation,thesoftware requirements specification and reviews analysis modeling: data modeling, functional modeling and information flow: data flow diagrams, behavioral modeling; the mechanics of structured analysis: creating entity/ relationship diagram, data flow model, control flow model, the control and process specification; the data dictionary.
4. **SYSTEM DESIGN**: Design Process: design and software quality, design principles; design concepts: abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; functional independence, cohesion, coupling; design heuristics for effective modularity; design model; design documentation, architectural design: software architecture, data design: data modeling, data structures, databases and data warehouse, analyzing alternative architectural designs, architectural complexity; mapping requirements into a software architecture; transform flow, transaction flow; transform mapping and transaction mapping.
5. **TESTING AND MAINTENANCE**: Software testing techniques, software testing fundamentals: objectives, principles, testability; test case design, white box testing, basis path testing: control structure testing: black box testing, testing for specialized environments, architectures and applications. software testing strategies: verification and validation, unit testing, integration testing, validation testing, alpha and beta testing; system testing: recovery testing, security, testing, stresstesting, performance testing; acceptance testing: alpha and beta testing; the art of debugging, debugging process debugging approaches; software re engineering, reverse engineering, restructuring, forward engineering, software configuration management.
6. **SOFTWARE RELIABILITY AND QUALITY ASSURANCE**: Quality concepts, software quality assurance, SQA activities; software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: review meeting, review reporting and record keeping, review guidelines; formal approaches to SQA; statistical software quality assurance; ISO 9000 quality standards, ISO 9001 and six sigma

standards, software reliability: measures of reliability and availability, software safety.

7. **COMPUTERAIDEDSOFTWARE ENGINEERING:** CASE, building blocks; integrated case environments and architecture, repository.

TEXT BOOK

Pressman Roger S., ―Software Engineering – A Practitioner's Approach‖ , McGraw Hill, 2004

REFERENCE BOOKS

1. Jalote P ankaj, ―An Integrated Approach to Software Engineering‖, 3rd edition, Narosa Book Distributors Private Ltd, 2005
2. Mall Ra jib, ―Fundamentals ofSoftware Eng ineering ‖, Prentice Hall of India,2003
3. Sommerville Ian, ―Software Engineering‖, 8th edition, Addison Wesley, 2007
4. Gustafson David, ―Software Eng ineering ‖, Tata McGraw Hill, 2002
5. Behforooz Ali and Hudson Frederick J., ―Software Engineering Fundamentals‖, Oxford University press, John Wiley & Sons, 2005

WEB REFERENCES

1. http://en.wikipedia.org/wiki/Software_engineering
2. http://www.onesmartclick.com/engineering/softwar e-engineering.html
3. http://www.bleadingedge.com/Publications/C++Journal/Cpjour2.htm
4. http://www.astrainfotech.com/

EC-208	DIGITAL AND ANALOG COMMUNICATION	L T P	Cr
		3 0 0	3

OBJECTIVE

To acquaint the students with the knowledge of different modes of communication techniques as well as equipments and standard guiding such communication.

1. **COMMUNICATION SYSTEM COMPONENTS:** Introduction to Communication: definition & means of communications; digital and analog signals: sign waves, square waves; properties of signals: amplitude, frequency, phase; theoretical basis for data communication: Fourier analysis: Fourier series and Fourier Transform (property, ESD, PSD and Raleigh) effect of limited bandwidth on digital signal.
2. **DATA ENCODING SCHEMES:** Physical connections: modulation, amplitude-, frequency-, phase- modulation; Data encoding: binary encoding (NRZ), Manchester encoding, differential Manchester encoding.
3. **DATA TRANSMISSION**: Transmission Media: Twisted pair-, co-axial-, fiber optic-cables, wireless media; transmission impairments: attenuation, limited bandwidth of the channels, delay distortion, noise, data rate of the channels (Nyquist theorem, Shannon limit)
4. **DATA COMMUNICATION INTERFACES:**
   Physical layer interfaces: RS 232, X.21; parallel interfaces: the telephone network: DDD network; private- line service; the telephone circuit; data modems: synchronous modems; asynchronous modems; modem synchronization
5. **STANDARDS IN DATA COMMUNICATIONS:** Communication modes: simplex, half duplex, full duplex; transmission modes: serial-, parallel- transmission; synchronizations: asynchronous-, synchronous-transmission; type of services: connection oriented-, connectionless-services; flow control: unrestricted simplex protocol, simplex stop- and -wait protocol, sliding window protocol.
6. **SWITCHING SYSTEMS:** Introduction: circuit switching; packet switching: data gram, virtual circuits, permanent virtual circuits. Telephone Systems: PSTN, ISDN, asynchronous digital subscriber line. Multiplexing: frequency division-, time-, wave- division multiplexing
7. **SECURITY IN DATA COMMUNICATIONS:** Transmission errors: feedback-, forward-error control approaches; error detection; parity check, block sum check, frame check sequences; error correction: hamming codes, cyclic redundancy check. data encryption: secret key cryptography, public key cryptograph; data compression: run length encoding, Huffman encoding.

TEXT BOOK

Halsall Fred, ―Data Communications, Computer Networks and Open Systems‖, 4th Editon, Low Price edition, Addison Wesley, 2000

REFERENCE BOOKS

1. Fitzgerald Jerry, ―Business Data Communications‖, 7th Edition, John Wiley & Sons, 2001
2. Carlson Bruce A., Crilly Paul B., and Rutledge Janet C., ―Communication Systems‖, 4th Edition, Tata McGraw Hill, 2002.
3. Proiiss J. G., ―Digital Communications‖, 4th Edition, McGraw Hill
4. Stallings W., ―Data & Computer Communications‖, Prentice Hall of India

5. Roden, ―Digital & Data Communication Systems‖, Prentice Hall of India, 1992
6. Forouzan Behrouz A., ―Data Communications and Networking‖, 2nd Edition, Tata McGraw Hill, 2003

IT-308	CORE JAVA	L T P	Cr
		4 0 0	4

OBJECTIVE To relay the theoretical and practical knowledge of Core Java programming language

PRE-REQUISITES Basic Knowledge of programming language and object oriented programming

1. **INTRODUCTION TO JAVA & PRINCIPLES OF OBJECT ORIENTED PROGRAMMING**: Basic Concepts of OOP and its Benefits; Application of OOP; The Creation of Java; Importance of Java for the Internet; Java's Magic: The Byte-code; Features of Java; Downloading and Installing JDK/JRE ;Sample Java Program

2. **DATA TYPE, VARIABLES, ARRAY & STRINGS**: Different types of data types, Literals, Variables, Type conversion and casting :Java's automatic type conversion, Casting incompatible types; Automatic type promotion in expression; Arrays: One-Dimensional Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, String handling: String class, Different string operations, String comparison ,Searching and modifying a string, Using string buffer class, Vector & Wrapper classes

3. **OPERATORS, EXPRESSION, CONTROL STATEMENTS:** Different types of operators: arithmetic, bitwise, logical, relational, Boolean, assignment, conditional, special; Operator precedence and associatively; Using parentheses; Expression; Solving an expression; Control statements: if-else, nested if-else switch; Iteration statements: while, do-while, for, nested loops Jump Statements: using break, using continue, return

4. **OBJECT-ORIENTATION & INHERITANCE :** Object-Oriented Programming in Java: Java Program Structure, Defining Class & Methods, Declaring Objects ,Constructors, "this" keyword, Overloading , Recursion ,"static" keyword, Command line arguments, Garbage collection, finalize() method, Stack class; Inheritance: Different types of Inheritance, super keyword, Method overriding, Different types of access specifiers, final class, Abstract class & data types

5. **INTERFACES, PACKAGE & MULTITHREADING :** Defining Interface, Extending & Implementing interfaces, implementing multiple inheritance, Package: Java API Packages, Using System Package, Naming Conventions, Creating package, Accessing a package, using your own package; Multithreading: The Java Thread Model, Creating a Thread: extending Thread class and implementing Runnable interface, life cycle of a thread, using Thread methods, Thread exception Thread priority, Synchronization

6. **EXCEPTION HANDLING & APPLET PROGRAMMING:** Exception: Exception Handling mechanism , Multiple catch statements , Using finally statements , throwing our own exception; Applet: Local & Remote Applets ,Steps to write & running Applets, Applet life cycle, Passing parameters, Displaying numerical values, getting input from the user

7. **GRAPHICS PROGRAMMING & FILE HANDLING:** Graphics class: Lines & Rectangle, Circles & Ellipses, Arcs, Polygons, Line Graphs, Bar Charts; File Handling: Stream Classes: Character & Byte Stream Class, I/O Exceptions, Reading /Writing character, Reading /Writing bytes, Concatenating & buffering files, Random Access Files

TEXT BOOK Balaguruswamy , E., ""Programming with Java", Tata Mcgraw Hill

REFERENCE BOOKS

1. Herbert Schildt , "The Complete Reference Java 2 fifth edition, McGraw Hill.
2. Horetmann Cay and Cornell Gary, "Core Java Volume – I", Pearson Education.
3. Horetmann Cay and Cornell Gary, "Core JavaTM 2, Volume II – Advanced Features", 7th Edition, Pearson Publisher.
4. Kathy Sierra and Bert Bates, "Head First Java" by O'REILLY publications.
5.

CS-353	COMPUTER GRAPHICS LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS
1. 2D line as raster graphics display using Bresenhem line drawing algorithm
2. 2D line drawing as raster graphics display using DDA line drawing algorithm
3. Circle drawing as raster graphics display using mid point circle drawing algorithm
4. Polygon filling as raster graphics display using Boundary fill algorithm and Flood fill algorithm
5. Line clipping
6. Polygon clipping
7. Display 3D object as 2D raster graphics display using perspective transformation
8. Rotation for 3D object about arbitrary axis
9. Hidden surface removal from a 3D object

10. 2D transformations of a given object (triangle, rectangle, pentagon) for translating, scaling, rotating, reflecting, shearing
11. Create a screen saver using inbuilt functions of graphics
12. Zoom an object
13. Reverse zooming
14. Create a Bezier Curve

REFERENCE BOOKS
1. Hearn Donald and Baker M. Pauline, ―Computer Graphics‖, 2nd Edition, Prentice Hall of India, 1999
2. Rogers David F., ―Procedural Elements for Computer Graphics‖, 2nd Edition, Tata McGraw Hill, 2001

IT-358	CORE JAVA LAB	L T P	Cr
		0 0 2	1

The following programs on different topic are to be done in this lab.

1. **Sample Program**
   (a) Write a Java program to print "Hello Java"
2. **Operators and Expressions**
   (a) Write a java program to find the area of a rectangle.
   (b) To write a java program to find the result of the following expressions
       (i)   (a<<2) +(b>>2)
       (ii)   (b>0)
       (iii)   (a+b*100)/10
       (iv)   a & b
       Assume a=10, b=5
   (c) To write a java program to print the individual digits of a 3 digit number using Command line arguments.
3. **Decision making statements**
   (a) Write a java program to read two integers and print the larger number. followed by the words "is larger". If the numbers are equal print the message "These numbers are equal"
   (b) Write a java program to read an integer and find whether the number is odd or even.
   (c) Write a java program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by 7.
4. **Looping Statements**
   (a) Write a Java program to find the sum of digits of a given number.
   (b) Write a java program to find the first 15 terms of Fibonacci sequence.
   (c) Write a java program to print the Armstrong numbers.
   (d) Given a number, write a program using while loop to reverse the digits of the number.
                  For example, the number
                     12345
                  should be written as 54321.
5. **Array & Strings**
   (a) Write a java program to find the largest and smallest number in an array.
   (b) Write a java program to multiply two matrices.
   (c) Write a java program to sort the following numbers in descending order.
                  {55, 40, 80, 65, 71}
   (d) Write a java program that creates a string object and initializes it with your name and performs the following operations
       (i)   To find the length of the string object using appropriate String method.
       (ii)   To find whether the character 'a' is present in the string. If yes find the number of times 'a' appear in the name and the location where it appears.
   (e) Write a java program to arrange the following word in alphabetical order
                  {Madras, Delhi, Ahmadabad, Calcutta, Bombay}
   (f) Write a java program to create a StringBuffer object and illustrate how to append characters and to display the capacity and length of the StringBuffer.
6. **Classes & Objects**
   (a) Write a java program to display total marks of 5 students using student class. Given the following attributes: Regno(int), Name(string), Marks in subjects(Integer Array), Total (int).
   (b) Write a java program to find the area of a room using constructor.
   (c) Write a java program to implement method overloading.
   (d) Write a java program to show the use of "static" members.
   (e) Write a java program to implement the nesting of methods.

7. **Inheritance**
   (a) Write a java program to implement single inheritance using "super" keyword.

(b) Write a java program to implement method overriding.
(c) Write a java program to implement multiple inheritances.

8. **Package & Multithreading**
   (a) Write a program to create your own package and use that package in another program to print " Hello package".
   (b) Write a program to implement multithreading using the system function like yield(), stop(), sleep().
9. **Exception Handling and Applet programming**
   (a) Write a java program to implement multiple try/catch statements.
   (b) Write a java program to print " Hello applets" using applets.
10. **File handling**
    (a) Write a program to copy the content of one file into another using character stream classes.
    (b) Write a program to copy the content of one file into another using byte stream classes.

IT-252	COMPUTER NETWORKS LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS
1. Overview of network programming.
2. To discover network topology in UNIX/Linux/Windows environment.
3. Study of network cables, connectors, cabling options, hubs, switches etc.
4. Write a program to create sockets for sending and receiving data; handling multiple connections
5. Write a program to obtain the local and remote socket address and to obtain information about the (A) Host (B) Network (C) Protocols (D) Domains
6. Write a program to manipulate the IP Address
7. Building a small Ethernet LAN.
8. Write a program to make a Telnet Client and an FTP Client
9. Write a program to implement checksum method for proper data transmission
10. Write a program to implement RSA and SHA algorithm for security of a network
11. Types of Optical fibers and study of connectivity of optical modules
12. Study of (a) Wireless Connectivity and (b) Different networking commands
13. Study of Ethernet Switch configuration (Simulator to be decided)
14. Configuring IPv4 and IPv6 addresses.
15. To configure a Linux/Windows Server Box as an IP Router
16. Setting up and configuring an IP Router using (a) Distance Vector Routing Protocol, (b) Link State Routing Protocol, and (c) Border Gateway Protocol (BGP)
17. Analysis of Transport Layer Protocols using IP utilities like TCP Dump, etc.
18. Setting up of any one (a) Web Server and a ftp server or (b) DNS Server and a DHCP server

REFERENCE BOOKS
1. Tanenbaum Andrew S., ―Computer Networks‖, 4th edition, Prentice Hall of India, 2003.
2. Halsall Fred, Data Communications, Computer Networks and Open Systems, 4th edition, Addison Wesley, Low Price Edition, 2000
3. Peterson Larry L. and Davie Bruce S., ―Computer Networks – A System Approach‖, 3rd Edition, Morgan Kaufmann, 2003

PD-393	ADVANCED PROFESSIONAL DEVELOPMENT	L T P	Cr
		0 0 2	1

OBJECTIVE:
To equip the students with the basics of law, accounting, corporate policies, and ethics; the general awareness useful in leading a well informed life.

1. **LAW FOR THE LAYMAN**: Indian Judiciary System; Intellectual Property Rights (IPR); labour laws; employee rights; human rights; criminal laws, civil rights.
2. **BASICS OF ACCOUNTING**: Credit-Debit transactions; balance sheet; ledgers; receipts & vouchers; P & L statement; exercises.
3. **MONEY MANAGEMENT**: Types of taxes; how to manage taxes; investment options; an overview of stocks & shares; savings options; understanding important terms (depreciation, VAT, education cess).
4. **CORPORATE RULES & POLICIES**: The need; advantages; illustrations of certain rules & policies followed by selected corporate; code of conduct.
5. **RIGHTS & DUTIES:** An overview of the Indian constitution; fundamental rights & duties; directive principles of state policy; societal values; ideologies of some famous personalities.
6. **TECHNOLOGY, POLITICS & RELIGIONS IN INDIA**: various religions and their teachings; political developments in India; history of science & technology.

7. **HUMAN VALUES**: Ethics at work place; human values; morals & ethics; professional ethics; case studies.

REFERENCE BOOKS

1. Anthony M.J, ―Law for the Laym an‖, Hind Pocket Books, 2003
2. Mathur Reeta, ―Recent Trends in Indian Economy ‖, 3 Vol set, Sublime Publication, 2003
3. Eisen J. Peter, ―Accounting - The Easy Way‖, Barron's Educational Series, 2003
4. Kiyosaki Robert, and Lechter Sharon, ―Rich Dad, Poor Dad‖, Warner Books, 2001
5. Lakhotia R. N, ―Income Tax Guide for the Taxpayer‖, Vision Books, 2009

NOTE: One trainer per lecture and two trainers per practical session. Classroom with board/projector for PPT and video clips will be required.

PD-391	CO-CURRICULAR ACTIVITIES	L T P	Cr
			1

Refer to PD-191 for details.

OBJECTIVE: To train and enhance the students' problem solving skills, reasoning ability, quantitative ability, and reading comprehension skills.

1. **LOGICAL REASONING**: Logical deductions (Syllogism & Venn Diagrams); logical connectives.
2. **ANALYTICAL REASONING**: Seating arrangements; combinations; selections; comparisons; blood relations directions, etc.
3. **NON-VERBAL REASONING (ALPHA-NUMERIC & VISUAL PUZZLES):** To solve problems on numbers, alphabet, symbols and visuals; problem types are series, analogies, odd man out, coding decoding, and symbols & notations.
4. **BUSINESS MATHS**: Number system; ratios; averages; time & work; time & distance; percentages; profit & loss; simple & compound interest.
5. **HIGHER MATHS:** Algebra; Mensuration.
6. **DATA INTERPRETATION & SUFFICIENCY**: Tables, Bar chart, line graph, pie charts; to enable student assess whether the given data is sufficient to solve a question; for both reasoning based and quant based problems.
7. **READING COMPREHENSION**: To enable a student comprehend short and long passages from the perspective of solving questions based on the passage.

REFERENCE BOOKS

1. Aggarwal R. S., ―Verbal & Non-Verbal Reasoning ‖, 2008, S. Chand, 1994
2. Aggarwal R. S., ―Quantitative Aptitude for Competitive Examinations‖, S . Chand, 2008
3. Gulati, SL, ―Quantitative Ability‖, Bookhive India, 2006
4. GRE Barron's‖, 13th Edition, Barron's Educational Series, 2009
5. Devi Shakuntla, ―Book of Num bers‖, 1984
6. Summers George J., ―The Great Book of Puzzles & Teasers‖ , Jaico Publishing House, 1989.

EC-304	PRINCIPLES OF DIGITAL SYSTEM DESIGN	L T P	Cr
		3 0 0	3

OBJECTIVE

To impart knowledge of VHDL is useful in making the various Combinational and Sequential circuits for designing the design circuit can be implemented using FPGA and CPLD Devices. These devices can be programmed according to our requirement by using VHDL.

PRE-REQUISITES

Knowledge of digital electronics

1. **FUNDAMENTALS OF DIGITAL TECHNIQUES**: Digital signal, logic gates: AND, OR, NOT, NAND, EX-XOR, EX-NOR; Boolean algebra; review of number system; binary codes: BCD, Excess-3, Gray, EBCDIC, ASCII; Error detection and correction codes; combinational design using gates: design using gates, Karnaugh map
2. **COMBINATIONAL DESIGN USING MSI DEVICES**: Multiplexers and Demultiplexers and their use as logic elements, decoders, adders / subtractors, BCD arithmetic circuits, encoders, decoders/ drivers for display devices.
3. **SEQUENTIAL CIRCUITS**: Flip-flops: S-R, J-K, T, D, master-slave, edge triggered, shift registers, counters, asynchronous and synchronous ring counters and Johnson counter.
4. **PROGRAMMABLE LOGIC DEVICES**: ROM, PLA, PAL, FPGA and CPLDs.
5. **INTRODUCTION TO VHDL**: Data objects, classes and data types, operators, overloading, logical operators, types of delays entity and architecture declaration, introduction to behavioural, dataflow and structural models.
6. **VHDL STATEMENTS:** Assignment statements, sequential statements and process, conditional statements, generate

statement, case statement array and loops, resolution functions, packages and libraries, concurrent statements,subprograms: application of functions and procedures, structural modelling, component declaration, structural layout and generics, configuration statements.

7. **COMBINATIONAL CIRCUIT DESIGN:** VHDL models and simulation of combinational circuits such as multiplexers, demultiplexers, encoders, decoders,codeconverters,comparators,implementation of Boolean functions, etc.
SEQUENTIAL CIRCUITS DESIGN: VHDL models and simulation of sequential circuits flip flops, shift registers, counters, etc. design implementation using CPLDs and FPGAs.

TEXT BOOK

Jain R. P., ―Modern Digital Electronics‖ , 3rd Edition, Tata McGraw Hill, 2000.

REFERENCE BOOKS
1. Brown and Vranesic, ―Fundamentals of Digital Logic with VHDL Desig n‖ , Tata McGraw Hill, 2000
2. Taub and Schilling, ―Digital Integrated Electronics‖, McGraw Hill, 2008
3. Malvino A. P. and Leach D., ―Digital Principles and Applications‖, McGraw Hill, 1986
4. Mano Morris, ―Digital Design‖, 4th Edition, Prentice Hall of India, 2006
5. IEEE, ―IEEE Standard VHDL Language Reference Manual‖, IEEE Computer Society Press, 1993
6. Chang K. C., ―Digital Design and Modelling with VHDL and Synthesis‖, IEEE Computer Society Press.
7. Roth Charles H., ―Digital System Design using VHDL‖, PWS, 1998
8. Navabi Z., "VHDL-Analysis & Modelling of Digital Systems‖, 2nd Edition. McGraw Hill, 1997
9. Perry, ―VHDL‖, 4th Edition, Tata McGraw Hill, 2002

IT-309	PROGRAMMING USING C#	L T P	Cr
		4 0 0	4

Objective: To impart knowledge of C# programming is useful in making various web and windows applications on .NET framework.

1. **.NET OVERVIEW:** overview of distributed computing; origin of .NET technology; understanding .NET platform; do's and don'ts of .NET; benefits and limitations of .NET approach; building blocks of .NET framework; .NET programming languages; .NET types and .NET namespaces; C# and the .NET.
2. **VISUAL STUDIO .NET AND ITS. MAJOR COMPONENTS:** understanding CLR; CTS and CLS; role of MSIL and Metadata; developing C# Applications using Visual Studio .Net.
3. **INTRODUCTION TO C#:** Evolution of C#; Characteristics of C#; C++ and C#; Java and C#; object-oriented programming using C#; Applications of C#.
4. **C# PROGRAMMING:** Creating a C# program; types in C#; operators; statements and control; classes & objects; inheritance and polymorphism; methods; arrays and strings; interfaces; abstract and base classes.
5. **SPECIAL FEATURES OF C#:** operator overloading; properties and indexers; delegates and their usefulness; attributes; I/O in C#; exception and error handling in C#; C# and windows application.
6. **INTRODUCTION TO ADO .NET:** comparison of ADO and ADO. NET; introduction to data access with ADO.NET; components of ADO.NET; overview of XML; XML and ADO.NET.
7. **WEB DEVELOPMENT AND ASP .NET:** comparison of ASP and ASP .NET; features of ASP .NET; benefits of ASP .NET; web forms and their components; overview of web services.

REFERENCE BOOKS

1. Balaguruswammy, E, "Programming in C#", Tata McGraw Hill
2. Jain, V K, "The Complete Guide to C# Programming", IDG Books India.
3. Pappas & Murray, "C# Essentials", Prentice Hall of India
4. Gunnerson Eric, "A programmer's Introduction to C#", IDG Books
5. Wakefield, "C# and .NET Web Developers Guide", IDG Books India

CS-304	FORMAL LANGUAGES AND COMPILER DESIGN	L T P	Cr
		4 0 0	4

OBJECTIVE: The goal of this course is to provide students with an understanding of basic concepts in the theory of languages and computation. At the end of this course students will be able to:
- Construct finite state machines and the equivalent regular expressions.
- Prove the equivalence of languages described by finite state machines and regular expressions.
- Construct pushdown automata and the equivalent context free grammars.
- Prove the equivalence of languages described by pushdown automata and context free grammars.

- Construct Turing machines and Post machines.
- Prove the equivalence of languages described by Turing machines and Post machine

PRE-REQUISITES: Knowledge of mathematics and Programming Languages

1. **FUNDAMENTAL OF FORMAL LANGUAGES:** Strings, Alphabet, Language, Finite state machine definitions, Mechanism of finite automaton model, deterministic finite automaton (DFA) and non deterministic finite automaton (NFA), transition diagrams, Acceptance of strings and Language recognizers. NFA with null (^) transitions, Conversions and Equivalence of NFA to DFA conversion, Minimization of FSM, Myhill-Nerode theorem for minimization of finite automata.

2. **MEALY AND MOORE MACHINES**: Concept of basic machine, Moore and Mealy Machines; Equivalence of Moore and Mealy Machines, properties and limitations of FSM.

3. **REGULAR LANGUAGES:** Regular sets, Regular expressions, Regular Language, Identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions, Equivalence of Two Finite Automata, Equivalence of Two Regular Expression. Pumping lemma of regular sets, closure properties of regular sets (Proofs not required).

4. **CONTEXT FREE GRAMMARS:** Definition of Context free Grammar (CFG), Left-most and Right-most Derivations and Derivation Tree, Ambiguous grammar; Simplication of Context free Grammar (CFG), Chomsky Normal Form (CNF), Greibach Normal Form (GNF).

5. **PUSHDOWN AUTOMATA:** Introduction to pushdown automata; Mechanism of PDA, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFG and PDA, interconversion (Proofs not required). Designing of pushdown machines (PDA).

6. **TURING MACHINES:** Definition and Mechanism of Turing Machine (TM), Deterministic and non-deterministic Turing machines; Acceptance by Turing Machine (TM), Design of Turing machines; Types of Turing Machines: Universal Turing Machine, Multi-Tape Turing Machine, Multi-head Turing Machine; halting problem of Turing machines, PCP problem. Recursively enumerable languages.

7. **HIERARCHY OF GRAMMARS:** Chomsky hierarchy of grammars: Regular Grammar, Context-free Grammar, Context-sensitive Grammar and Unrestricted Grammar, Relation between languages of classes; Computability: basic concepts, primitive recursive functions.

TEXT BOOK
1. Mishra K. L. P. and Chandrasekaran N., ―Theory of Computer Science - Automata, Languages and Com putations‖, Prentice Hall of India, 2000

REFERENCE BOOKS
1. Hopcroft, Ullman O. D. and Mothw ani R., ―Introduction to Automata Theory, Language & Computations‖, Addison Wesley, 2001
2. Linz Peter, ―Introduction to Formal Languages & Autom ata‖, Narosa Publications, 2001
3. Greenlaw Ramond and Hoover H. James, ―Fundamentals of the Theory of Computation - Principles and Practice‖, Harcourt India Pvt. Ltd., 1998
4. Lewis H. R. and Papaditriou C. H., ―Elements of Theory of Computation‖ , Prentice Hall of India, 1998
5. Martin John C., ―Introduction to Languages and Theory of Computations‖, Tata McGraw Hill, 2003

WEB REFERENCES
1. http://www.comp.nus.edu.sg/~sanjay/cs3231.html
2. http://en.wikipedia.org/wiki/Theory_of_computation
3. http://www.wisdom.weizmann.ac.il/~oded/toc-bi.html.

IT-305	DATA MINING & DATA WAREHOUSING	L T P	Cr
		3 0 0	3

OBJECTIVE

This course introduces basic concepts, tasks, methods, and techniques in data mining. The emphasis is on various data mining problems and their solutions. Students will develop an understanding of the data mining process and issues, learn various techniques for data mining, and apply the techniques in solving data mining problems using data mining tools and systems. Students will also be exposed to a sample of data mining applications.

PRE-REQUISITES

Basic knowledge of data base management system

1. **DATA WAREHOUSING:** Definition, usage and trends. DBMS vs data warehouse; data marts; metadata; multidimensional data mode; data cubes; schemas for multidimensional database: stars, snowflakes and fact constellations.
2. **DATA WAREHOUSE PROCESS AND ARCHITECTURE:** OLTP vs OLAP, ROLAP vs MOLAP; types of OLAP, servers, 3-Tier data warehouse architecture; distributed and virtual data warehouses; data warehouse manager.
3. **DATA WAREHOUSE IMPLEMENTATION:** Computation of data cubes; modelling OLAP data, OLAP queries manager; data warehouse back end tools; complex aggregation at multiple granularities; tuning and testing of data warehouse.
4. **DATA MINING:** Definition and task; KDD versus data mining; data mining techniques, tools and applications.
5. **DATA MINING QUERY LANGUAGES:** Data specification, specifying knowledge; hierarchy specification; pattern presentation and visualization specification; data mining languages and standardization of data mining.
6. **DATA MINING TECHNIQUES:** Association rules; clustering techniques; decision tree knowledge discovery through neural networks and genetic algorithm; rough sets; support vector machines and fuzzy techniques.
7. **MINING COMPLEX DATA OBJECTS:** Spatial databases, multimedia databases, time series and sequence data; mining text databases and mining Word Wide Web.

TEXT BOOK

A nahory Sam and Murray Dennis, ―Data Warehousing In the Real World‖, Pearson Education, 1997

REFERENCE BOOKS
1. Han Jiawei and Kamber Micheline, ―Data Mining - Concepts & T echniques‖, Morgan Kaufmann,
2. Berson Alex, ―Data Warehousing, Data Mining and OLTP‖, Tata McGraw Hill, 1997
3. Pujari Arun K., ―Data Mining T echniqueV, University Press, Hyderabad, 2001
4. Adriaans Pieter and Zantinge Dolf, ―Data Mining‖, Pearson Education, 1997
5. Mallach, ―Data Warehousing System ‖, McGraw Hill, 2000
6. W. H. Inman, ―Building the Data Warehouse‖, John Wiley & Sons, 1996
7. Inman W. H. and Gassey C. L., ―Managing the Data WarehouseV, John Wiley & Sons.
8. Mitchell T. M., ―Data Mining‖, McGraw Hill, 1997

WEB REFERENCES
1. http://databases.about.com/od/datamining/Data_Mi ning_and_Data_Warehousing.htm
2. http://www.anderson.ucla.edu/faculty/jason.frand/t eacher/technologies/palace/datamining.htm
3. http://infogoal.com/dmc/dmcdwh.htm
4. http://www.crm2day.com/data_mining/

IT-402	ADVANCE JAVA	L T P	Cr
		4 0 0	4

OBJECTIVE

To relay the theoretical and practical knowledge of Advanced Java programming language

PRE-REQUISITES

Basic knowledge of programming language and object oriented programming

1. **INTRODUCTION TO CORE JAVA:** Overview of Core Java: Data types; variables; operators; Arrays; Control Statements; Classes & Methods; Inheritance; Package, Multithreading; Exception Handling Applet Programming, I/O Handling
2. **AWT , SWING, COLLETION:** Introduction to AWT: Working with windows, Text, Controls, Layout Mangers, Menus; Swing: JApplet, Icons and Labels, TextFields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Tables; Collection overview: collection interfaces: Collection, List, Set , SortedSet; Collection classes ArrayList, LinkedList, HashSet, LinkedHashSet, TreeSet
3. **JAVA DATA BASE CONNECTIVITY (JDBC):** Introduction; JDBC architecture; Different types of JDBC drivers; JDBC API; Steps for using JDBC: Loading a driver, Connecting to a database, creating and executing JDBC statements, Handling SQL exceptions; Executing DDL & DML commands; Accessing the result sets; creating a JDBC application to query a database; Creating application using advanced features of JDBC: Using the PreparedStatement, Managing database transactions, Creating stored procedures, Using meta data
4. **JAVA BEANS:** Introduction; advantages of java beans; application builder tools; using bean developer kit(BDK); JAR files; Introspection; Developing a simple bean using the BDK; Using bound properties; Using BeanInfo interface; constrained properties; persistence; Customizers; The java bean API; Using bean builder
5. **SERVLETS:** Introduction; The life cycle of a thread; Using Tomcat for servlet development; Simple servlet example; The servlet API; javax.servlet package; reading servlet parameter; javax.servet.http package; handling HTTP requests and responses; Using cookies; Session Tracking; Security issues
6. **JSP:** JSP overview: How JSP works, Basic example; JSP Syntax & Semantics; JSP development model: Components of a JSP page, A complete example; Expressions, Scriplets and declarations page, Request dispatching, Session and Thread management: Session Tracking, Session API, Thread Management , Servlet Thread Model; JSP Custom; Expressions Language; JSP database access with JDBC
7. **STRUTS:** The Struts framework: An introduction to struts, Building a simple struts application; Struts development models: Model 1, MVC architecture; Validator; Tiles; Declarative Exception Handling; Struts Modules

TEXT BOOK

1. Herbert Schildt , "The Complete Reference Java 2 fifth edition", McGraw Hill.

REFERENCE BOOKS

1. Phil Hanna ," The Complete Reference JSP 2.0" Tata McGraw-Hill
2. James Homes," The Complete Reference Struts " Tata McGraw-Hill
3. Balaguruswamy , E., ""Programming with Java", Tata Mcgraw Hill
4. Horetmann Cay and Cornell Gary, "Core JavaTM 2, Volume II – Advanced Features", 7th Edition, Pearson Publisher.
5. "Complete reference JDBC", Tata Mcgraw Hill
6. JDBC Study Material by NIIT

EC-354	DIGITAL SYSTEM DESIGN LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS:
1. Design all gates using VHDL
 2. Write VHDL programs for the following circuits,check the wave forms and the hardware generated
   2.1 half adder
   2.2 full adder
3. Write VHDL programs for the following circuits, check the wave forms and hardware generated
   3.1 multiplexer
   3.2 demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and hardware generated:
   4.1 decoder
   4.2 encoder
5. Write a VHDL program for comparator and check the wave forms and the hardware generated
6. Write a VHDL program for ALU
7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated
8. Write a VHDL program for a counter and check the wave forms and the hardware generated
9. Write a VHDL programs for the following circuits , check the wave forms and hardware generated
   9.1 Register
   9.2 Shift register
10. Implement any three (given above) on FPGA / CPLD kit.

REFERENCE BOOKS:
1. Brown and Vranesic, ―Fundamentals of Digital Logic with VHDL Design‖, Tata McGraw Hill, 2000
2. Roth Charles H., ―Digital System Design using VHDL‖, PWS, 1998

3. Navabi Z., "VHDL-Analysis & Modelling of Digital Systems‖, 2nd Edition. McGraw Hill, 1997

IT-359	PROGRAMMING USING C# LAB	L T P	Cr
		0 0 2	1

LAB EXPERIMENTS :
1. Write a program in C# illustrating the use of sequence, conditional and iteration Construct.
2. Write a program in C# illustrating various operators like logical, arithmetical, relational, etc.
3. Write a program in C# illustrating overloading of various operators.
4. Write a program in C# illustrating use of friend, inline and Static Member functions.
5. Write a program in C# illustrating use of one-dimensional and two-dimensional arrays.
6. Write a program in C# illustrating use of various operations performed on strings.
7. Write a program in C# illustrating use of constructor and various types of Constructors.
8. Write a program in C# illustrating various forms of inheritance.
9. Write a program in C# illustrating use of interfaces.
10. Write a program in C# illustrating use of delegates, events, Properties & indexers.
11. Write a program in C# illustrating use of virtual functions, Virtual base class.
12. Write a program in C# illustrating exception handling.
13. Write a program in C# illustrating simple web applications using ASP.net.
14. Write a program in C# illustrating use of Active X Controls.
15. Write a program to show Database connectivity in C#.

IT-355	DATA MINING AND DATA WAREHOUSING LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS
1. Schematic implementation of a University Data Warehouse (Virtual Data Warehouse)
2. Experiment to include elements of an ETL tool like data scrubbing and loading
3. Implementation of a popular algorithm like Apriori to find association from any market basket dataset
4. Implementation of an Outlier detection mechanism based on any of the standard methods (distance/density, etc.) and demonstration of outliers detected from a standard dataset
5. Use of Regression techniques in making effective prediction
6. How to design effective classifiers using training and testing data
7. Implementation of a popular clustering algorithm like K-Mean, K Medoid or DBSCAN and determination of resultant clusters of a standard dataset like Iris.
8. Methodology to find Principal Components in a dataset
9. Implementation of Kohonen Self Organising Map and how it categorises the data.
10. Computation of Decision Trees and Splitting points for a suitable dataset
11. Implementation of a popular fuzzy clustering algorithm like FCM and determination of resultant clusters of a standard dataset like Iris.
12. A simple experiment to highlight the usefulness of sampling in large scale data mining
13. An experiment to highlight the use of Genetic Algorithms in rule mining or clustering
14. An experiment to highlight the use of Rough Sets in Data Mining

REFERENCE BOOKS
1. Anahory Sam and Murray Dennis, ―Data Warehousing In the Real World‖, Pearson Education, 1997
2. Han Jiawei and Kamber Micheline, ―Data Mining - Concepts & T echniques‖, Morgan Kaufmann, 2001
3. Berson Alex, ―Data Warehousing, Data Mining and OLTP‖, Tata McGraw Hill, 1997
4. Pujari Arun K., ―Data Mining T echniques‖, University Press, 2001
5. Adriaans Pieter and Zantinge Dolf, ―Data Mining‖, Pearson Education, 1997

IT-452	ADVANCE JAVA LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS
1. Program to Program for printing Hello World and find the sum of odd integers between 1 and 99.
2. Program from getting input from keyboard.
3. Program for calling a method using class instance, and create a class fruit with the following attributes:
   - Name of the fruit
   - Single fruit or bunch fruit
   - Price

   Define a suitable constructor and displayFruit() method that displays values of all the attributes. Write a program that creates 2 objects of fruit class and display their attributes.
4. Program that calculates and prints the simple interest using the formula : simple interest =PNR/100 Input values P, N, R should be accepted as command line input as below, e.g. java Simple interest 5 10 15
5. Program (a) that prints prime numbers between 1 to n. Number n should be accepted as command line input,(b) for getting address and name of the computer.
6. Program to sort the elements of an array in ascending order.
7. Program that will contain two arrays on containing the products and the other containing the prices and to display the same
8. Create a user-defined exception class using the extends keyword. Write a constructor for this class that takes a string argument and stores it inside the object with a string handle. Write a method that prints out the stored string. Create a try-catch clause to exercise the created exception.
9. Create a Java program using thread
10. Program to accept two names as command line parameters. Check whether each of them exist in c:\java directory. If it exists, display its name and size, else, display the message that it does not exist. Further, if the extension of the file is ―htm ‖ then it has to be deleted.
11. Create an Applet to display a string ―I am in the centre‖ in Courier font, with size 30 and style and italic. This text should be centered both horizontally and vertically.
12. Create a simple, non-editable combo box with a list of items, when selected one of the items, will display the string to the console and also printing the string which is being deselected, i.e., the string which already been selected.
13. Program through which the insert statement can be given at runtime. Use it to insert the following test data in the master and details tables.
14. Write a Echoserver and Echoclient program that displays whatever is typed in the server on to the client using sockets.
15. Use socket programming to design a client/server application that takes the password as input and checks whether it is correct. The program should print the appropriate message.
16. Using servlet develop a Java program (database connectivity)
17. Using RMI develop a client-server frame

REFERENCE BOOKS

1. Horstmann Cay and Cornell Gary, ―Core Java‖, Volume I - Fundamentals, 8th Edition, Pearson Education,2007
2. Callway Dustin R., ―Inside S ervlets‖ , 2nd Edition, Addison-Wesley Professional, 2001
3. Goodwill James and Bryan Morgan, ―Developing Java S ervlets‖ , 2nd Edition, Techm edia, 2001

PD-393	DEPARTMENTAL PDP / PROBLEM SOLVING SKILL INTRA & INTERPERSONAL SKILLS	L T P	Cr
		0 0 2	1

OBJECTIVE: To equip the students with the basics of law, accounting, corporate policies, and ethics; the general awareness useful in leading a well informed life.

1. **LAW FOR THE LAYMAN**: Indian Judiciary System; Intellectual Property Rights (IPR); labour laws; employee rights; human rights; criminal laws, civil rights.
2. **BASICS OF ACCOUNTING**: Credit-Debit transactions; balance sheet; ledgers; receipts & vouchers; P & L statement; exercises.
3. **MONEY MANAGEMENT**: Types of taxes; how to manage taxes; investment options; an overview of stocks & shares;

savings options; understanding important terms (depreciation, VAT, education cess).
4. **CORPORATE RULES & POLICIES**: The need; advantages; illustrations of certain rules & policies followed by selected corporate; code of conduct.
5. **RIGHTS & DUTIES:** An overview of the Indian constitution; fundamental rights & duties; directive principles of state policy; societal values; ideologies of some famous personalities.
6. **TECHNOLOGY, POLITICS & RELIGIONS IN INDIA**: various religions and their teachings; political developments in India; history of science & technology.
7. **HUMAN VALUES**: Ethics at work place; human values; morals & ethics; professional ethics; case studies.

REFERENCE BOOKS
1. Anthony M.J, —Law for the Laym an‖, Hind Pocket Books, 2003

2. Mathur Reeta, —Recent Trends in Indian Economy ‖, 3 Vol set, Sublime Publication, 2003
3. Eisen J. Peter, —Accounting - The Easy Way‖, Barron's Educational Series, 2003
4. Kiyosaki Robert, and Lechter Sharon, —Rich Dad, Poor Dad‖, Warner Books, 2001
5. Lakhotia R. N, —Income Tax Guide for the Taxpayer‖, Vision Books, 2009

NOTE: One trainer per lecture and two trainers per practical session. Classroom with board/projector for PPT and video clips will be required.

PD-391	CO-CURRICULAR ACTIVITIES	L T P	Cr
			1

Refer to PD-191 for details.
OBJECTIVE: To train and enhance the students' problem solving skills, reasoning ability, quantitative ability, and reading comprehension skills.
1. **LOGICAL REASONING**: Logical deductions (Syllogism & Venn Diagrams); logical connectives.
2. **ANALYTICAL REASONING**: Seating arrangements; combinations ; selections; comparisons; blood relations directions, etc.
3. **NON-VERBAL REASONING (ALPHA-NUMERIC & VISUAL PUZZLES):** To solve problems on numbers, alphabet, symbols and visuals; problem types are series, analogies, odd man out, coding decoding, and symbols & notations.
4. **BUSINESS MATHS**: Number system; ratios; averages; time & work; time & distance; percentages; profit & loss; simple & compound interest.
5. **HIGHER MATHS:** Algebra; Mensuration.
6. **DATA INTERPRETATION & SUFFICIENCY**: Tables, Bar chart, line graph, pie charts; to enable student assess whether the given data is sufficient to solve a question; for both reasoning based and quant based problems.
7. **READING COMPREHENSION**: To enable a student comprehend short and long passages from the perspective of solving questions based on the passage.

REFERENCE BOOKS
1. Aggarwal R. S., —Verbal & Non-Verbal Reasoning ‖, 2008, S. Chand, 1994
2. Aggarwal R. S., —Quantitative Aptitude for Competitive Examinations‖, S . Chand, 2008
3. Gulati, SL, —Quantitative Ability‖, Bookhive India, 2006
4. GRE Barron's‖, 13th Edition, Barron's Educational Series, 2009
5. Devi Shakuntla, —Book of Num bers‖, 1984
6. Summers George J., —The Great Book of Puzzles & Teasers‖ , Jaico Publishing House, 1989.

DETAILED SYLLABUS (4th Year)

IT-422	COMPUTER SOFTWARE TESTING	L T P	Cr
		3 0 0	3

OBJECTIVE
To develop deep understanding about computer software testing methodologies and tools

PRE-REQUISITES
Knowledge of programming, software engineering, software project management

1. **FUNDAMENTALS AND TESTING TYPES:** First, second and later cycles of testing, Objectives and limits of testing, Overview of software development stages, Planning and Design stages and testing during these stages. Glass box code, Regression and Black box testing, Software errors, Categories of software error

2. **REPORTING AND ANALYZING BUGS:** Problem reports, Content and Characteristics of Problem Report, analysis and Tactics for analyzing a reproducible bug, Making a bug reproducible

3. **PROBLEM TRACKING SYSTEM:** Objective of Problem Tracking System, tasks of the system, Problem tracking overview, users of the tracking system, mechanics of the database

4. **TEST CASE DESIGN:** Characteristics of a good test, equivalence classes and boundary values, visible state transitions, Race conditions and other time dependencies, load testing. Error guessing, Function equivalence testing, Regression Testing, General issues in configuration testing, printer testing

5. **LOCALIZATION AND USER MANUALS TESTING:** Translated text expands, Character sets, Keyboards, Text filters, Loading, saving, importing, and exporting high and low ASCII, Operating system Language, Hot keys, Error message identifiers, Hyphenation rules, Spelling rules, Sorting Rules, Uppercase and Lowercase conversion, Printers, Sizes of paper, CPU's and video, Rodents, Data formats and setup options, Rulers and measurements, Culture-bound Graphics and output, European product compatibility, Memory availability, automated testing, Testing User Manuals, Effective documentation, documentation tester's objective, How testing documentation contributes to software reliability

6. **TESTING TOOLS AND TEST PLANNING**: Fundamental tools, Automated acceptance and regression tests, standards, Translucent box testing Overall objective of the test plan: product or tool? Detailed objective, type of test, strategy for developing components of test planning documents, components of test planning documents, documenting test materials

7. **MANAGEMENT ISSUES OF TESTING:** Software Development tradeoffs and models, Quality-related costs, The development time line, Product design, alpha, Pre-beta, Beta, User Interface freeze, Pre- final, Final integrity testing, Project post-mortems, Legal consequences of defective software, Managing and role of a testing group, independent test agencies

TEXT BOOK
Cem Kaner, Jack Falk and Hung Quoc Nguyen, ―Testing Computer Software‖, 2nd Edition, Wiley, 1999.

REFERENCE BOOKS

1. Craig, Jaskiel, ―Systematic Software Testing‖, Artech House, 2002
2. Aditya P. Mathur, ―Foundation of Software Testing ‖, 1st Edition, Pearson Education, 2008
3. Bauersfeld, ―Software by Design: Creating People Friendly Software‖, M&T Books, New York, 1994
4. Beck, ―Test Driven Development‖, Addison-Wesley Signature Series, Library of Congress Catalogingin-Publication, 5th Edition, 2004.
5. Elfriede Dustin, ―Effective Software Testing: 50 Specific Ways to Improve Your Testing ‖, 1st Edition, Addison-Wesley, 2002.
6. Freedman, Weinberg, ―Handbook of Walkthroughs, Inspections & Technical Reviews‖, 3rd Edition, Dorset House, 1990.

WEB REFERENCES

1. en.wikipedia.org/wiki/Software_testing
2. www.uxd.com

CS-402	ARTIFICIAL INTELLIGENCE	L T P	Cr
		4 0 0	4

OBJECTIVE: To introduce about artificial intelligence approaches to problem solving, various issues involved and application areas

PRE-REQUISITES: Knowledge of neural networks, data structures

1. **INTRODUCTION TO AI AND SEARCH TECHNIQUES**: Foundation and history of AI; data, information and knowledge; AI problems and techniques – AI programming languages, problem space representation with examples; blind search strategies, breadth first search, depth first search, heuristic search techniques: hill climbing: best first search, A * algorithm AO* algorithm, Means-ends analysis.
2. **KNOWLEDGE REPRESENTATION ISSUES:** predicate logic; logic programming; constraint propagation; representing knowledge using rules.
3. **REASONING UNDER UNCERTAINITY:** Reasoning under uncertainty, non monotonic reasoning; Review of probability; Bayes'probabilistic interferences and Dempster Shafer theory; heuristic methods; symbolic reasoning under uncertainty; statistical reasoning, fuzzy reasoning.
4. **PLANNING & GAME PLAYING:** Minimax search procedure; goal stack planning; non linear planning, hierarchical planning, planning insituational calculus; representation for planning; partial order planning algorithm.
5. **LEARNING:** Basic concepts; rote learning, learning by taking advices, learning by problem solving, learning from examples, discovery as learning, learning by analogy; explanation based learning; neural nets; genetic algorithms.
6. **OTHER KNOWLEDGE STRUCTURES:** semantic nets, partitioned nets, parallel implementation of semantic nets; frames, common sense reasoning and thematic role frames; architecture of knowledge based system; rule based systems; forward and backward chaining; frame based systems.
7. **APPLICATIONS OF ARTIFICIAL INTELLIGENCE:** Principles of natural language processing; rule based systems architecture; expert systems, knowledge acquisition concepts; AI application to robotics, and current trends in intelligent systems; parallel and distributed AI: psychological modeling, parallelism in reasoning systems, distributed reasoning systems and algorithms

TEXT BOOK
Rich Elaine and Knight Kevin, ―Artificial Intellig ence‖ 3rd Edition, Tata McGraw Hill, 1991

REFERENCE BOOKS
1. Nilson Nils J., ―Artificial Intelligence‖, McGraw-Hill, New York 1971
2. Russell Stuart and Norvig Peter, ―Artificial Intelligence: A Modern Approach‖, Prentice Hall of India, 1998
3. Negnevitsky, ―Artificial Intelligence: A Guide to Intelligent System ‖, Pearson Education, 2004.
4. Patterson O. W., ―Introduction to Artificial Intelligence & Expert Systems‖, Prentice Hall of India, 1996.
5. Winston Patrick Henry, ―Artificial Intellig ence‖, 3rd Edition, Addition Wesley, 1992
6. Clockson & Mellish, ―Programming PROLOG‖, 3rd Edition, Narosa Publications, 2002.

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1. http://wwwformal.stanford.edu/jmc/whatisai/
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3. www.imdb.com.

CS-403	SOFT COMPUTING TECHNIQUES	L T P	Cr
		3 0 0	3

OBJECTIVE : To introduce about incorporating more mathematical approach (beyond conventional logic system) into the artificial intelligence approaches for problem solving such as fuzzy logic, genetic algorithms, etc.

PRE-REQUISITES : Knowledge of mathematics, statistics and probability

1. **INTRODUCTION:** Comparison of soft computing methods: neural networks, fuzzy logic, and genetic algorithm with conventional artificial intelligence (hard computing).
2. **NEURAL NETWORKS INTRODUCTION AND ARCHITECTURE:** Neural Networks: H istory, overview of biological Neuro-system, Mathematical Models of Neurons ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta. Associative Memories,Kohonen selforganizing networks, Hebbian learning,Hopfield network.

3. **BACK PROPOGATION NETWORKS :** Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.Radial basis function networks.
4. **FUZZY SET THEORY:** Basic definition and terminology; basic concepts of fuzzy logic; set theoretic operators; membership functions: formulation and parameterization; fuzzy union, intersection and complement; fuzzy rules and fuzzy reasoning; fuzzy inference systems: Mamdani and Sugeno fuzzy models, fuzzy associative memories.
5. **NEURO-FUZZY MODELLING:** Adaptive neuro-fuzzy inference systems; neuro-fuzzy controller-feedback control; expert control; back propagation through time and real-time recurrent learning; reinforcement learning control; gradient-free optimization.
6. **NEURO-FUZZY CONTROLLER IN ENGINEERING APPLICATIONS:** Fuzzy logic in control engineering-Mamdani and Sugeno architecture for fuzzy control; analytical issues in fuzzy logic control; fuzzy logic in intelligent agents; fuzzy logic in mobile robot navigation and its application in different areas
7. **GENETIC ALGORITHMS:** Basics of genetic algorithms; design issues in genetic algorithm; genetic modeling; hybrid approach; GA based fuzzy model identification; fuzzy logic controlled genetic algorithm.

TEXT BOOK

Introduction to Soft Computing – S.N.Sivanandan and Deepa – Wiley Publications
REFERENCE BOOKS

1. Rajasekharan S. and Vijayalakshmi Pai S. A., "Neural Networks, Fuzzy Logic & Genetic Algorithms", Prentice-Hall of India, 2003
2. Kecman Vojislav, "Learning and Soft Computing", MIT Press, 2001
3. Introduction to soft computing –Sivanandam and Deepa..
4. Konar Amit, "Artificial Intelligence and Soft Computing – Behavioural and Cognitive Modeling of the Human Brain", Special Indian Edition, CRC Press, 2008
5. Goldberg David E., "Genetic Algorithms", Pearson Education, 2003.
6. Sivanandam, "Introduction to Neural Networks with MATLAB 6.0", Tata McGraw Hill
7. Kumar Satish, "Neural Networks: Classroom Approach", Tata McGraw Hill
8. Yen John and Langari Reza, "Fuzzy Logic, Intelligence, Control, and Information", Pearson Education, 2003.
9. Zurada Jack N., "Introduction to Neural Networks", Jaico Publishers.
10. Haykin Simon, "Neural Networks", Prentice Hall, 1993/Pearson Education, 1999.
11. Koza J., "Genetic Programming", MIT Press, 1993

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1. http://www.helsinki.fi/~niskanen/sc2000.html
2. http://en.wikipedia.org/wiki/Soft_computing
3. http://www.softcomputing.es/en/home.php
4. http://www.springerlink.com/content/101181/

CS-452	ARTIFICIAL INTELLIGENCE LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS
1. Study of Prolog programming language
2. Write programs to use iterative structures using Prolog (at least 3 programs)
3. Write programs to demonstrate inferencing/ deductive logic using Prolog (at least 3 programs)
4. Write a program to solve 8 queens problem using Prolog.
5. Solve any problem using depth first search using Prolog.
6. Solve any problem using best first search using Prolog.
7. Solve 8-puzzle problem using best first search using Prolog
8. Solve Robot (traversal) problem using means End Analysis using Prolog.
9. Solve traveling salesman problem using Prolog.
10. Write program to exhibit the ability of building an Expert System using Prolog
11. Study the properties and issues of Natural Language Processing
12. Study the grammar mapping issues in language translation from English to Hindi and vice versa

REFERENCE BOOKS
1. Clockson & Mellish, ―Programming PROLOG‖, Narosa Publications, 3rd Edition, 2002.
2. Winston Patrick Henry, ―Artificial Intellig ence‖ , 3rd Edition, Addition Wesley, 1992

CS-453	SOFT COMPUTING TECHNIQUES LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. To perform Union,Intersection and Complement operations.
2. To implement De-Morgan's Law
3. To plot various membership functions.
4. To implement FIS Editor. Use Fuzzy toolbox to model tip value that is given after a dinner based on quality and   service.
5. To implement FIS Editor.
6. Write a program to calculate simple addition and subtraction of fuzzy sets.
7.Write a program in C which reads the score of 20 students in a programming class out of 100
8..Generate ANDNOT function using McCulloch-Pitts neural net.
9. Generate XOR function using McCulloch-Pitts neural net.
10. Hebb Net to classify two dimensional input patterns in bipolar with given targets.
11. Perception net for an AND function with bipolar inputs and targets.
12. To calculate the weights for given patterns using heteroassociative neural net.
13. To store vector in an auto-associative net. Find weight matrix & test the net with input
14. To store the vector ,find the weight matrix with no selfconnection.Test this using a discrete Hopfield net.
15.Write a M-file for XOR function(binary input and output)with momentum factor
using back propagation algorithm.

TEXT BOOK
Introduction to Soft Computing – S.N.Sivanandan and Deepa – Wiley Publications

REFERENCE BOOKS

1. Rajasekharan S. and Vijayalakshmi Pai S. A., "Neural Networks, Fuzzy Logic & Genetic Algorithms", Prentice-Hall of India, 2003
2. Kecman Vojislav, "Learning and Soft Computing", MIT Press, 2001
3. Introduction to soft computing –Sivanandam and Deepa..
4. Konar Amit, "Artificial Intelligence and Soft Computing – Behavioural and Cognitive Modeling of the Human Brain", Special Indian Edition, CRC Press, 2008
5. Goldberg David E., "Genetic Algorithms", Pearson Education, 2003.

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1. http://www.helsinki.fi/~niskanen/sc2000.html
2. http://en.wikipedia.org/wiki/Soft_computing
3. http://www.softcomputing.es/en/home.php
4. http://www.springerlink.com/content/101181/

LIST OF DEPARTMENT ELECTIVE 1

CS-422	CRYPTOGRAPHY AND DATA COMPRESSION	L T P	Cr
		3 0 0	3

OBJECTIVE: The course will attempt to dispel some of the many myths that surround the idea of cryptography. Cryptography is (and will continue to be) an increasingly important area of IT and it is important that practitioners are aware of the realities of the subject. The course will provide a down-to-earth overview of cryptographic techniques applicable in an IT environment, and outline the constraints and limitations of *realistic* secure systems. A running theme is the tradeoff between usability and security of a system. Also covered are a number of compression techniques - data compression and data encryption are, in some respects, closely related. A working knowledge of C is assumed and essential.

PRE-REQUISITES: Knowledge of cryptography, analysis & design algorithms and mathematics

1. **INTRODUCTION:** Basics of cryptography; history; usefulness of compression techniques
2. **COMPRESSION**: Packing, Huffman coding, Run length encoding, Lempel-Ziv-Welch, PKZIP, Delta modulation, JPEG; latest compression techniques
3. **ERROR DETECTION AND CORRECTION**: Parity, 1, 2, n-dimensions, Hamming codes, p-out-of-q codes
4. **CRYPTOGRAPHY:** vocabulary; history; steganography - visual textual, cipher hiding, false errors; public key cryptography – authentication; signatures; deniability
5. **MATHEMATICS**: information; confusion; diffusion; modular arithmetic; inverses; Fermats little theorem; Chinese remainder theorem, factoring; prime numbers; discrete logarithms
6. **ALGORITHMS**: DES, AES (Rijndael), IDEA, One time pad, Secret sharing and splitting, RSA, Elliptic curves, Modes, Random numbers
7. **ATTACKING SYSTEMS**: Recognition, Destroying data, Cryptanalysis - Differential cryptanalysis - cracking DES

TEXT BOOK

B. Schneier, ―Applied Cryptography: Protocols, Algorithms and Source Code in C‖, 2nd edition, Wiley, 1996.

REFERENCE BOOKS
1. Suhas Desai, ―Security in Computing ‖, Pearson Education, 2010
2. ―Integration of Data Compression and Cryptography: Another Way to Increase the Information S ecurity‖, IEEE Computer Society Volume 2, 2007
3. W. Trappe and L. Washington, ―Introduction to Cryptog raphy‖, 2nd edition, Pearson Education, 2006

WEB REFERENCES
1. http://www.data-compression.com/index.shtml
2. http://www.webopedia.com/TERM/D/data_compres sion.html
3. http://en.wikipedia.org/wiki/Data_compression
4. http://www.debugmode.com/imagecmp/

CS-431	ADVANCED COMPUTER ARCHITECTURE	L T P	Cr
		3 0 0	3

OBJECTIVE

To introduce various technological aspects about parallelism in super computing, microprocessors supporting such high scale computing, other hardware architectures, ultimately leading to high performance computing through grid computing.

PRE-REQUISITES

Knowledge of digital electronics, digital system design, computer networks and computer organization & architecture

1. **PARALLEL COMPUTER MODELS:** The state of computing, multiprocessors and multicomputer; multi-vector and SIMD computers; architectural development tracks.
2. **PROGRAM AND NETWORK PROPERTIES:** Conditions of parallelism; data and resource dependences; hardware and software parallelism; program partitioning and scheduling; grain size and latency; program flow mechanisms; control flow versus data flow, data flow architecture; demand driven mechanisms; comparisons of flow mechanisms
3. **SYSTEMS INTERCONNECT ARCHITECTURES:** Network properties and routing, static interconnection networks; dynamic interconnection networks; multiprocessor system interconnects; hierarchical bus systems; crossbar switch and multiport memory; multistage and combining network.
4. **PROCESSORS AND MEMORY HIERARCHY:** Advanced processor technology; instruction-set architectures; CISC scalar processors; RISC scalar processors; superscalar processors, VLIW architectures; vector and symbolic processors memory technology: hierarchical memory technology, inclusion, coherence and locality, memory capacity planning, virtual memory technology
5. **BACKPLANE BUS SYSTEM:** Backplane bus specification; addressing and timing protocols; arbitration transaction and interrupt; cache addressing models; direct mapping and associative caches.
6. **PIPELINING:** Linear pipeline processor; nonlinear pipeline processor; instruction pipeline design; mechanisms for instruction pipelining; dynamic instruction scheduling; branch handling

techniques; arithmetic pipeline design; computer arithmetic principles; static arithmetic pipeline, multifunctional arithmetic pipelines.

7. **VECTOR PROCESSING PRINCIPLES:** Vector instruction types; vector-access memory schemes; synchronous parallel processing: SIMD architecture and programming principles; SIMD parallel algorithms; SIMD computers and performance enhancement

TEXT BOOK

Hwang Kai and Briggs A., ―Advanced Computer Architecture‖, Tata McGraw Hill, 2008

REFERENCE BOOKS

1. Hennessy John L. and Patterson David A., ―Computer Architecture: A Quantitative Approach‖, 3rd edition, 2002
2. Flynn Michael J., ―P ipelined and Parallel Processor Desig n‖, Narosa Publications, Reprint 2009
3. Hwang Kai and Briggs A., ―Computer Architecture and Parallel P rocessing ‖, McGraw- Hill, 1990
4. Sima Dezso, Fountain Terence and Kacsuk Peter, ―Advanced Computer Architectures‖, Pearson Education

WEB REFERENCES

1. http://www.doc.ic.ac.uk/~phjk/AdvancedCompArchi tecture/Lectures/
2. http://www.ecs.syr.edu/faculty/ercanli/cse661/
3. http://cs.binghamton.edu/~nael/classes/cs325/

CS-432	NATURAL LANGUAGE PROCESSING	L T P	Cr
		3 0 0	3

Objective:- To motivate understanding of issues related to natural language understanding, generation and translation, which ultimately linked to machine learning, computer vision and expert systems. This course provides an introduction to the field of computational linguistics, also called natural language processing (NLP) - the creation of computer programs that can understand and generate natural languages (such as English). Natural language understanding as a vehicle will be used to introduce the three major subfields of NLP: syntax (which concerns itself with determining the structure of an utterance), semantics (which concerns itself with determining the explicit truth-functional meaning of a single utterance), and pragmatics (which concerns itself with deriving the context-dependent meaning of an utterance when it is used in a specific discourse context). The course will introduce both knowledge-based and statistical approaches to NLP, illustrate the use of NLP techniques and tools in a variety of application areas, and provide insight into many open research problems.

PRE-REQUISITES

Knowledge of theory of computations

1. **INTRODUCTION TO NATURAL LANGUAGE UNDERSTANDING**: The study of language; applications of NLP; evaluating language understanding systems; different levels of language analysis; representations and understanding; organization of natural language understanding systems; linguistic background: an outline of English syntax.
2. **GRAMMARS AND PARSING:** Grammars and sentence structure; top-down and bottom-up parsers; transition network grammars; top-down chart parsing; feature systems and augmented grammars: basic feature system for English
3. **MORPHOLOGICAL ANALYSIS AND THE LEXICON**: Brief review of regular expressions and automata; finite state transducers; parsing with features; augmented transition networks
4. **GRAMMARS FOR NATURAL LANGUAGE**: Auxiliary verbs and verb phrases; movement phenomenon in language; handling questions in context-free grammars; hold mechanisms in ATNs.
5. **HUMAN PREFERENCES IN PARSING**: Encoding uncertainty; deterministic parser; word level morphology and computational phonology; basic text to speech; introduction to HMMs and speech recognition, parsing with CFGs; probabilistic parsing; representation of meaning.
6. **AMBIGUITY RESOLUTION**: Statistical methods; estimating probabilities; part-of- speech tagging; obtaining lexical probabilities; probabilistic context- free grammars; best first parsing.
7. **SEMANTICS AND LOGICAL FORM**: Word senses and ambiguity, encoding ambiguity in logical form, semantic analysis; lexical semantics; word sense; disambiguation; discourse understanding; natural language generation, Indian language case studies.

TEXT BOOK

Allen James, ―Natural Language Understanding ‖, 2nd edition, Pearson Education, 2003.

REFERENCE BOOKS

1. Winograd Terry, ―Language as a Cognitive P rocess‖, Addison Wesley, 1983
2. G azder G., ―Natural Language Processing in Prolog‖, Addison Wesley, 1989

3. Arbib Mdlj and Kfaury, ―Introduction of Formal Language T heory‖, Springer Verlag, 1988
4. Jurafsky D. and Martin J. H., ―Speech and Language P rocessing ‖, Pearson Education, 2002.
5. Manning Christopher D. and Schütze Hinrich, ―Foundations of Statistical Natural Language P rocessing ‖, The MIT Press, Cambridge, Massachusetts. 1999.

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1. http://www.cse.unt.edu/~rada/CSCE5290/
2. http://www.bowdoin.edu/~allen/nlp/
3. http://www.encyclopedia.com/doc/1G1- 1 60760429.html

CS-433	COMPUTER VISION/ IMAGE PROCESSING	L T P	Cr
		5 0 0	3

OBJECTIVE

To introduce the student to computer vision algorithms, methods and concepts this will enable the student to implement computer vision systems with emphasis on applications and problem solving.

PRE-REQUISITES
Introduction to image processing

1. **RECOGNITION METHODOLOGY:** Conditioning; labeling; grouping; extracting, matching; edge detection; gradient based operators; morphological operators; spatial operators for edge detection; thinning, region growing, region shrinking; labeling of connected components.
2. **BINARY MACHINE VISION:** Thresholding; segmentation; connected component labeling, hierarchal segmentation; spatial clustering; split and merge; rule-based segmentation; motion- based segmentation
3. **AREA EXTRACTION:** Concepts; data-structures; edge; line-linking; Hough transform; line fitting; curve fitting (least-square fitting);**Region Analysis:** Region properties, external points, spatial moments; mixed spatial; gray-level moments; boundary analysis: signature properties, shape numbers.
4. **FACET MODEL RECOGNITION:** Labeling lines; understanding line drawings; classification of shapes by labeling of edges; recognition of shapes; consisting labeling problem; backtracking; perspective projective geometry; inverse perspective projection; photogrammetric – from 2D to 3D, Image matching: Intensity matching of ID signals, matching of 2D image, Hierarchical image matching.
5. **OBJECT MODELS AND MATCHING**: 2D representation, Global vs. Local features. General Frame Works For Matching: Distance relational approach, Ordered structural matching, View class matching, Models database organization
6. **GENERAL FRAME WORKS:** Distance –relational approach, Ordered –Structural matching, View class matching, Models database organization.
7. **KNOWLEDGE BASED VISION:** Knowledge representation, Control-strategies, Information integration.

TEXT BOOK

Forsyth David A. and Ponce Jean, ―Computer Vision: A Modern Approach‖, Prentice Hall, 2003.

REFERENCE BOOKS
1. Jain R., Kasturi R. and S chunk B. G., ―Machine Vision‖, McGraw-Hill, 1995.
2. Sonka Milan, Hlavac Vaclav and Boyle Roger, ―Image Processing, Analysis, and Machine Vision‖ , Thomson Learning, 2006
3. H aralick Robert and Shapiro Linda, ―Computer and Robot Vision‖, Vol. I and II, Addison-Wesley, 1993

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2. http://www.cs.rochester.edu/~nelson/courses/visio n/notes/notes.html
3. http://www.cogs.susx.ac.uk/courses/compvis/index .html

CS-434	EXPERT SYSTEM	L T P	Cr
		5 0 0	3

OBJECTIVE
To educate the students about theory behind Expert system and how they fit into the scope of computer science; that is the logic, probability, data structures, AI, and other topic that form the theory of expert system **PREREQUISITES**

Knowledge of Artificial Intelligence and PROLOG

1. **INTRODUCTION TO EXPERT SYSTEM:** Introduction; characteristics; development of expert system technology; applications and domains; languages, shells and tools; elements, production systems.
2. **THE REPRESENTATION OF KNOWLEDGE:** Introduction; the meaning of knowledge; productions; semantic nets, object-attribute-value triples; frames; logic and sets; propositional logic; the first order predicate logic; quantifiers
3. **EXPERT SYSTEMS ARCHITECTURES:** Introduction; rule based system architecture; non production system architectures; dealing with uncertainty; knowledge acquisition and validation; knowledge system building tools
4. **METHOD OF INFERENCE:** Introduction; trees, lattices and graphs; state and problem spaces; rules of inference; first order predicate logic; logic systems; resolution; resolution systems and deductions; forward and backward chaining
5. **REASONING UNDER UNCERTAINTY:** Introduction; uncertainty; types of error; errors and induction; probabilities; hypothetical reasoning and backward induction; temporal reasoning and markov chains; uncertainty in inference chain
6. **INEXACT REASONING:** Introduction; uncertainty and rules; certainty factors; Dempster–Shafer Theory; approximate reasoning; the state of uncertaint
7. **DESIGN OF EXPERT SYSTEM:** Introduction; stages in the development of an expert system; errors in development stages; software engineering and expert system; the expert system life cycle; a detailed life cycle model.

TEXT BOOK

Giarratano Riley, ―Expert Systems: Principles and Programming‖, 3rd Edition, Thomson Brooks/Cole, 1989

REFERENCE BOOKS
1. Darlington K, ―The Essence of Expert Systems‖, Prentice Hall, 2000
2. Patterson Dan W., ―Introduction to Artificial and Expert Systems‖, Prentice Hall of India, 2002
3. Jean-Louis Ermine, ―Expert Systems: Theory and Practice‖, Prentice Hall of India, 2001
4. Waterman Donald A., ―A Guide to Expert Systems‖, 1st edition, Pearson Education, 1986.

CS-435	ROBOTICS	L T P	Cr
		3 0 0	3

OBJECTIVE

The goal of the course is to familiarize the students with the concepts and techniques in robot anipulator control, enough to evaluate, chose, and incorporate robots in engineering systems.

PRE-REQUISITES

Exposure to linear algebra and matrix operations, programming in a high level language

1. **ROBOTIC MANIPULATION**: Automation and robots; classification; application; specification; notations.
2. **DIRECT KINEMATICS**: Dot and cross products, co-ordinate frames; rotations; homogeneous; coordinates; link co-ordination arm equation, (five- axis robot, four axis robot, six axis robot).
3. **INVERSE KINEMATICS**: General properties of solutions tool configuration; five axis robots, three- four axis; six axis robot (inverse kinematics).
4. **WORKSPACE ANALYSIS AND TRAJECTORY PLANNING WORK:** envelop and examples, workspace fixtures; pick and place operations; continuous path motion; interpolated motion, straight-line motion
5. **ROBOT VISION:** Image representation, template matching; polyhedral objects; Shane analysis, segmentation (Thresholding, region labeling, shrink operators, swell operators, Euler numbers, perspective transformation, structured illumination, camera calibration).
6. **TASK PLANNING**: Task level programming; uncertainty; configuration; space; gross motion; planning; grasp planning; fine-motion planning; simulation of planer motion; source and goal scenes; task planner simulation.
7. **MOMENTS OF INERTIA, PRINCIPLES OF NC AND CNC MACHINES.**

TEXT BOOK

Shilling Robert, ―Fundamentals of Robotics-Analysis and Control‖, Prentice Hall of India, 2009.

REFERENCE BOOKS
1. Fu,Gonzales and Lee, ―Robotics‖, McGraw Hill, 2009.
2. Craig J.J., ―Introduction to Robotics‖, Prentice Hall of India, 1989
3. Ghoshal, ―8051 Micro Controller & interfacing ‖, Pearson Education, 2008
4. Staug hard, ―Robotics and Artificial Intellig ence‖, Prentice Hall of India, 2009.
5. Grover, Wiess, Nagel and Odere y, ―Industrial Robotics‖, McGraw Hill, 2008.
6. Stdder Walfram, ―Robotics and Mechatronics‖, Tata McGraw Hill

7. Niku S. B. , ―Introduction to Robotics‖ , Pearson Education, 2001
8. Klafter R. D., Chmielewski T. A. and Negin M., ―Robot Eng ineering ‖, Prentice Hall of India, 1994
9. Mittal R. K. and Nagrath I. J., ―Robotics and Control‖, Tata McGraw Hill, 2003

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1. http://en.wikipedia.org/wiki/Robotics
2. http://www.transitport.net/Lists/Robotics.in.Japan.html
3. http://www-formal.stanford.edu/jmc/whatisai/

CS-441	ADVANCED DATABASE MANAGEMENT SYSTEMS	L T P	Cr
		3 0 0	3

OBJECTIVE

To bring out various issues related to advanced computing with respect to database management systems such as parallelism in implementation, data backup and recovery management, intelligent data mining techniques, standards, etc.

PRE-REQUISITES: Knowledge ofdatabase management systems

1. **DATA MODELS**: EER model and relationship to the OO model; object oriented data model and ODMG standard; other data models - NIAM, GOOD, ORM
2. **QUERY OPTIMISATION**: Query execution algorithms; heuristics in query execution; cost estimation in query execution; semantic query optimisation; database transactions and recovery procedures: transaction processing concepts, transaction and system concepts, desirable properties of a transaction, schedules and recoverability, serializability of schedules; transaction support in SQL; recovery techniques; database backup; concurrency control, locking techniques for concurrency control, concurrency control techniques; granularity of data items
3. **CLIENT/SERVER COMPUTING**: Client/Server concepts; 2-tier and 3-tier client/server systems; client/server architecture and the internet; client /database server models; technology components of client/server systems; application development in client/server systems
4. **DISTRIBUTED DATABASES**: Reliability and commit protocols; fragmentation and distribution; view integration; distributed database design; distributed algorithms for data management; heterogeneous and federated database systems
5. **DEDUCTIVE DATABASES**: Recursive queries; Prolog/Datalog notation; basic inference mechanism for logic programs; deductive database systems; deductive object oriented database systems
6. **DATA WAREHOUSING:** Basic concepts; data warehouse architecture; data characteristics; reconciled data layer data transformations; derived data layer user interface.
7. **COMMERCIAL AND RESEARCH PROTOTYPES**: Parallel database; multimedia database, mobile database; digital libraries; temporal database

TEXT BOOK

Ramakrishnan Rag hu, ―Database Management System‖, McGraw Hill, 3rd Edition, 2003

REFERENCE BOOKS
1. Elmasri R. and Navathe S. B., ―Fundamentals of Database Systems‖, 3rd Edition, Addison Wesley, Low Priced Edition, 2000.
2. Tamer M. and Valduricz, ―Principles of Distributed Database Systems‖, 2nd Edition, LP E Pearson Edition.
3. Silbershatz A., Korth H. F. and Sudarshan S., ―Database System Concepts‖, 3rd Edition, McGraw-Hill, International Edition, 1997.
4. DesD Bipin C., ―An Introduction to Database Systems‖, Galgotia Publications.
5. lioffer Feffray A., Prescotl Mary B.and McFadden Fred R., ―Modern Database Manag em ent‖, 6th Edition,
6. Pearson Education.
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1. www.cse.iitb.ac.in/dbms
2. www.idt.com/products
3. www.developers.net/tsearch?searchkeys=database
4. www.pdf-word.net/

CS-442	DIGITAL IMAGE PROCESSING	L T P	Cr
		3 0 0	3

OBJECTIVE

To introduce the students about the basic concepts and analytical methods of processing digital signals, especially, the images and imaging part; to understand the properties of static and streaming images/video.

PRE-REQUISITES

Knowledge of data compression, discrete structures, digital signal processing, computer graphics

1. **INTRODUCTION AND DIGITAL IMAGE FUNDAMENTALS:** Origins of digital image processing; examples of fields that use digital image processing; fundamentals steps in image processing; elements of digital image processing systems; image sampling and quantization; some basic relationships like neighbors; connectivity, distance measures between pixels; linear and non linear operations.
2. **IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN:** Some basic gray level transformations; histogram processing; enhancement using arithmetic and logic operations; basics of spatial filters, smoothening and sharpening spatial filters, combining spatial enhancement
3. **IMAGE ENHANCEMENT IN THE FREQUENCY DOMAIN:** Introduction to Fourier transform and the frequency domain, smoothing and sharpening frequency domain filters; homomorphism filtering; image restoration: a model of the image degradation / restoration process, noise models, restoration in the presence of noise only spatial filtering, periodic noise reduction by frequency domain filtering; linear position-invariant degradations; estimation of degradation function; inverse filtering; Wiener filtering, constrained least square filtering, geometric mean filter; geometric transformations.
4. **IMAGE COMPRESSION:** Coding; inter-pixel and psycho visual redundancy; image compression models; elements of information theory; error free compression; lossy compression; image compression standards.
5. **IMAGE SEGMENTATION:** Detection of discontinuities; edge linking and boundary detection; Thresholding; regionoriented segmentation; motion based segmentation
6. **REPRESENTATION ANDDESCRIPTION:** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms**.**
7. **OBJECT RECOGNITION:** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

TEXT BOOK
Jain A. K., ―Digital Image P rocessing ‖, Prentice Hall of India, 1995

REFERENCE BOOKS
1. Gonzalez Rafael C. and Woods Richard E., ―Digital Image Processing‖, 2nd edition, Pearson Education, 2002
2. J ahne Bernd, ―Digital Image P rocessing ‖, 5th Ed., Springer, 2000
3. Pratt William K., ―Digital Image Processing: P iks Inside‖, John Wiley & Sons, 2001.
4. Forsyth D. A. and Ponce J., ―Computer Vision: A Modern Approach‖ , Prentice Hall, 2003
5. Horn Berthold, ―Robot Vision‖, MIT Press, McGraw Hill, 1986
6. Jain R., Kasturi R. and Schunck B. G. , ―Machine Vision‖, McGraw Hill, 1995

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1. en.wikipedia.org/wiki/Digital_image_processing
2. www.imageprocessingplace.com
3. www.icaen.uiowa.edu
4. www.uct.ac.za/depts/physics/laser/hanbury/intro_ip .html
www.eng.auburn.edu/~sjreeves/Classes/IP/IP.html

CS-443	DISTRIBUTED COMPUTING	L T P	Cr
		3 0 0	3

This course will introduce the algorithms and technologies of distributed systems. It will teach both fundamentals as well as systems where these fundamentals are applied in practice.

PREREQUISITES
Knowledge of databases, networking, operating system and web technologies

1. **DISTRIBUTED COMPUTING:** History, forms of computing; strengths and weaknesses of distributed computing; OS basics; network basics; software engineering basics; **CLIENT SERVER PARADIGM:** issues, software engineering for a network service, connection oriented and connectionless servers, iterative server and concurrent server, stateful servers.
2. **INTERPROCESS COMMUNICATION:** Archetypal IPC program interface; event synchronization; timeouts and threading; deadlock and timeouts; data representation, data encoding; text based protocols, request response protocols; event and sequence diagram; connection vs. connectionless IPC.
3. **DISTRIBUTED COMPUTING PARADIGMS AND SOCKET API:** Paradigms; abstraction; socket metaphor; diagram socket API, stream mode socket API; sockets with non-blocking I/O; secure socket API
4. **GROUP COMMUNICATION:** Unicasting; multicasting, archetypal multicast API; connection oriented and

connectionless; reliable, unreliable multicast; Java basic multicast API.

5. **DISTRIBUTED OBJECTS:** Message passing vs. distributed objects; archetypal distributed object architecture; distributed object systems; remote procedure calls; Java RMI architecture; API for Java RMI; Advanced RMI: Client callback, stub downloading, RMI security manager; allowing for stub downloading

6. **SIMPLE OBJECT ACCESS PROTOCOL:** SOAP request, SOAP response; Apache SOAP; invoking web service; implementing web service

7. **ADVANCED DISTRIBUTED COMPUTING PARADIGMS:** Message queue system paradigm; mobile agents; network service; object spaces

TEXT BOOK
Tanenbaum Andrew S. and van Steen Maarten, ―Distributed Systems: Principles and Paradigms‖, Prentice Hall, 2002.

REFERENCE BOOKS
1. Coulouris George, Dollimore Jean, Kindberg Tim, ―Distributed Systems: Concepts and Desig n‖, Book News, Inc,2003.
2. Garg Vijay K., ―Elements of Distributed Computing‖, Wiley, 2002.

WEB REFERENCES
1. http://en.wikipedia.org/wiki/Distributed_computing
2. http://www.dhpc.adelaide.edu.au/education/dhpc/2 000/lecture-notes.html
3. http://www.eli.sdsu.edu/courses/spring99/cs696/no tes/
4. http://www.geocities.com/SiliconValley/Vista/4015/ Chapter1 .html

List Of Department Elective 2

OBJECTIVE
To provide the foundation required for becoming a good software project manager by means of planning,

evaluation and estimation, risk management, allocation and monitoring of resources, controlling software quality

PRE-REQUISITES
Knowledge of software engineering and the basic principles of management.

1. **INTRODUCTION:** Definition of a Software Project (SP), SP vs. other types of projects activities covered by SPM; categorizing SPs; project as a system;management control, requirement
specification; information and controlin organization

2. **STEPWISE PROJECT PLANNING:** Introduction, selecting a project; identifying project scope and objectives; identifying project infrastructure,
analyzing project characteristics; identifying project products and activities; estimate efforts each activity; identifying activity risk; allocate resources; review/ publicize plan

3. **PROJECT EVALUATION AND ESTIMATION:** Cost benefit analysis; cash flow forecasting; cost benefit evaluation techniques; risk evaluation; Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods: rapidapplication development, water fall, V-process-, spiral- models; Prototyping; delivery; Albrecht function point analysis

4. **ACTIVITY PLANNING AND RISK MANAGEMENT**: Objectives of activity planning; project schedule; projects and activities; sequencing and scheduling activities, network planning model; representation of lagged activities; adding the time dimension, backward and forward pass; identifying critical path; activity throat, shortening project; precedence networks; Risk Management:

IT-306	SOFTWARE PROJECT MANAGEMENT	L T P	Cr
		5 1 0	4

Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values

5. **RESOURCE ALLOCATION AND MONITORING THE CONTROL**: Introduction, the nature of resources, identifying resource requirements; scheduling resources creating critical paths; counting the cost; being specific; publishing the resource schedule; cost schedules, the scheduling sequence; Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control

6. **MANAGING CONTRACTS AND PEOPLE**: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises

7. **SOFTWARE QUALITY**: Introduction; the place of software quality in project planning; the importance of software quality; defining software quality, ISO 9126; Practical software quality measures; product versus process quality management;

external standards; techniques to help enhance software quality; Study of any software project management software: viz Project 2005 or equivalent.

TEXT BOOK

Bob Hughes and Mike Cotterell, ―Software Project Manag em ent‖, 2nd Edition, Tata McGraw Hill, 1999

REFERENCE BOOKS
1. Futrell, ―Software Quality & Project Manag em ent‖, Pearson Education, 2002.
2. Jalote Pankaj, Software Project Management, Pearson Education, 2002.
3. Gopalaswam y Ramesh, ―Managing Global Software Projects‖, Tata McGraw Hill, 2001
4. Pressman Roger S., ―Software Engineering – A Practitioner's Approach‖, 5th Edition, McGraw Hill, 2001
5. Walker Royce, ―Software Project Manag em ent‖, Addison Wesley, 1998
6. Maylor, ―Project Manag em ent‖, Third Edition, 2003.
7. Demarco Tom, ―Controlling Software Project Management and Measurem ent‖, Prentice Hall, 1982
8. Glib Tom and Susannah Finzi, ―Principles of Software Engineering Management‖, Addison Wesley, 1998.

WEB REFERENCES
1. en.wikipedia.org/wiki/Software_project_manageme nt
2. www.comp.glam.ac.uk/staff/dwfarthi/projman.htm
3. www.softwareprojects.org
4. www.sei.cmu.edu
5. www.iimb.ernet.in/iimb/docs/eep06/SPM_EDPOutli ne.pdf

IT-423	INTRODUCTION TO E-COMMERCE & ERP	L T P	Cr
		5 0 0	3

OBJECTIVE

To provide knowledge about the protocols, methods, security issues in electronic commerce as well as about enterprise resource planning tools, models and techniques

PRE-REQUISITES

Knowledge of internet and web development, data mining, computer networks, software engineering
1. **INTRODUCTION AND CONCEPTS**: Networks and commercial transactions – Internet and other novelties, networks and electronic transactions today, Model for commercial transactions, Internet environment – internet advantage, worlds wide web and other internet sales venues, Online commerce solutions.
2. **ELECTRONIC PAYMENT METHODS:** Updating traditional transactions, Secure online transaction models, Online commercial environments, digital currencies and payment systems, Offline secure processing, private data networks, Security protocols, Electronic Payment Systems: Digital payment systems
3. **DIGITAL CURRENCIES:** Operational process of Dig cash, Ecash Trail, Using Ecash, Smart cards, Electronic Data Interchange: basics, EDI versus Internet and EDI over Internet. Strategies, Techniques and Tools, Shopping techniques and online selling techniques.
4. **ERP- AN ENTERPRISE PERSPECTIVE:** Production Finance, Personnel disciplines and their relationship, Transiting environment, MIS Integration for disciplines, Information/Workflow, Network Structure, Client Server Integrator System, Virtual Enterprise.
5. **ERP - RESOURCEMANAGEMENT PERSPECTIVE:** Functional and Process of Resource. Management, Introduction to basic Modules of ERP System: HRD, Personnel Management, Training and Development, Skill Inventory, Material Planning and Control, Inventory, Forecasting, Manufacturing, Production Planning, Production Scheduling, Production Control, Sales and Distribution, Finance, Resource Management in global scenario.
6. **ERP - INFORMATION SYSTEM PERSPECTIVE:** Introduction to OLAP (Online Analysis and Processing), TP, OAS, KBS, MRP, BPR, SCM, REP, CRM, Information Communication Technology.
7. **ERP-KEY MANAGERIAL ISSUES:** Concept Selling, IT Infrastructure, Implication, of ERP Systems on Business Organization, Critical success factors in ERP System, ERP Culture Implementation Issues, Resistance to change, ERP Selection issues, Return on Investment, Pre and Post Implementation Issues.

TEXT BOOK

Ravi Kalakota and Andrew Whinston, ―Frontiers of Electronic Com m erce‖, Addison Wesley, 1 996

REFERENCE BOOKS
1. V. K. Garg and N. K. Venkita Krishna, ―Enterprise Resource Planning – Concepts and Practice‖, Prentice Hall of India, 1998,
2. Motiwala, ―Enterprise Resource & Planning ‖, 1st edition, Pearson Education
3. John Antonio, Fernandez, ―The SAP/3 H andbook‖, Tata McGraw Hill

4. Denial Am or, ―The E-Business Revolution‖, Addison Wesley
5. Sokol, ―From EDI to E-Commerce: A Business Initiative‖, Tata McGraw Hill
6. Greenstein and Feinm an, ―E Com m erce‖, Tata McGraw Hill
7. Rajan and Nag, ―E Commerce: The Cutting Edge of Business‖, Tata McGraw Hill
8. Jaffrey F. Rayport , Bernard J . Jaworski, ―ECommerces‖, Tata McGraw Hill, 2002
9. Greenstein and Feinm an, ―Electronic Commerce – Security, Risk Management and Control‖, Tata McGraw Hill, 2002
10. Hendry Chan, Raymond Lee, Tharam Dillon and Ellizabeth Cang, ―E-Commerce Fundamentals and Applications‖, John Wiley.

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2. www.bizautomation.com
3. itmanagement.earthweb.com/erp
4. www.e2-llc.com/e2_ecommerce_erp.aspx
5. e-comm.webopedia.com/TERM/e/ERP.html

IT-424	MOBILE COMPUTING	L T P	Cr
		3 0 0	3

OBJECTIVE

A recent development in portable devices and high- bandwidth, ubiquitous wireless networks has made mobile computing a reality. Indeed, it is widely predicted that within the next few years'access to Internet services will be primarily from wireless devices, with desktop browsing the exception. Such predictions are based on the huge growth in the wireless phone market and the success of wireless data services. This course will help in understanding fundamental concepts, current developments in mobile communication systems and wireless computer networks.

PRE-REQUISITES

Computer Networks and wireless communication

1. **INTRODUCTION TO WIRELESS TRANSMISSION:** Applications, A short history of wireless communication, Frequency for radio transmission, Signals, Antennas,Signal propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems.
2. **MEDIUM ACCESS CONTROL:** Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access
3. **TELECOMMUNICATION SYSTEMS:** GSM: Mobile services, System architecture, Radio interface, Protocols, Localization And Calling, Handover, Security, New data services; DECT: System architecture, Protocol architecture; TETRA, UMTS and IMT-2000: UMTS Basic architecture, UTRA FDD mode, UTRA TDD mode
4. **SATELLITE & BROADCAST SYSTEMS:** History, Applications, Basics: GEO, LEO, MEO; Routing, Localization Handover, Examples, Cyclic repetition of data, Digital audio, broadcasting: Multimedia object transfer protocol; Digital video broadcasting
5. **WIRELESS LAN:** Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks, IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management, Future development; HIPERLAN: Protocol architecture, Physical layer, Channel access control. Sublayer, Medium access control Sublayer, Information bases And Networking; Bluetooth: User scenarios, Physical layer, MAC layer, Networking. Security, Link management.
6. **MOBILE NETWORK LAYER:** Mobile IP: Goals, assumptions and requirements, Entities and Terminology IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and Encapsulation , Optimizations, Reverse tunnelling, Ipv6; Dynamic host configuration protocol, Ad hoc networks: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics,
7. **MOBILE TRANSPORT LAYER**: Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP

TEXT BOOK

J ochen Schiller, ―Mobile Com munications‖, Addison Wesley/Pearson Education, 2005

REFERENCE BOOKS

1. Garg Kumkum, ‖Mobile Computing‖, Pearson Education, 2006
2. Talukder Asoke K. and Yavagal R. R., ―Mobile Computing‖, Tata McGraw-Hill, 2005.
3. Uwe Hansman, Lothar Merk, Martin S. Nicklous and Thomas Stober, ―Principles of Mobile Com puting ‖, 2nd Edition, Springer-Verlag, 2003, ISBN 81-7722-468-9
4. Dharma Prakash Agrawal and Qing-An Zeng, ―Introduction to Wireless and Mobile System s‖, 2nd edition, 2006
5. Stallings William, ―Wireless Communications and Networks‖, Pearson Education, 2009
6. Yi-Bing Lin and Im rich Chlamtac, ―Wireless and Mobile Network Architectures‖, John Wiley & Sons, 2004, ISBN 9971-51-366-8
7. Rappaport, ―Wireless Communications Principles and Practices‖ Prentice Hall, 2nd edition, 2006.
8. Nicopolitidis P., ―Wireless Networks‖, John Wiley and Sons, 2003.
9. Pahlavan K and Krishnamurthy P., ―Principles of Wireless Networks‖ Prentice Hall, 2002.
10. Richharia M., ―Mobile Satellite Communication: Principles and Trends‖ , Pearson Education, 2000.

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1. http://www.it.iitb.ac.in/~it601/dep/?id=3
2. http://www.onesmartclick.com/engineering/digitalcommunications.html
3. http://www.nd.edu/~surendar/teach/spr02/ubicomp/ lecture.shtml
4. http://es.fbk.eu/people/murphy/classes/290e/notes/ index.html

	OBJECT ORIENTED	L T P	Cr

IT-425	SOFTWARE ENGINEERING AND UML	3 0 0	3

OBJECTIVE

To provide adequate knowledge about the different types of system software available and to introduce the object oriented concepts to the programming skills.

PRE-REQUISITES

Understanding of object orientation and knowledge of software engineering

1. **REVIEW OF OBJECT ORIENTED SYSTEMS**: Design objects, class hierarchy, inheritance, polymorphism, object relationships and associations, aggregations and object containment, object persistence, meta classes, object oriented systems development life cycle, Software development process, object oriented systems development: a use case driven approach.
2. **OBJECT ORIENTED ANALYSIS**: Analysis process, use case driven object oriented analysis, use-case model, object classification, theory, different approaches for identifying classes, classes, responsibilities and collaborators, identifying object relationships, attributes and methods, super sub class relationships, A- part of relationships aggregation, class responsibilities, object responsibilities.
3. **OBJECT ORIENTED DESIGN**: Object oriented design process, corollaries, design axioms, design patterns, object oriented design philosophy
4. **METHODOLOGY FOR OBJECT ORIENTED DESIGN**: Object modeling technique as software engineering methodology, Rumbaing methodology, Jacobson Methodology, Booch Methodology
5. **UNIFIED APPROACH FOR OBJECT ORIENTED DESIGN**: Patterns, Frameworks, the unified approach, unified modeling language (UML).
6. **UML:** Why we model, types of models, principles of modeling, object oriented modeling, object oriented concepts, UML notation, object oriented analysis: use case diagrams, interaction diagrams, activity diagrams, object oriented design: class diagrams, object diagrams, state diagrams, collaboration diagrams, post-testing: deployment diagrams, patterns, frameworks
7. **USING UML FOR OOD:** UML object constraint language, designing classes: the process, class visibility, refining attributes, designing methods ad protocols, packages and managing classes, designing interface objects, view layer interface design, macro and micro level interface design process

TEXT BOOK

Jacobson Ivar, ―Object Oriented Software Engineering‖ Addison Wesley, 1997.

REFERENCE BOOKS

1. Bennett, ―Object Oriented System Analysis and Design using UML‖, Tata McGraw Hill, 2009
2. Deacon,‖ Object Oriented Analysis and Desig n‖, Pearson Education, 2009
3. Ali Bahrami, ―Object Oriented Systems Development‖, McGraw Hill, 1999
4. Rum baug h et al, ‖Object Oriented Modeling and Desig n‖, Prentice Hall of India, 2007
5. Booch Grady, ―Object Oriented Analysis and Design with applications‖ , 3rd edition, Addison Wesley, 2007
6. Mehta Subhash and Basandra Suresh K., ―Object OrientedSoftware Engineering‖, Galgotia Publications, 1995

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2. uml-tutorials.trireme.com
3. www.smartdraw.com/tutorials/software/oose/tutoria l_01 .htm
4. www.iconixsw.com
5. www.rspa.com/spi/analysismodeling.html

IT-431	BIOINFORMATICS	**L T P**	**Cr**
		5 0 0	**3**

OBJECTIVE

Bioinformatics is a rapidly growing field that integrates molecular biology, biophysics, statistics, and computer science. Fundamentally it is a field focused on comparison: how similar are two given proteins? What are the differences between various DNA sequences? How is the data from one microarray assay different from another? Furthermore, bioinformatics is concerned with quantifying the significance of these differences. In any of the examples above, once a metric for similarity is obtained, it must also be statistically characterized to determine the likelihood that such a relationship could occur by chance. In this

course, you will learn many of the popular tools for performing bioinformatics analysis and you will be introduced to the thinking that drives the algorithms.

PRE-REQUISITES
Knowledge of fundamentals of biology, genetics, data structures and statistics

1. **INTRODUCTION TO MOLECULAR BIOLOGY:** Gene structure and information content; molecular biology tools, genomic information content
2. **COMPUTATIONAL BIOLOGY:** Data searches and pair wise alignments; gaps; scoring matrices; Needleman and Wunsch algorithm; global and local alignments; database searches.
3. **PHYLOGENETICS:** Molecular phylogenetics; phylogenetic trees; distance matrix methods; character-based methods of phylogenetics; parsimony.
4. **GENOMICS:** Patterns of substitution within genes; estimating substitution numbers; molecular clocks; ancestral sequences; searches; consensus trees; tree confidence; genomics; prokaryotic gene structure; gene density; eukariotic genomes; gene expression.
5. **PROTEOMICS:** Protein and RNA structure prediction, polypeptic composition, secondary and tertiary structure; algorithms for modeling protein folding; structure prediction; proteomics; protein classification; experimental techniques; ligand screening; post-translational modification prediction.
6. **GENE EXPRESSION DATA:** Microarrays and gene expression data; microarray design; analysis of data; application; microarray standards; clustering(SOM, PCA/SVD, k-means, hierarchical); classification (LVQ, SVM); processing gene expression data using decision tree based methods (ID3, ASSISTANT, C5.0)
7. **NEW AREAS OFBIOINFORMATICS:** Metabolic: metabolic pathways; drug targe identification; biological systems: systems of molecular network; eco-systems, elements of systems modeling; nutrigenomics; palenteoinformatics; toxic genomics, systems biology; pharmacogenomics, synthetic biology, bioterrorism, biological and chemical warfare, data security issues in bioinformatics, bio-ethics, cloning, transgenic organisms, bio-ethics in agriculture, ontology, standards

TEXT BOOK
Mount David, ―Bioinformatics: Sequence and Genome Analysis‖, 2008

REFERENCE BOOKS
1. Attwood T. K. and Parry-Smith D. J ., ―Introduction to Bioinform atics‖, Pearson Education, 2003
2. Krane D. E. and Raym er M. L., ―Fundamental Concepts of Bioinform atics‖, Pearson Education, 2003.
3. Gibas Cynthia, Jambeck Per, ―Developing Bioinformatics Computing Skills‖, O'Reilly, 2001
4. Zar J . H., ―Biostatistical Analysis‖ , 4th edition, Pearson Education, 1999.
5. Baldi Pierre and Brunak Søren, ―Bioinform atics: The Machine Learning Approach‖, 2nd edition, MIT Press, 2001
6. Westhead D. R. et al, ―Instant Notes Series: Bioinform atics‖, Viva Books Pvt. Ltd., 2003
7. Baxenavis Andreas and Ouellette B. F. Francis (eds), ―Bioinform atics: A Practical Guide to the Analysis of Genes and Proteins‖, John Wiley, 1998

WEB REFERENCES
1. http://bioinfo.ernet.in/
2. http://www.ibioinformatics.org/
3. http://www.bioinfbook.org/
4. http://www.bioplanet.com/bioinformatics_tutorial.htm

IT-441	NETWORK SECURITY & MANAGEMENT	L T P	Cr
		5 0 0	3

OBJECTIVE
The main objective behind this course is to learn about the various network attacks and preventing attacks. This course is designed to cover Application security, Operating system security, Network security, Web security etc.

PRE-REQUISITES
Knowledge of data communications and computer networks, computer programming, data structures, mathematics, telecom network. Knowledge of digital signal processing is desirable

1. **INTRODUCTION:** Codes and ciphers; some classical systems; statistical theory of cipher systems: complexity theory of crypto systems; stream ciphers, block ciphers.
2. **STREAM CIPHERS:** Rotor based system; shift register based systems; design considerations for stream ciphers, crypt-analysis of stream ciphers; combined encryption and encoding; block ciphers: DES and variant, modes of use of DES; public key systems: knapsack systems, RSK, Diffie Hellman exchange; authentication and digital signatures; elliptic curve based systems.
3. **SYSTEM IDENTIFICATION AND CLUSTERING:** Cryptology of speech signals: narrow band and wide band

systems; analogue and digital Systems of speech encryption.

4. **SECURITY: HASH FUNCTION**

   AUTHENTICATION: Protocols; digital signature standards; electronic mail security: PGP (Pretty Good Privacy), MIME; data compression technique; IP security: architecture, authentication leader, encapsulating security; payload: key management; web security: secure socket layer & transport layer security, secure electronics transactions; firewalls design principle; established systems.

5. **TELECOMMUNICATION NETWORK**

   ARCHITECTURE: TMN management layers, management information model; management servicing and functions; structure of management information and TMN information model; SNMP v1, SNMP2 & SNMP3, RMON1 & 2; Broadband Network Management (ATM, HFC, DSL); ASN

6. **SECURITY IN NETWORKS:** Threats in networks, Network security control, Firewalls, Intrusion detection systems, Secure e-mail, Networks and cryptography, Example protocols: PEM, SSL, IPsec,**Administrating Security:** Security

   planning, Risk analysis, Organizational security policies, Physical security.

7. **LEGAL, PRIVACY, AND ETHICAL ISSUES IN COMPUTER SECURITY:** Protecting program and data; information and law; rights of employees and employers; software failures; computer crime, privacy; ethical issues in computer society; case studies of ethics

TEXT BOOK

Stallings William, ―Cryptography and Network S security‖ 4th Edition, Prentice-Hall, Englewood Cliffs, 2006

REFERENCE BOOKS
1. ―Cryptography and Network Security: Principal & Practices‖, 3rd Edition, Prentice Hall of India, 2002
2. Mani Subram anian, ―Network Management Principles & Practices‖, Addison Wesley, 1999
3. Burke J. Richard, ―Network Management Concepts and Practice A Hand-on Approach, Pearson Education, Reprint 2004
4. Kauffman C., Perlman R. and Spenser M., ―Network Security‖, 2nd Edition, Prentice Hall, 2002.
5. Stallings William, ―SNMP‖, Addison Wesley, 1999
6. ―S NMP : A Guide to Network Manag em ent‖, McGraw Hill, 2005
7. Wang H . H ., ―Telecom Network Manag em ent‖, 3rd Edition, McGraw Hill, 1997
8. Dlack U., ―Network Management‖, 3rd Edition, McGraw Hill, 1997
9. Menezes Alfred, van Oorschot Paul, and Vanstone Scott, ―Handbook of Applied Cryptog raphy‖, CRC Press, NY, 2004.
10. Bellovin S. and Chesvick W., ―Internet Security and Firewalls‖, 2nd Edition, Addison Wesley, 1998.
11. S chneier Bruce, ―Applied Cryptog raphy‖, Wiley Student Edition, 2nd Edition, Singapore, 1996.

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1. www.londonexternal.ac.uk
2. crypto.stanford.edu/cs155/
3. www.skillstrainuk.com/network-security
4. www.networkcomputing.com
5. www.foundstone.com/us/resources-free-tools.asp

IT-442	INFORMATION SECURITY	L T P	Cr
		3 0 0	3

OBJECTIVE

To impart knowledge about the information security tools, techniques, procedures, standards, etc. that are essential for protection of information in an organization

1. **INTRODUCTION TO COMPUTER SECURITY:** Protocols; passwords; access control; distributed systems security; multilevel security; multilateral security; monitoring systems; biometrics; physical tamper resistance; network attack and defense; protecting e-commerce systems; copyright and privacy protection.

2. **CRYPTOGRAPHY:** Basic mathematical background to cryptography; symmetric and asymmetric cryptographic algorithms; hashes; randomness; signatures; simple cryptographic protocols.

3. **SOFTWARE SECURITY:** What is software security?; Common software vulnerabilities: lack of input validation (buffer overflows, SQL injections, race conditions, access control, etc.; flaws: design flaws, implementation flaws; deployment flaws; case studies; Language level security: typing; tainting input data; untrusted code security; application level security: runtime monitoring; static analysis; verification; JML, Spec; software evaluation; case studies.

4. **VERIFICATION OF SECURITY PROTOCOLS:** Modelling of black box security protocols; intruder model; security requirements; BAN logics and other security protocol logics; process algebraic approach to security protocol verification; model checking; Spi calculus; strand spaces; operational models; security protocols in action.

5. **SECURITY IN ORGANISATIONS:** Security policies; Roles; Classifications; Assets and threats; Risk, vulnerability; control; attack; damage; Risk analysis; Methods/tools for risk analysis; CERTs; Risk assessment and risk management

6. **INFORMATION SECURITY STANDARDS:** Code of Practice for Information Security (BS7799 and ISO 27001); evaluation of information security, like ITSEC and the Common Criteria; Security plan; attack trees; business continuity planning/incident recovery; Legal issues: patents and copyright.

7. **NETWORK SECURITY:** Principles behind network security; their main protocols as well as network security mechanisms and techniques; wired and wireless networks: IP security, Email security, Web security, secure management, Intruders, Viruses, Firewalls and Privacy.

TEXT BOOK

William Stallings, ―Network Security Essentials - Applications and Standards‖, 2nd Edition, Prentice Hall, ISBN 0-13-120271-5

REFERENCE BOOKS
1. Anderson R. J., ―Security Engineering: A guide to Building Dependable Distributed Systems‖ , John Wiley & Sons Inc, New York, 2001, ISBN 0-471- 38922-6
2. van Tilborg H. C. A., ―Fundamentals of Cryptology: A Professional Reference and Interactive Tutorial‖, Kluwer Academic Publishers, 2000.
3. Kurose James F. and Ross Keith W., ―Computer Networking: A Top-Down Approach Featuring the Internet‖, Addison Wesley, 2005, ISBN 0-321- 26976-4

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1. https://www.securityforum.org
2. www.freetechbooks.com/information-securityf52.html
3. csrc.nist.gov/
4. www.infsec.ethz.ch

IT-443	INFORMATION STORAGE & MANAGEMENT	L T P	Cr
		3 0 0	3

OBJECTIVE

Using a ―building block‖ approach, the ISM curriculum provides a core understanding of storage technologies and progresses into system architectures, introduction to networked storage, and introduction to information availability. The course provides a comprehensive introduction to data storage technology fundamentals. Students will gain knowledge of the core logical and physical components that make up a storage systems infrastructure.

PRE-REQUISITES

Knowledge of computer networks

1. **INTRODUCTION:** Meeting today's data storage needs - data creation; data creation: individuals, business; categories of data; data storage models; common data storage media and solutions - tape storage systems, optical data storage, disk based storage
2. **DATA CENTER INFRASTRUCTURE:** Example; key requirements of storage systems management activities

3. **STORAGE SYSTEMS ARCHITECTURE**: Storage system environment; components of a host; connectivity; physical disks; RAID array; disk storage systems; data flow exercise
4. **NETWORKED STORAGE**: Direct Attached Storage (DAS), Network Attached Storage (NAS), Fiber Channel Storage Area Network (FC SAN), IP Storage Area Network (IP SAN), Content Addressed Storage (CAS)
5. **BUSINESS CONTINUITY**: Introduction, overview, backup and recovery, local replication, remote replication.
6. **MONITORING AND MANAGING THE DATA CENTER**: Areas of the data center to monitor; considerations for monitoring the data center; techniques for managing the data center.

7. **SECURING STORAGE AND STORAGE VIRTUALIZATION:** Securing the storage infrastructure; virtualization technologies.

TEXT BOOK

Osborne Marc Farley, ―Building Storage Networks‖ Tata McGraw Hill

REFERENCE BOOKS
1. Spalding Robert, ―Storage Networks: The Complete Reference―, Tata McGraw Hill
2. Gupta Meeta, ―Storage Area Network Funim entals‖, Pearson Education Limited
3. Kowalski Gerald J. and Maybury Mark T., ―Information Storage & Retrieval Systems Theory & Implem entation‖, BS Publications
4. Thejendra B. S., ―Disaster Recovery & Business Continuity‖ , S hroff Publishers & Distributors, EMC – Students Kit.

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1. http://www.cs.cmu.edu/~fp/courses/03- 312/handouts/1 8-storage.pdf
2. http://www.freedownloadscenter.com/Information Management/

IT-444	PERVASIVE COMPUTING	L T P	Cr
		3 0 0	3

OBJECTIVE

This course will study the mechanisms and environments of pervasive computing. This course will cover many of the maturing technologies in input/output, networking, information infrastructure, and ease-of-use that will become necessary as computers become small, pervasive, and in constant connection with each other. Some of the I/O interfaces that will be investigated include speech, vision, gestures, combinations of sensors, and location sensors.

PRE-REQUISITES

Knowledge of networking and mobile computing
1. **INTRODUCTION:** The Computer for the 21st century; wireless technologies, signal propagation, multiplexing, modulation, and spread spectrum techniques; challenges and issues in ubiquitous computing: disconnected operation, update propagation, update conflicts, synchronization, replication, bandwidth adaptation, power adaptation, context awareness, location tracking, migration, system support, security, smart spaces, invisibility, localized scalability, uneven conditioning
2. **DEVICE TECHNOLOGY:** Compaq iPAQ 5400 series, iPAQ 5450 sSpecs, Tiqit Eightythree, Eighty three specs, Palm Tungsten-T, Tungsten-T specs, Bluetooth qualified products.
3. **WIRELESS NETWORKING AND SATELLITE SYSTEMS:** Overview of the IEEE 802.1 1b wireless Ethernet standard. The Bluetooth radio system, Wi-Fi (802.1 1b), General Packet Radio Service in GSM, 802.11 a, b & g

Comparison, 802.11 a & b Comparison, 802.11a Official Standard, WAP and WML, Satellite Systems: basic routing, localization, and handoff issues

4. **MOBILE NETWORKING**: Mobile IP; Ad-Hoc Networks: AODV, DSR, DSDV routing; Wireless TCP: indirect TCP, Snooping TCP, Mobile TCP

5. **SENSOR NETWORKS AND AD HOC ROUTING:** System architecture for networked sensors; making sharing pervasive: Ubiquitous computing, multi-hop wireless ad hoc network routing protocols; TAG: tiny aggregation service.

6. **LANGUAGES, PROTOCOLSAND INFORMATION MANAGEMENT:** Jini, Sync, UDDI, Universal Plug-and-Play (UPnP), Simple Object Access Protocol (SOAP) 1.1, Mobile and TCP over wireless, information management: location-independent and location-dependent computing models

7. **USER INTERFACES AND APPLICATION EXAMPLES:** Coordination infrastructure for interactive workspaces; ICrafter: a service framework for ubiquitous computing environments, The Interactive Workspaces project, Ubiquitous Computing Rooms; context-aware design and interaction; fluid Interaction; overview of the PARCTAB ubiquitous computing experiment.

TEXT BOOK
Agrawal Dharma Prakash and Zeng Qing-An, ―Introduction to Wireless and Mobile Systems‖, 2nd Edition, 2006

REFERENCE BOOKS
1. Talukder Asoke K. and Yavag al R. R., ―Mobile Computing‖, Tata McGraw-Hill, 2005.
2. Burkhardt Jochen, Horst Henn, Hepper Stefan, S chaec Thomas and Rindtorff Klaus, ―Pervasive Computing: Technology and Architecture of Mobile Internet Applications‖, Pearson Education, 2007.
3. Adelstein Frank, Gupta S. K. S., Richard G. G. and Schwiebert L., ―Funim entals of Mobile and Pervasive Computing‖, Tata McGraw-Hill, 2005.
4. Foster Ian and Kesselm an Carl, ―The Grid 2: Blueprint for a New Computing Infrastructure‖, Morgan Kaufmann Publishers, 2004, ISBN 1- 55860-933-4
5. Amor Daniel, ―Internet Future Strategies: How Pervasive Computing Services Will Change the World‖, Prentice-Hall PTR, 2008.
6. Hansman Uwe, Merk Lothar, Nicklous Martin S. and Stober Thomas, ―Principles of Mobile Com puting ‖, 2nd Edition, Spring er-Verlag, 2003, ISBN 81-7722-468-9
7. Lin Yi-Bing and Chlamtac Im rich, ―Wireless and Mobile Network Architectures‖ , John Wiley & Sons, 2004, ISBN 9971-51-366-8
8. Nicopolitidis P., Obaidat M. S., Papadimitriou G. I. and Pompportsis A . S., ―Wireless Networks‖, John Wiley & Sons, 2003, ISBN 9812-53-033-9
9. S aulpaug h Tom and Mirho Charles, ―Inside the J avaOS Operating System ‖, Addison-Wesley, Reading 1999, ISBN 0-201-18393-5
10. Graham Steve, Simeonov Simeon, Boubez Toufic, Daniels Glen, Davis Doug, Nakamura Yuichi and Neyama Ryo, ―Building Web Services with Java: Making Sense of XML, SOAP, WSDL and UDDI‖, ISBN: 0-672-32181-5, 2001

WEB REFERENCES
1. Jini Technology Core Platform Specification, v. 2.0, SunMicrosystems, June 2003; www.sun.com/software/jini/specs/core2_0.pdf.
2. UPnP Device Architecture 1.0, UPnP Forum, Dec. 2003; www.upnp.org/resources/documents/CleanUPnPD A1 0120031 202s.pdf.
3. R. Chinnici et al., Web Services Description Language (WSDL) Version 2.0," W3C working draft, Aug. 2004; www.w3.org/TR/2004/WDwsdl20-20040803.
4. UDDI Version 2.04 API Specification, OASIS standard, July 2002; http://uddi.org/pubs/ProgrammersAPI-V2.04- Published-2002071 9.pdf
5. http://www.iswpc.org/2007/cfp.html
6. http://www.parliament.uk/documents/upload/postp n263.pdf
7. http://searchnetworking.techtarget.com/sDefinition/ 0,,sid7_gci759337,00.htm
8. http://www.isoc.org/inet2000/cdproceedings/3a/3a _1.htm

IT-445	HUMAN COMPUTER INTERACTION	L T P	Cr
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OBJECTIVE
To acquaint with the analysis, design and development aspects of enhancing interactions between human and computer system keeping in view the behavioral and psychological factors of any human

PRE-REQUISITES
Knowledge of computer organization and architecture, software engineering, computer graphics and multimedia technologies

1. **INTRODUCTION:** Introduction toHuman- Computer Interaction (HCI); history; human factors of interactive

software – goals of software engineering, goals of user interface design; motivation for human factors in design; accommodation of human diversity.

2. **HUMAN INFORMATION PROCESSING:** Human memory; thinking – reasoning and problem solving; skill acquisition; mental models; decision making; computer system interfaces: mechanics of input and output devices, review of computer architecture;performance characteristics of humans and systems; review of computer graphics

3. **PRINCIPLES BEHIND HUMAN - SYSTEM INTERACTION:** Paradigms of interaction; principles to support usability.

4. **USER CENTERED DESIGN OVERVIEW:** Software development life cycle – actual, three pillars of design; usability engineering; iterative design and prototyping; design rationale; usability testing

5. **TASK ANALYSIS:** Basic concepts, task decomposition; knowledge based analysis; entity- relationship base analysis; sourcesof information; uses of task analysis

6. **SYSTEM DESIGN:** Use cases; scenarios; structuring information; information architecture; process flows, wireframes, mock-ups, comps.

7. **DESIGN FOR UNIVERSAL ACCESS:** Access concepts; accessible software; factors driving software accessibility;universal accessibility principles, guidelines and recommendations; case studies

TEXTBOOK

Dix Alan, ―Human Computer Interaction‖, Pearson Education, 2002.

REFERENCE BOOKS

1. Carroll John, ―H CI Models, Theories, and Frameworks: Toward a Multidisciplinary S cience‖, Morgan Kaufmann, 2003
2. Clark Ruth Colvin and Mayer Richard Pfeiffer, ―eLearning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning ‖, 2002
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4. Garrett Jesse James, ―A Visual Vocabulary for Information Architecture‖, JJG .Net, USA, 2002
5. Garrett Jesse James, ―The Elements of User Experience‖, New Press Riders, USA, 2002
6. Krug Steve, ―Don't Make Me Think: A Common Sense Approach to Web Usability‖ , New Press Riders, USA, 2000
7. Meigs Tom, ―Ultimate Game Desig n‖, The McGraw-Hill Companies, USA, 2003
8. Nielsen Jakob, ―Designing Web Usability: The Practice of Simplicity‖, New Press Riders, USA, 1999
9. Salen Katie and Zimmerman Eric, ―Rules of Play: Game Design Fundam entals‖, The MIT Press, USA, 2003

WEB REFERENCES

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2. http://en.wikipedia.org/wiki/Humancomputer_interaction
3. http://hci-journal.co