



**AMRITA SAI INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)**

NH-9, Amrita Sai Nagar, Paritala (Post), Kanchikacherla (Mandal),
Krishna District, Andhra Pradesh - 521180.



PERMANENTLY AFFILIATED TO JNTUK, ACCREDITED BY NAAC WITH GRADE 'A'

COURSE STRUCTURE

FOR

Master of Computer Applications

(MCA)

(Applicable for the batches admitted from 2018-19)

I Semester

SNO	Subject code	Subject Title	T	P
1	18MC1T1	C PROGRAMMING AND DATA STRUCTURES	4	--
2	18MC1T2	DIGITAL LOGIC & COMPUTER ORGANIZATION	4	--
3	18MC1T3	DISCRETE MATHEMATICAL STRUCTURES AND GRAPH THEORY	4	--
4	18MC1T4	ENGLISH LANGUAGE COMMUNICATION SKILLS	4	--
5	18MC1T5	ACCOUNTING AND FINANCIAL MANAGEMENT	4	--
6	18MC1L1	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB	--	3
7	18MC1L2	C PROGRAMMING & DATA STRUCTURES LAB	--	3
8	18MC1L3	PC HARDWARE & SOFTWARE LAB	--	3

II Semester

SNO	Subject code	Subject Title	T	P
1	18MC2T1	OOPS THROUGH JAVA	4	--
2	18MC2T2	OPERATING SYSTEMS	4	--
3	18MC2T3	OPTIMIZATION TECHNIQUES	4	--
4	18MC2T4	STATISTICAL PROGRAMMING WITH R	4	--
5	18MC2T5	DATABASE MANAGEMENT SYSTEMS	4	--
6	18MC2L1	OOPS THROUGH JAVA LAB	--	3
7	18MC2L2	STATISTICAL PROGRAMMING WITH R LAB	--	3
8	18MC2L3	DATABASE MANAGEMENT SYSTEMS LAB	--	3

III Semester

SNO	Subject code	Subject Title	T	P
1	18MC3T1	THEORY OF COMPUTATIONS	4	--
2	18MC3T2	COMPUTER NETWORKS	4	--
3	18MC3T3	SOFTWARE ENGINEERING	4	--
4	18MC3T4	ADVANCED JAVA & WEB TECHNOLOGIES	4	--
5	18MC3T5	DESIGN AND ANALYSIS OF ALGORITHMS	4	--
6	18MC3L1	ADVANCED JAVA & WEB TECHNOLOGIES LAB	--	3
7	18MC3L2	SHELL SCRIPTING LAB	--	3
8	18MC3L3	COMPUTER NETWORKS LAB	--	3

IV Semester

SNO	Subject code	Subject Title	T	P
1	18MC4T1	OBJECT ORIENTED ANALYSIS AND DESIGN	4	--
2	18MC4T2	COMPILER DESIGN	4	--
3	18MC4T3	DATA WAREHOUSING AND MINING	4	--
4	----	ELECTIVE-1	4	--
5	----	ELECTIVE-2	4	--
6	18MC4L1	CLOUD COMPUTING LAB	--	3
7	18MC4L2	DATA WAREHOUSING AND MINING LAB	--	3
8	18MC4L3	OBJECT ORIENTED ANALYSIS AND DESIGN LAB	--	3

V Semester

SNO	Subject code	Subject Title	T	P
1	18MC5T1	BIG DATA ANALYTICS	4	--
2	18MC5T2	CYBER SECURITY	4	--
3	18MC5T3	PYTHON PROGRAMMING	4	--
4	----	ELECTIVE-3	4	--
5	----	ELECTIVE-4	4	--
6	18MC5L1	BIG DATA ANALYTICS LAB	--	3
7	18MC5L2	SOFTWARE TESTING LAB	--	3
8	18MC5L3	PYTHON PROGRAMMING LAB	--	3

VI Semester

SNO	Subject code	SUBJECT
1	18MC6S1	SEMINAR ON PROJECT
2	18MC6P1	DISSERTATION/ THESIS

Elective: 01

sno	Subject code	Subject Title
1	18MC4T4A	MOBILE COMPUTING
2	18MC4T4B	HUMAN COMPUTER INTERACTION
3	18MC4T4C	CLOUD COMPUTING

Elective: 02

sno	Subject code	Subject Title
1	18MC4T5A	SOFTWARE PROJECT MANAGEMENT
2	18MC4T5B	ARTIFICIAL INTELLIGENCE
3	18MC4T5C	EMBEDDED SYSTEMS

Elective: 03

sno	Subject code	Subject Title
1	18MC5T4A	SOFTWARE TESTING METHODOLOGIES
2	18MC5T4B	COMPUTER FORENSICS
3	18MC5T4C	E-COMMERCE

Elective: 04

sno	Subject code	Subject Title
1	18MC5T5A	INTERNET OF THINGS
2	18MC5T5B	MULTIMEDIA APPLICATION DEVELOPMENT
3	18MC5T5C	NETWORK PROGRAMMING



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SYLLABUS

FOR

Master of Computer Applications

(MCA)

(Applicable for the batches admitted from 2018-19)

Course Code 18MC1T1	C PROGRAMMING AND DATA STRUCTURES	T	P
	Maximum expected contact hours : 64	4	--
I Year I Semester			
COURSE OBJECTIVES			
1	To make the students aware of the modularity concepts and programming fundamentals.		
2	To make the learners understand the concepts in 'C' Programming Language and enable them to develop good programming skills.		
3	To make students familiar with data types and their sizes, control structures and functions		
4	To make the learners understand the concepts of arrays, memory addresses, pointers and files		
5	To introduce the students the fundamentals of Data Structures, Abstract concepts and how these concepts are useful in problem solving.		
6	To develop the students towards analyzing step by step and develop algorithms to solve real world problems and also implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs.		
7	To expose the students on various searching & sorting techniques.		
COURSE OUTCOMES			
1	It is expected that students are capable of solving mathematical problems using C language.		
2	It is expected that students are proficient in writing programs in C to solve logical problems.		
3	It is expected that the learners would develop familiarity in writing programs to store and manipulate data in Files.		
4	Able to implement appropriate data structure for a given application.		
5	Appreciate trade-offs involved in choosing static versus dynamic data structures also implementation of stacks, queues and linked lists, trees, Graphs and their applications.		
6	Understand the context of searching and sorting and identify the trade-offs involved in selecting the most efficient data structures and sorting techniques.		

UNIT-I:

Introduction to Computers, HW and SW concepts, Algorithm, pseudo code, flowchart, program development steps, Introduction to various IDE's and their use in C program development, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Control structures such as if, go to, labels, and switch statements.

UNIT-II:

Loops- while, do-while and for statements, break, continue, Arrays -concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays other than strings, 2-D character arrays – 2-D arrays other than character arrays – Multidimensional arrays.

UNIT-III:

Functions: basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor. Passing 1-D arrays, 2-D arrays, and functions. **Pointers:** concepts, initialization of pointer variables, pointers and Function arguments, passing by address –dangling memory, Character pointer s and functions, pointer s to pointer s, pointer s and multidimensional arrays, dynamic memory managements functions, command line arguments.

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UNIT-IV:

Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typed of, bit-fields, Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations

Data Structures: Introduction to Data Structures – Time Complexity –Space Complexity – Pattern matching – naive method – Robin Karp Algorithm - Searching – Linear and binary search methods, sorting –Bubble sort, selection sort, Insertion sort, Quick sort, merge sort.

UNIT-V:

Single linked lists, doubly linked lists, circular list, representing stacks and queues in C using arrays and linked lists, infix to post fix conversion, postfix expression evaluation. Trees- Binary trees, terminology, representation, traversals, Graphs - terminology, representation, graph traversals (dfs & bfs) –Warshalls – Dijkstra – Kruskal – Prims Algorithms. Only Algorithms

TEXT BOOKS:

1. C and Data Structures: A snapshot oriented treatise using live engineering examples
N B Venkateswarlu, E. V Prasad, S Chand & Co.
2. Computer science, A structured programming approach using C,
B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C ,
Horowitz, Sahni, Anderson- Freed, 2nd ed, universities Press, 2008.
2. Classic Data Structures, Samanta, 2nd ed, PHI, 2009.
3. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/ Pearson.
4. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
5. DataStructures Using C , A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/ Pearson.
6. Programming in C , Stephen G. Kochan, III Edition, Pearson .

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Course Code 18MC1T2	DIGITAL LOGIC & COMPUTER ORGANIZATION	T	P
	Maximum expected contact hours : 64	4	--
I Year I Semester			
COURSE OBJECTIVES			
1	To make the students aware of basic hardware and software concepts of computer organization.		
2	To make the learners familiarize with the organization and architecture of modern computing systems with an emphasis on performance.		
3	To make the students realize and learn the working of system buses, internal and external memory, computer arithmetic, instruction sets, and CPU structure/function.		
4	To expose the students the concepts of micro programmed control and Input-Output organization.		
COURSE OUTCOMES			
1	It is expected that the students are able to design CPU control units, arithmetic and logic units, input/output sub-systems, design memory systems and comprehend working principles of different kinds of cache memories.		
2	It is expected that the students would have good exposure with concepts like categorize cost, performance issues and design trade-offs considered in designing a computer processor including memory.		
3	It is expected the students understand the representation of data, addressing modes, instructions sets.		
4	It is expected that the students are familiar with the inner workings of a computer and ability to analyze the hardware and software issues related to computers and the interface between the two.		

UNIT – I

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.

Digital Components: Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit.

Data Representation: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes, Error Detection Codes.

UNIT – II

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions.

Microprogrammed Control: Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit.

UNIT – III

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Reduced Instruction Set Computer.

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point Arithmetic Operations.

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UNIT – IV

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access.

UNIT – V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Memory Management Hardware.

Text Book:

- Computer System Architecture --- M. Morris Mano, 3rd edition, Pearson Education/PH

Reference Books:

- Computer Organization, 5th ed., Hamacher, Vranesic and Zaky, TMH, 2002
- Computer Organization & Architecture: Designing for Performance, 7th Ed., William Stallings, PHI, 2006
- Digital Logic and Computer Systems Organization--- V.Rajaraman, T.Radhakrishnan PHI,2006

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Course Code 18MC1T3	DISCRETE MATHEMATICAL STRUCTURES AND GRAPH THEORY	T	P
	Maximum expected contact hours : 64	4	--
I Year I Semester			
COURSE OBJECTIVES			
1	To make students understand the basics topics and techniques of discrete methods and combinatorial reasoning.		
2	To expose students how to symbolize, read and understand the logical arguments also construct the logical arguments.		
3	To make students analyze relations – binary, partial order.		
4	To introduce students on the topics like counting techniques and fundamentals in graph theory.		
COURSE OUTCOMES			
1	It is expected that the students would develop familiarity with various concepts like Statements, Validate the arguments, verify the proofs and construct proofs.		
2	It is expected that the learners would appreciate relations, analyzes binary relations, reflexive, symmetric, transitive and partial ordered relations.		
3	It is expected that the students would differentiate Lattices and poset.		
4	It is expected that the students understand different types of counting techniques and applies.		
5	It is expected that the learners are capable enough in solving different types of recurrence relations and apply wherever necessary.		
6	It is expected the students gain knowledge about graphs and graph coloring.		

UNIT- I:

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

UNIT-II:

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram. Functions: composition of functions, Inverse Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application. Algebraic structures: Algebraic systems, Examples and general properties, Semi groups and monoids, groups, sub groups, Definitions, Examples, morphism, Isomorphism and related problems.

UNIT-III:

Elementary Combinatorics: Basis of counting, Enumeration of Combinations & Permutations, Enumerating of Combinations & Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, principles of Inclusion – Exclusion.

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UNIT-IV:

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-V:

Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Kruskals Algorithm, Binary trees, Planar Graphs, Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Number

TEXTBOOKS:

1. Discrete Mathematical Structures with Applications to computer science J.P Tremblery, R.Manohar, TMH
2. Discrete Mathematical for computer Scientists & Mathematicians “ J.L. Molt, A.Kandel, T.P.Baker, PHI

REFERENCE TEXTBOOKS:

1. Elements of Discrete Mathematics, C L Liu, D P Mohanpatra, TMH
2. Discrete Mathematics, Schaum’s Outlines, Lipschutz, Lipson, TMH
3. Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI, 200
4. Discrete Mathematics, Johnsonbaugh, 6th ed., Pearson, 2005
5. Discrete Mathematics, Malik, Sen, 6th ed., Cengage Learning, 2004
6. Discrete Mathematics for computer science, Bogart, Stein and Drysdale, Springer, 2005

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Course Code 18MC1T4	ENGLISH LANGUAGE COMMUNICATION SKILLS	T	P
	Maximum expected contact hours : 64	4	--
I Year I Semester			
COURSE OBJECTIVES			
1	To train the learners in the elements of the administrative and professional compilation skills including the style, format etc.		
2	To expose learners to the processes and procedures of interpersonal communication.		
3	To make the learners aware of the processes of employing relevant communicative patterns for academic and/or professional environments.		
4	To develop a professional-level reading skill for understanding, interpreting and analyzing textual data.		
5	To offer understanding in the processes of Technical communication skills.		
COURSE OUTCOMES			
1	Acquire proficiency in administrative and professional compilation skills.		
2	Attain practice in Interpersonal Communication.		
3	Acquire authentic understanding in the elements of functional English for authentic use of language in any given academic and/or professional environment.		
4	Enhance Reading skills, along with a wide range of Vocabulary.		
5	Acquire competence in Technical communication skills.		

UNIT I:

Informal conversation Vs Formal expression Verbal and non-verbal communication, barriers to effective communication – kinesics

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UNIT II:

Types of Communication - - Oral, aural, Writing and reading - Word-Power - Vocabulary- Jargon - rate of speech, pitch, tone - Clarity of voice Technical presentations - types of presentation –video conferencing-- participation in meetings - chairing sessions.

UNIT III:

Formal and informal interviews – ambiance and polemics - interviewing in different settings and for different purposes e.g., eliciting and giving information, recruiting, performance appraisal.

UNIT IV:

Written communication - differences between spoken and written communication - features of effective writing such "as clarity, brevity, appropriate tone clarity, balance etc.- GRE. TOEFL models

UNIT V:

Letter-writing - business letters – pro forma culture - format - style – effectiveness, promptness - Analysis of sample letters collected from industry - email, fax. Technical Report writing - Business and Technical Reports – Types of reports - progress reports, routine reports - Annual reports - format - Analysis of sample reports from industry - Synopsis and thesis writing

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REFERENCE BOOKS:

1. Essentials of Business Communication, Rajendra Pal, J S KorlahaHi , Sultan Chand & Sons,
2. Basic Communication Skills for Technology, Andrea J. Rutherford, Pearson Education Asia,
3. Advanced Communication Skills, V. Prasad, Atma Ram Publications.
4. Business Communication, Theory & Application .Raymond . Lesikav, John D. Pettit Jr. All India Traveller Bookseller
5. Business Communication, RK Madhukar, Vikas Publishing House Pvt Ltd
6. English. for Technical Communication – vols I & 2.,K R Lakshminarayana. SCITECH Publications
7. Edmond H Weiss: Writing Remedies: Practical Exercises for Technical Writing, Universities Press
8. Cliffs Test Prep for GRE and TOEFL, Computer Based Test, IDG Books.
9. GRE and TOEFL, Kaplan and Baron's
10. English in Mind, Herbert Puchta and Jeff Stranks, Cambridge

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Course Code 18MC1T5	ACCOUNTING AND FINANCIAL MANAGEMENT	T	P
	Maximum expected contact hours : 64	4	--
I Year I Semester			
COURSE OBJECTIVES			
1	The objective to firm's past performance to provide information that is useful for estimating its future performance.		
2	The course integrates key concepts from accounting, finance, economics, and business strategy and applies them to financial decision-making.		
3	The class is case-oriented. You are responsible for preparing cases in advance of the class session, including familiarizing yourself with the relevant accounting issue.		
4	The course is practical and focuses on enabling you to apply many of the theories that you have learned in other courses in the setting of understanding a business.		
COURSE OUTCOMES			
1	Understand the accounting process in business.		
2	Attain practice in Interpersonal Communication.		
3	To gain a knowledge on application of concepts and principles in preparing.		
4	To evaluate the tactical decisions of middle level managers relating to cost and management accounting.		
5	To analyze the financial statements and evaluate the decisions for better investment.		

UNIT-I:

Accounting: Generally Accepted Accounting Principles (GAAP) & Accounting standards, Characteristics and limitations of single entry system, double entry system of accounting, introduction of basis books of accounts, ledgers. Preparation of trail balance – Final accounts – company final accounts – Users of Accounting Information, Role of Accountant in modern Organizations.

UNIT-II:

Financial Management – meaning and scope, role, objectives of time value of money – over vitalization – under capitalization – profit maximization – wealth maximization – EPS maximization. Ration Analysis - advantages - limitations - Fund flow analysis – meaning, importance, preparation and interpretation of Funds flow and cash flow statements – statements of changes in working capital.

UNIT-III:

Costing – nature and importance and basic principles. Elements of cost – Absorption costing Vs. Marginal costing – Financial accounting Vs. cost Accounting Vs. management accounting. Marginal costing and Break – even Analysis: nature, scope and importance– practical applications of marginal costing, limitation and importance of cost – volume, profit analysis, short run decisions.

UNIT-IV:

Standard costing and budgeting : nature, scope and computation and analysis – materials variance, labor variance and sales variance – cash budget, sales - budget – flexible Budgets, master budgets.

UNIT-V:

Introduction to computerized accounting system: coding logic and codes, master files, transaction files, introduction documents used for data collection, processing of different files and Outputs obtained.

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TEXT BOOKS:

1. Accounting for Managers, P. Vijaya Kumar, and Himalaya Publications.
2. Accounting for Management. Vijaya Kumar.TMH.
3. Financial Accounting, S.N Maheswari and S.K. Maheswari, Vikas.
4. Financial Accounting, A. Mukherjee and M. Heneef, TMH.

REFERENCE BOOKS:

1. Basic Financial Accounting for Management, Ambaresh Gupta, Pearson.
2. Accounts And Finance for Non accounts, Chatterjee, D.K.Himalaya.
3. Financial Analysis and Accounting, P. Premchand Babu and M. Madam Mohan, Himalaya.
4. Essential of Financial Accounting, Ashish, K and Ballacharya, PHI.
5. Guide to Financial Management, John Tannent, Viva.

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Course Code 18MC1L1	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB	T	P
		--	3
I Year I Semester			
COURSE OBJECTIVES			
1	To expose the students to a variety of self-instructional, learner-friendly modes of language learning.		
2	To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.		
3	To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.		
4	To train them to use language effectively to face interviews, group discussions, public speaking.		
5	To initiate them into greater use of the computer in resume preparation, report writing, format-making etc		
COURSE OUTCOMES			
1	Acquire competence in the scientific processes of articulation		
2	Develop insights into the elements of listening comprehension		
3	Develop understanding about the patterns of communication with special reference to standardization of pronunciation		
4	Develop the skills of public speaking in both across the table communication and public address		
5	Be aware of the elements of employment- oriented communication		

1. Introduction to Phonetics
2. Introduction to Vowels and Consonants and associated Phonetic symbols.
3. Introduction to Accent, Intonation and Rhythm.
4. Situational Dialogues/Role Play.
5. Debate
6. Public Speaking.
7. Group Discussions
8. Facing Interviews
9. Resume preparation
10. E-Correspondence

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MODULE	TOPICS/SUB-TOPICS	LAB SESSIONS
1	INTRODUCTION TO PHONETICS-Vowels,- Consonants, -Diphthongs INTRODUCTION TO STRESS & INTONATION-Articulation, - Respiration, -Phonation	3
2	GROUP DISCUSSIONS FACING INTERVIEWS	4
3	SITUATIONAL/DIALOGUE/	2
4	ROLE PLAY RESUME PREPARATION	2
5	PUBLIC SPEAKING, DEBATE	2
6	GRE,TOEFL,GMAT MODELS, e- CORRESPONDENCE	3

Suggested Software for Lab classes:

- Cambridge Advanced Learners' Dictionary with exercises
- The Rosetta Stone English Library Clarity Pronunciation Power
- Mastering English in Vocabulary, Grammar, Spellings, Composition Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Oxford Advanced Learner's Compass, 7th Edition Language in Use, Foundation Books Pvt Ltd
- Learning to Speak English - 4 CDs
- Microsoft Encarta
- Murphy's English Grammar, Cambridge
- Time series of IQ Test, Brain-teasers, Aptitude Test etc.
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

REFERENCE BOOKS:

1. The Human Touch: personal Skills for Professional Success – by DebraPaul.
2. The Definitive Book of body Language – by Allan Pease, Barbara Pease.
3. How to Face Interviews – by Clive Fletcher.s
4. The 7 Habits of Highly Effective People – by StephenCovery.

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Course Code 18MC1L2	C PROGRAMMING & DATA STRUCTURES LAB	T	P
		--	3
I Year I Semester			
COURSE OBJECTIVES			
1	To learn/strengthen a programming language like C		
2	To learn problem solving techniques		
3	To Introduce the student to simple linear and non linear data structures such as lists, stacks, queues, etc.,		
4	To develop skills to design and analyze simple linear and non linear data structures		
5	To Strengthen the ability to identify and apply the suitable data structure for the given real world problem		
6	To Gain knowledge in practical applications of data structures		
COURSE OUTCOMES			
1	It is expected that the students could construct a C program (Write, Edit, Compile, Link and Execute).		
2	It is expected that the students are proficient in writing Programs using selection, control statements, functions, arrays, pointers, structures and files.		
3	It is expected that the students are able to convert design, analysis to C program statements.		
4	It is expected that learners are capable of analyzing complex problem, design, implement and execute the program.		
5	It is expected that learners are able to design and analyze the time and space efficiency of the data structure		
6	It is expected that learners are capable to identify the appropriate data structure for given problem		

Exercise 1.

- Write a C program to find the sum of individual digits of a positive integer.
- A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 2.

- Write a C program to calculate the following Sum: $\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$
- Write a C program to find the roots of a quadratic equation.
- Write a C program to implement Newton Raphson method for a quadratic equation
- Write a C program to implement Newton Raphson method for a general purpose algebraic equation

Exercise 3

- Write C programs that use both recursive and non-recursive functions
 - To find the factorial of a given integer.
 - To find the GCD (greatest common divisor) of two given integers.
 - To solve Towers of Hanoi problem.

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- iv) Write program to calculate probability of head/tail by generating random numbers using random() function.

Exercise 4

- a) The total distance travelled by vehicle in 't' seconds is given by distance = $ut + \frac{1}{2}at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec²). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
- b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

Exercise 5

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C program that uses functions to perform the following:
- i) Addition of Two Matrices
 - ii) Multiplication of Two Matrices
 - iii) Checking symmetricity of a square matrix.
 - iv) Calculating transpose of a matrix in-place manner.

Exercise 6

- a) Write a C program that uses functions to perform the following operations:
- i) To insert a sub-string in to given main string from a given position.
 - ii) To delete n Characters from a given position in a given string.
- b) Write a C program to determine if the given string is a palindrome or not

Exercise 7

- a) Write a C program that displays the position/ index in the string S where the string T begins, or -1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

Exercise 8

- a) Write a C program to generate Pascal's triangle.
- b) Write a C program to construct a pyramid of numbers.

Exercise 9

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Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\dots+x^n$

For example: if n is 3 and x is 5, then the program computes $1+5+25+125$. Print x, n, the sum Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if $n < 0$, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

Exercise 10

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to convert a Roman numeral to its decimal equivalent.

Exercise 11

a) Write a C program that uses functions to perform the following operations using Structure:

i) Reading a complex number ii) Writing a complex number

iii) Addition of two complex numbers iv) Multiplication of two complex numbers

Exercise 12

a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)

Reference Books:

1. Computer Programming in C, V. Rajaraman, PHI.
2. C Programming, E.Balagurusamy, 3rd edition, TMH.
3. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.

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Course Code 18MC1L3	PC HARDWARE & SOFTWARE LAB	T	P
		--	3
I Year I Semester			
COURSE OBJECTIVES			
1	Enabling the student to understand basic hardware and software tools through practical Exposure		
2	To make students familiar with MS-Office.		
3	To make the students understand the layout of a computer system.		
4	To make the students understand the installations of operating systems.		
5	To provide students the basic knowledge in creating web pages.		
6	To make the students understand the connectivity of Internet.		
COURSE OUTCOMES			
1	It is expected that the students are able to assemble a PC and install an operating system.		
2	It is expected that the students could create documents.		
3	It is expected the students are able to design professional presentations.		
4	It is expected the students are able to work with spreadsheets.		
5	It is expected that the students could connect PC to various Networks		
6	It is expected that the students could design static web pages.		

PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

Internet & World Wide Web:

Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene(protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

Productivity tools Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

PC Hardware

Task 1: Identification of the peripherals of a computer.

To prepare a report containing the block diagram of the CPU along with the configuration of ach peripheral and its functions. Description of various I/O Devices

Task 2(Optional) : A practice on disassembling the components of a PC and assembling them to back to working condition.

Task 3: Examples of Operating systems- DOS, MS Windows, Installation of MS windows on a PC.

Task 4: Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

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Task 5:

Hardware Troubleshooting (Demonstration):

Identification of a problem and fixing a defective PC(improper assembly or defective peripherals).

Software Troubleshooting (Demonstration):. Identification of a problem and fixing the PC for any software issues

Internet & Networking Infrastructure

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task 7: Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums

Task 8: Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importance of security patches updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced

Word

Task 9 : MS Word Orientation:

Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

Task 10: Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Excel

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Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations **Creating a Scheduler** - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

LOOKUP/VLOOKUP

Task 12: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power Point

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Task 14: Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

TEXT BOOK:

Faculty to consolidate the workshop manuals using the following references

1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
3. Information Technology Workshop,3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology , Vikas Gupta, dreamtech.

REFERENCE BOOK:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu

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Course Code 18MC2T1	OOPS THROUGH JAVA	T	P
	Maximum expected contact hours : 64	4	--
I Year II Semester			
COURSE OBJECTIVES			
1	To expose the students to object-oriented concepts, including classes, objects, methods, properties, abstraction, polymorphism, inheritance, encapsulation, and more.		
2	To train the learners to implement and use inheritance and polymorphism, including interfaces and abstract classes, Packages.		
3	To make the students understand the fundamentals of Java programming and developing Java applications.		
4	To make the students to design appropriate Exception Handling in Java methods.		
5	To make the students to understand the concepts of Threads, Files and I/O Streams, Applets, Networking in java.		
COURSE OUTCOMES			
1	It is expected that the students are competent enough to write, debug, and document well-structured Java applications.		
2	It is expected that the students would apply decision and iteration control structures to implement algorithms and the learners implement Java classes from specifications.		
3	It is expected that the learners effectively create and use objects from predefined class libraries.		
4	It is expected that the students have proficient knowledge in handling of inheritance, and polymorphism as programming techniques and working with Interfaces, Abstract Class, Packages, Exceptions and Threads.		
5	It is expected that the students would work with Files, I/O Streams, Networking Packages and Applets.		

UNIT-I:

Basics of Object Oriented Programming(OOP): Need for OO paradigm , A way of viewing world- Agents, responsibility, messages, methods, classes and instances, class hierarchies(Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms

Java Basics: Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects- concepts of classes, objects, constructors methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT-II:

Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, sombination, benefits of inheritance costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes.

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Packages and Interfaces: Defining, Creating and Accessing a package, Understanding CLASSPATH, Importing packages, differences between classes and interfaces, defining an interface, Implementing interface, applying interfaces variables in interface and extending interfaces.

UNIT-III:

Exception handling and Multithreading: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque.

UNIT-IV:

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy , user-interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, list panes- scroll pane, dialogs, menu bar, graphics, layout manager- layout manager types- boarder, grid, flow, card and grid bag.

UNIT-V:

Applets: Concepts of Applets, differences between applets and applications, lifecycle of an applet, types of applets, creating applets, passing parameters to applets.

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons-The JButton class, Check boxes, Radio Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees and Tables.

TEXTBOOKS:

1. Java-The complete reference,7/e, Herbert schildt, TMH.
2. JAVA: How to program, 8/e, Dietal , Dietal,PHI.
3. Introduction of programming with JAVA,S.Dean,TMH.
4. Introduction to Java programming, 6/e, Y.Daniel Liang, Pearson.

REFERENCES:

1. Core Java 2, Vol 1(Vol 2) Fundamentals(Advanced), 7/e, Cay.S.Horstmann,Gary Cornell, Pearson.
2. Big Java2,3/e, Cay.S. Horstmann,Wiley.
3. Object Oriented Programming through Java, P.Radha Krishna, University Press.
4. JAVA& Object Orientation an Introduction, 2/e, John Hunt, Springer.
5. Introduction to JAVA Programming, 7/e, Y. Daniel Liang, Pearson. , TMH.

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Course Code 18MC2T2	OPERATING SYSTEMS	T	P
	Maximum expected contact hours : 64	4	--
I Year II Semester			
COURSE OBJECTIVES			
1	To make the students understand the fundamentals of Operating system, OS-Structure and its operations.		
2	To make the students recognize the importance of scheduling algorithms.		
3	To make the students understand the relationship of critical sections, semaphores and inter process communication to concurrent programming.		
4	To make the students proficient in memory management techniques and virtual memory concepts.		
5	To make the learners proficient in handling I/O in a computer system.		
6	To expose the students to the features of an operating system related to protection and security.		
COURSE OUTCOMES			
1	It is expected that the students appreciate operating system design concepts and familiar with the implementation of these concepts.		
2	It is expected that the students are familiar with various operating system concepts as they are applied to memory, process, file system and I/O device management.		
3	It is expected that the students recognize OS support for virtual memory, disk scheduling, I/O, and file systems.		

UNIT-I:

Introduction: Computer –system organization, Computer- system Architecture, Operating-system Structure, Operating-system Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special-purpose systems ,Computing Environments , Operating-system Structure:, Operating-system Services, User , Operating-system Interface, System calls, System programs, Operating-system Design and Implementation, , Operating-system structure, Virtual Machine

UNIT-II:

Process Management:

Processes: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC Systems, Communication in Client-Server systems

Threads: Overview, Multithreading Models, Thread Libraries, Java Threads, Threading Issues, OS Examples

CPU Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Thread Scheduling, Operating system Examples Process Synchronization: Background, The Critical- section problem, Petersons solution, Synchronization Hardware, Semaphores, Classic problems of Synchronization, Monitors, Atomic Transactions.

UNIT-III:

Memory management: Main memory: Swapping, Contiguous memory Allocation, Paging, Structure of the Page table, Segementation Virtual memory: Background, Demand paging, copy-on-Write, Page Replacement, Allocation of frames, Thrashing, Memory-Mapped Files.

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UNIT-IV:

File-system Interface: Concept, Access Methods, Directory structure, Filesystem Mounting, File sharing, Protection

File-system Implementation: File-system Structure, Implementation, Directory Implementation, Allocation Methods, Free- Space Management, Efficiency and Performance, Recovery, Log-Structured File systems, NFS Mass –storage Structure: Overview, Disk Structure, Disk Attachment, Disk Scheduling, Disk and swap-space Management, RAID Structure, Stable-Storage Implementation, Tertiary-Storage Structure I/O systems: Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O requests to Hardware Operations, STREAMS, Performance.

UNIT-V:

Deadlocks: System model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock avoidance Deadlock Detection and Recovery form Deadlock. Protection: Goals of Protection, Principles of protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability – Based systems, Language-Based Protection

Security: The Security Problem, Program Threads, System and Network

Threats, Cryptography as a security tool, User Authentication, Implementing security Defenses, Firewalling to protect systems and Networks.

TEXTBOOKS:

1. Operating system concepts, 7/e, Abraham Silberschatz, Galvin, John Wiley &sons , Inc.

REFERENCES:

1. Operating systems, 6/E, William stallings, PHI/Pearson.
2. Operating systems 3/e, Dietal, Dietal, Pearson.
3. Operating systems, 2/e, Dhamdhare, TMH.
4. An introduction to Operating systems, Concepts and practice, Pramod Chandra P. Bhat, PHI
5. Operating systems, Elmasri, Carrick, Levine, TMH.
6. Operating systems, 3/e ,Nutt, Chaki, Neogy Pearson.
7. Operating systems, Brian L. Stuart, Cengage.
8. Operating systems, Haldar, Aravind, Pearson.

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Course Code 18MC2T3	OPTIMIZATION TECHNIQUES		T	P
	Maximum expected contact hours : 64		4	--
I Year II Semester				
COURSE OBJECTIVES				
1	To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems			
2	To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology			
3	To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.			
COURSE OUTCOMES				
1	Apply basic concepts of mathematics to formulate an optimization problem			
2	Analyse and appreciate variety of performance measures for various optimization problems			
3	Understand importance of optimization of industrial process management			

UNIT-I:

Development: Definition, Characteristics and Phrases, scientific method. Types of models, general methods for solving, operations research modes.

Allocation: introduction linear programming formulation, graphical solution, simplex methods, artificial variable technique, duality principle.

UNIT-II:

Transportation problem: Formulation, optimal solution, unbalanced transportation, assignment problem: formulation, optimal solution, variations problem, degeneracy i.e. non square $M \times N$ matrix, restrictions sequencing: Introduction, optimal solution for processing each of n jobs through three machines, travelling salesman problem(i.e.) shortest acyclic route models.

UNIT-III:

Replacement: Introduction, replacement of items that deteriorate when money value is not counted and counted, and replacement of items that fail completely (i.e.) group replacements. **Waiting lines:** Introduction , single channel, poisson arrivals, exponential service time infinite population and unrestricted queue.

UNIT-IV:

Inventory: Introduction, single item, deterministic models, production is instantaneous or at a constant rate , shortages are allowed or not allowed and with draws from stock is continuous, purchase inventory model with one price break ,shortages are not allowed , instantaneous production demand production or purchase cost is relevant, stochastic models, simple problems.

UNIT-V:

Theory of Games: Introduction, minmax (maximum), criterion and optimal strategy solution of games with saddle points, rectangular without saddle points. Dynamic programming: Introduction, Bellman's Principle of optimality, solutions for simple problems.

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Project Management: PERT and CPM , difference between PERT and CPM, PERT/CPM network components and precedence relations, Time Estimates for activities.

TEXTBOOKS:

1. Operations Research, S.D.Sharma, Ramnath, & Kedarnath co, Meerut.
2. Operations Research, An introduction , 8/e, Taha, Pearson.

REFERENCES:

1. Operations Research, P.K.Gupta, D.S. Hira, S.Chand.
2. Operations Research, R.D.Asrhedkar, R.V.Kulkarni.
3. Operations Research, Problems & sollutons, 3/e, JKSharma, Macmillan.
4. Operations Research, 8/e, Hillier, Liberman, TMH.
5. Operations Research, 2/e, Panneerselvam.

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Course Code 18MC2T4	STATISTICAL PROGRAMMING WITH R	T	P
	Maximum expected contact hours : 64	4	--
I Year II Semester			
COURSE OBJECTIVES			
1	Use R for statistical programming, computation, graphics, and modeling		
2	Write functions and use R in an efficient way		
3	Fit some basic types of statistical models		
4	Use R in their own research		
5	Be able to expand their knowledge of R on their own		
6	Be able to used the knowledge in Data Science		
COURSE OUTCOMES			
1	List motivation for learning a programming language		
2	Access online resources for R and import new function packages into the R workspace		
3	Import, review, manipulate and summarize data-sets in R		
4	Explore data-sets to create testable hypotheses and identify appropriate statistical tests		
5	Perform appropriate statistical tests using R Create and edit visualizations		
6	Apply R fundamentals in Data science		

UNIT-I:

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

UNIT-II:

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,-If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quick sort Implementation-Extended Example: A Binary Search Tree.

UNIT-III:

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices,

Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT-IV:

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot () Function – Customizing Graphs, Saving Graphs to Files.

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UNIT-V:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,- ANOVA. Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Spines- Decision- Random Forests,

TEXT BOOKS:

- 1) The Art of R Programming, Norman Matloff, Cengage Learning
- 2) R for Everyone, Lander, Pearson

REFERENCE BOOKS:

- 1) R Cookbook, Paul Teetor, Oreilly.
- 2) R in Action, Rob Kabacoff, Manning

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Course Code 18MC2T5	DATABASE MANAGEMENT SYSTEMS	T	P
	Maximum expected contact hours : 64	4	--
I Year II Semester			
COURSE OBJECTIVES			
1	To explain the students the strategies used in a DBMS.		
2	To expose the students in Relational Algebra, Calculus in detail.		
3	To make the students understand the need of SQL Statements.		
4	To make the learners demonstrate the importance of Normalization.		
5	To make the students understand the need for transaction processing, concurrency control and recovery mechanisms to maintain data integrity.		
6	To make the learners appreciate on how the database maps onto physical storage and how the security can be implemented.		
COURSE OUTCOMES			
1	It is expected that learners identify the features of the DBMS that will meet the organizational needs.		
2	It is expected that the students familiarize on different ER Models		
3	It is expected that the students are able to design a database efficiently.		
4	It is expected that the students are able to write queries using Relational Algebra, Relational Calculus.		
5	It is expected that the students recognize the importance of normal forms.		
6	It is expected that the students are able to judge the value of transaction transparency, concurrency control in the maintenance of data integrity.		
7	It is expected that the students write queries using SQL Statements		

UNIT-I:

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models –Database Languages –DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, History of Data base Systems. Introduction to Data base design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets ,Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views – Destroying /altering Tables and Views.

UNIT- II:

Relational Algebra and Calculus: Relational Algebra – Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus. Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, NULL values – Comparison using Null values – Logical connectives – AND, OR and NOT – Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT- III:

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND,

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THIRD Normal forms – BCNF –Properties of Decompositions- Loss less join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT- IV:

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks –Performance of Locking – Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT-V:

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

TEXTBOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition,2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan,McGraw hill, VI edition,2006.
3. Fundamentals of Database Systems 5th edition., Ramez Elmasri, Shamkant .Navathe,Pearson Education,2008.

REFERENCEBOOKS:

1. Database Management System Oracle SQL and PL/SQL,P.K.Das Gupta,PHI.
2. Database System Concepts,Peter Rob & Carlos Coronel,Cengage Learning,2008.
3. Database Systems, APractical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
4. Database Principles, Programming, and Performance, P.O’Neil, E.O’Neil, 2nd ed.,ELSEVIER
5. Fundamentals of Relational Database Management systems,S.Sumathi,S.Esakkirajan,Springer.
6. Introduction to Database Management,M.L.Gillenson and others,Wiley Student Edition.
7. Database Development and Management, Lee Chao, Auerbach publications,Taylor & Francis Group.
8. Introduction to Database Systems, C.J.Date,Pearson Education.

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Course Code 18MC2L1	OOPS THROUGH JAVA LAB		T	P
			--	3
I Year II Semester				
COURSE OBJECTIVES				
1	To make the students understand the fundamentals of Java programming and developing Java applications.			
2	To expose the students to object-oriented concepts, including classes, objects, methods, properties, abstraction, polymorphism, inheritance, encapsulation, and more.			
3	To train the learners to implement and use inheritance and polymorphism, including interfaces and abstract classes, Packages.			
4	To make the students to design appropriate Exception Handling in Java methods.			
5	To make the students to understand the concepts of Threads, Files and I/O Streams, Applets, Networking in java.			
COURSE OUTCOMES				
1	It is expected that the students are competent enough to write, debug, and document well-structured Java applications.			
2	It is expected that the students would apply decision and iteration control structures to implement algorithms and the learners implement Java classes from specifications.			
3	It is expected that the learners effectively create and use objects from predefined class libraries			
4	It is expected that the students have proficient knowledge in handling of inheritance, and polymorphism as programming techniques and working with Interfaces, Abstract Class, Packages, Exceptions and Threads.			
5	It is expected that the students would work with Files, I/O Streams, Networking Packages and Applets.			

1. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. every subsequent value is the sum of the 2 values preceding it. Write A Java Program (WJJP) that uses both recursive and non recursive functions to print the nth value of the Fibonacci sequence.
2. WJJP to demonstrate wrapper classes and to fix the precision.
3. WJJP that prompts the user for an integer and then prints out all the prime numbers upto that Integer.
4. WJJP that checks whether a given string is a palindrome or not. Ex. MALAYALAM is a palindrome.
5. WJJP for sorting a given list of names in ascending order.
6. WJJP to check the compatibility for multiplication, if compatible multiply two matrices and find its transpose.
7. WJJP that illustrates how runtime polymorphism is achieved.
8. WJJP to create and demonstrate packages.
9. WJJP, using String Tokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.
10. WJJP that reads on file name form the user then displays information about whether the file exists, whether the file is readable/writable, the type of file and the length of the file in bytes and display the content of the using FileInputStream class.
11. WJJP that displays the number of characters, lines and words in a text/text file.
12. Write an Applet that displays the content of a file.
13. WJJP that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +-*?/% operations. Add a text field to display the result.

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14. WJJP for handling mouse events.
15. WJJP demonstrating the life cycle of a thread.
16. WJJP that correctly implements Producer-Consumer problem using the concept of Inter Thread Communication.
17. WJJP that lets users create Pie charts. Design your own user interface(with Swings & AWT).
18. WJJP that allows user to draw lines, rectangles and ovals.
19. WJJP that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result and then sends the result back to the client. The client displays the result on the console. For ex: The data send form the client is the radius of a circle and the result produced by the server is the area of the circle.
20. WJJP to generate a set of random numbers between two numbers x1 and x2, and $x1 > 0$.
21. WJJP to create an abstract class named shape, that contains an empty method named number Of Sides(). Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method number Of Sides(), that contains the number of sides in the given geometrical figure.
22. WJJP to implement a Queue, using user defined Exception Handling (also make use of throw, throws).
23. WJJP that creates 3 threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third displays “Welcome” every 3 seconds. (Repeat the same by implementing Runnable).
24. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamsteretc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviours, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.

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Course Code 18MC2L2	STATISTICAL PROGRAMMING WITH R LAB	T	P
		--	3
I Year II Semester			
COURSE OBJECTIVES			
1	Familiarize participants with R syntax		
2	Understand the concepts of objects and assignment		
3	Understand the concepts of vector and data types		
4	Get exposed to a few functions		
COURSE OUTCOMES			
1	Explore data-sets to create testable hypotheses and identify appropriate statistical tests		
2	Perform appropriate statistical tests using R		
3	Create and edit visualizations with R		

1. Write a program to illustrate basic Arithmetic in R
2. Write a program to illustrate Variable assignment in R
3. Write a program to illustrate data types in R
4. Write a program to illustrate creating and naming a vector in R
5. Write a program to illustrate create a matrix and naming matrix in R
6. Write a program to illustrate Add column and Add a Row in Matrix in R
7. Write a program to illustrate Selection of elements in Matrixes in R
8. Write a program to illustrate Performing Arithmetic of Matrices
9. Write a program to illustrate Factors in R
10. Case study of why you need use a Factor in R
11. Write a program to illustrate Ordered Factors in R
12. Write a program to illustrate Data Frame Selection of elements in a Data frame
13. Write a program to illustrate Sorting a Data frame
14. Write a program to illustrate List ? Why would you need a List
15. Write a program to illustrate Adding more elements into a List
16. Write a program to illustrate if-else-else if in R
17. Write a Program to illustrate While and For loops in R
18. Write a program to illustrate Compare and Matrices and Compare vectors
19. Write a program to illustrate Logical & and Logical | operators in R.
20. Write a program to illustrate Functions in Quick sort implementation in R
21. Write a program to illustrate Function inside function in R
22. Write a program to illustrate to create graphs and usage of plot() function in R
23. Write a program to illustrate Customising and Saving to Graphs in R.
24. Write a program to illustrate some built in Mathematical Functions

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Course Code 18MC2L3	DATABASE MANAGEMENT SYSTEMS LAB	T	P
	Maximum expected contact hours :	--	3
I Year II Semester			
COURSE OBJECTIVES			
1	To make the students understand DDL, DML, TCL, DCL commands. •		
2	To make the students understand the basic SQL queries and complex queries using joins.		
3	To make the students understand benefits of granting and revoking privileges, index, synonym and sequence		
4	To make the students get an insight into the working of Locking Tables.		
	To make the students aware of writing PL/SQL blocks, Procedures, Functions, Triggers and Packages.		
COURSE OUTCOMES			
1	It is expected that the learners able to create a Database and perform all DDL, DML, TCL, DCL operations.		
2	It is expected that the students can grant and revoke privileges.		
3	It is expected that the students can lock the tables.		
	It is expected that the learners create Stored Procedures and Functions, Triggers and Packages.		

1. Execute a single line and group functions for a table.
 2. Execute DCL and TCL Commands.
 3. Create and manipulate various DB objects for a table.
 4. Create views, partitions and locks for a particular DB.
 5. Write PL/SQL procedure for an application using exception handling.
 6. Write PL/SQL procedure for an application using cursors.
 7. Write a DBMS program to prepare reports for an application using functions.
 8. Write a PL/SQL block for transaction operations of a typical application using triggers.
 9. Write a PL/SQL block for transaction operations of a typical application using package.
 10. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
 11. Create table for various relation
 12. Implement the query in sql for a) insertion b) retrieval c) updation d) deletion
 13. Creating Views
 14. Writing Assertion
 15. Writing Triggers
 16. Implementing operation on relation using PL/SQL
 17. Creating Forms
 18. Generating Reports
- Typical Applications – Banking, Electricity Billing, Library Operation, Pay roll, Insurance, Inventory etc.

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Course Code 18MC3T1	THEORY OF COMPUTATION	T	P
	Maximum expected contact hours : 64	4	- -
II Year I Semester			
COURSE OBJECTIVES			
1	To give an overview of the theoretical foundations of computer science from the perspective of formal languages		
2	To illustrate finite state machines to solve problems in computing		
3	To explain the hierarchy of problems arising in the computer sciences.		
4	To familiarize Regular grammars, context free grammar		
COURSE OUTCOMES			
1	To use basic concepts of formal languages of finite automata techniques		
2	To Design Finite Automata's for different Regular Expressions and Languages		
3	To Construct context free grammar for various languages		
4	To solve various problems of applying normal form techniques, push down automata and Turing Machines		
5	To participate in GATE, PGCET and other competitive examinations		

UNIT - I FINITE AUTOMATA (FA): Introduction, Deterministic Finite Automata (DFA) -Formal definition, simpler notations (state transition diagram, transition table), language of a DFA. Nondeterministic Finite Automata (NFA)- Definition of NFA, language of an NFA, Equivalence of Deterministic and Nondeterministic Finite Automata, Applications of Finite Automata, Finite Automata with Epsilon Transitions, Eliminating Epsilon transitions, Minimization of Deterministic Finite Automata, Finite automata with output (Moore and Mealy machines) and Inter conversion.

UNIT - II REGULAR EXPRESSIONS (RE): Introduction, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA's to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. REGULAR GRAMMARS: Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.

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UNIT - III CONTEXT FREE GRAMMER (CFG): Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG's, Minimization of CFG's, CNF, GNF, Pumping Lemma for CFL's, Enumeration of Properties of CFL (Proof's omitted).

UNIT - IV PUSHDOWN AUTOMATA: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA. **TURING MACHINES (TM):** Formal definition and behaviour, Languages of a TM, TM as accepters, and TM as a computer of integer functions, Types of TMs.

UNIT V RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES (REL): Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.

TEXT BOOKS: 1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory Languages and Computation, 3rd edition, Pearson Education, India.

REFERENCE BOOKS: 1. K. L. P Mishra, N. Chandrashekar (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India.

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Course Code 18MC3T2	COMPUTER NETWORKS	T	P
	Maximum expected contact hours : 64	4	- -
II Year I Semester			
COURSE OBJECTIVES			
1	Understand the division of network functionalities into layers.		
2	Be familiar with the components required to build different types of networks		
3	Be exposed to the required functionality at each layer		
4	Learn the flow control and congestion control algorithms		
COURSE OUTCOMES			
1	Identify the components required to build different types of networks		
2	Choose the required functionality at each layer for given application		
3	Identify solution for each functionality at each layer		
4	Trace the flow of information from one node to another node in the network		

UNIT-I:

Network Hardware reference model: Transmission media, Narrowband ISDN, Broad band ISDN, ATM.

The data Link layer: Design Issues, Error detection and correction, Elementary Data Link Protocols, Sliding window protocols : Data link layer in HDLC, Internet and ATM.

UNIT-II:

Channel allocation methods: TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard BO2 for LANS – Ethernet, Token Bus, Token ring, Bridges.

Network layer Routing Algorithms: Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Choke packets and Load shedding.

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UNIT-III:

Internet Working: Tunneling, internetworking, Fragmentation, network layer in the internet – IP protocols, IP address, Subnets, Internet control protocols, DSDP, BOP, Internet multicasting, Mobile IP. Network layer in the ATM Networks – cell formats, connection setup, routing and switching, service categories, and quality of service, ATM LANs.

UNIT-IV:

The Transport Layer: Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, end to end protocols: UDP, reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call – BLAST, CHAN, SELECT, DCE.

UNIT-V:

Application Layer: Network Security, Cryptographic Algorithms: DES, RSA. Security Mechanisms: Authentication Protocols, Firewalls. Name service (DNS) Domains Hierarchy, Name servers. Traditional Applications: SMTP, MIME, World Wide Web: HTTP, Network Management: SNMP.

TEXTBOOKS:

1. Computer Networks and rew, Tanenbaum, 4/e, Pearson
2. Data and computer communications, stallings, 8/e, PHI

REFERENCEBOOKS

1. Data communications and networking Forouzan, 4/e, TMH
2. Computer Networks – A System Approach, Peterson, Bruce Davie, 2/e, Harcourt Asia
3. Compute communications and networking technologies, Gallo, Hancock, Cengage
4. An Engineering approach to compute networking, Kesha, Pearson
5. Communication networks, 2/e, Leon-Garcia, TMH
6. Computer networks, Anuranjan Misra, ACME Learning

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Course Code 18MC3T3	SOFTWARE ENGINEERING	T	P
	Maximum expected contact hours : 64	4	- -
II Year I Semester			
COURSE OBJECTIVES			
1	Be employed in industry, government, or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility;		
2	Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment; and		
3	Progress through advanced degree or certificate programs in computing, science, engineering, business, and other professionally related fields.		
COURSE OUTCOMES			
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics		
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors		
3	an ability to communicate effectively with a range of audiences		
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts		
	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives		

UNIT-I:

Introduction to Software Engineering:

The evolving role of software, Changing Nature of Software, Software myths. (Text Book 3)

The software problem: Cost, schedule and quality, Scale and change.

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UNIT-II:

Software Process: Process and project, component software process, Software development process models : Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project. Project management process.

UNIT- III:

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation.

Planning a software project: Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.

UNIT- IV:

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures.

Design: Design concepts, function-oriented design, object oriented design, detailed design, verification, metrics.

UNIT-V:

Coding and Unit testing: Programming principles and guidelines, incrementally developing code, managing evolving code, unit testing, code inspection, metrics.

Testing: Testing concepts, testing process, black-box testing, white-box testing, metrics.

TEXTBOOKS:

1. A Concise introduction to software engineering (undergraduate topics in computer science), Pankaj Jalote, Springer International Edition.
2. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
3. Software Engineering, 3/e, & 7e Roger S.Pressman, TMH

REFERENCEBOOKS:

1. Software Engineering, 8/e, Sommerville, Pearson.
2. Software Engineering principles and practice, W S Jawadkar, TMH
3. Software Engineering concepts, R Fairley, TMH

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Course Code 18MC3T4	ADVANCED JAVA AND WEB TECHNOLOGIES	T	P
	Maximum expected contact hours : 64	4	- -
II Year I Semester			
COURSE OBJECTIVES			
1	To make the students get acquainted with skills for creating websites and web apps through learning various technologies like HTML, CSS, JavaScript, PHP, MYSQL, XML, JavaBeans, Servlets, JSP, JDBC, AJAX and Web Services		
COURSE OUTCOMES			
1	Students will be acquainted with necessary fundamental skills for creating websites and web apps. This course alone is not sufficient for creating high-end web apps like Facebook, Google etc.		

UNIT-I:

Review of HTML4: Common tags, HTML Tables and formatting internal linking, Complex HTML forms. Introduction to Scripting Languages: Java Scripts, Control structures, functions, arrays & objects, DHTML, CSS, event model, filters & transitions.

UNIT-II:

Review of Applets, Class, Event Handling, AWT Programming:

Introduction to Swing: Japplet, Handling Swing Controls like Icons, Buttons, Text Boxes, Combo Boxes, Tabbed Pains, Scroll Pains, Trees, Tables, Differences between AWT Controls & Swing Controls, Developing a Home page using Applets & Swing.

UNIT-III:

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK, Introspection, Using Bound properties, Bean Info Interface, Constrained properties, Persistence, Customizers, Java Beans API.

Introduction to Serve lets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization Parameters, The javax.Servlet.HTTP package, Handling, Http Request & responses, Using Cookies, Session Tracking, Security Issues.

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UNIT-IV:

Introduction to JSP: The Problem with Serve lets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC.

Setting Up the JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Passing Control and Data Between Pages – Sharing Session and Application Data Memory Usage Considerations.

UNIT-V:

Database Access: Database Programming using JDBC, Studying Javax.sql.* package. Accessing a Database from a JSP Page, Application – Specific Database Actions Deploying JAVA Beans in a JSP Page.

TEXTBOOKS:

1. Internet and World Wide Web: How to program,6/e, Dietel, Dietel, Pearson.
2. The Complete Reference Java2, 8/e, Patrick Naughton, Herbert Schildt, TMH.
3. Java Server Faces, Hans Bergstan, O'reilly.

REFERENCEBOOKS:

1. Web Programming, building internet applications, 2/e, Chris Bates, Wiley Dreamtech
2. Programming World Wide Web, Sebesta, PEA
3. Web Tehnologies, 2/e, Godbole, kahate, TMH
4. An Introduction to web Design , Programming ,Wang, Thomson

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Course Code 18MC3T5	DESIGN AND ANALYSIS OF ALGORITHMS	T	P
	Maximum expected contact hours : 64	4	- -
II Year I Semester			
COURSE OBJECTIVES			
1	To analyze performance of algorithms.		
2	To choose the appropriate data structure and algorithm design method for a specified application.		
3	To understand how the choice of data structures and algorithm design methods impacts the performance of programs		
4	To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.		
5	To understand the differences between tractable and intractable problems.		
6	To introduce P and NP classes.		
COURSE OUTCOMES			
1	Ability to analyze the performance of algorithms.		
2	Ability to choose appropriate algorithm design techniques for solving problems.		
3	Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.		

UNIT-I:

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis. Disjoint Sets-disjoint set operations, union and find algorithms, spanning trees, connected components and bi- connected components.

UNIT-II:

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen's matrix multiplication. Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

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UNIT-III:

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-IV:

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT-V:

Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution. NP-Hard and NP- Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

TEXTBOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. The Algorithm Design Manual, 2nd edition, Steven S. Skiena, Springer.
3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd.

REFERENCEBOOKS:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
2. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu BALachandra Dave, Pearson Education.
3. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc GrawHill.
4. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.

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Course Code 18MC3L1	ADVANCED JAVA & WEB TECHNOLOGIES LAB	T	P
		-	3
II Year I Semester			
COURSE OBJECTIVES			
1	To get familiar with Web designing using HTML, CSS server architecture.		
2	To understand n-tier architecture and able to develop a web application using java technologies		
3	To gain the skills and project-based experience needed for entry into web application and development careers.		
COURSE OUTCOMES			
1	Students are able to develop a dynamic webpage by the use of java script and DHTML.		
2	Students will be able to write a well formed / valid XML document		
3	Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table		
4	Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.		
5	Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.		

Week-1

Design the following static web pages required for an online book store web site.

1) HOME PAGE:

The static home page must contain three frames.

Top frame : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame : At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

Fig 1.1

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2) LOGIN PAGE:



This page looks like below:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	<p style="text-align: center;">Login :</p> <p>Pwdsword: <input type="text"/></p> <p style="text-align: center;"><input type="text"/></p> <p style="text-align: center;"> <input type="button" value="Submit"/> <input type="button" value="Reset"/> </p>			

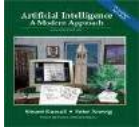


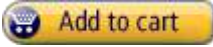


3) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE		Book : XML Bible Author : Winston Publication : Wiely	\$ 40.5	

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CIVIL		Book : AI Author : S.Russel Publication : Princeton hall	\$ 63	
		Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	\$ 50	

Week-2

4) CART PAGE:

The cart page contains the details about the books which are added to the cart.

The cart page should look like this:

Logo	Web Site Name				
	Home	Login	Registration	Catalogue	Cart
CSE	Book name	Price	Quantity	Amount	
ECE					
EEE	Java 2	\$35.5	2	\$70	
CIVIL	XML bible	\$40.5	1	\$40.5	
			Total amount -	\$130.5	

5) REGISTRATION PAGE:

Create a “registration form “with the following fields

- 1) Name (Text field)
- 2) Password (password field)
- 3) E-mail id (text field)
- 4) Phone number (text field)
- 5) Sex (radio button)

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- 6) Date of birth (3 select boxes)
- 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
- 8) Address (text area)

WEEK3:

VALIDATION:

Write *JavaScript* to validate the following fields of the above registration page.

- 1. Name (Name should contains alphabets and the length should not be less than 6 characters).
- 2. Password (Password should not be less than 6 characters length).
- 3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
- 4. Phone number (Phone number should contain 10 digits only).

Note : You can also validate the login page with these parameters.
Use PHP to connect with the database to store the above details.

Week-4:

Design a web page using **CSS (Cascading Style Sheets)** which includes the following:

- 1) Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.
- 2) Set a background image for both the page and single elements on the page.
- 3) Control the repetition of the image with the background-repeat property. Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.
- 4) Define styles for links as

A:link

A:visited

A:active

A:hover

- 5) Work with layers

- 6) Add a customized cursor

Week-5:

Write an XML file which will display the Book information which includes the following:

- 1) Title of the book 2) Author Name
- 3) ISBN number 4) Publisher name
- 5) Edition 6) Price

Write a Document Type Definition (DTD) to validate the above XML file.

Display the XML file as follows.

The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.

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Use XML schemas XSL and CSS for the above purpose.
 Note: Give at least for 4 books. It should be valid syntactically.
 Hint: You can use some xml editors like XML-spy

Week-6:

VISUALBEANS:

Create a simple visual bean with a area filled with a color. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click. The color should also be changed if we change the color in the “property window“.

Week-7:

- 1) Install TOMCAT web server and APACHE. While installation assign port number 4040 to TOMCAT and 8080 to APACHE. Make sure that these ports are available i.e., no other process is using this port.
- 2) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root. Access the pages by using the urls :
<http://localhost:4040/rama/books.html> (for tomcat) <http://localhost:8080/books.html> (for Apache)

Week-8:

User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a serve let for doing the following.

1. Create a Cookie and add these four user id’s and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display “ You are not an authenticated user “. Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInitParameters () method.

Week-9:

Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form). Practice ‘JDBC’ connectivity.

Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

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Week-10:

Write a JSP which does the following job:

Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form.

Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies)

Week-11:

Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount)) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC.

Week-12:

HTTP is a stateless protocol. Session is required to maintain the state. The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of local host). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session. Invalidate ()). Modify your catalogue and cart JSP pages to achieve the above mentioned functionality using sessions.

REFERENCE BOOKS:

1. Jon Duckett “Beginning Web Programming” WROX.
2. Marty Hall and Larry Brown “Core Servlets and Java Server pages Vol. 1: Core Technologies”, Pearson.
3. DanWoods and Gautam Guliani,”Open Source for the Enterprise: Managing Risks, Reaping Rewards”, O’Reilly, Shroff Publishers and Distributors, 2005.
4. Sebesta,”Programming world wide web” Pearson.
5. Dietel and Nieto,“Internet and World Wide Web – How to program”,PHI/Pearson Education Asia.
6. Murach,“Murach’s beginning JAVA JDK 5”, SPD
7. Wang,“An Introduction to web Design and Programming”,Thomson

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Course Code 18MC3L2	SHELL SCRIPTING LAB	T	P
		-	3
II Year I Semester			
COURSE OBJECTIVES			
1	To write shell scripts to solve problems		
2	To implement some standard Linux utilities such as ls,cp,etc using system calls		
3	To develop network based applications using C		
COURSE OUTCOMES			
1	Ability to Understand the Linux environment		
2	Ability to perform to perform the file management and multiple tasks using shell scripts in Linux environment.		

Exercise-1

- a) Program using basic network commands
- b) Program using system calls: create, open, read, write, close, stat, fstat, lseek . Program to implement inter process communication using pipes
- c) Program to perform inter process cots : sniffer

Exercise-2

- a) Write a Shell script that accepts a filename, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
- b) Write a Shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
- c) Write a Shell script that displays list of all the files in the current directory to which the user has read, Write and execute permissions.
- d) Write a Shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

Exercise-3

- a) Write a Shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
- b) Write a Shell script to list all of the directory files in a directory
- c) Write a Shell script to find factorial of a given integer.
- d) Write a Shell script to count the number of lines in a file that do not contain vowels.

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Exercise-4

- a) Write a C program to list files in a directory
- b) Write a C program to emulate the Unix ls-l command.
- c) Write a C program to list for every file in a directory, its inode number and file name.

Exercise-5

- a) Write a C Program that demonstrates redirection of standard output to a file .
Eg: ls>f1.
- b) Write a C program to create a child process and allow the parent to display ,parent and the child to display ,child` on the screen.
- c) Write a C program to create a Zombie process.
- d) Write a C program that illustrates how an orphan is created.

Exercise-6

- a) Write a program that illustrates how to execute two commands concurrently with a command pipe
- b) Write C programs that illustrate communication between two unrelated processes using named pipe (FIFO file)
- c) Write a C program in which a parent writes a message to a pipe and the child reads the message.

Exercise-7

- a) Write a C program (sender.c) to create a message queue with read and write permissions to write three messages to it with different priority numbers.
- b) Write a C Program (receiver.c) that receives the messages and displays them.
- c) Write a C program that illustrates suspending and resuming processes using signals

Exercise-8

- a) Write a client and server programs in C for connection oriented communication between server and client process using Linux domain sockets to perform the following:
Client process sends a message to the server process. The server receives the message, reverses it and sends it back to the client. The client will then display the message to the standard output device.
- b) Write a client and server programs in C for connection oriented communication between server and client process using Internet domain socket to perform the following:
Client process sends a message to the server process. The server receives the message, reverses it

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and sends it back to the client. The client will then display the message to the standard output device.

c) Write a C program to perform the following:

One process creates a shared memory segment and writes a message ,Hello` into it. Another process open the segment and reads the message that is ,Hello`. It will then display the message "Hello" to the standard output device.

Reference Books:

1. Beginning Linux Programming 4th Edition, N.Matthew,R.Stones, Wrox, Wily India Edition.
2. Advanced Unix Programming N.B.Venkateswarlu, BS Publications
3. Unix & Shell Programming, M.G.Venkatesh Murthy, Pearson Education
4. Unix shells by example,4th Edition Ellie Quigley, Pearson Education.

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Course Code 18MC3L3	COMPUTER NETWORKS LAB	T	P
		-	3
II Year I Semester			
COURSE OBJECTIVES			
1	To learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP.		
2	To learn practical approach to Ethernet/Internet networking; networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work.		
COURSE OUTCOMES			
1	Understand the structure and organization of computer networks; including the division into network layers, role of each layer, and relationships between the layers.		
2	Understand the basic concepts of application layer protocol design; including client/server models, peer to peer models, and network naming.		
3	In depth understanding of transport layer concepts and protocol design; including connection oriented and connection-less models, techniques to provide reliable data		

PART – A

1. Implement the data link layer framing methods such as character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra’s algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.

PART – B

1. Implement the following forms of IPC.
a) Pipes b) FIFO
2. Implement file transfer using Message Queue form of IPC
3. Write a programme to create an integer variable using shared memory concept and increment the variable
4. Simultaneously by two processes. Use semaphores to avoid race conditions
5. Design TCP iterative Client and server application to reverse the given input sentence
6. Design TCP iterative Client and server application to reverse the given input sentence
7. Design TCP client and server application to transfer file
8. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call “select”
9. Design a TCP concurrent server to echo given set of sentences using poll functions
10. Design UDP Client and server application to reverse the given input sentence
11. Design UDP Client server to transfer a file
12. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
13. Design a RPC application to add and subtract a given pair of integers

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Course Code 18MC4T1	OBJECT ORIENTED ANALYSIS AND DESIGN	T	P
	Maximum expected contact hours : 64	4	3
II Year II Semester			
COURSE OBJECTIVES			
1	To understand the Object-based view of Systems		
2	To develop robust object-based models for Systems		
3	To inculcate necessary skills to handle complexity in software design		
COURSE OUTCOMES			
1	Ability to analyze and model software specifications.		
2	Ability to abstract object-based views for generic software systems		
3	Ability to deliver robust software components.		

UNIT- I:

Introduction to UML: The meaning of Object-Orientation, object identity, encapsulation, information hiding, polymorphism, genericity, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture.

UNIT-II:

Basic structural Modeling: Classes, relationships, common mechanisms, diagrams, Advanced structural modeling: advanced relationships, interfaces, types & roles, packages, instances.

Class & object diagrams: Terms, concepts, examples, modeling techniques, class & Object diagrams.

UNIT-III:

Collaboration diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration diagrams, iterated messages, use of self in messages.

Sequence diagrams: Terms, concepts, differences between collaboration and sequence diagrams, depicting synchronous messages with/without priority call back mechanism broadcast message.

UNIT- IV:

Behavioral Modeling: Interactions, use cases, use case diagrams, activity diagrams.

Advanced Behavioral Modeling: Events and signals, state machines, processes & threads, time and space, state chart diagrams.

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UNIT-V:

Architectural Modeling: Terms, concepts, examples, modeling techniques for component diagrams and deployment diagrams.

TEXTBOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, Rumbaugh, Ivar Jacobson, PEA
2. Fundamentals of Object Oriented Design in UML, Meilir Page- Jones, Addison Wesley

REFERENCEBOOKS:

1. Head First Object Oriented Analysis & Design, Mclaughlin, SPD O'Reilly, 2006
2. Object oriented Analysis & Design Using UML, Mahesh, PHI
3. The Unified Modeling Language Reference Manual, 2/e, Rumbaugh, Grady Booch, etc., PEA
4. Object Oriented Analysis & Design, Satzinger, Jackson, Thomson
5. Object Oriented Analysis Design & implementation, Dathan., Ramnath, University Press
6. Object Oriented Analysis & Design, John Deacon, PEA
7. Fundamentals of Object Oriented Analysis and Design in UML, M Pages-Jones, PEA
8. Object-Oriented Design with UML, Barclay, Savage, Elsevier, 2008

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Course Code 18MC4T2	COMPILER DESIGN		T	P
	Maximum expected contact hours : 64		4	
II Year II Semester				
COURSE OBJECTIVES				
1	Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.			
COURSE OUTCOMES				
1	Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.			
2	Parser and its types i.e. Top-down and Bottom-up parsers.			
3	Construction of LL, SLR, CLR and LALR parse table.			
4	Syntax directed translation, synthesized and inherited attributes.			
5	Techniques for code optimization.			

UNIT – I

Introduction Language Processing, Structure of a compiler the evaluation of Programming language, The Science of building a Compiler application of Compiler Technology. Programming Language Basics.

Lexical Analysis:- The role of lexical analysis buffering, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

UNIT –II

Syntax Analysis -: The Role of a parser, Context free Grammars Writing A grammar, top down parsing bottom up parsing Introduction to Lr Parser.

UNIT –III

More Powerful LR parser (LR1, LALR) Using Armigers Grammars Equal Recovery in Lr parser Syntax Directed Transactions Definition, Evolution order of SDTS Application of SDTS. Syntax Directed Translation Schemes.

UNIT – IV

Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking. Canted Flow Back patching

UNIT – V

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Runtime Environments, Stack allocation of space, access to Non Local data on the stack Heap Management code generation – Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation.

Machine Independent Optimization. The principle sources of Optimization peep hole Optimization, Introduction to Data flow Analysis.

TEXT BOOKS:

1. Compilers, Principles Techniques and Tools. Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman, 2nd edition, pearson, 2007
2. Compiler Design K. Muneeswaran, OXFORD
3. Principles of compiler design, 2nd edition, Nandhini Prasad, Elsevier.

REFERENCE BOOKS:

1. Compiler Construction, Principles and practice, Kenneth C Loudon, CENGAGE
2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu, SPRINGER

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Course Code 18MC4T3	DATA WAREHOUSING AND MINING	T	P
	Maximum expected contact hours : 64	4	3
II Year II Semester			
COURSE OBJECTIVES			
1	To identify the scope and essentiality of Data Warehousing and Mining.		
2	To analyze data, choose relevant models and algorithms for respective applications.		
3	To study spatial and web data mining.		
4	To develop research interest towards advances in data mining		
COURSE OUTCOMES			
1	Understand Data Warehouse fundamentals, Data Mining Principles.		
2	Design data warehouse with dimensional modelling and apply OLAP operations		
3	Identify appropriate data mining algorithms to solve real world problems		
4	Compare and evaluate different data mining techniques like classification, prediction clustering and association rule mining		
5	Describe complex data types with respect to spatial and web mining.		
6	Benefit the user experiences towards research and innovation. integration		

UNIT-1:

Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

UNIT-II:

Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classifier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT-III:

Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical,

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Continuous attributes, Concept hierarchy, Sequential, Sub graph patterns

UNIT-IV:

Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNIT-V:

Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining,
Search Engines: Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

TEXTBOOKS:

1. Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipin kumar, Addison- Wesley.
2. Introduction to Data Mining with Case Studies: GK Gupta; Prentice Hall.

REFERENCEBOOKS:

1. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, Pearson, 2008.
2. Fundamentals of data warehouses, 2/e, Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
3. Data Mining Theory and Practice, Soman, Diwakar, Ajay, PHI, 2006.
4. Data Mining, Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber, Elsevier, 2006.

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Course Code 18MC4T4A	MOBILE COMPUTING (ELECTIVE-I)	T	P
	Maximum expected contact hours : 64	4	
II Year II Semester			
COURSE OBJECTIVES			
1	To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.		
2	To understand the typical mobile networking infrastructure through a popular GSM protocol		
3	To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer		
4	To understand the database issues in mobile environments & data delivery models.		
5	To understand the ad hoc networks and related concepts.		
6	To understand the platforms and protocols used in mobile environment.		
COURSE OUTCOMES			
1	Able to think and develop new mobile application.		
2	Able to take any new technical issue related to this new paradigm and come up with a solution(s).		
3	Able to develop new ad hoc network applications and/or algorithms/protocols.		
4	Able to understand & develop any existing or new protocol related to mobile environment		

UNIT-I

Mobile Communications: An Overview- Mobile Communication-guided transmission, unguided transmission- signal propagation frequencies, antennae, modulation, modulation methods and standards for voice-oriented data communication standards, modulation methods and standards for data and voice communication, mobile computing- novel applications and limitations, mobile computing architecture, mobile system networks. Mobile devices and systems: Cellular networks and frequency reuse, Mobile smart phones, Smart mobiles and systems, handheld pocket computers, Handheld devices, Smart systems, Limitations of mobile devices

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UNIT-II:

GSM and other 2G Architectures: GSM-services and system architecture, Radio interfaces of GSM, Protocols of GSM, Localization, Call handling, GPRS system architecture. Wireless medium access control, CDMA, 3G, and 4G

Communication: Modulation, Multiplexing, Controlling the medium access, Spread spectrum, Coding methods, IMT-2000 3G wireless communication standards, WCDMA 3G communication standards, CDMA 3G communication standards, Broadband wireless access, 4G networks.

UNIT-III:

Mobile IP Network layer: IP and Mobile IP network layers: OSI layer functions, TCP/IP and Internet protocol, Mobile internet protocol; Packet delivery and Handover Management; Location Management: Agent Discovery; Mobile TCP Introduction to Mobile Adhoc network: fixed infrastructure architecture, MANET infrastructure architecture; MANET: properties, spectrum, applications; Security in Ad-hoc network; Wireless sensor networks; sensor network applications.

UNIT-IV:

Synchronization: Synchronization in mobile computing systems, Usage models for Synchronization in mobile application, Domain-dependant specific rules for data synchronization, Personal information manager, synchronization and conflict resolution strategies, synchronizer; Mobile agent: mobile agent design, aglets; Application Server

UNIT-V:

Mobile Wireless Short Range Networks and Mobile Internet: Wireless networking and wireless LAN, Wireless LAN (WLAN) architecture, IEEE 802.11 protocol layers, Wireless application protocol (WAP)-WAP1.1 architecture, wireless datagram protocol (WDP), Wireless Transport Layer Security (WTLS), wireless transaction and session layers, wireless application environment.

TEXTBOOK:

1. RAJ KAMAL, "Mobile Computing," second edition, Oxford.
2. ASOKE K TALUKDER, HASANAHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
3. UWE Hansmann, Lothar Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer

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Course Code 18MC4T4B	HUMAN COMPUTER INTERACTION (ELECTIVE-I)	T	P
	Maximum expected contact hours : 64	4	
II Year II Semester			
COURSE OBJECTIVES			
1	Provide an overview of the concepts relating to the design of human-computer interfaces in ways making computer-based systems comprehensive, friendly and usable		
2	Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces		
3	Understand the important aspects of implementation of human-computer interfaces		
4	Identify the various tools and techniques for interface analysis, design, and evaluation.		
5	Identify the impact of usable interfaces in the acceptance and performance utilization of information systems.		
6	Identify the importance of working in teams and the role of each member within an interface development phase.		
COURSE OUTCOMES			
1	Outline the nature of user frustration and how to reduce-		
2	Describe how technologies can be designed to change people's attitudes and behavior		
3	Consider which interface is best for a given application or activity.		
4	it Discuss how to plan and run a successful data gathering program		
5	Discuss the difference between qualitative and quantitative data and analysis.		
6	Identify some of the common pitfalls in data analysis, interpretation, and presentation		
7	Explain the main principles of a user-centered approach.		

UNIT-I:

Introduction: Importance of user Interface, definition, importance of good design. Benefits of good design. A brief history of Screen design

The graphical user interface: Popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

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UNIT-II:

Design process: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, Understanding business junctions.

UNIT-III:

Screen Designing : Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT-IV:

Windows: Windows new and Navigation schemes selection of window, selection of devices based and screen based controls.

Components: Components text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.

UNIT-V:

Software tools : Specification methods, interface, Building Tools.

Interaction Devices: Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

TEXTBOOKS :

1. Human Computer Interaction. 3/e, Alan Dix, Janet Finlay, Goryd, Abowd, Russell Beal, PEA, 2004.
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley Dreama Tech.

REFERENCEBOOKS:

1. Designing the user interface. 4/e, Ben Shneidermann, PEA.
2. User Interface Design, Soren Lauesen , PEA.
3. Interaction Design PRECE, ROGERS, SHARPS, Wiley .
4. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.

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Course Code 18MC4T4C	CLOUD COMPUTING (ELECTIVE-I)	T	P
	Maximum expected contact hours : 64	4	
II Year II Semester			
COURSE OBJECTIVES			
1	Basics of cloud computing..		
2	Key concepts of virtualization		
3	Different Cloud Computing services		
4	Cloud Implementation, Programming and Mobile cloud computing		
5	Cloud Backup and solutions		
COURSE OUTCOMES			
1	Understanding the key dimensions of the challenge of Cloud Computing		
2	Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization		
3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.		
4	Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas		

UNIT I:

Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing

Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II:

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing

Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

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UNIT III:

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feed back control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore (text book 1), Amazon Simple Storage Service(S3) (Text book 2)

Cloud Security: Cloud security risks, security – atop concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1)

Google: Google App Engine, Google Web Toolkit (Text Book 2)

Microsoft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

TEXT BOOKS:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

REFERNCE BOOK:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

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Course Code 18MC4T5A	SOFTWARE PROJECT MANAGEMENT (ELECTIVE-II)	T	P
	Maximum expected contact hours : 64	4	
II Year II Semester			
COURSE OBJECTIVES			
1	Deliver successful software projects that support organization's strategic goals		
2	Match organizational needs to the most effective software development model		
3	Plan and manage projects at each stage of the software development life cycle (SDLC)		
4	Create project plans that address real-world management challenges		
5	Develop the skills for tracking and controlling software deliverables		
COURSE OUTCOMES			
1	Implement general business concepts, practices, and tools to facilitate project success.		
2	Apply appropriate legal and ethical standards.		
3	Adapt project management practices to meet the needs of stakeholders from multiple sectors of the economy (i.e. consulting, government, arts, media, and charity)		
4	Apply project management practices to the launch of new programs, initiatives, products, services, and events relative to the needs of stakeholders.		
5	Appraise the role of project management in organization change.		

UNIT-I:

Conventional Software Management: The waterfall model, conventional software Management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation. **Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT-II:

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

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UNIT- III:

Model based software architectures: A Management perspective and technical perspective.

Work Flows of the process: Software process workflows, Iteration workflows.

Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments. **Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT- IV:

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

Process Automation: Automation Building blocks, The Project Environment.

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

UNIT-V:

Tailoring the Process: Process discriminates.

Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.

TEXTBOOKS:

1. Software Project Management, Walker Royce, PEA, 2005.

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH
2. Software Project Management, Joel Henry, PEA
3. Software Project Management in practice, Pankaj Jalote, PEA, 2005,
4. Effective Software Project Management, Robert K.Wysocki, Wiley,2006
5. Project Management in IT, Kathy Schwalbe, Cengage
6. Quality Software Project Management, Futrell,Donald F. Shafer, Donald I. Shafer, PEA

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Course Code 18MC4T5B	ARTIFICIAL INTELLEGEENCE (ELECTIVE-II)	T	P
	Maximum expected contact hours : 64	4	
II Year II Semester			
COURSE OBJECTIVES			
1	To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.		
2	To create an understanding of the basic issues of knowledge representation and Logic and blind and heuristic search, as well as an understanding of other topics such as minimal, resolution, etc. that play an important role in AI programs.		
3	To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems		
4	To review the different stages of development of the AI field from human like behavior to Rational Agents.		
5	To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.		
COURSE OUTCOMES			
1	Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.		
2	Formulate and solve problems with uncertain information using Bayesian approaches.		
3	Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.		
4	Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing		
5	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.		

UNIT-I:

Introduction to artificial intelligence: Introduction , history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI **Problem solving: state-space search and control strategies:** Introduction, general problem solving, characteristics of problem,

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exhaustive searches, heuristic search techniques, iterative- deepening a*, constraint satisfaction

UNIT-II:

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha- beta pruning, two-player perfect information games

Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic

UNIT-III:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames

advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-IV:

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

UNIT-V:

Machine learning paradigms: Introduction, machine learning systems, supervised and unsupervised learnings, inductive learning, deductive learning, clustering, support vector machines, case based reasoning and learning

Artificial neural networks: Introduction, artificial networks, single layer feed forward networks, multi layered forward networks, design issues of artificial neural networks

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TEXTBOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCEBOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Luger, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

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Course Code 18MC4T5C	EMBEDDED SYSTEMS (ELECTIVE-II)	T	P
	Maximum expected contact hours : 64	4	
II Year II Semester			
COURSE OBJECTIVES			
1	To have knowledge about the basic working of a microcontroller system and its programming in assembly language.		
2	To provide experience to integrate hardware and software for microcontroller applications systems.		
COURSE OUTCOMES			
1	Foster ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.		
2	Foster ability to write the programs for microcontroller.		
3	Foster ability to understand the role of embedded systems in industry.		
4	Foster ability to understand the design concept of embedded systems.		

UNIT-I:

Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

UNIT-II:

8-bit microcontrollers architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

UNIT-III:

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

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UNIT-IV:

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

UNIT-V:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware. Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

REFERENCE BOOKS:

1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

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Course Code 18MC4L1	CLOUD COMPUTING LAB	T	P
		-	3
II Year II Semester			
COURSE OBJECTIVES			
1	To provide an overview of concepts of Cloud Computing.		
2	To make the students understand concepts of virtualization and to use cloud as Infrastructure, Platform, Software services.		
3	To understand the security features, user management of Cloud.		
COURSE OUTCOMES			
1	Student should understand and appreciate cloud architecture.		
2	Student can create and run virtual machines on open source OS		
3	Student can implement Infrastructure, storage as a Service.		
4	Student can study and implement Identity management and User management.		
5	Student can study and implement single-sign-on.		
6	Students can install and appreciate security features and user management for cloud using web application.		

Week-1

To study cloud architecture and cloud computing model

Week-2, 3

Installation and Configuration of virtualization using KVM (Linux) or Oracle Virtual Box (Windows)

Week-4

To study and implementation of Infrastructure as a Service

Week-5, 6

To study and implementation of Storage as a Service

Week-7, 8

To study and implementation of identity

Week-9, 10

To Study Cloud security management

Reference Books:

1. Enterprise Cloud Computing by Gautam Shroff, Cambridge,2010
2. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley - India, 2010
3. Getting Started with OwnCloud by Aditya Patawar , Packt Publishing Ltd, 2013

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Course Code 18MC4L2	DATAWAREHOUSING AND MINING LAB	T	P
		-	3
II Year II Semester			
COURSE OBJECTIVES			
1	Practical exposure on implementation of well known data mining tasks.		
2	Exposure to real life data sets for analysis and prediction.		
3	Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.		
4	Handling a small data mining project for a given practical domain.		
COURSE OUTCOMES			
1	The data mining process and important issues around data cleaning, pre-processing and integration.		
2	The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.		

1. Demonstration of preprocessing on dataset student. arff
2. Demonstration of preprocessing on dataset labor. arff
3. Demonstration of Association rule process on dataset contact lenses.arff using apriority algorithm
4. Demonstration of Association rule process on dataset test. arff using apriority algorithm
5. Demonstration of classification rule process on dataset student. Arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee .arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee. Arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee. Arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris. arff using simple k-means
10. Demonstration of clustering rule process on dataset student. arff using simple k-means

Text Book:

Jiawei Han, Micheline Kamber “ Data Mining: Concepts and Techniques” 3rd edition ,Morgan Kaufmann, 2012

References:

1. Ramesh Sharda, Dursun Delen, David King Business Intelligence, 2/E; Efraim Publisher Turban,pearson Education, 2011
2. Berry, Gordon S. Linoff, “Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management”, John Wiley & Sons Inc publishers, 3 rd Edition, 2011.

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Course Code 18MC4L3	OBJECT ORIENTED ANALYSIS AND DESIGN LAB	T	P
		-	3
II Year II Semester			
COURSE OBJECTIVES			
1	Construct UML diagrams for static view and dynamic view of the system.		
2	Generate creational patterns by applicable patterns for given context		
3	Create refined model for given Scenario using structural patterns.		
4	Construct behavioral patterns for given applications.		
COURSE OUTCOMES			
1	To understand the Case studies and design the Model		
2	To understand how design patterns solve design problems.		
3	To develop design solutions using creational patterns		
4	To construct design solutions by using structural and behavioral patterns.		

Week 1:

Familiarization with Rational Rose or Umbrella

Week 2, 3 & 4:

For each case study:

- a) Identify and analyze events
- b) Identify Use cases
- c) Develop event table
- d) Identify & analyze domain classes
- e) Represent use cases and a domain class diagram using Rational Rose
- f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:

For each case study:

- a) Develop Use case diagrams
- b) Develop elaborate Use case descriptions & scenarios
- c) Develop prototypes (without functionality)
- d) Develop system sequence diagrams

Week 7, 8, 9 & 10:

For each case study:

- a) Develop high-level sequence diagrams for each use case
- b) Identify MVC classes / objects for each use case
- c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
- e) Develop three-layer package diagrams for each case study

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Week 11 & 12:**For each case study:**

- a) Develop Use case Packages
- b) Develop component diagrams
- c) Identify relationships between use cases and represent them
- d) Refine domain class model by showing all the associations among classes

Week 13 onwards:**For each case study:**

- a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

TEXT BOOK :

1. Craig Larman, "Applying UML and Patterns: An Introduction to ObjectOriented Analysis and Design and the Unified Process", 2nd ed., Pearson Education Asia, 2002.

REFERENCEBOOKS:

1. Simon Sennet, Steve McRobb, and Ray Farmer, "Object Oriented Systems Analysis and Design using UML", 2nd ed., McGraw Hill, 2002.
2. Andrew Haigh, "Object-Oriented Analysis & Design," 1st ed., Tata McGraw-Hill, 2001.

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Course Code 18MC5T1	BIG DATA ANALYTICS	T	P
	Maximum expected contact hours : 64	4	3
III Year I Semester			
COURSE OBJECTIVES			
1	To optimize business decisions and create competitive advantage with Big Data		
2	To explore the fundamental concepts of big data analytics.		
3	To learn to analyze the big data using intelligent techniques.		
COURSE OUTCOMES			
1	Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.		
2	Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.		
3	Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.		

UNIT-I:

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II:

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III:

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing

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a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin Applying Structure to Hadoop Data with Hive:

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O’reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

SOFTWARE LINKS:

1. Hadoop: <http://hadoop.apache.org/>
2. Hive: <https://cwiki.apache.org/confluence/display/Hive/Home>
3. Piglatin: <http://pig.apache.org/docs/r0.7.0/tutorial.html>

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Course Code 18MC5T2	CYBER SECURITY	T	P
	Maximum expected contact hours : 64	4	
III Year I Semester			
COURSE OBJECTIVES			
1	This course focusses on the models, tools, and techniques for enforcement of security with some emphasis on the use of cryptography. Students will learn security from multiple perspectives.		
COURSE OUTCOMES			
1	After the completion of the course, the students will be able to develop basic understanding of security, cryptography, system attacks and defenses against them.		

UNIT- I: Introduction to Cybercrime:

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

UNIT -II: Cyber offenses:

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT -III: Cybercrime Mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT -IV: Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity

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Theft (ID Theft)

UNIT -V: Cybercrimes and Cyber security:

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.
2. Principles of Information Security, Micheal E.Whitman and Herbert J.Mattord, Cengage Learning.

REFERENCES:

1. Information Security, Mark Rhodes, Ousley, MGH.

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Course Code 18MC5T3	PYTHON PROGRAMMING	T	P
	Maximum expected contact hours : 64	4	3
III Year I Semester			
COURSE OBJECTIVES			
1	To acquire programming skills in core Python.		
2	To acquire Object Oriented Skills in Python		
3	To develop the skill of designing Graphical user Interfaces in Python		
	To develop the ability to write database applications in Python		
COURSE OUTCOMES			
1	Explain basic principles of Python programming language		
2	Implement object oriented concepts,		
3	Implement database and GUI applications.		

UNIT - I:

Introduction:History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT - II:

Types, Operators and Expressions: Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT - III:

Data Structures Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT - IV:

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.**Modules:** Creating modules, import statement, from. Import statement, name spacing,

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

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UNIT – V:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

TEXT BOOKS

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage

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Course Code 18MC5T4A	SOFTWARE TESTING METHODOLOGIES	T	P
	(ELECTIVE-III)		
Maximum expected contact hours : 64		4	
III Year I Semester			
COURSE OBJECTIVES			
1	To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.		
2	To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.		
3	It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.		
4	It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.		
5	To learn the domain testing, path testing and logic based testing to explore the testing process easier.		
6	To know the concepts of state graphs, graph matrixes and transition testing along with testability tips to enhance the testing process in different way.		
COURSE OUTCOMES			
1	Know the basic concepts of software testing and its essentials.		
2	Able to identify the various bugs and correcting them after knowing the consequences of the bug		
3	Use of program's control flow as a structural model is the corner stone of testing.		
4	Performing functional testing using control flow and transaction flow graphs.		
5	Know the basic techniques for deriving test cases		
6	Follow an effective, step-by-step process for identifying needed areas of testing, designing test conditions and building and executing test cases		

UNIT-I:

Introduction:- Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

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UNIT-II:

Transaction Flow Testing:-transaction flows, transaction flow testing techniques.
 Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III:

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-IV:

Paths, Path products and Regular expressions:- path products & path _expression, reduction procedure, applications, regular expressions & flow anomaly detection.
 Logic Based Testing:- overview, decision tables, path expressions, kv charts, specifications.

UNIT-V:

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips.
 Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.

TEXTBOOKS:

1. Software testing techniques - Boris Beizer, International Thomson computer press, second edition.
2. Software Testing- Yogesh Singh, CAMBRIDGE

REFERENCEBOOKS:

1. Introduction to Software Testing, Paul Amman, Jeff Offutt, CAMBRIDGE
2. Effective Software testing, 50 Specific ways to improve your testing, Elfriede Dustin, PEA

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Course Code 18MC5T4B	COMPUTER FORENSICS (ELECTIVE-III)	T	P
	Maximum expected contact hours : 64	4	
III Year I Semester			
COURSE OBJECTIVES			
1	To provide an understanding Computer forensics fundamentals.		
2	To analyze various computer forensics technologies		
3	To provide computer forensics systems 4.		
4	To identify methods for data recovery		
5	To apply the methods for preservation of digital evidence.		
COURSE OUTCOMES			
1	Understand the definition of computer forensics fundamentals		
2	Describe the types of computer forensics technology.		
3	Analyze various computer forensics systems.		
4	Illustrate the methods for data recovery, evidence collection and data seizure.		
5	Summarize duplication and preservation of digital evidence.		

UNIT-I:

Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations, Taking A Systematic Approach, Procedure for Corporate High-Tech Investigations, Understanding Data Recovery Workstations and Software,

Investor's Office and Laboratory: Understanding Forensics Lab Certification Requirements, Determining the Physical Requirements for a Computer Forensics Lab, Selecting a Basic Forensic Workstation

UNIT-II

Data Acquisition: Understanding Storage Formats for Digital Evidence, Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions, Using Acquisition Tools, Validating Data Acquisition, Performing RAID Data Acquisition, Using Remote Network Acquisition Tools, Using Other Forensics Acquisition Tools

Processing Crime and Incident Scenes: Identifying Digital Evidence, Collecting the Evidence in Private-Sector Incident Scenes, Processing law Enforcement Crime Scenes, Preparing for a Search, Securing a Computer Incident or Crime Scene, Sizing Digital evidence at the Scene, Storing Digital evidence, obtaining a Digital Hash.

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UNIT-III

Current Computer Forensics Tools: Evaluating Computer Forensics Tool Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software

Computer Forensics Analysis and Validation: Determining What Data to Collect and Analyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisition

UNIT-IV

Recovering Graphics and Network Forensics: Recognizing a Graphics File, Understanding Data Compression, Locating and Recovering Graphics Files, Understanding Copyright Issues with Graphics, Network Forensic, Developing Standard Procedure for Network Forensics, Using Network Tools, Examining Honey Project

UNIT-V

E-mail Investigations Cell Phone and Mobile Device Forensics: Exploring the Role of E-mail in Investigations, Exploring the Role of Client and Server in E-mail, Investigating E-mail Crimes and Violations, Understanding E-mail Servers, Using Specialized E-mail Forensics Tools, Understanding Mobile Device Forensics, Understanding Acquisition Procedure for Cell Phones and Mobile Devices

TEXTBOOK:

1. Nelson, Phillips Enfinger, Stuart, " Computer Forensics and Investigations, Cengage Learning.

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Course Code 18MC5T4C	E-COMMERCE (ELECTIVE-III)	T	P
	Maximum expected contact hours : 64	4	
III Year I Semester			
COURSE OBJECTIVES			
1	This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information		
COURSE OUTCOMES			
1	Understand the basic concepts and technologies used in the field of management information systems;		
2	Have the knowledge of the different types of management information systems;		
3	Understand the processes of developing and implementing information systems;		
4	Be aware of the ethical, social, and security issues of information systems;		

UNIT-I

Electronic Commerce, Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic commerce, Mercantile Process models.

UNIT-II

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

UNIT-III

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks. Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT- IV

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses.
Advertising and Marketing, Information based marketing,

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Advertising on Internet, on-line marketing process, market research.

UNIT-V

Consumer Search and Resource Discovery, Information search and Retrieval, Commerce Catalogues, Information Filtering. Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processings, Desktop video conferencing.

TEXTBOOK:

1. Frontiers of Electronic Commerce, Kalakata, Whinston, PEA,2006.

REFERENCE BOOKS:

1. E-Commerce Fundamentals and Applications Hendry Chan, Raymond Lee, Dillon, Chang, John Wiley.
2. E-Commerce,AManagerial Perspective, Turban E, Lee J , King, Chung H.M.,PEA,2001.
3. E-Commerce An Indian Perspective , 3/e, P.T. Joseph, PHI,2009.
4. E-Commerce, S.Jaiswal , Galgotia.
5. Electronic Commerce , Gary P.Schneider, Thomson.

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Course Code 18MC5T5A	INTERNET OF THINGS (ELECTIVE-IV)	T	P
	Maximum expected contact hours : 64	4	
III Year I Semester			
COURSE OBJECTIVES			
1	To assess the vision and introduction of IoT. 5		
2	To Understand IoT Market perspective.		
3	To Implement Data and Knowledge Management and use of Devices in IoT Technology.		
4	To Understand State of the Art - IoT Architecture.		
5	To classify Real World IoT Design Constraints, Industrial Automation in IoT.		
COURSE OUTCOMES			
1	Illustrate the application of IoT in Industrial Automation and identify Real World Design		
2	Compare and Contrast the use of Devices, Gateways and Data Management in IoT.		
3	Implement state of the art architecture in IoT.		
4	Determine the Market perspective of IoT		
5	Interpret the vision of IoT from a global context.		

UNIT- I:

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind Io Ts Sources of the Io Ts, M2M Communication, Examples OF Io Ts, Design Principles For Connected Devices Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT -II:

Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT- III:

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT -IV:

Data Acquiring, Organizing and Analytics in IoT/M2M,

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Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT- V:

Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

TEXTBOOKS:

1. Internet of Things: Architecture, Design Principles And Applications,Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

REFERNCE BOOKS:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister , Oreilly.

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Course Code 18MC5T5B	MULTIMEDIA APPLICATION DEVELOPMENT (ELECTIVE-IV)		T	P
	Maximum expected contact hours : 64		4	
III Year I Semester				
COURSE OBJECTIVES				
1	Represent data in multimedia applications; examine image data, video data, and audio data in detail.			
2	Apply compression techniques to multimedia content Carry out the multimedia projects using software tools such as Macromedia flash using Object oriented design and Action			
3	Examine the ideas behind MPEG standards such as MPEG-1, MPEG-2, MPEG-4, and MPEG-7			
4	Explore network technologies and protocols that make interactive multimedia applications.			
COURSE OUTCOMES				
1	Apply lossless data compression which involves no distortion of the original signal			
2	Explore issues and technologies for computer and multimedia network communications			
3	Understand the concepts focusing on the discrete cosine transform and discrete wavelet transform.			
4	Know various multimedia software tools.			
5	Design multimedia software that are suitable to Internet applications			

UNIT- I:

Fundamental concepts in Text and Image:

Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT- II:

Fundamental Concepts in Video and Digital Audio:

Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

UNIT-III:

Action Script I: Action Script Features, Object-Oriented Action Script, Data types and Type Checking, Classes, Authoring an Action Script Class.

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Action Script II: Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions.

Application Development:

An OOP Application Frame work, Using Components with Action Script Movie Clip Subclasses.

UNIT- IV

Multimedia Data Compression:

Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zero tree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

Basic Video Compression Techniques:

Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

UNIT-V

Multimedia Networks:

Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM etworks, Transport of MPEG- 4, Media-on- Demand (MOD).

TEXTBOOKS:

1. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, PHI/ PEA.
2. Multimedia Systems, Parag Havaldar, Gerard Medioni, cengage, 2009.
3. EssentialsAction Script 3.0, Colin Moock, SPD O, Reilly,2007.

REFERENCEBOOKS:

1. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
2. Digital Multimedia, Nigel Chapman, Jenny Chapman, Wiley- Dreamtech.
3. Multimedia & Communications Technology, Steve Heath, Elsevier .
4. Multimedia Technology & Applications, David Hilman , Galgotia.
5. Multimedia Technologies, Banerji, Mohan Ghosh,MGH.

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Course Code 18MC5T5C	NETWORK PROGRAMMING (ELECTIVE-IV)	T	P
	Maximum expected contact hours : 64	4	3
III Year I Semester			
COURSE OBJECTIVES			
1	Network Security: Secure Sockets (SSL), TLS, SSH, HTTPS, PGP, Kerberos.		
2	Data Link and Transport Layers, Ethernet, TCP/IP protocol suite.		
3	Sockets Programming: TCP Programming (TELNET, HTTP).		
4	UDP Sockets: TFTP, DNS.		
5	Web Programming: HTTP, CGI, Cookies, JavaScript, HTML, XML.		
COURSE OUTCOMES			
1	understand the key protocols which support the Internet		
2	have a detailed knowledge of the TCP/UDP Sockets		
3	create applications using techniques such as multiplexing, forking, multithreading		
4	learn advanced programming techniques such as IPv6 Socket Programming, Broadcasting, Multicasting		

UNIT-I:

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II:

TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT-III:

Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket

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option IPV6 socket option and TCP socket options.

UNIT-IV:

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP. **Elementary name and Address conversions:** DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT-V:

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. **Remote Login:** Terminal line disciplines, Pseudo- Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

TEXTBOOK:

1. UNIX Network Programming, Vol. I, SocketsAPI, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

REFERENCES:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

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Course Code 18MC5L1	BIG DATA LAB	T	P
		-	3
III Year I Semester			
COURSE OBJECTIVES			
1	To introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.		
2	To enable students to have skills that will help them to solve complex real-world problems in for decision support.		
COURSE OUTCOMES			
1	Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.		
2	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics		
3	Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.		

Week 1,2:

1. Implement the following Data structures in Java
a) Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i) Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, Fully distributed
(ii) Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:
 - Adding files and directories
 - Retrieving files
 - Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 6:

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data.
Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

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Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9,10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11, 12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

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Course Code 18MC5L2	SOFTWARE TESTING LAB	T	P
		-	3
III Year I Semester			
COURSE OBJECTIVES			
1	Demonstrate the UML diagrams with ATM system descriptions.		
2	Demonstrate the working of software testing tools with c language.		
3	Study of testing tools- win runner, selenium etc.		
4	Writing test cases for various application		
COURSE OUTCOMES			
1	Find practical solutions to the problems		
2	Solve specific problems alone or in teams		
3	Manage a project from beginning to end		
4	Work independently as well as in teams		
5	Define, formulate and analyze a problem		

1 Write programs in 'C' Language to demonstrate the working of the following constructs:

- i) do...while
- ii) while....do
- iii) if...else
- iv) switch
- v) for

2 "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.

3 Take any system (e.g. ATM system) and study its system specifications and report the various bugs.

4 Write the test cases for any known application (e.g. Banking application)

5 Create a test plan document for any application (e.g. Library Management System)

6 Study of Win Runner Testing Tool and its implementation

- a) Win runner Testing Process and Win runner User Interface.
- b) How Win Runner identifies GUI(Graphical User Interface) objects in an application and describes the two modes for organizing GUI map files.
- c) How to record a test script and explains the basics of Test Script Language (TSL).
- d) How to synchronize a test when the application responds slowly.
- e) How to create a test that checks GUI objects and compare the behaviour of GUI objects in different

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versions of the sample application.

- f) How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel.
- g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.
- h) How to read and check text found in GUI objects and bitmaps.
- i) How to create a batch test that automatically runs the tests.
- j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.

7 Apply Win Runner testing tool implementation in any real time applications.

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Course Code 18MC5L3	PYTHON PROGRAMMING LAB	T	P
		-	3
III Year I Semester			
COURSE OBJECTIVES			
1	To be able to introduce core programming basics and program design with functions using Python programming language.		
2	To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.		
3	To understand the high-performance programs designed to strengthen the practical expertise.		
COURSE OUTCOMES			
1	Student should be able to understand the basic concepts scripting and the contributions of scripting language		
2	Ability to explore python especially the object oriented concepts, and the built in objects of Python.		
3	Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations		

Exercise 1 - Basics

- a) Running instructions in Interactive interpreter and a Python Script
- b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

- a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
- b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

- a) Write a Program for checking whether the given number is a even number or not.
- b) Using a for loop, write a program that prints out the decimal equivalents of $1/2$, $1/3$, $1/4$, . . . , $1/10$
- c) Write a program using a for loop that loops over a sequence. What is sequence ?
- d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued

- a) Find the sum of all the primes below two million.
Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:
1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
- b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

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Exercise - 5 - DS

- a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
- b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS - Continued

- a) Write a program combine_lists that combines these lists into a dictionary.
- b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

- a) Write a program to print each line of a file in reverse order.
- b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

- a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

- b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

- a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
- b) Write a function dups to find all duplicates in the list.
- c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

- a) Write a function cumulative_product to compute cumulative product of a list of numbers.
- b) Write a function reverse to reverse a list. Without using the reverse function.
- c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

- a) Write a program that defines a matrix and prints
- b) Write a program to perform addition of two square matrices
- c) Write a program to perform multiplication of two square matrices

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Exercise - 12 - Modules

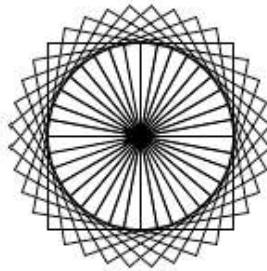
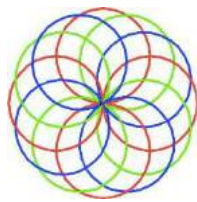
- a) Install packages requests, flask and explore them. using (pip)
- b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
- c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

Exercise - 13 OOP

- a) Class variables and instance variable and illustration of the self variable
 - i) Robot
 - ii) ATM Machine

Exercise - 14 GUI, Graphics

- a) Write a GUI for an Expression Calculator using tk
- b) Write a program to implement the following figures using turtle



Exercise - 15 - Testing

- a) Write a test-case to check the function even _numbers which return True on passing a list of all even numbers
- b) Write a test-case to check the function reverse _string which returns the reversed string

Exercise - 16 - Advanced

- a) Build any one classical data structure.
- b) Write a program to solve knapsack problem.

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