Under Graduate Course Structure

For

COMPUTER SCIENCE & ENGINEERING (Applicable for batches admitted from 2018-2019)

S No	Programme Code	Programme Name	Branch	No. of Sections	No. of Students	Page
1	05	B. Tech	Computer Science & Engineering	02	120	1-3



Autonomous Regulations – R18

Amrita Sai Institute of Science & Technology

Approved by AICTE, New Delhi; Permanently Affiliated to JNTUK, Kakinada ISO 9001:2015 Certified Institution; Accredited by NAAC with "A" grade Recognized by UGC under 2(f) and 12(B) of UGC 1956 Act
Amrita Sai Nagar, Paritala, Krishna District Andhra pradesh – 521 180 www.amritasai.edu.in, 0866-2428399

- a. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
- b. Problem analysis: Identity, formulates, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- d. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- e. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling of complex engineering activities, with an understanding of the limitations.
- f. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- j. Communication: Communicate effectively on complex engineering activities with the engineering community and with t h e-society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- k. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 1. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Objectives

PSO-1	Foundation of mathematical concepts: To use mathematical methodologies to crack
	problem using suitable mathematical analysis, data structure and suitable algorithm.
PSO-2	Foundation of Computer System: the ability to interpret the fundamental concepts and
	methodology of computer systems. Students can understand the functionality of
	hardware and Software aspects of computer systems.
	Foundations of Software development: the ability to grasp the software development
	lifecycle and methodologies of software systems. Possess competent skills and
PSO-3	knowledge of software design Process. Familiarity and practical proficiency with a broad
	area of programming concepts and provide new ideas and innovations towards research.

Program Educational Objectives

PEO-1	Prepare graduates to have knowledge and competency for careers in and related to Computer Science & Engineering
PEO-2	Prepare graduates to become leader in fields related to Computer Science.
PEO-3	Prepare graduates to pursue higher education in Engineering or other Professional fields

I Year I Semester

S. No	Course Code	Course	L	Т	Р	C
1	18BSIT1	English – I	2	1	-	3
2	18HSIT2	Mathematics - I	3	1		3
3	18BSIT3	Mathematics - II (Mathematical Methods)	3	1		3
4	18BSIT4	Applied Physics	3	1	1	3
5	18CSIT5	Computer Programming through C	3	1		3
6	18MEIT6	Engineering Drawing Practice	1			3
7	18BSIL1	English Language Communication Skills - I			3	1
8	18BSIL2	Applied Physics Lab			3	1
9	18CSIL3	Computer Programming Lab			3	1
10	18BSIL4	Applied Physics - Virtual Labs - Assignments			3	
Total Credits					21	

L-Lecture; T-Tutorial; P-Practical; C-Credits;

B. Tech. Course Structure – Computer Science & Engineering

I Year II Semester

S. No	Course Code	Course	L	Т	Р	C
1	18BS2T1	English – II	2	1	-	3
2	18BS2T2	Mathematics - III	3	1		3
3	18BS2T3	Applied Chemistry	3	1		3
4	18CS2T4	Object Oriented Programming Through C++	3	1		3
5	18BS2T5	Environmental Studies	3	1		3
6	18CS2T6	Engineering Mechanics	1			3
7	18BS2L1	English Language Communication Skills - II			3	1
8	18BS2L2	Applied Chemistry Lab			3	1
9	18CS2L3	Object Oriented Programming Through C++ Lab			3	1
Total Credits					21	

II Year I Semester

S. No	Course Code	Course	L	Т	Р	С
1	18CS3T1	Unix and Shell Programming	3	1		3
2	18CS3T2	Mathematical Foundations for Computer Science	3	1		3
3	18CS3T3	Computer Organisation	3	1		3
4	18CS3T4	Java Programming	3	1		3
	Elective I					
	18CS3T5A	Digital Logic Design	3			
5	18CS3T5B	Data Analytics-1		1		2
5	18CS3T5C	Cloud Computing-1		1		3
	18CS3T5D	Web and Mobile Development-1				
	18CS3T5E	Cyber Security-1				
6	18CS3T6	Data structures through c++	3	1		3
7	18CS3L1	Data Structures through C++ Lab			3	1
8	18CS3L2	Java Programming Lab			3	1
9	18CS3L3	Unix and Shell Programming Lab	3			2
Total Credits				2	20	

L-Lecture; T-Tutorial; P-Practical; C-Credits;

B. Tech. Course Structure – Computer Science & Engineering

II Year II Semester

S. No	Course Code	Course	L	Т	Р	С
1	18CS4T1	Python Programming	3	1		3
2	18CS4T2	Advanced Data Structures	3	1		3
3	18CS4T3	Database Management Systems	3	1		3
4	18CS4T4	Formal Languages and Automata Theory	3	1		3
	Elective II	•				
	18CS4T5A	Computer Graphics				
5	18CS4T5B	Data Analytics-2		1		2
3	18CS4T5C	Cloud Computing-2	3	1		3
	18CS4T5D	Web and Mobile Development-2				
	18CS4T5E	Cyber Security-2				
6	18CS4T6	Operating Systems	3	1		3
7	18CS4L1	Advanced Data Structures Lab			3	1
8	18CS4L2	Python Programming Lab			3	1
9	18CS4L3	Database Management Systems Lab	3			2
	Total Credits				20	

S. No	Course Code	Course	L	Т	Р	С
1	18CS5T1	Web Technologies	3	1		3
2	18CS5T2	Statistics with R Programming	3	1		3
3	18CS5T3	Software Engineering	3	1		3
4	18CS5T4	Computer Networks	3	1		3
		Elective III				
	18CS5T5A	Compiler Design	3			
5	18CS5T5B	Data Analytics-3		1		2
5	18CS5T5C	Cloud Computing-3		1		3
	18CS5T5D	Web and Mobile Development-3				
	18CS5T5E	Cyber Security-3				
6	18CS5L1	Statistics with R Programming Lab			3	1
7	18CS5L2	Computer Networks Lab			3	1
8	18CS5L3	Web Technologies Lab			3	1
9	18CS5T6	Professional Ethics & Intellectual Property Rights	3			2
	Total Credits				20	

III Year I Semester

L-Lecture; T-Tutorial; P-Practical; C-Credits;

B. Tech. Course Structure – Computer Science & Engineering

III Year II Semester

S. No	Course Code	Course	L	Т	Р	С
1	18CS6T1	Principles of Programming Languages	3	1		3
2	18CS6T2	Design and Analysis of Algorithms	3	1		3
3	18CS6T3	Data Warehousing and Data Mining	3	1		3
4	18CS6T4	Object Oriented Analysis and Design using UML	3	1		3
		Elective III				
	18CS6T5A	TCP/IP Protocols				
5	18CS6T5B	Data Analytics-4	2	1		2
3	18CS6T5C	Cloud Computing-4	3	1		3
	18CS6T5D	Web and Mobile Development-4				
	18CS6T5E	Cyber Security-4				
6	18CS6L1	Object Oriented Analysis and Design using UML Lab			3	1
7	18CS6L2	Data Mining Lab			3	1
8	18CS6I1	Internship & Mini Project				2
		Total Credits		2	20	

IV Year I Semester

S. No	Course Code	Course	L	Т	Р	С
1	18CS7T1	Cryptography and Network Security	3	1		3
2	18CS7T2	Hadoop and Big Data	3	1	1	3
3	18CS7T3	Artificial Intelligence	3	1		3
4	18CS7T4	Adhoc & Sensor Networks	3	1	1	3
		Elective IV				
	18CS7T5A	Mobile Computing				
5	18CS7T5B	Cloud Computing	3	1		3
	18CS7T5C	Forensic Computing				
6	18CS7L1	Hadoop & Big Data Lab			3	1
7	18CS7L2	J2ME & Android Programming Lab			3	1
8						
Total Credits					20	

B. Tech. Course Structure – Computer Science & Engineering

IV Year II Semester

S. No	Course Code	Course	L	Т	P	C
1	18CS8T1	Distributed Systems	3	1		3
2	18CS8T2	Machine Learning	3	1		3
	18CS8T3A	Natural Language Processing	3	1		3
3	18CS8T3B	Natural Language Processing	3	1		3
	18CS8T3C	Deep learning	3	1		3
4	18CS8T4	Management science				
5		Project Work				8
	Total Credits				20	

(Course Code	MATHEMATICAL FOUNDATION OF	L	Т	Ρ	С
	18CS3T2	COMPUTER SCIENCE	3	1	-	3
PURP	OSE: Basic foundatio	ns to Computer Science and Engineering				_
INSTR	UCTIONAL COURSE	OBJECTIVES				
1	To introduce the stu	udents to the topics and techniques of discrete methods and combinatorial reasor	ning.			
2	To introduce a wide v	variety of applications.				
3	The algorithmic appro	oach to the solution of problems is fundamental in discrete mathematics				
4	This course reinforce	s the close ties between this discipline and the area of computer science.				
COUR	SE OUTCOMES					
1	Student will be able to	o demonstrate skills in solving mathematical problems				
2	Student will be able to	o comprehend mathematical principles and logic				
3	Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software					
4	Student will be able to	o manipulate and analyze data numerically and/or graphically using appropriate Softwa	re			

 5
 Student will be able to communicate effectively mathematical ideas/results verbally or in writing

 6
 Student will be able to know basic data structures in computer science

UNIT -I:Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus:Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT -II: Set Theory: Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

UNIT- III: Algebraic Structures and Number Theory: *Algebraic Structures:* Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory:* Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

UNIT -IV: Combinatorics: Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

UNIT -V: Recurrence Relations: Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT -VI: Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems withou*t* Proofs).

TEXT BOOKS:

- 1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. anohar, Tata McGraw Hill.
- 2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
- 3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

- 1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
- 2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
- 3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

0	Course Code	DIGITAL LOGIC DESIGN		Т	Ρ	С
	18CS3T3			1		3
PURP	OSE: Digital logic	design is a system in electrical and computer engineering that us	ses s	simple	e nur	nber
values	s to produce input a	and output operations				
INSTR	RUCTIONAL COUR	SE OBJECTIVES				
1	To introduce the	basic tools for design with combinational digital logic and state mach	ines.			
2	To introduce the	basic tools for design with sequential digital logic and state machines	S.			
		Sri P Bhargaya				

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Dr. M Babu Reddy,	Sri. S Venkateswrlu
Professor CS, KU	Asst. Prof, HCW, Hyd
Dr. A Vijaya Krishna	Sri. K Gopala Reddy,
Professor, CSE, PMU	Assoc. Prof. & Head



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3	To learn simple digital circuits in preparation for computer engineering.					
COUR	SE OUTCOMES					
1	An ability to define different number systems, binary addition and subtraction, 2's complement					
1	representation and operations with this representation					
2	An ability to understand the different switching algebra theorems and apply them for logic functions.					
2	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic					
3	functions.					
4	An ability to define the other minimization methods for any number of variables Variable Entered					
4	Mapping (VEM) and perform an algorithmic reduction of logic functions					
5	Quine-MeCluskey (QM) Techniques and perform an algorithmic reduction of logic functions					

UNIT- I: Digital Systems and Binary Numbers Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction

UNIT -II: Concept of Boolean algebra Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms,

UNIT- III: Gate level Minimization Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't - Care Conditions, NAND and NOR Implementation, Exclusive-OR Function

UNIT- IV:Combinational Logic Introduction, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of **Combinational Circuits**

UNIT- V: Synchronous Sequential Logic Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked Sequential Circuits, Mealy and Moore Models of Finite State Machines

UNIT -VI: Registers and Counters Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter

TEXT BOOKS:

- 1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
- 2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

- 1. Digital Logic and Computer Design, M.Morris Mano, PEA.
- 2. Digital Logic Design, Leach, Malvino, Saha, TMH.
- 3. Modern Digital Electronics, R.P. Jain, TMH

Course Code		L	Т	Ρ	С		
	18CS3T4	JAVA PROGRAMMING	3	1		3	
PURP	OSE: A student shoul	d be able to develop all types of cross platform applications and also able developir	ng Mol	oile, De	sktop,	web,	
server s	server side and dynamic web applications.						
INSTR	INSTRUCTIONAL COURSE OBJECTIVES						
1	1 Introducing Object oriented programming languages						
2	Know about objects	and classes in abstract level					
3	Know basic level prir	nitives of OOPs					
4	Know conceptual learning on threading						
5	5 Explains about event handling in OOPs						
6	Know about graphica	al user interface					
Dr. k Prof	(Sahadeevaiah essor, CSE, JNTU	KU Sri. P Bhargava Senior Software Engineer, Smart Net IT Solutions					
Dr. M Babu Reddy, Professor CS, KU Sri. S Venkateswrlu Asst. Prof, HCW, Hyd							
Dr. A Prof	A Vijaya Krishna essor, CSE, PMU	Sri. K Gopala Reddy, Assoc. Prof. & Head					



COUR	SE OUTCOMES
1	Implementing programs for user interface and application development using core java principles
2	Comprehension of java programming constructs, control structures in Java Programming Constructs
3	Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling
4	Understanding of Thread concepts and I/O in Java
5	Being able to build dynamic user interfaces using applets and Event handling in java Applets-
6	Understanding of various components of Java AWT and Swing and writing code snippets using them Abstract Window Toolkit

UNIT I: Introduction to OOP Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

UNIT II: Variables, Primitive Data types, Identifiers- Naming Coventions, Keywords, Literals, Operators: Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops., Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT III: Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package Exceptions & Assertions - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions

UNIT IV: MultiThreading : java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive() and join(), Syncronization, suspending and Resuming threads, Communication between Threads Input/Output: reading and writing data, java.io package

UNIT V: Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint() Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes

UNIT VI: Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar Swing: Introduction , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box Pluggable Look and Feel

TEXT BOOKS:

- 1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
- 2 Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
- JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning. 3.
- Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH 4
- Introduction to Java rogramming, 7th ed. Y Daniel Liang, Pearson 5.

- 1. JAVA Programming, K.Rajkumar.Pearson
- Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech 2.
- Core JAVA for Beginners, Rashmi Kanta Das, Vikas. 3
- 4. Object Oriented Programming Through Java, P. Radha Krishna, Universities Press.

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	Course Code			DATA STRUCTURES THROUGH C++	L	T	P	C
	18CS3T5		DATASTRUCTUR	LES THROUGH C++	3	1		3
PU	RPOSE: Data structure is	designed to	organize data to suit a specifi	c purpose so that it can be accessed and	worked	with in	approp	oriate
way	S.							
INS	TRUCTIONAL COURSE	OBJECTIV	ES					
1	To be familiar with	To be familiar with basic techniques of object oriented principles and exception handling using C++						
2	To be familiar with	To be familiar with the concepts like Inheritance, Polymorphism						
3	Solve problems us	Solve problems using data structures such as linear lists, stacks, queues, hash tables						
4	Be familiar with ad	vanced dat	a structures such as baland	ced search trees, AVLTrees, and B Tre	es.			
CO	URSE OUTCOMES							
1	Understand the bas	sic termino	logy used in computer prog	gramming				
2	Write, compile and	debug pro	grams in C language.					
3	Use different data	types in a c	computer program.					
4	Design programs i	nvolving de	cision structures, loops and	d functions.				
5	Explain the differer	nce betwee	n call by value and call by r	eference				
	Dr. K Sahadeevaiah			Sri. P Bhargava				

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UNIT-I: ARRAYS

Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type- Polynomial Representation- Polynomial Addition. Spares Matrices, Introduction- Sparse Matrix Representation-Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

UNIT-II: STACKS AND QUEUES

Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Circular Queues, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix, Infix to prefix and prefix evaluation

UNIT-III: LINKED LISTS

Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++- Designing a Chain Class in C++- Pointer manipulation in C++-Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations- Reusing a Class, Circular Lists, Space Lists, Linked Stacks and Queues, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input- Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists- Reference Counts, Shared and Recursive Lists

UNIT-IV: TREES

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Trees, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, In order Traversal Preorder Traversal, Post order Traversal, Tree traversals using stack(non recursive), Thread Binary Trees, Threads, In order Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

UNIT-V: GRAPHS

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Articulation points ,Bi connected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure. Warshall's algorithm

UNIT-VI: SORTING

Insertion Sort, Divide and conquer strategy, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort. Radix sort

TEXT BOOKS:

- 1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd ed
- 2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., 2nd ed
- 3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student ed

REFERENCE BOOKS:

- 1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
- 2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
- 3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

C	ourse Code	COMPUTER ORGANIZATION	L	Т	Ρ	С
	18CS3T6 Maximum expected contact hours : 64			1		2
		Prerequisites : Digital Logic Design	3	I		3
PURP	OSE: A student shou	Id be know the mechanism that provides for communication among CPU, main	memo	ory, an	d I/O.	Main
Structu	ral components of the	e CPU: Control Unit: Controls the operation of the CPU and hence the computer.	o Arit	hmetio	c and I	ogic
IINSTR	UCTIONAL COUR	SE UDJEUTIVES				
1	Comprehensive know	wledge of computer system including the analysis and design of components of th	ie syst	em		
COUR	SE OUTCOMES					
1	Gives a view of com	puter system from user's perspective, representation of data				
2	Understanding RTL,	Micro operations, ALU, Organization of stored program computer, types of instruc	tions a	nd des	sign of	
2	basic components o	f the system				
3	Illustration of data p	aths and control flow for sequencing in CPUs, Microprogramming of control unit o	f CPU			
4	Illustration of algorit	hms for basic arithmetic operations using binary and decimal representation				
5	Description of differ	ent parameters of a memory system, organization and mapping of various types o	f mem	ories		
6	Describes the mean	s of interaction devices with CPU, their characteristics, modes and introduction mu	Iltiprod	cessor	s.	

UNIT I :BASIC STRUCTURE OF COMPUTERS : Computer Types, Functional unit, Basic Operational concepts, Bus structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes.

UNIT II : REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer Bus and

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memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Register Computer instructions, Timing and control, Instruction cycle, Memory - Reference Instructions. Input - Output and Interrupt, Design of basic computer, Design of Accumulator Logic.

UNIT III : CENTRAL PROCESSING UNIT : General Register Organization, STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer. MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, design of control unit

UNIT IV: COMPUTER ARITHMETIC : Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT V : THE MEMORY SYSTEM : Memory Hierarchy, Main memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory.

UNIT-VI: INPUT-OUTPUT ORGANIZATION : Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access. MULTI PROCESSORS: Introduction, Characteristics or Multiprocessors, Interconnection Structures, Inter processor Arbitration.

TEXT BOOKS:

- a. Computer System Architecture, M.Moris Mano, 3rd Edition, Pearson/PHI
- Computer Organization , Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill. b.
- Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier c.

REFERENCES:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

C	ourse Code		L	Т	Ρ	С
				-	4	2
PURP	DSE: Data structur	e is designed to organize data to suit a specific purpose so that it ca	an be	acce	ssed	and
worke	d with in appropria	ite ways				
INSTR	INSTRUCTIONAL COURSE OBJECTIVES					
1	To develop skills to design and analyze simple linear and non linear data structures					
2	2 To Strengthen the ability to identify and apply the suitable data structure for the given real world problem					
3	To Gain knowledge in practical applications of data structures					
COUR	SE OUTCOMES					
1	Be able to design	and analyze the time and space efficiency of the data structure				
2	Be capable to ide	ntity the appropriate data structure for given problem				
3	Have practical kn	owledge on the application of data structures				

- 1. Implementation of Singly linked list with all operations
- 2. Implementation of Doubly linked list with all operations
- 3. Implementation of Multistack in a Single Array.
- 4. Implementation of Circular Queue.
- 5. Implementation of Binary Search trees.
- 6. Implementation of Hash table.
- 7. Implementation of Heaps.
- 8. Implementation of Breadth First Search Techniques.
- 9. Implementation of Depth First Search Techniques.

10. Implementation of Prim's Algorithm.

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- 11. Implementation of Dijkstra's Algorithm.
- 12. Implementation of Kruskal's Algorithm
- 13. Implementation of MergeSort
- 14. Implementation of Quick Sort
- 15. Implementation of Data Searching using divide and conquer technique

C	Course Code		L	Т	Ρ	С
	18CS3L2	JAVA PROGRAIVIIVIING LAD			4	2
PURPC	PURPOSE: : A student should be able to develop all types of cross platform applications and also able developing Mobile,					
Deskto	Desktop, web, server side and dynamic web applications					
INSTR	UCTIONAL COURSE	OBJECTIVES				
1	1 To understand heap and various tree structures like AVL, Red-black, B and Segment trees					
2	2 To understand the problems such as line segment intersection, convex shell and Voronoi diagram					
COURS	SE OUTCOMES					
1	Implement heap ar	nd various tree structure like AVL, Red-black, B and Segment trees				
2	Solve the problems	s such as line segment intersection, convex shell and Voronoi diagram				

Exercise - 1 (Basics)

- a. Write a JAVA program to display default value of all primitive data type of JAVA
- b. Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.
- c. Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
- d. Write a case study on public static void main

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

- a. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- b. Write a JAVA program to sort for an element in a given list of elements using bubble sort
- c. Write a JAVA program to sort for an element in a given list of elements using merge sort.
- d. Write a JAVA program using StringBufferto delete, remove character.

Exercise - 3 (Class, Objects)

- a. Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
- b. Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

- a. Write a JAVA program to implement constructor overloading.
- b. Write a JAVA program implement method overloading.

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Exercise - 5 (Inheritance)

- a. Write a JAVA program to implement Single Inheritance
- b. Write a JAVA program to implement multi level Inheritance
- c. Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

- a. Write a JAVA program give example for "super" keyword.
- b. Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

- a. Write a JAVA program that describes exception handling mechanism
- b. Write a JAVA program Illustrating Multiple catch clauses

Exercise - 8 (Runtime Polymorphism)

- a. Write a JAVA program that implements Runtime polymorphism
- b. Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise - 9 (User defined Exception)

- a. Write a JAVA program for creation of Illustrating throw
- b. Write a JAVA program for creation of Illustrating finally
- c. Write a JAVA program for creation of Java Built-in Exceptions
- d. Write a JAVA program for creation of User Defined Exception

Exercise - 10 (Threads)

- a. Write a JAVA program that creates threads by extending Thread class .First thread display"Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)
- b. Write a program illustrating isAlive and join ()
- c. Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

- a. Write a JAVA program Producer Consumer Problem
- b. Write a case study on thread Synchronization after solving the above producer
- c. consumer problem

Exercise - 12 (Packages)

- a. Write a JAVA program illustrate class path
- b. Write a case study on including in class path in your os environment of your package. c). Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)

- a. Write a JAVA program to paint like paint brush in applet.
- b. Write a JAVA program to display analog clock using Applet.
- c. Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

- a. Write a JAVA program that display the x and y position of the cursor movement using Mouse.
- b. Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Exercise - 15 (Swings)

- a. Write a JAVA programto build a Calculator in Swings
- b. Write a JAVA program to display the digital watch in swing tutorial.

Exercise - 16 (Swings - Continued)

- a. Write a JAVA program that to create a single ball bouncing inside a JPanel.
- b. Write a JAVA program JTree as displaying a real tree upside down

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(Course Code			Т	Ρ	С	
	18CS3T1	UNIX SHELL PROGRAMMING	3	1	-	3	
PURPO	PURPOSE: Interactive use, Customization of your UNIX session, Programming						
INSTR	UCTIONAL COURSE	OBJECTIVES					
1	Facility with UNIX command syntax and semantics						
2	2 Ability to read and understand specifications, scripts and programs						
3	3 Individual capability in problem solving using the tools presented within the class						
4	4 Students will demonstrate a mastery of the course materials and concepts within in class discussions						
COURS	SE OUTCOMES						
1	Master the ability	to use a variety of common Unix commands and utilities					
2	Implement various file processing commands used in UNIX						
3	3 Construct various shell scripts for simple applications						
4	Explain the process management using system calls LINIX environment						

UNIT-I: Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II: The File system - The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chorp Command Changing the Group of a File.

UNIT-III: Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters -Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV: Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V: Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The \$? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

UNIT-VI: The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control

TEXT BOOKS:

- The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
 Introduction to Unix Shell Programming by M. G. Venkatesh Murthy, Pearson

REFERENCE BOOKS:

1. Unix and shell programming by B.M. Harwani, OXFORD university press

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(Course Code		L	Т	Ρ	С
	18CS3L3	UNIX SHELL PRUGRAMMING LAB		-	4	2
PURPOSE:						
INSTF	RUCTIONAL COUR	SE OBJECTIVES				
1	This course intro	duces basic understanding of UNIX OS, UNIX commands				
2	2 File system and to familiarize students with the Linux environment					
3	3 To make student learn fundamentals of shell scripting and shell programming					
COUR	SE OUTCOMES					
1	Student will be a	ble to run various UNIX commands on a standard UNIX/LINUX Operat	ing sy	/stem		
2	Student will be a	ole to run C / C++ programs on UNIX.				
3	Student will be a	ole to understand and handle UNIX system calls				
4	Student will be a	ole to do shell programming on UNIX OS.				

- 1. Study of Unix/Linux general purpose utility command list
 - man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, a. cal, logout, shutdown.
 - b. Study of vi editor.
 - c. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
 - d. Study of Unix/Linux file system (tree structure).
 - e. Study of .bashrc, /etc/bashrc and Environment variables
- 2. Write a C program that makes a copy of a file using standard I/O, and system calls
- 3. Write a C program to emulate the UNIX Is -I command.
- 4. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - Is -I | sort
- 5. Write a C program that illustrates two processes communicating using shared memory
- 6. Write a C program to simulate producer and consumer problem using semaphores
- 7. Write C program to create a thread using pthreads library and let it run its function.
- 8. Write a C program to illustrate concurrent execution of threads using pthreads library.

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Department of Computer Science and Engineering

Course Code	B.Tech	ELECTIVE-1	L	Т	Р	С
18CS3T5C	II Year	CLOUD COMPUTING-1	3	1	-	3
	I Sem					

OBJECTIVES:

- To get familiar with basics of the Internet Programming
- To acquire knowledge and skills for creation of web site
- To gain ability to develop responsive web applications
- To train the fundamental concepts of database management system, database modeling and design, Relational Data Modeling SQL

OUTCOMES:

- Implement interactive web page(s) using HTML, CSS
- Design a responsive web site using HTML5 and CSS3.
- Perform project planning, analysis, design, implementation and testing in group / as an individual for any real time information system with all realistic constraints.
- Solve issues of information systems using the learnt database principles.

Unit 1 : Introduction to Web

Introduction to Web

Introduction to Computers and the Internet, Introduction, The Internet in Industry and Research, HTML5, CSS3, Evolution of the Internet and World Wide Web, Web Basics, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting

Unit 2 : HTML

HTML Introduction- HTML Elements, HTML Attributes, HTML Headings, HTML Paragraphs, HTML Formatting, HTML Fonts, HTML Styles, HTML Links, HTML Images, HTML Tables, HTML Lists, HTML Forms, Internal Linking, meta Elements, New HTML5 Form input Types, input and datalist Elements and autocomplete Attribute, Page-Structure Elements, HTML5 Audio, HTML5 Video

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Unit 3 : CSS

CSS Introduction, CSS Syntax, Inline Styles, Embedded Style Sheets, Conflicting Styles, Linking External Style Sheets, Positioning Elements: Absolute Positioning, z-index, Positioning Elements: Relative Positioning, span, CSS Selectors, CSS Color, CSS background, CSS Fonts, CSS Text, CSS Links, CSS Lists, CSS Tables, CSS Box Model, CSS Margin, CSS Padding, CSS Border, Text Shadows, Rounded Corners, Box Shadows, CSS Outline, CSS Cursors, CSS Overflow, CSS Display, CSS Visibility, CSS Position, CSS Layers, CSS Float, CSS Alignment, CSS Pseudo-classes, CSS Pseudo-elements CSS Opacity

Unit 4 : DATABASE SYSTEMS DATA MODELING AND RELATIONAL MODEL

DATABASE SYSTEMS

History and motivation for database systems; components of database systems; DBMS functions; database architecture and data independence.

Data modeling: conceptual models; object -oriented model;

RELATIONAL MODEL

Relational data model; relational algebra, relational calculus

Unit 5 : SQL & NORMALIZATION

Relational data model; Database query languages: Overview of database languages; SQL-DDL, DML, DCL, TCL Commands, The Form of Basic SQL Query, Examples on Basic SQL Queries Integrity Constraints, Set operations, Aggregate Operators, Joins, Nested Queries, Triggers

Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF)

Unit-6: CLOUD COMPUTING

Computing,High Performance Computing,Parallel Computing,Distributed Computing,Grid Computing,Cluster Computing,Mobile Computing,Massively Parallel Computing,Network Computing,Service Oriented Architecture,Definition of Cloud,History Of Cloud,Virtualization,Cloud Computing ,Deployment Models,Service Models

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TEXT BOOKS

- 1. A. Silberschatz, H. F. Korth & S. Sudershan, Database system concepts, McGraw Hill, 6th Edition 2010.
- 2. R. Elmasri & S. B. Navathe, Fundamentals of database systems, Addison Wesley, 6th Edition, 2011.
- 3. Internet & World Wide Web How to Program, 5/e- Paul J. Deitel, Harvey M. Deitel, Abbey Deitel-Prentice Hall India
- 4. Programming the World Wide Web (8th ed)- ROBERT W. SEBESTA, Pearson

Reference Books:

- 1. C. J. Date, An introduction to database systems, Addison Wesley,8 Edition, 2003.
- 2. H. Garcia et al., Database system implementation, Prentice Hall,2

Web References :

- 1. https://www.dataversity.net/brief-history-database-management/
- 2. <u>https://link.springer.com/chapter/10.1007/978-1-349-149</u>31-5_11
- 3. <u>https://www.studytonight.com/dbms/architecture-of-database.php</u>
- 4. <u>https://www.w3schools.com/html/</u>
- 5. https://www.coursera.org/learn/html
- 6. <u>https://bitshifters0.files.wordpress.com/2015/03/programming-the-world-wide-web-sebesta-robert.pdf</u>
- 7. <u>https://sureshvcetit.files.wordpress.com/2017/10/prentice-hall-internet-and-world-wide-web-how-to-program-5th-edition-0132151006.pdf</u>
- 8. https://www.w3schools.com/css/
- 9. <u>https://www.tutorialrepublic.com/css-tutorial/</u>

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Department of Computer science and Engineering

Course Code	B.Tech	ELECTIVE-1	L	Т	Р	С
18CS3T5E	II Year	CYBER SECURITY - I	3	1	-	3
	I Sem					

OBJECTIVES:

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

OUTCOMES:

- Making Software easily right out of the box
- Experience with an interpreted Language
- To build software for real needs
- Prior Introduction to testing software

Unit I : Introduction

History of Python, Need of Python Programming, Applications Basics of Python Programming, Python in statistics context, Python in machine learning context, Python in Cyber security context, installation in windows/linux/mac, Using the REPL(Shell), Running Python Scripts, Variables, Assignment,Keywords, InputOutput, Indentation.

Types - Integers, Strings, Booleans; Operators, Control Flow- if, if-elif-else, for, while, break, continue

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Unit II : Data Structures and Functions

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

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, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages - decorators, collections, generators File I/O: File opening, reading, writing, appending, merging, processing

Unit III : OOP in Python&Brief Tour of the Standard Library

Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions Advanced Python Objects : numbers, strings, lists, tuples, dictionaries

Pandas: introduction, installation, Jupyter notebook, loading CSN, JSON, text, excel files, set header row, set column names, updating, deleting columns,rows, Numpy: introduction, installation, numpy arrays, image and video processing with Open CV : displaying, sizing, resizing images, face detection, video capture, Interactive data visualization : Bokeh, Bokeh with pandas, web scrapping

Unit IV : COMPUTER NETWORKS

Computer networks Introduction, Types of computer networks, OSI reference model and its layered tasks, TCP/IP reference model and its layered tasks, **Physical layer -** introduction, Data transfer in physical layer, Devices in physical layer, Analog and Digital data, Analog and digital signals, **Data Link layer -** Framing - bit stuffing, character stuffing, Flow and error control mechanisms – introduction, Stop and Wait protocol, Go Back N, Selective Repeat protocol, Error Detection/ Error Correction codes – introduction, Hamming code, CRC, Check Sum, Multiple access methods, Switching, **Network layer** – introduction, Host to Host or End to End delivery, Class-full address, Class-less address, IPV4 addressing mechanism, IPV6 addressing mechanism, Public and private IP addresses, **Routers,Routing algorithms** – introduction,Shortest Path routing algorithm, Distance vector routing algorithm,

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Transport Layer- introduction, Process to Process delivery, UDP(User Datagram Protocol), TCP(Transmission Control Protocol), SCTP(Stream Control Transmission Protocol), Congestion Control policies, **Application Layer**– introduction, Domain Name System(DNS), World Wide Web(WWW), Uniform Resource Locator(URL), Hyper Text Transfer Protocol(HTTP), File Transfer Protocol(FTP)

Unit V: ETHICAL HACKING

Introduction to ethical hacking, Information security overview, Information security threats and attack vectors, Hacking concepts, Ethical hacking concepts, information security controls, penetration testing concepts, information security laws and standards, Footprinting and Reconnaissance – Footprinting concepts, footprinting through search engines, foot printing through web services, footprinting through social networking sites, website footprinting, email footprinting, competitive intelligence, whois footprinting, DNS footprinting, network footprinting, footprinting through social engineering, footprinting tools, footprinting countermeasures, footprinting penetratoion testing

Unit VI :

Scanning Networks – network scanning concepts, scanning tools, scanning beyond IDS and firewall, banner grabing, draw network diagrams, scanning pen testing, **Enumeration** – Enumeration concepts, NetBIOS Enumeration, SNMP enumeration, LDAP numeration, NTP enumeration, SMTP and DNS enumeration, other enumeration techniques, enumeration counter

measures, enumeration pen testing, **Vulnerability analysis** – vulnerability assessment concepts, vulnerability assessment solutions, vulnerability scoring systems, vulnerability assessment tools, vulnerability assessment reports

TEXT BOOKS

- 1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
- 2. LearningPython, MarkLutz, Orielly
- 3. introduction to Data Communications and Networking by B. Fourouzen, 4 edition
- 4. computer networks 4 edition. Tanenbaum

ReferenceBooks:

- 1. Think Python, Allen Downey, Green TeaPress
- 2. CorePython Programming, W.Chun, Pearson.
- 3. Introduction to Python, Kenneth A.Lambert, Cengage

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Department of Computer Science and Engineering

Course Code	B.Tech	ELECTIVE-1	L	Т	Ρ	С
18CS3T5B	II YEAR I SEM	DATA ANALYTICS-1	3	1		3

Course Objective

Data Science with R. Acquire practical skills for visualizing, transforming, and modeling data in R. Learn data exploration, data visualization, predictive analytics, and descriptive analytics techniques. Create the highest quality analysis.

Course Outcome

- List motivation for learning a programming language
- Access online resources for R and import new function packages into the R workspace
- Import, review, manipulate and summarize data-sets in R
- Explore data-sets to create testable hypotheses and identify appropriate statistical tests
- Perform appropriate statistical tests using R
- Create and edit visualizations with R

UNIT-1: Regression

Introduction to Statistics, **Data Preprocessing**: Importing dataset, Handling missing data, Categorical data, Splitting the dataset into Training set and Test set, Feature Scaling, **Regression**: Simple Linear Regression, Multiple Linear Regression, Polynomial Regression, Support Vector Regression (SVR), Decision Tree Regression, Random Forest Regression, **Regression model evaluation**: R-Squared Intuition, Adjusted R-Squared Intuition, Interpreting Linear Regression Coefficients **Classification** Classification: Logistic Regression, K-Nearest Neighbors (K-NN), Support Vector Machines (SVM), Kernel SVM, Naïve Bayes, Decision Tree Classification, Random Forest Classification,

UNIT-2: Association rules and Deep learning

Evaluating Classification Models: False Positives & False Negatives, Confusion Matrix, Accuracy Paradox, CAP Curve, CAP Curve Analysis. **Clustering:** K-Means Clustering, Hierarchical Clustering. **Associate Rule Learning:** Apriori, ECLAT, **Reinforcement Learning:** Upper Confidence Bound, Thompson Sampling, Natural Language Processing, **Deep Learning:** Artificial Neural Networks, Convolutional Neural Networks, **Dimensionality Reduction**: Principal Component Analysis (PCA), Kernel PCA, Linear Discriminant Analysis (LDA), **Model Selection & Boosting**: Model Selection, XG Boost.

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UNIT-3:

Introduction: What is R-Evaluation of R-R features-R Applications-R in statistical context-R in Machine learning context-R installation on windows/MAC/Linux-Development environment overview-R SDK and R studio-**R Basics:** Introduction-Arithmetic in R-Variables-Variable assignment-Finding variables-Basic data types. **Introduction to vectors**-Vector operations-Matrices and arrays as vectors-Declarations-Comparison operators-Vector indexing and selecting-Vector recycling and repetition-Vector functions-NA and NULL values-Subscripts and generating sequence-Generating random numbers and sampling-Help in R and R studio.

UNIT-4:

R Matrices: Introduction-Creating a Matrix-Matrix arithmetic-Matrix operations-Matrix selection and Indexing-Factors and categorical matrices. **R Arrays:** Introduction-Array arithmetic-Array indexing. **R Data Frames:** Introduction-Data frame basics-Data frame indexing and selection-Data frame operations-Merging data frames-Applying functions on data frames. **R Lists:** List introduction-List operations-List indexing-Adding and deleting list elements-Functions on lists-Recursive lists.

UNIT-5:

Data input and output in R- Introduction-CSV files with R-Excel files with R-SQL with R-Web scraping with R. **R Programming:** programming basics-Logical operators-If else and else if statements-while loop-FOR loop-Functions-Tables-Strings

UNIT-6

R Packages: Installing and loading packages-Built-in package list and purpose explanation. Advanced **R Programming:** Introduction-Built-in R features-apply-Math functions-Regular expressions-Dates and time stamp. **Data Manipulation with R:** Introduction-DPLYR-Pipe operator-TIDYR. **Visualization with R:** ggplot2-Histograms-scatter plots-Bar plots-Box plots-2 variable ploting-coordinates and facing-Themes. **Interactive visualization with Plotly:** Introduction-plotly and ggplot2.

Reference Books:

- 1. R for Every one by Jared P Lander
- 2. The Art of R programming by Norman Matloff
- 3. R Cook Book by Paul Teetor
- 4. Hands on Programming with R by Garrett Gloremund
- 5. R programming for Data Science by Roger Peng
- 6. Data manipulation with R by Jaynal Abedin

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Department of Computer Science and Engineering

Course Code	B.Tech	ELECTIVE-1	L	Т	Р	С
	II Year	WEB AND MOBILE DEVELOPMENT-1				
18CS3T5D	I Sem		3	1	-	3

OBJECTIVES:

- To train the fundamental concepts of database management system, database modeling and design, Relational Data Modeling SQL
- To get familiar with basics of the Internet Programming
- To acquire knowledge and skills for creation of web site
- To gain ability to develop responsive web applications

OUTCOMES:

- Perform project planning, analysis, design, implementation and testing in group / as an individual for any real time information system with all realistic constraints.
- Solve issues of information systems using the learnt database principles.
- Implement interactive web page(s) using HTML, CSS
- Design a responsive web site using HTML5 and CSS3.

Unit 1 : DATABASE SYSTEMS DATA MODELING AND RELATIONAL MODEL

DATABASE SYSTEMS

History and motivation for database systems; components of database systems; DBMS functions; database architecture and data independence.

Data modeling: conceptual models; object -oriented model;

RELATIONAL MODEL

Relational data model; relational algebra, relational calculus

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Unit 2 : SQL

Relational data model; Database query languages: Overview of database languages; SQL-DDL, DML, DCL, TCL Commands, The Form of Basic SQL Query, Examples on Basic SQL Queries Integrity Constraints, Set operations, Aggregate Operators, Joins, Nested Queries, Triggers

Unit 3 : Introduction to Web

Introduction to Web

Introduction to Computers and the Internet, Introduction, The Internet in Industry and Research, HTML5, CSS3, Evolution of the Internet and World Wide Web, Web Basics, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting

Unit-4: HTML and HTML 5

HTML Introduction- HTML Elements, HTML Attributes, HTML Headings, HTML Paragraphs, HTML Formatting, HTML Fonts, HTML Styles, HTML Links, HTML Images, HTML Tables, HTML Lists, HTML Forms, Internal Linking, meta Elements

HTML-5

Introduction, New HTML5 Form input Types, input and datalist Elements and autocomplete Attribute, Page-Structure Elements, HTML5 Audio, HTML5 Video

Unit-5: Introduction to CSS

Introduction to CSS

CSS Introduction, CSS Syntax, Inline Styles, Embedded Style Sheets, Conflicting Styles, Linking External Style Sheets, Positioning Elements: Absolute Positioning, z-index, Positioning Elements: Relative Positioning, span, CSS Selectors, CSS Color, CSS background, CSS Fonts, CSS Text, CSS Links, CSS Lists, CSS Tables

Unit 6 : CSS Box Model & CSS 3

CSS Box Model

CSS Box Model, CSS Margin, CSS Padding, CSS Border, Text Shadows, Rounded Corners, Box Shadows, Linear Gradients; Introducing Vendor Prefixes, Radial Gradients, Text Stroke, Multiple Background Images, Reflections, Image Borders, Animation; Selectors, Transitions and Transformations

CSS3

CSS Outline, CSS Cursors, CSS Overflow, CSS Dimension, CSS Units, CSS Visual Formatting, CSS Display, CSS Visibility, CSS Position, CSS Layers, CSS Float, CSS Alignment, CSS Pseudo-classes, CSS Pseudo-elements, CSS Opacity

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TEXT BOOKS

- 1. A. Silberschatz, H. F. Korth & S. Sudershan, Database system concepts, McGraw Hill, 6th Edition 2010.
- 2. R. Elmasri & S. B. Navathe, Fundamentals of database systems, Addison Wesley, 6th Edition, 2011.
- 3. Internet & World Wide Web How to Program, 5/e- Paul J. Deitel, Harvey M. Deitel, Abbey Deitel-Prentice Hall India
- 4. Programming the World Wide Web (8th ed)- ROBERT W. SEBESTA, Pearson

Reference Books:

- 1. C. J. Date, An introduction to database systems, Addison Wesley, 8 Edition, 2003.
- 2. H. Garcia et al., Database system implementation, Prentice Hall,2

Web References :

- 1. <u>https://www.dataversity.net/brief-history-database-management/</u>
- 2. https://link.springer.com/chapter/10.1007/978-1-349-14931-5_11
- 3. https://www.studytonight.com/dbms/architecture-of-database.php
- 4. <u>https://www.w3schools.com/html/</u>
- 5. https://www.coursera.org/learn/html
- 6. <u>https://bitshifters0.files.wordpress.com/2015/03/programming-the-world-wide-web-sebesta-robert.pdf</u>
- 7. <u>https://sureshvcetit.files.wordpress.com/2017/10/prentice-hall-internet-and-world-wide-web-how-to-program-5th-edition-0132151006.pdf</u>
- 8. https://www.w3schools.com/css/
- 9. <u>https://www.tutorialrepublic.com/css-tutorial/</u>

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Code	B.Tech		L	Т	Р	С
18CS4T1	II Year II Sem	PYTHON PROGRAMMING	3	1	-	3

COURSE OBJECTIVES:

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science
- Explore the knowledge on functional programming languages

COURSE OUTCOMES:

- Making Software easily right out of the box..
- Experience with an interpreted Language.
- To build software for real needs.
- To build standard library functions
- To know the exception handling in efficient manner

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

UNIT – II: Types, Operators and Control flow: Types - Integers, Strings, Booleans; Strings : accessing, slicing, built-in functions;

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

UNIT – V: Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, **Error and Exceptions**: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

UNIT – VI: Brief Tour of the Standard Library – File I/O – open, close, read, write, tell, seek, rename, remove; String Pattern Matching(Regular Expressions) – match function, search function, matching VS searching, modifiers, patterns; GUI Programming-Tkinter programming, Tkinter widgets, Turtle Graphics

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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Professor, CSE, PMU	Assoc. Prof. & Head,CSE,ASIST



Course Code	B.Tech	ADVANCED DATA STRUCTURES	L	Т	Р	С
18CS4T2	II Year II Sem		3	1	-	3

Department of Computer science and Engineering

OBJECTIVES:

- Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).
- Analyze the space and time complexity of the algorithms studied in the course.
- Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions
- Demonstrate an understanding of external memory and external search and sorting algorithms Demonstrate an understanding of simple Entity-Relationship models for databases

OUTCOMES:

- Be able to understand and apply amortized analysis on data structures, including binary search trees, mergable heaps, and disjoint sets
- Understand the implementation and complexity analysis of fundamental algorithms
- Have an idea of applications of algorithms in a variety of areas, including linear programming and duality, string matching, game-theory

UNIT-I: HASHING: Introduction to ADS, Sets, Dictionaries, Introduction-Static Hashing-Hash Table- Hash Functions- Secure Hash Function- Overflow Handling- Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic Hashing.

UNIT-II: EFFICIENT BINARY SEARCH TREES: Optimal Binary Search Trees, AVL Trees, Max-Height of AVL tree, Search, Insert, Delete Red-Black Trees, Definition-Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree.

UNIT-III:PRIORITY QUEUES (HEAPS): Model, Simple Implementation, Binary Heap-Structure Property-Heap-Order Property-Basic Heap Operations- Other Heap Operation, Applications of Priority Queues- The Selection Problem Event Simulation Problem, Binomial Queues- Binomial Queue Structure – Binomial Queue Operation- Implementation of Binomial Queues, Lazy Binomial Queues.

UNIT-IV: SORTING: External Sorting, Introduction, K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs, Heap Sort.

UNIT-V: MULTIWAY SEARCH TREES M-Way Search Trees, Definition and Properties-Searching an M-Way Search Tree, B-Trees of order m, 2-3 tree, Definition and Properties-Number of Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree.

UNIT-VI: DIGITAL SEARCH STRUCTURES: Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a Trie- Sampling Strategies- Insertion into a Trie-Deletion from a Trie- Keys with Different Length- Height of a Trie- Space Required and Alternative Node Structure- Prefix Search and Applications- Compressed Tries- Compressed Tries With Skip Fields- Compressed Tries With Labelled Edges- Space Required by a Compressed Tries, Tries and Internet Packet Forwarding ,- IP Routing- 1-Bit Tries- Fixed-Stride Tries-Variable-Stride Tries.

TEXT BOOKS:

1. Data Structure and Algorithms in Java, 3rd edition, Michael T. Goodrich and Roberto Tamassia, ISBN: 0-471-46983-1.

2. Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.

- **3.** Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Andersonfreed, Universities Press
- 4. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson

- 1. File Structures : An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick
- **2.** C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand, 2010.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Code	B.Tech	DATA BASE	L	Т	Р	С
18CS4T3	II Year II Sem	MANAGEMENT SYSTEMS	3	1	-	3

COURSE OBJECTIVES

• To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

COURSE OUTCOMES

• Describe a relational database and object-oriented database.

• Create, maintain and manipulate a relational database using SQL

• Describe ER model and normalization f or database design.

• Examine issues in data storage and query processing and can formulate appropriate solutions.

• Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.

• Design and build database system for a given real world problem

UNIT-I: An Overview of Database Management, Introduction- What is Database System-What is Database-Why Database- Data Independence- Relation Systems and Others-Summary,

Database system architecture, Introduction- The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level- Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

UNIT-II:

The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and Er Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the Er Models, The Relational Model Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection-Set Operation, Renaming – Joins- Division- More Examples of Queries, Relational Calculus, Tuple Relational Calculus- Domain Relational Calculus.

UNIT-III:

Queries, Constraints, Triggers: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV:

Schema Refinement (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT-V:

Transaction Management and Concurrency Control:

Transaction, properties of transactions, transaction log, and transaction management with SQLusing commit rollback and save point.Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery. **UNIT-VI:**

Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing –Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization

TEXT BOOKS:

1. Introduction to Database Systems, CJ Date, Pearson

2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition

3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson

REFERENCES BOOKS:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th

Edition.

2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education

3. Introduction to Database Systems, C.J.Date Pearson Education

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Code	B.Tech	FORMAL LANGUAGE	L	Т	Р	С
18CS4T4	II Year II Som	AUTOMATA THEORY	3	1	-	3
	Sem					

COURSE OBJECTIVE:

- Introduce the student to the concepts of Theory of computation in computer science
- The students should acquire insights into the relationship among formal languages, formal Grammars and automata

COURSE OUTCOMES:

- Classify machines by their power to recognize languages,
- Employ finite state machines to solve problems in computing,
- Explain deterministic and non-deterministic machines,
- Comprehend the hierarchy of problems arising in the computer science

UNIT 1

Alphabets, Languages, Operations on strings and languages and operations on languages, Why Study Automata Theory? The Central Concepts of Automata Theory, s, Acceptance of a String by a Finite Automation, Components of FSA, Elements of FSA, Mathematical representation of FSA, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, 2DFA Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT 2

Regular sets, Regular expressions, Operations and applications of regular expressions, Identity rules, Conversion of a given regular expression into a finite automaton, Conversion of finite automata into a regular expression, Pumping lemma for regular sets, Closure properties of regular sets

UNIT 3

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, EProductions and Unit Productions,Normal Forms for Context Free Grammars-Chomsky NormalForm and Greibach Normal Form, Applications of Context Free Grammars.

UNIT 4

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

UNIT 5

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine

UNIT 6

Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Classes of P and NP, NP Hard and NP-Complete Problems

TEXT BOOKS:

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3rd Edition, Pearson, 2008.

2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, 3rd Edition, PHI, 2007.

REFERENCE BOOKS:

 A Textbook on Automata Theory Nasir S.F.B, P.K Srimani, Cambridge university press Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
 Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Co	urse Code	B.Tech		L	Т	Р	С
18	BCS4T5A	II Year II Sem	ELECTIVE-II COMPUTER GRAPHICS	3	1	-	3

COURSE OBJECTIVES:

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

COURSE OUTCOMES:

• Know and be able to describe the general software architecture of programs that use 3D computer graphics.

• Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic

accelerators/co-processors.

• Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).

UNIT-I:

2D Primitives Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformations - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

UNIT-II:

3D Concepts Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3Dtransformations – Viewing -Visible surface identification.

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UNIT-III:

Graphics ProgrammingColor Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes

UNIT-IV:

Rendering Introduction to Shading models – Flat and Smooth shading – Adding texture to faces –Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows.

UNIT-V:

FractalsFractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals

UNIT-VI:

Overview of Ray Tracing Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition Pearson Education,2004.

2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Code	B.Tech		L	Т	Р	С
18CS4T6	II Year	OPERATING SYSTEMS	3	1	-	3
	II Sem					

OBJECTIVES:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

UNIT I

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

UNIT-II:

Process Management – Process concept, The process, Process State Diagram , Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT-III:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV:

Concurrency: ProcessSynchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples **Principles of deadlock** – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

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UNIT-V:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management **Mass-storage structure** overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT VI:

Linux System: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

OUTCOMES:

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers
- Introduction to Android Operating System Internals

TEXT BOOK:

- 1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
- 2.Operating Systems Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
- 3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016 .

REFERENCES:

- 1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
- 2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.
- 3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 2007.

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Department of Computer science and Engeneering

Course Code	B.Tech	ADVANCED DATA	L	Т	Р	С
18CS4L1	II Year	STRUCTURES LAB	-	-	3	1
	II Sem					

OBJECTIVES:

- To understand heap and various tree structures like AVL, Red-black, B and Segment trees
- To understand the problems such as line segment intersection, convex shell and Voronoi diagram

OUTCOMES:

- Implement heap and various tree structure like AVL, Red-black, B and Segment trees
- Solve the problems such as line segment intersection, convex shell and Voronoi diagram
- 1. To perform various operations i.e., insertions and deletions on AVL trees.
- 2. To implement operations on binary heap.
 - a. Vertex insertion
 - b. Vertex deletion
 - c. Finding vertex
 - d. Edge addition and deletion
- 3. To implement Prim's algorithm to generate a min-cost spanning tree.
- 4. To implement Krushkal's algorithm to generate a min-cost spanning tree.
- 5. To implement Dijkstra's algorithm to find shortest path in the graph.
- 6. To implementation of Static Hashing (Use Linear probing for collision resolution)
- 7. To implement of Huffmann coding.
- 8. To implement of B-tree.

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Department of Computer science and Engeneering

Course Code	B.Tech	PYTHON PROGRAMMING	L	Т	Р	С
18CS4L2	II Year	LAB	-	-	3	1
	II Sem					

OBJECTIVES

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science
- Explore the knowledge on functional programming languages

OUTCOMES

- Making Software easily right out of the box.
- Experience with an interpreted Language.
- To build software for real needs.
- Prior Introduction to testing software
- To build standard library functions
- To know the exception handling in efficient manner

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
- 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.

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

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





Exercise - 15 - Advanced

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

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Course Code	B.Tech	DataBase Management	L	Т	Р	С
18CS4L3	II Year II Sem	Systems Lab			3	1

OBJECTIVES:

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and productspecific tools.
- > To familiarize the participant with the nuances of database environments towards
- > an information-oriented data-processing oriented framework
- > To give a good formal foundation on the relational model of data
- > To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

OUTCOMES:

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain Normalize a database
- > Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- > Design and build a GUI application using a 4GL

List of Experiments:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.

- 2. Queries using operators in SQL
- 3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
- 4. Queries using Group By, Order By, and Having Clauses
- 5. Queries on Controlling Data: Commit, Rollback, and Save point
- 6. Queries to Build Report in SQL *PLUS
- 7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
- 8. Queries on Joins and Correlated Sub-Queries
- 9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and

Locking Rows for Update, Creating Password and Security features

PL/SQL

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation

11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

15. Write a PL/SQL Code Creation of forms for any Information System such as Student

Information System, Employee Information System etc. 18

16. Demonstration of database connectivity

Note: The creation of sample database for the purpose of the experiments is expected to be predecided by the instructor.

\Text Books/Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press

2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.

3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson

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Course Code	B.Tech	ELECTIVE-2	L	Т	Р	С
	II Year	CLOUD COMPUTING-2	3	1	-	3
	II Sem					

- The student will learn about the cloud environment.
- Building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas,Paas,Saas, and developing cloud based software applications on top of cloud platforms

OUTCOMES:

- Understanding the key dimensions of the challenge of Cloud Computing own organization Assessment of the economics, financial, and technological implications for selecting cloud computing for
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
- Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas.

UNIT I : Cloud Platform Architecture

Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT II : Cloud Programming and Software Environments Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT III : Cloud Resource Management and Scheduling Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

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, Amazon Simple Storage Service (S3)

UNIT V:

Law of Cloudonomics, CloudAPI's, Open Stack CLoudArchitecture, Cloud Deployment Techniques, Service Level Agreements, Security in Cloud

UNIT VI :.

AWS Overview, History and Evolution of AWS, Overview of AWS Products and Services

TEXT BOOKS

1.Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.

2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.

3. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press

4. Cloudonomics: The Business Value of Cloud Computing + Website

5. Cloudonomics: The Business Value of Cloud Computing-A Review

REFERENCE BOOKS:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH



Department of Computer science and Engeneering

Course Code	B.Tech	ELECTIVE-2	L	Т	Р	С
18CS4T5E	II Year	CYBER SECURITY - 2	3	1	-	3
	II Sem					

OBJECTIVES:

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

OUTCOMES:

- Making Software easily right out of the box
- Experience with an interpreted Language
- To build software for real needs
- Prior Introduction to testing software

Unit I : System Hacking:

System Hacking Concepts, Cracking Passwords, Escalating Privileges, Executing Applications, Hiding Files, Covering Tracks, Penetration Testing **Malware Threats :** Malware Concepts, Trojan Concepts, VirusandWormConcepts, MalwareAnalysis, Countermeasures, Anti-MalwareSoftware, MalwarePenetration Testing

Unit II : Sniffing: Sniffing Concepts, Sniffing Technique: MAC Attacks ,Sniffing Technique: DHCP Attacks Sniffing Technique :ARP Poisoning, Sniffing Technique :Spoofing Attacks, Sniffing Technique: DNS Poisoning ,Sniffing Tools, Counter measures, Sniffing Detection Techniques ,Sniffing Pen Testing

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Social Engineering: Social Engineering Concepts, Social Engineering Techniques, Insider Threats, Impersonation on Social Networking Sites, Identity Theft ,Counter measures ,Social Engineering Pen Testing

Denial-of-Service :DoS / DDoS Concepts, DoS/DDoS Attack Techniques, Botnets, DDoS CaseStudy, DoS/DDoS Attack Tools, Counter measures, DoS/DDoS Protection Tools, DoS/DDoS Penetration Testing

UnitIII: Session Hijacking: Session Hijacking Concepts, Application Level Session Hijacking, Network Level Session Hijacking, Session Hijacking Tools, Countermeasures, Penetration Testing.

Evading IDS, Firewalls, and Honey pots: IDS, Firewall and Honey pot Solutions, Evading IDS, Evading Firewalls, IDS/Firewall Evading Tools, Detecting Honey pots, IDS/Firewall Evasion Counter measures ,Penetration Testing

Hacking Web Servers: Web Server Concepts, Web Server Attacks, Web Server Attack Methodology, Web Server Attack Tools, Counter measures, Patch Management, Web Server Security Tools, Web Server Pen Testing

Unit IV: Hacking Web Applications: Web App Concepts Web App Threats ,Hacking Methodology, Web App Hacking Tools, Counter measures, Web App Security Testing Tools, Web App Pen Testing

SQL Injection: SQL Injection Concepts, Types of SQL Injection , SQL Injection Methodology, SQL Injection Tools Evasion Techniques, Counter measures

Hacking Wireless Networks: Wireless Concepts, Wireless Encryption, Wireless Threats, Wireless Hacking Methodology, Wireless Hacking Tools, Bluetooth Hacking ,Counter measures, Wireless Security Tools

Unit V : Hacking Mobile Platforms: Mobile Platform Attack Vectors, Hacking Android OS, Hacking ,iOS ,Mobile Spyware ,Mobile Device Management ,Mobile Security Guidelines and Tools, Mobile Pen Testing

IoT Hacking: IoT Concepts, IoT Attacks, IoT Hacking Methodology, IoT Hacking Tools, and Counter measures IoT Pen Testing.

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Unit VI : Cloud Computing: Cloud Computing Concepts, Cloud Computing Threats, Cloud Computing Attacks, Cloud Security, Cloud Security Tools, Cloud Penetration Testing **Cryptography:** Cryptography Concepts, Encryption Algorithms ,Cryptography Tools, Public Key Infrastructure (PKI),Email Encryption, Disk Encryption ,Cryptanalysis, Countermeasures

TEXT BOOKS

- 1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
- 2. LearningPython, MarkLutz, Orielly
- 3. introduction to Data Communications and Networking by B. Fourouzen, 4 edition
- 4. computer networks 4 edition. Tanenbaum

REFERENCEBOOKS:

- 1. Think Python, Allen Downey, Green TeaPress
- 2. CorePython Programming, W.Chun, Pearson.
- 3. Introduction to Python, Kenneth A.Lambert, Cengage

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Course Code	B.Tech		L	Т	Р	С
18CS4T5B	II Year	ELECTIVE-2	3	1	-	3
	II Sem	DATA ANALY IICS-2				

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science
- Introduction to Big Data
- The limitations of the traditional solutions for Big Data problems
- Solving Hadoop Big Data problems

OUTCOMES:

- Making Software easily right out of the box
- Experience with an interpreted Language
- To build software for real needs
- Prior Introduction to testing software
- Anatomy of File Read and Write & how Map Reduce works

Unit I : SystemHacking:

SystemHacking Concepts, Cracking Passwords, Escalating Privileges, Executing Applications, Hiding Files, Covering Tracks, Penetration Testing

Malware Threats:

Malware Concepts, Trojan

Concepts, Virus and Worm Concepts, Malware Analysis, Countermeasures, AntiMalware Softwar e, Malware Penetration Testing

Unit II : Sniffing:

Sniffing Concepts,Sniffing Technique:MACAttacks,Sniffing Technique:DHCPAttacksSniffing Technique:ARPPoisoning,Sniffing Technique:Spoofing Attacks,Sniffing Technique:DNS Poisoning,Sniffing Tools,Countermeasures,Sniffing Detection Techniques,Sniffing Pen Testing **Social Engineering:** SocialEngineering Concepts,SocialEngineering Techniques, Insider Threats, ImpersonationonSocial Networking Sites, Identity Theft,Countermeasures,SocialEngineering Pen Testing **Denial-of-Service:** DoS/DDoS Concepts,DoS/DDoS AttackTechniques,Botnets,DDoS CaseStudy,DoS/DDoS AttackTools,Countermeasures,DoS/DDoS Protection Tools,DoS/DDoS Penetration Testing

Unit III : SessionHijacking:

SessionHijackingConcepts,ApplicationLevelSessionHijacking,NetworkLevelSessionHijacking, SessionHijacking Tools, Countermeasures, Penetration Testing.

Evading IDS, Firewalls, and Honeypots:

IDS, FirewallandHoneypotSolutions,Evading IDS, EvadingFirewalls, IDS/FirewallEvading Tools, Detecting Honeypots,IDS/FirewallEvasion Countermeasures,PenetrationTesting **Hacking WebServers:**

WebServer Concepts, WebServer Attacks, WebServer AttackMethodology, WebServer AttackTools, Countermeasures, PatchManagement, WebServer Security Tools, WebServer Pen Testing

Unit IV: Introduction to Big Data & Big Data Challenges, Limitations & Solutions of Big Data Architecture, Hadoop & its Features, Hadoop Ecosystem, Hadoop 2.x Core Components.

Unit V Hadoop Storage: HDFS (Hadoop Distributed File System) Hadoop Processing: MapReduce Framework, Different Hadoop Distributions, Hadoop Architecture and HDFS, Hadoop MapReduce Framework.

Unit VI : Advanced Hadoop MapReduce, Apache Pig, Apache Hive, Advanced Apache Hive and HBase, Advanced Apache HBaseProcessing ,Distributed Data with Apache Spark, Oozie

TEXT BOOKS

- 1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
- 2. LearningPython, MarkLutz, Orielly
- 3. Programming Pig by Gates Alan & Daniel Doi. ...
- 4. The Definitive Guide by Tom White. ...
- 5. Hadoop in Practice by Alex Holmes. ...

REFERENCEBOOKS:

- 1. Think Python, Allen Downey, Green TeaPress
- 2. CorePython Programming, W.Chun, Pearson.
- 3. Introduction to Python, Kenneth A.Lambert, Cengage
- 4. Professional **Hadoop** Solutions by Boris Lublinksy, Kevin Smith, and Alexey Yakubovich.
- 5. Programming Hive by Dean Wampler, Edward Capriolo & Jason Rutherglen.

Course Code	B.Tech	WEB AND MOBILE DEVELOPMENT-2	L	Т	Ρ	С
	II Year		3	1	I	3
	II Sem					

- To acquire knowledge of basics in java scripting.
- To acquire knowledge of various object models in java script.
- To acquire basics of Angular JS
- To apply Angular JS in developing real-time applications

OUTCOMES:

- Use operators, variables, arrays, control structures, functions and objects in JavaScript.
- Map HTML using the DOM Document Object Model.
- Use regular expressions for form validation.
- Using Angular JS along with HTML and CSS

Unit 1 : JAVA SCRIPT-INTRODUCTION AND BASICS

Introduction

Overview-Applications-Limitations-Where to place the script?-

Java Script Basics

Syntax-Enabling-Comments-Variables: Local and Global Variables-Datatypes: primitive and non-primitive datatypes –Operators: Arithmetic, Comparison, Bitwise, Logical, Assignment, Special operators-if statement-switch statement-loops: for, while, do-while-functions: syntax, arguments, function object

Unit 2 : JAVA SCRIPT OBJECTS AND MODELS

Java Script Objects

JS Object: ways of creating an object, Defining method in JavaScript Object, JavaScript Object Methods-Array Object-String Object-Date Object-Number Object-Math Object-Boolean Object

Java Script Object Models

Browser Object Models (BOM): Window Object, History Object, Navigation Object, Screen Object

Document Object Model (DOM): introduction- methods-Document-Elements-HTML-CSS-Events-Event Listener-Navigation-Nodes-Node Lists

Unit 3 : JAVA SCRIPT REGULAR EXPRESSIONS, VALIDATIONS & ERROR HANDLING

Java Script Regular ExpressionAnd Validations

Syntax-Modifiers-Patterns: Metacharacters, Quantifiers-properties-methods HTML Form Validation using Java Script-String, Password, Number, Image, Email

Java Script Error Handling

Syntax Errors-Runtime Errors, Logical Errors-try-catch-finally-throw

Unit-4: Angular JS-I

Overview-Environment setup-Angular JS MVC-First Example-Data Binding-Expressions-Directives-Controllers-Modules: Creating a Module, Add controller to a module, Add directive to a module Angular JS Scope-Dependency Injection: value, factory, service, provider, constant-

Unit-5: Angular JS-II

Angular JS Filters: list, how to add filters to directives and expressions-Tables: Displaying table with Angular JS and CSS-select: ng-options vs ng-repeat-DOM-Forms: input controls and events-Validation-Animation

Unit-6: Angular JS-Applications

Angular JS-Notepad Application-Angular JS-Login Application-Angular JS- Upload File Application-Angular JS-Navigating Menu Application-Angular JS-Search Tab-Angular JS-Maps Application-Angular JS-Timer Application

TEXT BOOKS

1. Learning AngularJS: A Guide to AngularJS Development-Ken Williamson-O'Reilly

2. Professional Angular JS-Karpov, Netto- Wiley India Pvt Ltd

Web References:

- 1. https://www.javatpoint.com/angularjs-tutorial
- 2. https://www.tutorialspoint.com/angularjs/index.htm
- 3. https://docs.angularjs.org/tutorial
- 4. https://www.w3schools.com/angular/

Under Graduate Course Structure

For

COMPUTER SCIENCE & ENGINEERING (Applicable for batches admitted from 2018-2019)

S No	Programme Code	Programme Name	Branch	No. of Sections	No. of Students	Page
1	05	B. Tech	Computer Science & Engineering	02	120	1-3



Autonomous Regulations – R18

Amrita Sai Institute of Science & Technology

Approved by AICTE, New Delhi; Permanently Affiliated to JNTUK, Kakinada ISO 9001:2015 Certified Institution; Accredited by NAAC with "A" grade Recognized by UGC under 2(f) and 12(B) of UGC 1956 Act
Amrita Sai Nagar, Paritala, Krishna District Andhra pradesh – 521 180 www.amritasai.edu.in, 0866-2428399

- a. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
- b. Problem analysis: Identity, formulates, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- d. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- e. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling of complex engineering activities, with an understanding of the limitations.
- f. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- j. Communication: Communicate effectively on complex engineering activities with the engineering community and with t h e-society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- k. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 1. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Objectives

	Foundation of mathematical concepts: To use mathematical methodologies to crack problem
F30-1	using suitable mathematical analysis, data structure and suitable algorithm.
	Foundation of Computer System: the ability to interpret the fundamental concepts and
PSO-2	methodology of computer systems. Students can understand the functionality of hardware
	and Software aspects of computer systems.
	Foundations of Software development: the ability to grasp the software development
PSO-3	lifecycle and methodologies of software systems. Possess competent skills and knowledge of
	software design Process. Familiarity and practical proficiency with a broad area of
	programming concepts and provide new ideas and innovations towards research.

Program Educational Objectives

PEO-1	Prepare graduates to have knowledge and competency for careers in and related to Computer Science
	& Engineering
PEO-2	Prepare graduates to become leader in fields related to Computer Science.
PEO-3	Prepare graduates to pursue higher education in Engineering or other Professional fields

B. Tech. Course Structure – Computer Science & Engineering

III Year I Semester

S. No	Course Code	Course	L	Т	Р	С
1	18CS5T1	Web Technologies	3	1		3
2	18CS5T2	Statistics with R Programming	3	1		3
3	18CS5T3	Software Engineering	3	1		3
4	18CS5T4	Computer Networks		1		3
		Elective III				
	18CS5T5A	Compiler Design				
5	18CS5T5B	Data Analytics-3	3	1		2
5	18CS5T5C	Cloud Computing-3	5	1		5
18	18CS5T5D	Web and Mobile Development-3				
	18CS5T5E	Cyber Security-3				
6	18CS5L1	Statistics with R Programming Lab		1	3	1
7	18CS5L2	Computer Networks Lab		1	3	1
8	18CS5L3	Web Technologies Lab			3	1
9	18CS5T6	Professional Ethics & Intellectual Property Rights				2
		Total Credits		2	20	

L-Lecture; T-Tutorial; P-Practical; C-Credits;

Course Code	B.Tech	WEB TECHNOLOGIES	L	Т	Р	C
18CS5T1	III Year ISem		3	1	0	3

This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

UNIT-I: HTML, CSS

Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution

UNIT-II: Java script:

The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions DHTML: Positioning Moving and Changing Elements

UNIT-III:

XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches, **AJAX A New Approach:** Introduction to AJAX, Integrating PHP and AJAX.

UNIT-IV:

PHP Programming: Introducing PHP: Creating PHP script, Running PHP script.

Working with variables and constants: Using variables, Using constants, Data types, Operators. **Controlling program flow:** Conditional statements, Control statements, Arrays, functions. PHP Strings, Working with forms.

UNIT-V:

PHP State management, PHP file upload and download, PHP Mail, PHP MySQLi, PHP OOPs concepts with examples.

UNIT-VI:

Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

OUTCOMES:

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets. Build dynamic web pages.
- Build web applications using PHP.
- Write simple client-side scripts using AJAX

TEXT BOOKS:

- 1) Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson. Web Technologies, Uttam K Roy, Oxford
- 2) The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage

REFERENCE BOOKS:

- 1) Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
- 2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
- 3) Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning

Course Code	B.Tech	ech STATISTICS WITH R PROGRAMMING	L	Т	Р	С
18CS5T2	III Year ISem		3	1	0	3

Students will be able to Use R for statistical programming, computation, graphics, and modeling, Write functions and use R in an efficient way, Fit some basic types of statistical models Use R in their own research, Be able to expand their knowledge of R on their own.

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 Quicksort Implementation-Extended 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 Fir 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 /out put, 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.

UNIT-V:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests, - ANOVA.

UNIT-VI:

Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision-Random Forests,

OUTCOMES:

At the end of this course, students will be able to: List motivation for learning a programming language Access online resources for R and import new function packages into the R workspace Import, review, manipulate and summarize data-sets in R. Explore data-sets to create testable hypotheses and identify appropriate statistical tests Perform appropriate statistical tests using R Create and edit visualizations.

TEXT BOOKS:

- 1) The Art of R Programming, A K Verma, Cengage Learning.
- 2) R for Everyone, Lander, Pearson
 - 3) The Art of R Programming, Norman Matloff, No starch Press.

REFERENCE BOOKS:

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

Course Code	B.Tech	3.Tech Year ISem	L	Τ	Р	C
18CS5T3	III Year ISem		3	1	0	3

- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and modeling languages.
- To design and develop correct and robust software products.
- To understand the quality control and how to ensure good quality software.
- To understand the planning and estimation of software projects.
- To understand the implementation issues, validation and verification procedures.
- To understand the maintenance of software

UNIT-I:

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, the Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

UNIT-II:

Requirements Analysis and Specification: Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design: Overview of the Design Process, How to Characterize a Design? Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

UNIT – III:

Function-Oriented Software Design: Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

UNIT – IV:

Coding And Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing.

UNIT – V:

Software Reliability And Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model. Computer Aided Software Engineering: Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment.

UNIT – VI:

Software Maintenance: Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

Software Reuse: what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.

OUTCOMES

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems

TEXT BOOKS:

- **1.** Software Engineering Concepts and Practices: Ugrasen Suman, Cengage Learning
- 2. Software Engineering A Practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition.
- **3.** Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
- 4. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

REFERENCE BOOKS:

1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008

- 2. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
- 3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

4. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

Course Code	B.Tech		L	Τ	Р	С
18CS5T4	III Year ISem	COMPUTER NETWORKS	3	1	0	3

Understand state-of-the-art in network protocols, architectures, and applications. Process of networking research Constraints and thought processes for networking research

Problem Formulation—Approach—Analysis.

UNIT – I:

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

UNIT – II:

Physical Layer – Fourier analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, and Code Division Multiplexing

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III:

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N-A Protocol Using Selective Repeat

UNIT – IV:

The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation- Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

UNIT – V:

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms-

Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

UNIT – VI:

Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp

Application Layer – The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

OUTCOMES:

Understand OSI and TCP/IP models

Analyze MAC layer protocols and LAN technologies Design applications using internet protocols Understand routing and congestion control algorithms understand how internet works

TEXT BOOKS:

1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010

2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, Firouz Mosharraf, McGraw Hill Education

REFERENCE BOOKS:

Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011

Course Code	B.Tech	COMPILER DESIGN	L	Т	Р	С
18CS5T5A	III Year ISem	(ELECTIVE)	3	1	0	3

Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

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 buffing, 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 passing 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.

$\mathbf{UNIT} - \mathbf{IV}$

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

UNIT – V

Runtime Environments, Stack allocation of space, access to Non Local date 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.

NIT -VI

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

OUTCOMES:

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.

Parser and its types i.e. Top-down and Bottom-up parsers. Construction of LL, SLR, CLR and LALR parse table.

Syntax directed translation, synthesized and inherited attributes. Techniques for code optimization.

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,Elsebier.

REFERENCE BOOKS:

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

Course Code	B.Tech	Data Analytics-3	L	Τ	Р	С
18CS5T5B	III Year ISem	(ELECTIVE)	3	1	-	3

COURSE OBJECTIVES:

- conceptualization and summarization of big data and machine learning, trivial data versus big data
- Big data computing technologies, machine learning techniques, and scaling up machine learning approaches.
- Develop skills to both design and critique visualizations
- Understand why visualization is an important part of data analysis

LEARNING OUTCOMES:

- Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
- Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
- Ability to prepare data for visualization
- Ability to design visualizations
- Ability to use web technology to create visualizations

Unit I: INTRODUCTION TO BIG DATA

What are Big Data, Big data features and challenges, Problems with Traditional Large-Scale System, Sources of Big Data, and 3 V's of Big Data, Types of Data?

HDFS CONCEPTS

HDFS Design & Goals, Understand Blocks and Configuration of block size, Block replication and replication factor, Understand Hadoop Rack Awareness and configure racks in Hadoop, File read and writes in HDFS.

Unit II: History of Hadoop, Available version Hadoop, Available Distributions of Hadoop (Cloudera, Hortonworks), Architecture of Hadoop & Planning for cluster, The Hadoop Distributed File System (HDFS) Hadoop Components, Modes of Hadoop, Installation of Hadoop Cluster

MAP-REDUCE

Introduction to MapReduce, Architecture of Map-Reduce, Understanding the concept of Mappers & Reducers MapReduce: Word Count Example, Phases of a MapReduce program, Data-types in Hadoop MapReduce, Driver, Mapper and Reducer classes, InputSplit and RecordReader, Input format and Output format in Hadoop, Concepts of Combiner and Partitioner.

Unit III : HBase, HBase Model, HBase Read, HBase Write, HBase Memstore, HBase Installation, RDBMS vs HBase, HBase Commands, Examples.

Hive: Hive Architecture, Hive Installation, Hive Data types, Create Database, Create table, Load Data, Drop table, Alter Table, Static Partitioning vs Dynamic Partitioning, Bucketing in Hive, Hive QL.

Unit IV: *PIG:* Introduction to Pig, Pig installation, Pig Running Modes, Data Types in Pig, Pig: Word Count Example, Pig Scripting, Pig Scripting: Word Count Example.

Unit V: Scoop: Scoop Installation, starting Scoop, Scoop import, Scoop Export, Scoop integration with hadoop Ecosystem.

Unit VI: Spark: What are Spark, Spark Installation, Spark Architecture, and Spark Components, What is spark RDD, Spark RDD Operations, and Spark word count example?

TEXT BOOKS

- 1. Hadoop The Definitive Guide by Tom White.
- 2. Hadoop for Dummies by Dirk Deroos.
- 3. Hadoop in Action by Chuck Lam.
- 4. Hadoop Operations by Eric Sammers.
- 5. Map Reduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop by Donald Miner.Information Dashboard Design: Displaying **Data** for At-a-glance Monitoring" by Stephen Few.

6. "Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsky"

REFERENCEBOOKS:

- 1. Learning Spark: Lightning-Fast Big Data Analysis" by Holden Karau
- 2. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data" by EMC Education Services
- 3. The Visual Display of Quantitative Information" by Edward R. Tufte. ...
- 4. "Storytelling With Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic. ...
- 5. "Data Visualization A Practical Introduction" by Kieran Healy.

Course Code	B.Tech	Cloud Computing-3	L	Т	Р	С
18CS5T5C	III Year I Sem	(ELECTIVE)	3	1	-	3

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

OUTCOMES:

- Understanding the key dimensions of the challenge of Cloud Computing
- Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
- Assessment of own organizations' needs for capacity building and training in cloud computingrelated IT areas

Unit I: INTRODUCTION TO BIG DATA

What is Big Data, Big data features and challenges, Problems with Traditional Large-Scale System, Sources of Big Data, 3 V's of Big Data, Types of Data.

HDFS CONCEPTS

HDFS Design & Goals, Understand Blocks and Configuration of block size, Block replication and replication factor, Understand Hadoop Rack Awareness and configure racks in Hadoop; File read and writes in HDFS.

Unit II : History of Hadoop, Available version Hadoop, Available Distributions of Hadoop (Cloudera, Hortonworks), Architecture of Hadoop & Planning for cluster, The Hadoop Distributed File System (HDFS) Hadoop Components, Modes of Hadoop, Installation of Hadoop Cluster

MAP-REDUCE

Introduction to MapReduce, Architecture of Map-Reduce, Understanding the concept of Mappers & Reducers MapReduce: Word Count Example, Phases of a MapReduce program, Data-types in Hadoop MapReduce, Driver, Mapper and Reducer classes, InputSplit and RecordReader, Input format and Output format in Hadoop, Concepts of Combiner and Partitioner.

Unit III : HBase, HBase Model, HBase Read, HBase Write, HBase Memstore, HBase Installation, RDBMS vs HBase, HBase Commands, Examples.

Hive: Hive Architecture, Hive Installation, Hive Data types, Create Database, Create table, Load Data, Drop table, Alter Table, Static Partitioning vs Dynamic Partitioning, Bucketing in Hive, Hive QL.

Unit IV: *PIG:* Introduction to Pig, Pig installation, Pig Running Modes, Data Types in Pig, Pig: Word Count Example, Pig Scripting, Pig Scripting: Word Count Example.

Unit V: Scoop: Scoop Installation, starting Scoop, Scoop import, Scoop Export, Scoop integration with hadoop Ecosystem.

Unit VI: Spark: What is Spark, Spark Installation, Spark Architecture, Spark Components, What is spark RDD, Spark RDD Operations, Spark word count example.

TEXT BOOKS

- 7. Hadoop The Definitive Guide by Tom White.
- 8. Hadoop for Dummies by Dirk Deroos.
- 9. Hadoop in Action by Chuck Lam.
- 10. Hadoop Operations by Eric Sammers.
- 11. Map Reduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop by Donald Miner.Information Dashboard Design: Displaying **Data** for At-a-glance Monitoring" by Stephen Few.

12. "Beautiful **Visualization**, Looking at **Data** Through the Eyes of Experts by Julie Steele, Noah Iliinsky"

REFERENCEBOOKS:

- 6. Learning Spark: Lightning-Fast Big Data Analysis" by Holden Karau
- 7. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data" by EMC Education Services
- 8. The Visual Display of Quantitative Information" by Edward R. Tufte. ...
- 9. "Storytelling With Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic. ...
- 10. "Data Visualization A Practical Introduction" by Kieran Healy.

Course Code	B.Tech	WEB AND MOBILE DEVELOPMENT-3	L	Τ	Р	С
18CS5T5D	III Year I Sem	(ELECTIVE)	3	1	-	3

- To learn Basics, Installation and architecture of ReactJS
- To learn architecture and various components of ReactJS
- To learn Basics, Installation and architecture of ReactNative
- To learn the components and applications of ReactNative

OUTCOMES:

- Will able to install and use ReactJS for developing apps
- Will able to install and use ReactNative for developing apps

Unit 1: REACT JS-1

Overview: Features, Advantages, Limitations-Environment setup: Installing ReactJS using create-reactapp command- Difference Between Angular JS and ReactJS- React JSX: Use, Attributes, Comments, Styling-React Components: Functional and Class

Unit 2: REACT JS-2

React State: defining and changing-React Props Overview: using props, default props, state and props-React Props Validation-React Constructor-React Component API: set State (), force Update (), find DOMNode ()-React Component Lifecycle- React Forms: Controlled and Uncontrolled- React Events

UNIT 3: REACT JS-3

React Lists: Rendering Lists inside components-React Keys: Using Keys with Component React Refs-React Fragments-React Router: Installation and Usage-React Map-React Table React Flux Concept-React Flux vs MVC

UNIT 4: REACT NATIVE-1

Overview: Features, Advantages and Limitations- Environment Setup-React Native View React Native State- React Native Props- React Native Style- React Native Height and width React Native Flexbox and Layout

UNIT 5: REACT NATIVE-2

React Native Scroll view- React Native List view- React Native Buttons- React Native Text Input- React Native Images- React Native HTTP-React Native Flat List- React Native Section List- React Native Touchables- React Native Activity Indicator

UNIT 6: REACT NATIVE-3

React Native Alert-React Native Picker- React Native Status Bar- React Native Switch- React Native Web View- React Native Progress Bar Android- React Native Progress Bar with Animated -Developing an example app using React Native

TEXT BOOKS :

- 1. Learning React Native: Building Native Mobile Apps with JavaScript-O-Reilly 2nd Edition
- 2. React Native Cook Book- by Dan Ward-Packt 2nd Edition Web

REFERENCES:

- 3. <u>https://www.javatpoint.com/reactjs-tutorial</u>
- 4. <u>https://www.tutorialspoint.com/reactjs/index.htm</u>
- 5. https://reactjs.org/tutorial/tutorial.html
- 6. <u>https://www.w3schools.com/react/</u>
| Course Code | B.Tech | STATISTICS WITH R PROGRAMMING LAB | L | Т | Р | С |
|-------------|---------------|-----------------------------------|---|---|---|---|
| 18CS5L1 | III Year ISem | | 0 | 0 | 3 | 1 |

After taking the course, students will be able to Use R for statistical programming, computation, graphics, and modeling, Write functions and use R in an efficient way, Fit some basic types of statistical models Use R in their own research, Be able to expand their knowledge of R on their own.

Prerequisites: R Programming, Statistics. List of Programs:

- 1. Simple programs on R statements (if, if-else, switch, R Next, R Break, R For Loop, R Repeat)
- 2. Write a function to print squares of numbers in sequence.
- 3. Write a program to create a function with Arguments.
- 4. Write a Program to create a list with same data type and different data type.
- 5. Write a program to create two vectors of different lengths.
- Write a program a) create a .csv file b) reading from .cse file c) analyzing the .cse file d) Writing in to the .csv file.
- 7. Write a program to create Pie charts, Bar Charts, Box Plot, Histogram, line Graphs using sample data.
- 8. Write a program to create input vector for lm () function using Linear Regression.
- 9. Write a program to create a sequence numbers between -1 and 20 incrementing by 0.2 Using Normal Distribution.
- Write a program to create a sample of 100 numbers which are incremented by 1.5 using Binomial Distribution.
- 11. Write a program to create R time series object for a period of 12 month and plot it. (consider the annual snowfall details at a place starting from Jan 2019)

OUTCOMES:

At the end of this course, students will be able to:

List motivation for learning a programming language Access online resources for R and import new function packages into the R workspace Import, review, manipulate and summarize data-sets in R. Explore data-sets to create testable hypotheses and identify appropriate statistical tests Perform appropriate statistical tests using R Create and edit visualizations.

TEXT BOOKS:

- 1. The Art of R Programming, A K Verma, Cengage Learning.
- 2. R for Everyone, Lander, Pearson
- 3. The Art of R Programming, Norman Matloff, No starch Press.

REFERENCE BOOKS:

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

Course Code	B.Tech		L	Т	Р	С
18CS5L2	III Year ISem	NET WORK PROGRAMMING LAB	0	0	3	1

- To write, execute and debug c programs which use Socket API.
- To understand the use of client/server architecture in application development
- To understand how to use TCP and UDP based sockets and their differences.
- To get acquainted with unix system internals like Socket files, IPC structures.
- To Design reliable servers using both TCP and UDP sockets

Prerequisites:

Knowledge of C Programming, Basic commands of UNIX.

List of Programs

- 1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whoisetc. Usage of elementary socket system calls (socket (), bind(), listen(), accept(),connect(),send(),recv(),sendto(),recvfrom()).
- 2. Implementation of Connection oriented concurrent service (TCP).
- 3. Implementation of Connectionless Iterative time service (UDP).
- 4. Implementation of Select system call.
- 5. Implementation of gesockopt (), setsockopt () system calls.
- 6. Implementation of getpeername () system call.
- 7. Implementation of remote command execution using socket system calls.
- 8. Implementation of Distance Vector Routing Algorithm.
- 9. Implementation of SMTP.
- 10. Implementation of FTP.
- 11.Implementation of HTTP.
- 12. Implementation of RSA algorithm.

Note: Implement programs 2 to 7 in C and 8 to 12 in JAVA.

OUTCOMES:

Understand and explain the basic concepts of Grid Computing; Explain the advantages of using Grid Computing within a given environment; Prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup. Discuss some of the enabling technologies e.g. high-speed links and storage area networks. Build computer grids.

SUGGESTED READING: Computer Networks

Course Code	B.Tech	WEB TECHNOLOGIES LAB	L	Т	Р	С
18CS5L3	III Year ISem		0	0	3	1

- To acquire knowledge of XHTML, Java Script and XML to develop web applications
- Ability to develop dynamic web content using Java Servlets and JSP
- To understand JDBC connections and Java Mail API
- To understand the design and development process of a complete web application

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

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 **"MCA"** the catalogue for MCA 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
mca mba BCA		Description of	the Web Site	

2) Login page

Logo		Web Site	Name	
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA		Login : 11a Password: *** Submit	51f0003 ***** Reset	

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:

Snap shot of Cover Page.

- Author Name
- Publisher
- Price

Add to cart button.

Logo		Web Site Name		
Home	Login	Registration	Catalogue	Cart
MCA MBA	ML Bible	Book : XML Bible Author : Winston Publication : Wiely	\$ 40.5	Add to cart
BCA	And the transmission of tr	Book : Al Author : S.Russel Publication : Princeton hall	\$ 63	Add to cart
	例發Java2 企業就Gee福序者计 CHINA-RUB.COM	Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	Add to cart
	HTML 4	Book:HTML in 24 hour Author:Sam Peter Publication:Sam	s \$50	Add to cart

REGISTRATION PAGE:

Name (Text field) Password (password field) E-mail id (text field) Phone number (text field) Sex (radio button) Date of birth (3 select boxes) Languages known (check boxes – English, Telugu, Hindi, Tamil) Address (text area)

1. 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. Write an XML files 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

- 3. Write a Document Type Definition (DTD) to validate the above XML file.
- 4. Write Ruby program reads a number and calculates the factorial value of it and prints the same.
- 5. Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.
- 6. Write a Ruby program that uses iterator to find out the length of a string. Write simple Ruby programs that uses arrays in Ruby.
- 7. Write programs which uses associative arrays concept of Ruby.

Write Ruby program which uses Math module to find area of a triangle. Write Ruby program which uses tk module to display a window

Define complex class in Ruby and do write methods to carry operations on complex objects.

- 8. Write perl program takes set names along the command line and prints whether they are regular files or special files
- 9. Example PHP program for contacts page.

User Authentication: Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

1. Create a Cookie and add these four user ids 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. Example PHP program for registering users of a website and login.

10. 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).

Write a PHP program 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.

11.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 PHP pages to achieve the above mentioned functionality using sessions.

OUTCOMES:

- Students will be able to develop static web sites using XHTML and Java Scripts To implement XML and XSLT for web applications
- Develop Dynamic web content using Java Servlets and JSP
- To develop JDBC connections and implement a complete Dynamic web application

Course Code	B.Tech	Professional Ethics & Intellectual Property Rights	L	Т	Р	С
18CS5T6	III Year ISem		3	0	0	2

Course Objectives:

- To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
- Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.
- To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.
- Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

UNIT I: Human Values:

Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

UNIT: II: Principles for Harmony:

Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism — Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument – Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past – Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

Unit IV: Introduction to Intellectual Property Rights (IPR)

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

Unit V: Copyrights and Neighboring Rights

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

UNIT VI: Patents

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – – Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

Outcome:

- It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
- It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
- IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.
- Student gets an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

<u>References</u>:

- 1) Professional Ethics by R. Subramaniam Oxford Publications, New Delhi.
- Ethics in Engineering by Mike W. Martin and Roland Schinzinger Tata McGraw-Hill 2003. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana - Maruthi Publications. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
- 3) Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
- 4) Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi Richard Stim: Intellectual Property, Cengage Learning, And New Delhi.
- 5) Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
- 6) Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI
- 7) Learning Pvt. Ltd 2009.
- 8) Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran University Science Press.
- 9) Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill 2013 Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

Under Graduate Course Structure

For

COMPUTER SCIENCE & ENGINEERING (Applicable for batches admitted from 2018-2019)

S No	Programme Code	Programme Name	Branch	No. of Sections	No. of Students	Page
1	05	B. Tech	Computer Science & Engineering	02	120	1-3



Autonomous Regulations – R18

Amrita Sai Institute of Science & Technology

Approved by AICTE, New Delhi; Permanently Affiliated to JNTUK, Kakinada ISO 9001:2015 Certified Institution; Accredited by NAAC with "A" grade Recognized by UGC under 2(f) and 12(B) of UGC 1956 Act
Amrita Sai Nagar, Paritala, Krishna District Andhra pradesh – 521 180 www.amritasai.edu.in, 0866-2428399

- a. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
- b. Problem analysis: Identity, formulates, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- d. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- e. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling of complex engineering activities, with an understanding of the limitations.
- f. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- j. Communication: Communicate effectively on complex engineering activities with the engineering community and with t h e-society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- k. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 1. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Objectives

	Foundation of mathematical concepts: To use mathematical methodologies to crack problem
P30-1	using suitable mathematical analysis, data structure and suitable algorithm.
	Foundation of Computer System: the ability to interpret the fundamental concepts and
PSO-2	methodology of computer systems. Students can understand the functionality of hardware
	and Software aspects of computer systems.
	Foundations of Software development: the ability to grasp the software development
	lifecycle and methodologies of software systems. Possess competent skills and knowledge of
PSO-3	software design Process. Familiarity and practical proficiency with a broad area of
	programming concepts and provide new ideas and innovations towards research.

Program Educational Objectives

PEO-1	Prepare graduates to have knowledge and competency for careers in and related to Computer Science & Engineering
PEO-2	Prepare graduates to become leader in fields related to Computer Science.
PEO-3	Prepare graduates to pursue higher education in Engineering or other Professional fields

B. Tech. Course Structure – Computer Science & Engineering

III Year II Semester

S. No	Course Code	Course	L	Т	Р	C
1	18CS6T1	Principles of Programming Languages	3	1		3
2	18CS6T2	Design and Analysis of Algorithms	3	1		3
3	18CS6T3	Data Warehousing and Data Mining	3	1		3
4	18CS6T4	Object Oriented Analysis and Design using UML	3	1		3
	Elective					
_	18CS6T5A	TCP/IP Protocols		1		
	18CS6T5B	Data Analytics-4	2			2
5	18CS6T5C	Cloud Computing-4	3	1		3
	18CS6T5D	Web and Mobile Development-4				
	18CS6T5E	Cyber Security-4				
6	18CS6L1	Object Oriented Analysis and Design using UML Lab			3	1
7	18CS6L2	Data Mining Lab			3	1
8	18CS6I1	11 Internship & Mini Project				2
	Total Credits					

L-Lecture; T-Tutorial; P-Practical; C-Credits;

Course Code	B.Tech	Principles of Programming Languages	L	Т	Р	С
18CS6T1	III Year II Sem		3	1	0	3

- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages
- To develop programs in non-procedural programming paradigms

OUTCOMES:

- Describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs, Apply object oriented, concurrency, and event handling programming constructs
- Develop programs in Scheme, ML, and Prolog
- Understand and adopt new programming languages

UNIT I

Introduction: The Role of Programming Languages: Why Study Programming Languages, Towards Higher-Level languages, Programming paradigms, Programming environments Language Description: Syntactic structure, language Translation Issues: Programming language Syntax, Stages in translation, Formal translation Models

UNIT II

Data, Data Types, and Basic Statements : Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions, assignment statements, mixed mode assignments, control structures, selection, iterations, branching, guarded statements

UNIT III

Subprograms and Implementations : Subprograms ,design issues ,local referencing, parameter passing, overloaded methods, generic methods, design issues for functions , semantics of call and return ,implementing simple subprograms , stack and dynamic local variables, nested subprograms, , dynamic scoping.

UNIT IV

Object-Orientation, Concurrency, and Event Handling : Grouping of data and Operations — Constructs for Programming Structures, abstraction Information Hiding, Program Design with Modules, Defined types, Object oriented programming — concept of Object, inheritance, Derived classes and Information hiding – Templates, Semaphores, Monitors, Message passing, Threads, statement level concurrency Exception handling (Using C++ and Java as example language).

UNIT V

Functional and Logic Programming Languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Programming with ML, Introduction to logic and logic programming – Programming with Prolog.

References:

- 1. "Programming Languages: Design and Implementations", Terrance W.Pratt, Marvin V. Zelkowitz, T.V.Gopal,Fourth ed.,Prentice Hall
- 2. "Programming Language Design Concept", David A. Watt, Willey India
- 3. "Programming languages: Concepts and Constucts", Ravi Sethi, Second Ed., Pearson.
- 4. "Types and programming Languages", Benjamin C. Pierce. The MIT Press Cambridge, Massachusetts London, England
- 5. Concepts of Programming Languages, Robert W. Sebesta, 10 th Ed., Pearson

Course Code	B.Tech	Design and Analysis of Algorithms	L	Т	Р	С
18CS6T2	III Year II Sem	Design and Analysis of Algorithmis	3	1	0	3

Course Objectives:

- To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms.
- To introduce the different algorithmic approaches for problem solving through numerous example problems.
- To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness.

Course Outcomes:

- Describe asymptotic notation used for denoting performance of algorithms.
- Analyze the performance of a given algorithm and denote its time
- Complexity using the asymptotic notation for recursive and non-recursive algorithms.
- List and describe various algorithmic approaches.
- Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches.
- Apply graph search algorithms to real world problems.
- Demonstrate an understanding of NP- Completeness theory and lower bound theory

UNIT-I

Introduction: Notation for Algorithm Specification, Insertion sort specification and analysis **Growth of functions**: Asymptotic notation, standard notation and common functions.

Recurrences: The substitution method, the recursion-tree method, the Master method

Set representation: Simple UNION and FIND, Weighted Union and collapsing.

UNIT-II

Divide-and Conquer: The general method, specification and analysis of: finding maximum minimum of a set of values, quick sort, merge sort, Strassen's Matrix multiplication.

Greedy Method: The general method, Knapsack problem, Optimal Storage on tapes, Job sequencing with deadlines, optimal merge patterns, Huffman codes.

UNIT-III

Dynamic Programming: The general method, Multistage graph, Floyd-Warshall algorithm, Bellman-Ford algorithm, Optimal Binary Search trees, 0/1 Knapsack, Traveling Salesman Problem, Matrix-Chain multiplication and Longest Common Subsequence.

UNIT-IV

Backtracking: The general method,8-Queens Problem, Sum of subsets, Graph Coloring, Hamiltonian cycle, 0/1 Knapsack Problem

Branch and Bound: The general method, Least cost search, control abstraction for LC-Search, Bounding, FIFO branch and bound, LC branch and bound, 0/1 knapsack problem, Travelling salesperson problem.

Depth first Search: Bi-connected components, topological sorting, strongly connected components. **UNIT-V**

Lower Bound Theory: Comparison trees for searching and sorting

NP-Completeness: Basic concepts, Polynomial time, polynomial time verification, reducibility

NP-complete problems: The clique problem, the vertex-cover problem, the Hamiltonian cycle problem, the travelling salesman problem and the subset sum problem.

Text Books:

- 1. Horowitz E. Sahani S:"Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications, 2008.
- 2. Cormen, Leiserson, Rivest, Stein: "Introduction to Algorithms", 3rdEdition, PHI Learning, 2017.
- 3. Aho, Hopcroft, Ulman, "The Design and Analysis of Computer Algorithms", Pearson Education, 2000.

Online Resources:

1. http://nptel.ac.in/courses/106101060/

Course Code	B.Tech	Data wara housing and data mining	L	Т	Р	С
18CS6T3	III Year II Sem	Data wait nousing and data mining	3	1	0	3

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behaviour.

OUTCOMES:

- Understand stages in building a Data Warehouse
- Understand the need and importance of pre-processing techniques
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms

UNIT –I:

Introduction: Why Data Mining? What Is Data Mining? 1.3 What Kinds of Data Can Be Mined? 1.4 What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.

UNIT –II:

Data Pre-processing: Data Pre-processing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT –III:

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT –IV:

Classification: Alterative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT –V

Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm.

UNIT –VI

Cluster Analysis: Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses.

TEXT BOOKS:

- 1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
- 2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS:

- 1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
- 2. Data Mining: Vikram Pudi and P. Radha Krishna, Oxford.
- 3. Data Mining and Analysis Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
- 4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

Course Code	B.Tech	Object Oriented Analysis and Design using UMI	L	Т	Р	С
18CS6T4	III Year II Sem	Object Oriented Analysis and Design using UNIL	3	1	0	3

- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified Modelling Language

OUTCOMES:

- Ability to find solutions to the complex problems using object oriented approach
- Represent classes, responsibilities and states using UML notation
- Identify classes and responsibilities of the problem domain

UNIT-I:

Introduction: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

UNIT-II:

Classes and Objects: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

UNIT-III:

Introduction to UML: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

UNIT-IV:

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

UNIT-V:

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

UNIT-VI:

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. Case Study: The Unified Library application.

TEXT BOOKS:

- 1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert Maksim chuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON.
- 2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.

REFERENCE BOOKS:

- 1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
- 2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
- 3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
- 4. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley

Course Code	B.Tech	TCP/IP Protocols	L	Т	Р	С
18CS6T5A	III Year II Sem	(ELECTIVE)	3	1	0	3

OBJECTIVES: The student should be made to:

- Understand the IP addressing schemes.
- Understand the fundamentals of network design and implementation
- Understand the design and implementation of TCP/IP networks
- Understand on network management issues
- Learn to design and implement network applications.

OUTCOMES: Upon completion of the course, the student should be able to:

- Design and implement TCP/IP networks.
- Explain network management issues.
- Design and implement network applications. Develop data structures for basic protocol functions of TCP/IP.
- Apply the members in the respective structures.
- Design and implement data structures for maintaining multiple local and global timers.

UNIT – I: Network Models: Layered Tasks, The OSI Model, Layers in OSI Model, TCP/IP Protocol suite, Addressing. Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, and Backbone Networks

UNIT – **II** : **Internetworking Concepts:** Principles of Internetworking, Connectionless Interconnection, Application Level Interconnection, Network Level Interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Routers TCP, UDP & IP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, Process to Process Communication, User Datagram, Checksum, UDP Operation, IP Datagram, Fragmentation, Options, IP Addressing: Classful Addressing, IPV6.

UNIT – III: Congestion and Quality of Service: Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Source Based Congestion Avoidance, DEC Bit Scheme, Quality of Service, Techniques to Improve QOS: Scheduling, Traffic Shaping, Admission Control, Resource Reservation, Integrated Services and Differentiated Services.

UNIT – IV: Queue Management: Concepts of Buffer Management, Drop Tail, Drop Front, Random Drop, Passive Buffer Management Schemes, Drawbacks of PQM, Active Queue Management: Early Random Drop, RED Algorithm.

UNIT – **V: Stream Control Transmission Protocol:** SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control. Mobile Network Layer: Entities and Terminology, IP Packet Delivery, Agents, Addressing, Agent Discovery, Registration, Tunnelling and Encapsulating, Inefficiency in Mobile IP.

UNIT-VI : Mobile Transport Layer : Classical TCP Improvements, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast \ Recovery, Transmission, Timeout Freezing, Selective Retransmission, Transaction Oriented TCP.

Course Code	B.Tech	Web and Mobile Development-4	L	Т	Р	С
18CS6T6D	III Year II Sem	(ELECTIVE)	3	1	0	3

- To learn architecture of .NET Framework and Fundamentals of C#
- To learn OOPS concepts through C#, Debugging
- To learn Basics, Installation and components of XAMARIN
- To learn building apps using XAMARIN

OUTCOMES:

- Will able to build application in C#
- Will able to build GUI apps using XAMARIN

UNIT 1: C# OVERVIEW AND BASICS

Introduction- .Net Framework: Components-What is C#- Java Vs C#- History of C#- Features of C#- C# Variables-C# Constants- C# Data types- C# Operators- C# Keywords C# Type Conversion- C# Control Statements(Decision Making, Loops, break, continue)

UNIT 2: C# FUNCTIONS, ARRAYS, STRINGS,

C# Function: Syntax and Types, Call by value, Call by Reference, Out Parameter- C# Arrays: 1-D, Multidimensional, Jagged Arrays, Passing Arrays to functions, Params, using for each loop- C# Strings

UNIT 3: OOPS IN C#, NAMESPACES, EXCEPTION HANDLING

C# Class and Objects- C# Encapsulation- C# Inheritance- C# Polymorphism- C# Abstraction- C# Namespaces Exception Handling- try, catch, finally- Custom Exception, Checked and Unchecked Exceptions-

UNIT 4: C# FILES, COLLECTIONS, GENERICS

C# Files- IO Classes: File Stream, Stream Writer, Stream Reader, Text Writer, Text Reader, Binary Writer, Binary Reader, String Writer, String Reader, File Info, Directory Info - C# Collections: List, Hash Set, Sorted Set, Stack, Queue, Linked List, Dictionary, Sorted Dictionary, Sorted List- C# Generics: Generic class and Generic method

UNIT 5: XAMARIN-1

Overview- Installation-Application Manifest- Android Resources- Android Activity Life cycle Permissions: SMS, Camera, Internet, Read Contacts, Read External Storage, Calendars, Locations, Bluetooth- Building the App GUI: Text View, Button, Check Box, Progress Bar, Radio Button, Toggle Buttons, Ratings Bar, Auto complete Text view

UNIT 6: XAMARIN-2

Xamarin Menus: Popup Menu, Options Menu- Layouts: Linear, Relative, Frame, Table Android Widgets: Date Picker, Time Picker, Spinner- Android Dialog: Alert- Android View: List, Grid- Deploying the app

TEXT BOOKS

- 1. Xamarin Mobile Application Development by Dan Hermes- APress
- 2. Mastering Xamarin UI Development by Steven F Daniel- Packt

Web References:

- 1. https://www.tutorialspoint.com/xamarin/
- 2. <u>https://dotnet.microsoft.com/learn/xamarin</u>
- 3. https://www.dotnettricks.com/learn/xamarin

Under Graduate Course Structure

For

COMPUTER SCIENCE & ENGINEERING (Applicable for batches admitted from 2018-2019)

S No	Programme Code	Programme Name	Branch	No. of Sections	No. of Students	Page
1	05	B. Tech	Computer Science & Engineering	02	120	1-3



Autonomous Regulations – R18

Amrita Sai Institute of Science & Technology

Approved by AICTE, New Delhi; Permanently Affiliated to JNTUK, Kakinada ISO 9001:2015 Certified Institution; Accredited by NAAC with "A" grade Recognized by UGC under 2(f) and 12(B) of UGC 1956 Act
Amrita Sai Nagar, Paritala, Krishna District Andhra pradesh – 521 180 www.amritasai.edu.in, 0866-2428399

- a. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
- b. Problem analysis: Identity, formulates, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- d. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- e. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling of complex engineering activities, with an understanding of the limitations.
- f. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- j. Communication: Communicate effectively on complex engineering activities with the engineering community and with t h e-society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- k. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 1. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Objectives

	Foundation of mathematical concepts: To use mathematical methodologies to crack problem
F30-1	using suitable mathematical analysis, data structure and suitable algorithm.
	Foundation of Computer System: the ability to interpret the fundamental concepts and
PSO-2	methodology of computer systems. Students can understand the functionality of hardware
	and Software aspects of computer systems.
	Foundations of Software development: the ability to grasp the software development
	lifecycle and methodologies of software systems. Possess competent skills and knowledge of
PSO-3	software design Process. Familiarity and practical proficiency with a broad area of
	programming concepts and provide new ideas and innovations towards research.

Program Educational Objectives

DEO 1	Prepare graduates to have knowledge and competency for careers in and related to Computer Science
	& Engineering
PEO-2	Prepare graduates to become leader in fields related to Computer Science.
PEO-3	Prepare graduates to pursue higher education in Engineering or other Professional fields

B. Tech. Course Structure – Computer Science & Engineering

III Year I Semester

S. No	Course Code	Course	L	Т	Р	C
1	18CS7T1	Cryptography and Network Security	3	1		3
2	18CS7T2	Hadoop and Big Data	3	1		3
3	18CS7T3	Artificial Intelligence	3	1		3
4	18CS7T4	Adhoc & Sensor Networks	3	1		3
		Elective IV				
	18CS7T5A	Mobile Computing				
5	18CS7T5B	Cloud Computing	3	1		3
	18CS7T5C	Forensic Computing				
6	18CS7L1	Hadoop & Big Data Lab			3	1
7	18CS7L2	J2ME & Android Programming Lab			3	1
8						
		Total Credits		2	20	

L-Lecture; T-Tutorial; P-Practical; C-Credits;

Course Code	B.Tech	Cryptography and Natwork Socurity	L	Т	Р	C
18CS7T1	IV Year ISem	ci yptograpity and Network Security	3	1	0	3

Course objectives:

The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the "modus operandi" of adversaries; which could be used for increasing software dependability.

Course outcomes:

1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.

2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

Syllabus:

UNIT I : Classical Encryption Techniques

Objectives: The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.

Introduction: Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense(Phishing Defensive measures, web based attacks, SQL injection & Defense techniques)(TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks)(TEXT BOOK 3).

UNIT II: Block Ciphers & Symmetric Key Cryptography

Objectives: The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations

UNIT III: Number Theory & Asymmetric Key Cryptography

Objectives: Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

UNIT IV : Cryptographic Hash Functions & Digital Signatures

Objectives: *Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature*

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

UNIT V: User Authentication, Transport Layer Security & Email Security

Objectives: Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.

User Authentication: Remote user authentication principles, Kerberos

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)

Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT VI: IP Security & Intrusion Detection Systems

Objectives: Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK2)

TEXT BOOKS:

- 1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
- 2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
- 3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

REFERENCE BOOKS:

- 1. 1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
- 2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

Course Code	B.Tech	Hadoon and Pig Data	L	Τ	Р	С
18CS7T2	IV Year ISem	пацоор ани від рата	3	1	0	3

Course Objectives:

Optimize business decisions and create competitive advantage with Big Data analytics Introducing Java concepts required for developing map reduce programs Derive business benefit from unstructured data Imparting the architectural concepts of Hadoop and introducing map reduce paradigm To introduce programming tools PIG & HIVE in Hadoop echo system.

Course Outcomes:

- Preparing for data summarization, query, and analysis.
- Applying data modelling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

Unit 1:

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

Reference:

Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC

Unit 2:

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

References:

Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly Hadoop in Action by Chuck Lam, MANNING Publ.

Unit 3:

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

Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly

Unit 4:

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 a

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

Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly Unit 5:

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

Reference:

Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss

Unit 6:

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 *References:*

Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss

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

References:

- 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
- 1. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

Course Code	B.Tech	Artificial Intelligence	L	Т	Р	С
18CS7T3	IV Year ISem	Al tilicial interligence	3	1	0	3

Course Objectives:

- 1. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- 2. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- 3. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

Course Outcomes:

After completing this course, students should be able to:

- 1. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- 2. Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- 3. Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- 4. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

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

UNIT-II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction

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

UNIT-III:

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

UNIT-IV:

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

UNIT-V:

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-VI:

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.

TEXT BOOKS:

- 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

REFERNCE BOOKS:

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

The student should be made to:

- 1. Understand the design issues in ad hoc and sensor networks.
- 2. Learn the different types of MAC protocols.
- 3. Be familiar with different types of adhoc routing protocols.
- 4. Be exposing to the TCP issues in adhoc networks.
- 5. Learn the architecture and protocols of wireless sensor networks.

OUTCOMES:

Upon completion of the course, the student should be able to:

- 1. Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
- 2. Analyze the protocol design issues of ad hoc and sensor networks
- 3. Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- 4. Evaluate the QoS related performance measurements of ad hoc and sensor networks.

UNIT Ι Fundamentals of Wireless Communication Technology - The Electromagnetic Spectrum - Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT MAC PROTOCOLS FOR AD HOC **WIRELESS NETWORKS** Π Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS **NETWORKS**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV WIRELESS SENSOR **NETWORKS** (WSNS) AND MAC PROTOCOLS single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V WSN ROUTING, LOCALIZATION & OOS

Issues in WSN routing - OLSR- Localization - Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

UNIT VI

Security: Security in ad hoc networks, Key management, Secure routing, Cooperation in MANETs, and Intrusion detection systems.

INTRODUCTION

Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms, TinyOS, NS-2 and TOSSIM. TEXT BOOK:

- 1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.
- 2. Ad hoc and Sensor Networks Theory and Applications, by Carlos Cordeiro and Dharma P. Agrawal, World Scientific Publications, March 2006, ISBN 981-256-681-3.
- 3. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science ISBN: 978-1-55860-914-3,(Morgan Kauffman)

REFERENCES:

- 1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
- 2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication 2002.
- 3. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
- 4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
- 5. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

Course Code	B.Tech	Mobile Computing	L	Τ	Р	С
18CS7T5A	IV Year ISem		3	1	0	3

Course Objective:

- 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

Syllabus:

UNIT I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT –II

(Wireless) Medium Access Control (MAC) : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT -III

Mobile Network Layer : IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV

Mobile Transport Layer : Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues : Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT V

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models,

Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

UNIT VI

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android. **Text Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009

2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772 Reference Book:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.

3. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

Course Code	B.Tech	CLOUD COMPUTING	L	Т	Р	С
18CS7T5B	IV Year I Sem		3	1	0	3

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

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 computingrelated IT areas

UNIT -I: Systems modeling, Clustering and virtualization

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT- II: Virtual Machines and Virtualization of Clusters and Data Centers

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT- III: Cloud Platform Architecture

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT -IV: Cloud Programming and Software Environments

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT- V: Cloud Resource Management and Scheduling

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

UNIT- VI: 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, Amazon Simple Storage Service (S3)

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.

2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.

3. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press **REFERNCE BOOKS:**

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH.

Course Code	B.Tech	Equancia Computing	L	Τ	Р	С
18CS7T5C	IV Year ISem	Forensic Computing		1	0	3

Course Objectives:

This course is intended to provide students with greater depth of study in a number of key topics in the area of computer security in society: cybercrime, computer and forensics, analysis

Course Outcomes:

- 1. Understand financial and accounting forensics, and explain their role in preventing various forms of fraud.
- 2. Distinguish various types of computer crime, and use computer forensic techniques to identify the digital fingerprints associated with criminal activities

Syllabus:

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

Unit-III:

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.

Unit-IV:

Current Computer Forensics Tools: Evaluating Computer Forensics Toll 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 Anlyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisition Unit-V:

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 Hiney Project

Unit-VI:

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 Devoices

TEXT BOOK:

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

Course Code	B.Tech	Hadoon & Rig Data Lab	L	Τ	Р	С
18CS7L1	IV Year ISem	Hadoop & Biy Data Lab			3	1

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:
 - a) Adding files and directories
 - b) Retrieving files
 - c) 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.

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.

Course Code	B.Tech	J2ME & Android Programming Lab	L	Т	Р	С
18CS7L2	IV Year ISem		J2WIE & Anurolu Programming Lab		3	1

- 1. Write a J2ME program to show how to change the font size and colour.
- 2. Write a J2ME program which creates the following kind of menu.
 - * cut
 - * copy
 - * past
 - * delete
 - * select all
 - * unselect all
- 3. Create a J2ME menu which has the following options (Event Handling):
 - a) cut can be on/off
 - b) copy can be on/off
 - c) paste can be on/off
 - d) delete can be on/off
 - e) select all put all 4 options on
 - f) unselect all put all
- 4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.
- 5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
 - * Area code should be one of the following: 040, 041, 050, 0400, 044
 - * There should 6-8 numbers in telephone number (+ area code)
- 6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.
- 7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons

require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.

- 8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
 - Students Marks Enquiry
 - Town/City Movie Enquiry
 - Railway/Road/Air (For example PNR) Enquiry/Status
 - Sports (say, Cricket) Update
 - Town/City Weather Update

• Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry Divide Student into Batches and suggest them to design database according to their domains and render information according the requests.

- 9. Write an Android application program that displays Hello World using Terminal.
- 10. Write an Android application program that displays Hello World using Eclipse.

11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.

12. Write an Android application program that demonstrates the following:

- (i) LinearLayout
- (ii) RelativeLayout
- (iii) TableLayout
- (iv) GridView layout
- 13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.

14. Write an Android application program that demonstrates intent in mobile application development

Under Graduate Course Structure

For

COMPUTER SCIENCE & ENGINEERING (Applicable for batches admitted from 2018-2019)

S No	Programme Code	Programme Name	Branch	No. of Sections	No. of Students	Page
1	05	B. Tech	Computer Science & Engineering	02	120	1-3



Autonomous Regulations – R18

Amrita Sai Institute of Science & Technology

Approved by AICTE, New Delhi; Permanently Affiliated to JNTUK, Kakinada ISO 9001:2015 Certified Institution; Accredited by NAAC with "A" grade Recognized by UGC under 2(f) and 12(B) of UGC 1956 Act
Amrita Sai Nagar, Paritala, Krishna District Andhra pradesh – 521 180 www.amritasai.edu.in, 0866-2428399
- a. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
- b. Problem analysis: Identity, formulates, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- c. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- d. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- e. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling of complex engineering activities, with an understanding of the limitations.
- f. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- g. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- h. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- i. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- j. Communication: Communicate effectively on complex engineering activities with the engineering community and with t h e-society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- k. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 1. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Objectives

PSO-1	Foundation of mathematical concepts: To use mathematical methodologies to crack problem
	using suitable mathematical analysis, data structure and suitable algorithm.
	Foundation of Computer System: the ability to interpret the fundamental concepts and
PSO-2	methodology of computer systems. Students can understand the functionality of hardware
	and Software aspects of computer systems.
PSO-3	Foundations of Software development: the ability to grasp the software development
	lifecycle and methodologies of software systems. Possess competent skills and knowledge of
	software design Process. Familiarity and practical proficiency with a broad area of
	programming concepts and provide new ideas and innovations towards research.

Program Educational Objectives

PEO-1	Prepare graduates to have knowledge and competency for careers in and related to Computer Science
	& Engineering
PEO-2	Prepare graduates to become leader in fields related to Computer Science.
PEO-3	Prepare graduates to pursue higher education in Engineering or other Professional fields

B. Tech. Course Structure – Computer Science & Engineering

III Year I Semester

S. No	Course Code	Course	L	Т	P	C
1	18CS8T1	Distributed Systems	3	1		3
2	18CS8T2	Machine Learning	3	1		3
	18CS8T3A	Natural Language Processing	3	1		3
3	18CS8T3B	Natural Language Processing	3	1		3
	18CS8T3C	Deep learning	3	1		3
4	18CS8T4	Management science				
5		Project Work				8
		Total Credits		2	20	

L-Lecture; T-Tutorial; P-Practical; C-Credits;

Course Code	B.Tech	Distributed systems	L	Τ	P	С
18CS8T1	IV Year ISem	Distributed systems	3	1	0	3

OBJECTIVES:

- Provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles

OUTCOMES:

- Develop a familiarity with distributed file systems.
- Describe important characteristics of distributed systems and the salient architectural features of such systems.
- Describe the features and applications of important standard protocols which are used in distributed systems.
- Gaining practical experience of inter-process communication in a distributed environment

UNIT-I:

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models-Interaction Model, Failure Model, Security Model.

UNIT-II:

Interprocess Communication: Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

UNIT-III:

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT-IV:

Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT-V:

Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

UNIT-VI:

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

TEXT BOOKS:

- 1. Ajay D Kshem kalyani, Mukesh Sighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge
- 2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication

REFERENCE BOOKS

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI

Course Code	B.Tech	Mashina Learning	L	Τ	Р	С
18CS8T2	IV Year ISem	Machine Learning	3	1	0	3

Course objectives:

The main objective of this course is for the students to achieve basic knowledge of artificial intelligence, a deepened technical understanding of machine learning research and theories, as well as practical experience of the use and design of machine learning and data mining algorithms for applications and experiments. The course has a strong focus towards applied IT. The student not only learns how to critically review and compare different algorithms and methods, but how to plan, design, and implement learning components and applications and how to conduct machine learning experiments.

Course outcomes:

- The student will be able evaluate and compare the performance or, other qualities, of algorithms for typical learning problems.
- The student will be able to design a supervised or unsupervised learning system.

Syllabus:

UNIT I: Introduction :

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find- S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT II: Linear Regression & Logistic Regression:

Predicting numeric values: regression - Finding the best fit lines with linear regression, Locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff.

Logistic Regression: Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

UNIT III: Artificial Neural Networks:

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks

UNIT IV: Evaluation Hypotheses: Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT V: Support vector machines & Dimensionality Reduction techniques:

Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data.

Dimensionality Reduction techniques: Principal Component analysis, Example.

UNIT VI:

Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Genetic Algorithms: Representing Hypotheses, Genetic Operators, Fitness Function and Selection, Illustrative Example.

TEXT BOOKS:

1. Machine Learning ,Tom M. Mitchell, MGH

2. Machine Learning in Action, Peter Harington, 2012, Cengage.`

REFERENCE BOOKS:

1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004

Course Code	
18CS8T3A	IV

OBJECTIVES:

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

OUTCOMES:

- Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
- Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
- Develop critical thinking skills
- Compare and contrast the threat environment based on industry and/or device type

UNIT - I:

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices

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 Highlevel 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:

Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT-V:

Data Acquiring, Organizing and Analytics in IoT/M2M, 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 – VI

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

Course Code	B.Tech		L	Т	Р	C
18CS8T3B	IV Year ISem	Natural Language Processing	3	1	0	3

Course Objectives: Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms.
- Able to design different language modeling Techniques.

UNIT-I

Introduction- Human languages, models, ambiguity, processing paradigms; Phases in natural language processing, applications. Text representation in computers, encoding schemes

UNIT - IĬ

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT - III

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT - IV

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT - V

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT - VI

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.

2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

REFERENCE:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.

Course Code	B.Tech	Deen learning	L	Т	Р	C
18CS8T3C	IV Year ISem	Deep learning	3	1	0	3

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

Course Outcomes:

- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modeling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

UNIT - I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Backpropagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT - II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks- Introduction to various networks.

UNIT - III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed – forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT - IV

Regularization for Deep Learning

Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness,

UNIT- V

Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT - VI

Optimization for Train Deep Models

Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:

- 1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
- 2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

Course Code	B.Tech	Management science	L	Τ	Р	С
18CS8T4	IV Year ISem	Management science	3	1	0	3

Course Objectives:

- To familiarize with the process of management and to provide basic insight into select contemporary management practices
- To provide conceptual knowledge on functional management and strategic management.

Course Outcome:

- After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
- Will familiarize with the concepts of functional management project management and strategic management.

UNIT I

Introduction to Management: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

UNIT II

Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans (Simple Problems) – Job Evaluation and Merit Rating - Marketing Management-Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

UNIT IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

Unit V

Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

UNIT VI

Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

Text Books

- 1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
- 2. Dr. A. R. Aryasri, Management Science' TMH 2011.

References:

- 1. Koontz & Weihrich: 'Essentials of management' TMH 2011
- 2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
- 3. Robbins: Organizational Behaviour, Pearson publications, 2011
- 4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
- 5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
- 6. Biswajit Patnaik: Human Resource Management, PHI, 2011
- 7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
- 8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
- 9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.