Week-9

VI - SEMESTER	L	T	P	
Design & Analysis of Algorithms	4	-	-	
Total Contact Hours - 56				
Pre-requisites: Data Structures				

COBJ1	Students will get exposure to the advantages of data Structures and under implementation of Dictionaries, Hash tables, Skip lists and trees.
COBJ2	Students can analyze the asymptotic performance of algorithms
COBJ3	Students can Demonstrate a familiarity with major algorithms and data str
COBJ4	Students can apply and Synthesize efficient algorithms in common eng design situations

SYLLABUS

UNIT – I:
Introduction: Algorithm, Pseudo-code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.
Disjoint Sets: disjoint set operations, union and find algorithms

UNIT – II:
Dictionaries: Sets, Dictionaries, Hash Tables, Open Hashing, Closed Hashing (Rehashing Methods), Hashing Functions (Division Method, Multiplication Method, Universal Hashing)
Other Data Structures: Skip Lists,Analysis of Skip Lists, AVL Trees (insertion & deletion), 2-3 Trees (insertion & deletion)

UNIT – III:
Pattern Matching: boyer-moore algorithms, knuth-morries-pratt algorithms
Tries: Definitions and concepts of digital search tree, binary trie, multi-way trie
File Structure: Fundamental file processing operations – opening files, closing files, reading and writing file contents, special characters in files, field and record organization, managing fixed-length, fixed field buffers.

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

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

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

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem

Text Books:

1. Data structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press
3. Fundamentals of DATA STRUCTURES in C: 2nd ed., Horowitz, Sahni, Anderson – freed, Universities Press

		L	T	P	C
A1CIT216	VI - SEMESTER				
	SOFTWARE ENGINEERING	4	-	-	4
	Total Contact Hours - 56				
	Pre-requisites: Basic Programming Development Experience				

Course Objectives	
COBJ1	Students will get exposure to various types of process models and their applicability to a specific project
COBJ2	Students will gain an understanding on end to end process of software requirements gathering, validation, present them using appropriate system models and arrive at good quality design
COBJ3	Students will read and analyze various risk management and quality management techniques.
COBJ4	Students will study different testing strategies and its applicability

SYLLABUS

UNIT I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

UNIT II:

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

UNIT III:

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT IV:

Design Engineering: Design process and Design quality, Design concepts, the design model.

Creating an architectural design: Software architecture; Data design; Architectural styles and patterns; Architectural Design.

Performing User interface design: Golden rules; User interface analysis and design; interface analysis; interface design steps; Design evaluation.

UNIT V:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

Metrics for Process and Products: Software Measurement, Metrics for software quality.

UNIT VI:

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th Edition, McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.
3. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers

A1CIT217	VI - SEMESTER	L	T	P
	Object Oriented Analysis and Design & Design Patterns	4	-	-
	Total Contact Hours - 56			
	Pre-requisites: Object Oriented Programming			

Course Objectives	
COBJ1	Introducing the Unified Process and showing how UML can be used w theprocess. .
COBJ2	Presenting a comparison of the major UML tools for industrial-stre development.
COBJ3	Introduction to design patterns, practical experience with a selecti central patterns.

SYLLABUS

UNIT - I

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle.

UNIT - II

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.
Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.
Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT – III

Basic Behavioral Modeling-I: Interactions, Interaction diagrams.
Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT- IV

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT – V

Structural Patterns: Adapter, Bridge, Composite, Decorator, Flyweight, Proxy, Discussion of Structural Patterns.

UNIT – VI

Behavioral Patterns: Chain of Responsibility, Command, Iterator, Memento, Observer, Visitor, Discussion of Behavioral Patterns.

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Design Patterns By Erich Gamma, Pearson Education
3. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2Toolkit, WILEY-Dreamtech India Pvt. Ltd.

1CIT316	VI – SEMESTER (Core Elective – II)	L	T	P	C
	DATA SCIENCES & ANALYTICS	3	-	-	3
	Total Contact Hours – 42				
	Prerequisite : None				

COURSE OBJECTIVES	
COBJ1.	• Recognize and analyze ethical issues in business related intellectual property, data security, integrity, and privacy.
COBJ2.	• Apply principles of Data Science to the analysis of busi problems.
COBJ3.	• Use data mining software to solve real-world problems.
COBJ4.	• Apply algorithms to build machine intelligence.

SYLLABUS

UNIT I

Hadoop: Introduction to Hadoop, Data storage and analysis, Comparison with other syste Apache Hadoop Project,

MapReduce: Analyzing data with UNIX tools and Hadoop, Hadoop Streaming and pipes

UNIT II

The Hadoop Distributed File system: The design of HDFS and its concepts

Hadoop I/O: Data Integrity, Compression, Serialization, File-Based Data Structures.

Developing a Map Reduce Application: The Configuration API, Configuring Development Environment, Writing a Unit Test, Running Locally on Test Data , Running a cluster ,Tuning a Job, Map Reduce Workflows,

UNIT III

How Map Reduce Works: Anatomy of Map Reduce Job Run, Failures, Job Schedulin Shuffle and Sort, Task Execution.

Map Reduce Types and Formats: Map Reduce Types, input formats, output formats.

UNIT IV

Map Reduce Features: Counters, sorting, joins, side data distribution, Map Reduce lib classes.

Setting Up a Hadoop Cluster: Cluster Specification, Cluster Setup and Installation, S Configuration, Hadoop Configuration, Post Install , Benchmarking a Hadoop Clu Hadoop in the Cloud.

UNIT V

Administering Hadoop: HDFS, Monitoring, Maintenance.

PIG: Installing and Running PIG, An Example, Comparison with Databases, Pig Latin, U Define Functions, Data Processing Operators, Pig in Practice.

UNIT VI

HBASE: HBasics, Concepts, Installation, Clients, Example, HBASE Versus RDBMS, Pr

ZoopKeeper: Installing and Running Zookeeper, An Example, The Zookeeper Serv Building Application with Zookeeper, Zookeeper in Production. Case Studies

Text Book:

1. "Hadoop: The Definitive Guide", Tom White, O'Reilly, 2010.

Reference:

1. "Hadoop In Action", Chuck Lam Manning, 2011.
2. "Pro Hadoop", Jason Venner, Apress, 2009.
3. "Data-IntensiveText Processing with Map Reduce", Jimmy Lin and Chris Dyer ,Morgan & Claypool 2010.

COURSE OUTCOMES

CO1	Define and explain the key concepts and models relevant to data science, including data cleaning and integration, data-intensive distributed computing, data mining algorithms, and data visualization.
CO2	Design, implement, and evaluate the core algorithms underlying an end-to-end data science workflow, including the experimental design, data collection, mining, analysis, and presentation of information derived from large datasets.
	ply "best practices" in data science, including facility with modern tools.

Mapping: OBJECTIVES OUTCOMES

ves/Outcomes	CO1	CO2	CO3
BJ1			X
BJ2	X	X	
BJ3		X	
BJ4	X		X

< A1CIT316><DATA SCIENCES & ANALYTICS>

ourse designed by	< COMPUTER SCIENCE & ENGINEERING>											
Course/Program outcomes mapping	a	b	c	d	e	f	g	h	i	j	k	l
Approval	Approved by: Meeting of BoS held on dd/mm/yyyy											
	Ratified by: Meeting of Academic council on: dd/											

A1CIT332	VI – SEMESTER (Core Elective – II)	L	T	P
	SERVICE ORIENTED ARCHITECTURE	3	-	-
	Total Contact Hours - 42			
	Pre-requisites: None			

Course Objectives	
COBJ1	Expose students to component architecture & service orientation
COBJ2	Expose students to architectural paradigms of service oriented architecture
COBJ3	Expose students to different technologies that make dynamic service architecture applications possible.

SYLLABUS

UNIT I

Software Architecture: Need for Software Architecture, Objectives of Software architecture,

Types of IT Architecture, Architectural patterns and styles

Service-Oriented Architecture: Service orientation in daily life, Evolution of SOA, Drivers for SOA, Dimensions of SOA, Key components of SOA, Perspectives of SOA.

UNIT II

Enterprise wide SOA: Considerations for Enterprise wide SOA, Strawman architecture, Enterprise SOA layers, Application development process, SOA methodology for enterprise.

Enterprise Applications: Architectural considerations, Solution architecture for enterprise Applications, solution architecture for enterprise.

UNITIII

Web services Overview: Heterogeneity problem, XML, SOAP, WSDL, UDDI registry,WS-1 Basic profile

Enterprise Service Bus : Routing and Scalable connectivity, Protocol transformation, Data/message transformation, core functionalities, optional features, logical components, deployment configurations, types of ESBs, Practical usage scenarios.

UNIT IV

Service Oriented Analysis and Design: Need for models, principles of service design, design of activity services, design of data, client and business process services

SOA Governance, Security and Implementation: SOA governance, SOA security,approach for enterprise wide SOA implementation

UNIT V

Technologies for SOA:

XML: Namespaces, schemas, processing/passing models

SOAP: messages, elements, attributes and processing model, message exchange types ,HTTP binding

WSDL: containment structure, elements of abstract description, elements of the implementation part, logical relationships, SOAP binding

UDDI Registry: Basic data model, tmodel, categorization and identification schemes, binding template, use of WSDL in the UDDI registry

UNIT VI

Web Services Implementation: Implementation Choices, Building Web Service Clients, Building Web Services, Bottom- Up Approach, Commercial Tools

TEXTBOOKS:

1. SOA Based Enterprise Integration: A step by step guide to services based application integration – WaseemRoshen, Tata Mc-Graw Hill Edition.
2. Service Oriented Architecture for Enterprise and Cloud applications – Second edition – Shankar Kambhampaty- Wiley India

REFERENCES:

1. "Introduction to service oriented modeling"-Service oriented Modeling: Service analysis, design and architecture – Wiley & Sons.
2. Service Oriented Architecture : Concepts, technology and design-Thomas Erl-Pearson Education 2005
3. SOA and Cloud computing: Practices,patterns and technologies – Anthony Assi,TouficBobez, Nitin Gandhi-Prentice Hall/Pearson PTR

A1CIT325	VI – SEMESTER (Core Elective – III)	L	T	P
	FIREWALL & VPN	3	-	-
	Total Contact Hours – 42			
	Prerequisite : None			

COURSE OBJECTIVES	
COBJ1.	Identify and assess current and anticipated security risks vulnerabilities
COBJ2.	Protect network from internal and external threats.
COBJ3.	Establish a VPN to allow IPSec remote access traffic
COBJ4.	Develop critical situation contingency plans and disaster recovery

SYLLABUS

UNIT 1

Introduction to Information Security: What is information security, characteristics information, CNSS security model, securing components, threats, attacks, **Introduction Networking:**Networking Fundamentals, Network Standards, OSI Reference Model Security, The Internet and TCP/IP

UNIT 2

Security Policies, Standards and Planning: Information Security Policy, security practices, Frame Works and Industry Standards: The ISO 27000 Series, NIST Secur Models, Spheres of Security, Security Education, Training and Awareness

UNIT III

Firewall Planning and Design:

Introduction to Firewalls, Types of firewall Protection, PAT/NAT, Firewall Categori Limitations of Firewalls**Packet Filtering:**Understanding Packets and Packet Filtering, Pac Filtering Methods, Packet Filter Rules

UNIT IV

Proxy Servers and Application Level Firewalls: Introduction to Proxy Servers and the goals, configuring proxy server, reverse proxies, **Firewall Configuration a Administration:** Establishing firewall rules and restrictions, firewall configuration strategi Remote management interface, configuring advanced firewall functions Firew authentication methods, password security tools

UNIT V

VPNs: VPN Components and Operations, Types of VPns, VPN Setps, Benefits of VP Tunneling Protocols used with VPNs (IPSec/IPE, PPTP, L2TP, PPP over SSL/PPP o SSH), VPN Best Practices

UNIT VI

Security Considerations for VPNs: Overview of IPSec, IPSec Protocols, IPSec Stand Implementing IPSec in a site to site Intranet VPN, site to site extranet VPN, Implem IPSec in Remote Access VPN

Text Books

1. "Firewalls and Network Security", Whittman, Mattord, Austin, Holden, Cenage Learning India Edition.
2. "Basics of Network Security, Firewalls and VPNs", NIIT, Prentice Hall of India Private Limited.

Reference Book

1. Network Security, Firewalls, and VPNs, J. Michael Stewart, Jones & Bartlett Learning,2010

COURSE OUTCOMES

CO1	Understand Foundations of Network Security
CO2	Network Security Implementation and management.
CO3	VPN technologies and VPN Management
CO4	Firewall Implementation

Course Level Mapping: OBJECTIVES OUTCOMES

Objectives/Outcomes	CO1	CO2	CO3	CO4
OBJ1	X			
OBJ2		X	X	
OBJ3		X		X
OBJ4		X	X	

	< A1CIT325><FIREWALLS & VPN>											
	< COMPUTER SCIENCE & ENGINEERING>											
	a	b	c	d	e	f	g	h	i	j	k	l
Approval	Approved by: Meeting of BoS held on dd/mm/yyyy											
	Ratified by: Meeting of Academic council on: dd/mm/yyyy											

A1CIT315	VI – SEMESTER (Core Elective – IV)	L	T	P	C
	NEURAL NETWORKS & SOFT COMPUTING	3	-	-	3
	Total Contact Hours – 42				
	Prerequisite : None				

COURSE OBJECTIVES	
COBJ1.	To have a detailed study of neural networks, Fuzzy Logic and uses of Heuristics based on human experience.
COBJ2.	To Familiarize with Soft computing concepts.
COBJ3.	To introduce the concepts of genetic algorithm and its applications to soft computing using some applications

SYLLABUS

Unit- I

Introduction: What is a neural network? Human Brain, Models of a neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural.

Unit-II

Learning Process: Error Correction learning, Memory based learning, Hebbain learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

Unit-III

Classical & Fuzzy Sets: Introduction to classical sets – properties, operations and relations; Fuzzy sets – memberships, uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions.

Unit – IV

Fuzzy Logic system Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Unit-V

Concept Learning: Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm.

Decision Tree learning: Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning.

Unit – VI

Genetic Algorithms: Motivation, Genetic Algorithms, an Illustrative example, Hypothesis space search, Genetic, Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms.

Text Books:

1. Neural networks A Comprehensive foundations, Simon Hhaykin, Pearson Education 2nd edition 2004
2. Neural Networks, Fuzzy Logic, Genetic Algorithms: Sysnthesis and Application by Rajasekharan and Pai, PHI Publications.
3. Machine Learning, Tom M.Mitchell, MGH

OUTCOMES