RAMACHANDRA
COLLEGE OF ENGINEERING
(Approved by AICTE, New Delhi, Affiliated to JNTUK: Kakinada)
NH-5 Bypass Road, Vatluru (V), ELURU – 534 007, A. P.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

New Courses Introduced in M Tech - R16 - Regulation

S. No	Name of the Course	Course Code
1.	Advanced Operating Systems	I0504
2.	Cyber Security	J2503
3.	Big Data Analytics	J4002

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

COMPUTER NETWORKS & INFORMATION SECURITY

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

I Semester

S. No.	SUBJECT	L	P	C
1	CYBER SECURITY	4	--	3
2	NETWORK MANAGEMENT CONCEPTS AND PRACTICES	4	--	3
3	ADHOC AND SENSOR NETWORKS	4	--	3
4	NETWORK PROGRAMMING	4	--	3
5	MOBILE COMPUTING	4	--	3
6	WEB TECHNOLOGIES	4	--	3
7	CNIS LAB 1	--	3	2
Total Credits				**20**

II SEMESTER

S.No.	SUBJECT	L	P	C
1	ADVANCED COMPUTER COMMUNICATIONS	4	--	3
2	BIG DATA ANALYTICS	4	--	3
3	TCP / IP	4	--	3
4	MANETS	4	--	3
5	**Elective – 1** 1. INTERNET OF THINGS 2. HACKING TECHNIQUES 3. ARTIFICIAL INTELLIGENCE 4. ADVANCED COMPUTER ARCHITECTURE	4	--	3
6	**Elective - 2** 1. VANETS 2. ISDN & BROADBAND ISDN 3. FIREWALLS & VPNs 4. WIRELESS NETWORKS &SECURITY	4	--	3
7	CNIS LAB 2	--	3	2
Total Credits				**20**

III Semester

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	**--**	**--**	2
2	Seminar – I	--	--	2
3	Project Work Part - I	--	--	16
Total Credits				**20**

IV Semester

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
Total Credits				**20**

	L	P	C
I Year – I SEMESTER	**4**	**0**	**3**

CYBER SECURITY

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II :

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III :

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

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV :

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

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010

	L	P	C
I Year – I SEMESTER	**4**	**0**	**3**

NETWORK MANAGEMENT CONCEPTS AND PRACTICES

UNIT I: Introduction to Network Management: Analogy of Telephone Network Management, Communication,* protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management. Network Management System Platform, Current Status and future of Network Management

UNIT II: SNMP v1 Network Management: Organization and Information Models: The History of SNMF Management Tue SNMP Mode, The Organization Model, System Overview, The Information Model. The SNMP Communication Model. Functional model -SNMP Management: SNMP v2: Major Changes in SNMPv2, SN[Mpv2 System Architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base. SNMPv2 Protocol, Compatibility with SNMP v1

UNIT III: Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial network management Systems, System Management, and Enterprise Management Solutions - Web-Based Management: NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation. Java management Extensions, Management of a Storage Area Network: Future Directions

UNIT IV: Performance Modeling and Estimation: Overview of Probability and Stochastic Processes - Probability, Random Variables Stochastic Processes, Queuing Analysis - How Queues Behave - A Simple Example Why Queuing Analysis, Queuing Models, Single-Server Queues. Multi server Queues, Examples, Queues with Priorities, Networks of Queues. Other Queuing Models. Estimating Model Parameters - Modeling and Estimation of Self-Similar Traffic: Self-Similar Traffic.-Self-Similarity, Self-Similar Data Traffic, Examples of Self-Similar Data Traffic, and Performance Implications of Self-Similarity. Modeling and Estimation of Self-Similar Data Traffic

UNIT V: Quality of Service in IP Networks: Exterior Routing Protocols and Multicast - Path-Vector Protocols: BGP and [DKH Multicasting. Integrated and Differentiated Services - Integrated Services Architecture (ISA), Queuing Discipline, Random Early Detection, Differentiated Services, Protocols for QOS Support -Resource Reservation: RSVP. Multiprotocol Label Switching, Real Time Transport Protocol (RTP)

TEXT BOOKS:

1. Mani Subramanian. "Network Management, Principles and Practice", Pearson Education, 2000, rp2007.
2. William Selling's. "'High-Speed Networks and Internets: Performance and Quality of Service - 2cd", Prentice Hall/Pearson Education, 2002.

REFERENCES BOOKS:

1. Benou Claise and Ralf Wolier, "Network Management: Accounting and Performance Strategies", Pearson Education. 2007, rp2008,
2. J. Richard Burke, " Network Management - Concepts and Practice: A Hands-on Approach". PI U, 2004, rp2008.
3. Stephen B. Morris, "Network Management, MBs and MPLS", Pearson Education, 2003. rp200S.

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I Year – I SEMESTER	**4**	**0**	**3**

ADHOC & SENSOR NETWORKS

UNIT I: Introduction to Ad Hoc Wireless Networks
Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols

UNIT II: Routing Protocols for Ad Hoc Wireless Networks
Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT III: Security protocols for Ad hoc Wireless Networks
Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT IV: Basics of Wireless Sensors and Applications
The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V: Security in WSNs
Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems–TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, Dataflow style language: TinyGALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.

TEXT BOOKS:

1. Ad Hoc Wireless Networks – Architectures and Protocols, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004
2. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P.Aggarwal,* World Scientific Publications / Cambridge University Press, March 2006
3. Wireless Sensor Networks – Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010

REFERENCE BOOKS:

1. Wireless Sensor Networks: An Information Processing Approach, *Feng Zhao, Leonidas Guibas*, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009
2. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008
3. Ad hoc Networking, *Charles E.Perkins*, Pearson Education, 2001
4. Wireless Ad hoc Networking, *Shih-Lin Wu, Yu-Chee Tseng,* Auerbach Publications, Taylor & Francis Group, 2007

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I Year – I SEMESTER	**4**	**0**	**3**

NETWORK PROGRAMMING

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

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

UNIT -III: Sockets : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.
I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, gesockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

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

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

TEXT BOOK:

1. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W. Richard Stevens, Pearson Edn. Asia.

2. UNIX Network Programming, 1st Edition, - W. Richard Stevens. PHI.

REFERENCES:

1. UNIX Systems Programming using C++ T CHAN, PHI.

2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education

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I Year – I SEMESTER	**4**	**0**	**3**

MOBILE COMPUTING

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.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772

REFERENCE BOOKS:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, “Mobile Computing, Technology Applications and Service Creation” Second Edition, Mc Graw Hill.
2. UWE Hansmann, LotherMerk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,” Second Edition, Springer.

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I Year – I SEMESTER	**4**	**0**	**3**

WEB TECHNOLOGIES

UNIT-I:

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

UNIT-II:

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-III:

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. Working with forms and Databases such as MySQL.

UNIT-IV:

PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-V:

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

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, 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.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. http://www.upriss.org.uk/perl/PerlCourse.html

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I Year – I SEMESTER	**0**	**3**	**2**

CNIS LAB 1

1) Write Ruby program reads a number and calculates the factorial value of it and prints the Same.

2) Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.

3) Write a Ruby program that uses iterator to find out the length of a string.

4) Write Ruby program which uses Math module to find area of a triangle

.

5) Write Ruby program which uses tk module to display a window

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

7) Write perl program takes set names along the command line and prints whether they are regular files or special files

8) An example perl program to connect to a MySQl database table and executing simple commands.

9) Example PHP program for cotactus page.

10) Implement the following forms of IPC. a) Pipes b) FIFO

11) Implement file transfer using Message Queue form of IPC.

12) Write a Program to create an integer variable using Shared Memory concept and increment the variable simultaneously by two processes. Use Semaphores to avoid Race conditions.

13) Design TCP iterative Client and Server application to reverse the given input sentence.

14) Design TCP concurrent Client and Server application to reverse the given input sentence.

15) Design TCP Client and Server application to transfer file.

16) Design UDP Client and Server application to reverse the given input sentence.

17) Design UDP Client Server to transfer a file.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

ADVANCED COMPUTER COMMUNICATIONS

UNIT-I:
Network layer: Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets.
Routing Algorithm –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks-
Congestion control algorithms-Load shedding, Congestion control in Data gram Subnet.

UNIT-II:
IPV4 Address address space, notations, classful addressing, classless addressing network addressing translation(NAT) , **IPV6 Address** structure address space, **Internetworking** need for network layer internet as a data gram, internet as connection less network.
IPV4 datagram, Fragmentation, checksum, options.
IPV6 Advantages, packet format, extension Headers, Transition from IPV4 to IPV6

UNIT–III:
Process to process delivery: client/server paradigm, multiplexing and demultiplexing, connectionless versus connection oriented services, reliable versus reliable.
UDP: well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP
TCP: TCP services, TCP features, segment, A TCP connection, Flow control, error control, congestion control.
SCTP: SCTP services SCTP features, packet format, An SCTP association, flow control, error control.
Congestion control: open loop congestion control, closed loop congestion control, Congestion control in TCP, frame relay,
QUALITY OF SERVICE: flow characteristics, flow classes **TECHNIQUES TO IMPROVE QOS**: scheduling, traffic shaping, resource reservation, admission control.

UNIT –IV:
Multimedia: introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MBone-the multicast back bone

UNIT –V: Emerging trends Computer Networks:
Mobile Ad hoc networks: applications of Ad hoc networks, challenges and issues in MANETS, MAC layers issues, routing protocols in MANET, transport layer issues, Ad Hoc networks security.
Wireless sensors networks: WSN functioning, operation system support in sensor devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management;
Wireless mesh networks WMN design, Issues in WMNs;

TEXT BOOKS:

1. Data communications and networking 4th edtion Behrouz A Fourzan, TMH
2. Computer networks 4th editon Andrew S Tane nbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

REFERENCE BOOKS:

1. Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

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I Year – 2nd SEMESTER	**4**	**0**	**3**

BIG DATA ANALYTICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE LINKS:

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

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I Year – 2nd SEMESTER	**4**	**0**	**3**

TCP/IP

UNIT I:

Internetworking concepts and architecture model – classful Internet address – CIDR – Subnet ting and Super netting – AARP – RARP- IP- IP Routing – ICMP – IPV6.

UNIT II:

Services – header – connection establishment and termination – interactive data flow – bulk data flow – timeout and retransmission – persist timer – keep alive timer – futures and performance.

UNIT III:

IP global software organization – routing table – routing algorithms – fragmentation and reassembly – error processing (ICMP) – Multicast Processing (IGMP).

UNIT IV

Data structure and input processing – transmission control blocks – segment format – comparison – finite state machine implementation – Output processing – mutual exclusion –computing the TCP Data length.

UNIT V:

Timers – events and messages – timer process – deleting and inserting timer event – flow control and adaptive retransmission – congestion avoidance and control – urgent data processing and push function.

TEXT BOOKS

1. Douglas E Comer," Internetworking with TCP/IP Principles , Protocols and Architecture" ,Vol 1 and 2, Vth Edition
2. W.Richard Stevans "TCP/IP Illustrated" Vol 1.2003.

REFERENCES BOOKS:

1. Forouzan, " TCP/IP Protocol Suite" Second Edition, Tate MC Graw Hill, 2003.
2. W.Richard Stevens "TCP/IP Illustrated" Volume 2, Pearson Education 2003

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I Year – 2nd SEMESTER	**4**	**0**	**3**

MANTES

UNIT I: INTRODUCTION TO ADHOC NETWORKS (9 hours) Introduction – Cellular and AdHoc Networks - Mobile Ad hoc Networking with 4G - Application of Mobile Ad Hoc Networks - Issues in Mobile Ad Hoc networks-Ad Hoc wireless Internet- Mobile Quality of Service - QoS Parameters-Issues and Challenges in providing Mobile QoS. Mobility models – types.

UNIT II: MAC AND MACW PROTOCOLS (9 hours) Issues and Challenges in designing a MAC protocol for mobile ad hoc networks-Design goals of MAC protocol-Classification of MAC protocols. Contention based protocols: MACAW, Floor acquisition Multiple Access Protocols, Media access with reduced handshake protocol. Contention Based Protocols with reservation mechanisms: Distributed packet reservation multiple access protocol, collision avoidance time allocation protocol, Five Phase reservation Protocol.

UNIT III: DESIGNING ROUTING PROTOCOLS FOR ADHOC NETWORKS (9 hours) Mobile Ad hoc networks – Routing Technology for Dynamic wireless networking -Issues in Designing a routing protocols for Ad Hoc Networks Classification of Routing Protocols. Approaches in Mobile Adhoc Networks. Table Driven routing protocols: Destination Sequenced Distance Vector Routing Protocol-Wireless Routing Protocol-Cluster head Gateway switched routing protocol.

UNIT IV: ROUTING PROTOCOLS FOR ADHOC WIRELESS NETWORKS (9 hours) On Demand routing protocol: Dynamic source routing protocol, AODV routing protocol, temporarily ordered routing algorithm. Hybrid routing protocols: Zone routing protocol, Zone based Hierarchical link state routing protocol.

UNIT V: QOS IN ADHOC WIRELESS NETWORKS (9 hours) Issues in designing a transport layer protocol for mobile ad hoc networks Design goals of transport layer- Mobile TCP over ad hoc wireless networks Ad hoc transport protocol-Secure routing in ad hoc networks. Introduction to Mobile QoS - Classification of QoS solutions-MAC layer solutions-Network layer solutions-Mobile QoS framework for Mobile Ad hoc networks

TEXTBOOKS:

1. C.Sivaram Murthy and B.S Manoj, “Ad Hoc Wireless Networks”, Pearson Education, Second Edition India, 2001.
2. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, “Mobile Ad Hoc Networking”, John Wiley, 2004

REFERENCES:

1. George Aggelou “Mobile Ad Hoc Networks”, McGraw-Hill, 2004.

2. Amitabh Mishra “Security and Quality of Service in Ad hoc Wireless Networks”, Cambridge University Press, 2008

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I Year – 2nd SEMESTER	**4**	**0**	**3**

INTERNET OF THINGS
(Elective -1)

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

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

UNIT II:

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

UNIT III:

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

UNIT IV:

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

UNIT V:

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

TEXTBOOKS:

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

REFERNCE BOOKS:

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

HACKING TECHNIQUES
(Elective -1)

UNIT I: Casing the Establishment - What is foot printing- Internet Foot printing. -Scanning- Enumeration - basic banner grabbing, Enumerating Common Network services. Case study- Network Security Monitoring

UNIT II: Securing permission - Securing file and folder permission. Using the encrypting file system. Securing registry permissions. Securing service- Managing service permission. Default services in windows 2000 and windows XP. Unix - The Quest for Root. Remote Access vs Local access. Remote access. Local access. After hacking root.

UNIT III: Dial-up ,PBX, Voicemail, and VPN hacking - Preparing to dial up. War-Dialing. Brude-Force Scripting PBX hacking. Voice mail hacking . VPN hacking. Network Devices – Discovery, Autonomous System Lookup. Public Newsgroups. Service Detection. Network Vulnerability. Detecting Layer 2 Media.

UNIT IV: Wireless Hacking - Wireless Foot printing. Wireless Scanning and Enumeration. Gaining Access. Tools that exploiting WEP Weakness. Denial of Services Attacks. Firewalls- Firewalls landscape- Firewall Identification-Scanning Through firewalls- packet Filtering- Application Proxy Vulnerabilities . Denial of Service Attacks - Motivation of Dos Attackers. Types of DoS attacks. Generic Dos Attacks. Unix and Windows DoS

UNIT V: Remote Control Insecurities - Discovering Remote Control Software. Connection. Weakness.VNC . Microsoft Terminal Server and Citrix ICA .Advanced Techniques Session Hijacking. Back Doors. Trojans. Cryptography . Subverting the systems Environment. Social Engineering. Web Hacking. Web server hacking web application hacking. Hacking the internet User - Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking.

TEXTBOOKS:

1. Stuart McClure, Joel Scam bray and Goerge Kurtz, “Hacking Exposed Network Security Secrets & Solutions”, Tata McGraw-Hill Publishers, 2010.

2. Ben smith, and Brian Komer, “Microsoft Windows Security Resource Kit”, Prentice Hall of India, 2010.

ARTIFICIAL INTELLIGENCE
(Elective -1)

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

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
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

ADVANCED COMPUTER ARCHITECTURE
(Elective -1)

UNIT I:

Introduction to High Performance Computing: Overview, Pipeline vs Parallel Processing Parallel Architectures: Classification and Performance.

Pipeline Processing: Pipeline Performance, design of arithmetic pipelines, multifiction pipes, concept of reservation table, collision vector and hazards.

UNIT II:

Instruction Processing Pipes: Instruction and data hazard, hazard detection and resolution, delayed jumps, delayed execution. RISC Philosophy.

UNIT III:

Pipeline scheduling Theory: Greedy pipeline scheduling algorithm, state diagram, modified state diagram, Latency cycles, optimal cycles, scheduling of static & dynamic Pipelines.

UNIT IV:

Implementation of pipeline schedulers Interconnection Networks: Interconnection network classification, Single stage/ Multistage Networks, crossbars, clos Networks, Benes Networks, Routing algorithms. Omega, Cub-connected and other networks.

UNIT V:

Introduction to Neurocomputing Architectures Topics from the current literature as self study and presentations by students.

TEXTBOOKS:

1. M. R. Bhujade, "Parallel Computing", Newage International Pvt. Ltd., 1995.
2. Stallings, William, "Computer organization and architecture, designing for performance", Prentice Hall of India, 1997

REFERENCE BOOKS:

1. J. L. Hennessy and D. A. Patterson, "Computer architecture: a quantitative approach", Harcourt Asia, Singapore 1996
2. Kain, “Advanced Computer Architecture: a system Design approach”, PHI.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

VANETS
(Elective -2)

UNIT I:

Chassis and Drive Line Control Components of chassis management system – role of various sensors and actuators pertaining to chassis system – construction – working principle of wheel speed sensor, steering position, tyre pressure, brake pressure, steering torque, fuel level, Engine and vehicle design data Drive Line Control: Speed control – cylinder cut – off technology, Gear shifting control – Traction / braking control, brake by wire – Adaptive cruise control, throttle by wire. Steering – power steering, collapsible and tilt able steering column – steer by wire

UNIT II:

Engine Management System: Basic Engine Operations – Fuel Control, Ignition control, Lambda Control, Idle Speed Control, Knock Control, Open Loop and Closed Loop Control. Sensors: Basic sensor arrangement; Types of sensors such as oxygen sensors, Crank angle position sensors, fuel metering/vehicle speed sensors and detonation sensors, altitude sensors, flow sensors, throttle position sensors, solenoids,

UNIT III:

Safety and Security Systems : Airbags, seat belt tightening system, collision warning systems, child Lock, anti lock braking systems, Vision enhancement – Static and Dynamic bending of Head light, road recognition system, Anti theft technologies, smart card system, number plate coding, central locking system.

UNIT IV:

Comfort and Vehicle Control System: Active suspension systems, requirement and characteristics, different types, Vehicle Handling and Ride characteristics of road vehicle, pitch, yaw, bounce control, power windows, adaptive noise control. ABS Control System – Torque Balance at Wheels road contact – Control cycle of ABS System – Advantages – Traction control system- Combination of ABS with Traction control system

UNIT V:

Intelligent Transportation System: Traffic routing system – Automated highway systems – Lane warning system – Driver Information System, driver assistance systems – Data communication within the car, Driver conditioning warning – Route Guidance and Navigation Systems – vision enhancement system – In-Vehicle Computing – Vehicle Diagnostics system. VANET usage in Automobiles

TEXT BOOKS:

1. U. Kiencke, and L. Nielsen, ”Automotive Control Systems”, SAE and Springer-Verlag, 2000.

2. Ljubo Vlacic, Michel Parent, Fumio Hiroshima, “Intelligent Vehicle Technologies”, Butterworth-Heinemann publications, Oxford, 2001.

REFERENCES:

1. Crouse, W.H. & Anglin, D.L., “Automotive Mechanics”, Intl. Student edition, 9th edition, TMH, New Delhi, 2002.

2. William B. Ribbens -Understanding Automotive Electronics, 5th edition, Butter worth Heinemann Woburn,1998.

3. Bosch, “Automotive Hand Book”, 8th edition, SAE, 2007.

4. Internet References.

ISDN & BROADBAND ISDN
(Elective -2)

UNIT I:

Principles of circuit switching & signaling schemes, space time & space time division switching, single stage & multi stage switching network. Traffic engineering and telegraphic theory. Markov processes representing traffic, calculation of blocking probability.

UNIT II:

Modeling and analysis of important media access control protocols: ALOHA, slotted ALOHA, CSMA, CSMA/CD. LAN: Ethernet, token ring, FDDI.

UNIT III:

B-ISDN architecture, B-ISDN protocols, ATM traffic & congestion control, signaling, routing and addressing, Internetworking: switches, bridges, routers, gateways. ATM switching.

UNIT IV:

Broadband ISDN. Protocol reference model. SDH- basic features. ATM standard. Multistage networks. Traffic models; delay and loss performance. Cell switching. Cell scale and burst scale queuing. Protocol layers, their service and models. Internet protocol stack, link layer and local area networks.

UNIT V:

Network layer and routing. Transport layer. Congestion control. Application layer protocols. Web and HTTP.FTP and email. Mobile adhoc networking. Routing approaches. Mobile ad hoc networking. Protocol performance and open issues. Clustering and hierarchial routing. Ad hoc network security.

TEXTBOOKS

1. Digital Telephony, Bellamy , Wiley • Fields And Waves In Communication Electronics 3ed By Ramo, Ramo ,Wiley

2. S. Basagni, Mobile Ad Hoc Networking, Wiley

REFERENCES

1. J.M.Pitts & J.A.Schormans, Introduction to IP and ATM Design and Performance (2/e), Wiley
2. C.Siva Ram Murthy & B.S.Manoj, Adhoc Wireless Networks (2/e), Pearson Education

FIREWALLS AND VPNS
(Elective-2)

UNIT I:
Network Security Fundamentals, Firewall Fundamentals, VPN Fundamentals

UNIT II:
Network Security Threats and Issues, Network Security Implementation, Network Security Management

UNIT III:
Exploring the Depths of Firewalls, Firewall Deployment Considerations, Firewall Management and Security Concerns

UNIT IV:
Using Common Firewalls, VPN Management, VPN Technologies

UNIT V:
Firewall Implementation: A Thorough Case Study, VPN Implementation: A Thorough Case Study, Network Security Resources, and the Future

TEXTBOOK:
Network Security, Firewalls and VPNs, Second Edition, by J. Michael Stewart

WIRELESS NETWORKS &SECURITY
(Elective -2)

UNIT I: MULTIPLE RADIO ACCESS

Medium Access Alternatives: Fixed-Assignment for Voice Oriented Networks Random Access for Data Oriented Networks, Handoff and Roaming Support, Security and Privacy.

UNIT II: WIRELESS WANS

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000)

UNIT III: WIRELESS LANS

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, physical Layer- MAC Sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

UNIT IV: ADHOC AND SENSOR NETWORKS

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT V: WIRELESS MANS AND PANS

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

TEXT BOOKS:

1. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Ed., 2007.

2. Dharma Prakash Agrawal & Qing-An Zeng, “Introduction to Wireless and Mobile Systems”, Thomson India Edition, 2nd Ed., 2007.

REFERENCES:

1. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, 2007.

2. Kaveth Pahlavan, Prashant Krishnamurthy, "Principles of Wireless Networks",Pearson Education Asia, 2002.

3. Gary. S. Rogers & John Edwards, “An Introduction to Wireless Technology”, Pearson Education, 2007.

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I Year – 2nd SEMESTER	**0**	**3**	**2**

CNIS LAB 2

1) (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.

2) Implement the following file management tasks in Hadoop:

- Adding files and directories
- Retrieving files
- Deleting files

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

3) Run a basic Word Count MapReduce program to understand MapReduce Paradigm**.**

4) Write a mapreduce 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.

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

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

7) Implementing Client /Server model using Stream Socket (Connection oriented Socket).

8) Implementing Client /Server model using Datagram socket (connectionless Sockets).

9) Find the technical specifications of ATM switch, and then compare the ATM technology or service with the technology such as Ethernet.

10) Capture and study the wireless frames that are exchanged between wireless host and the access point.

11) The aim of this exercise is to configure BGP among the routers (Routers R1–R3).

12) Discovering of IPv6 using Wireshark and do the comparative study of the header format of IPv4 and IPv6

13) Setting Up Ad Hoc Wireless Network in Windows XP
Objective: to learn how to set up an Ad Hoc wireless network in windows XP

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

COMPUTER SCIENCE & ENGINEERING

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

I Semester

S.No.	SUBJECT	L	P	C
1	ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS	4	--	3
2	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	4	--	3
3	COMPUTER ORGANIZATION AND ARCHITECTURE	4	--	3
4	DATABASE MANAGEMENT SYSTEMS	4	--	3
5	ADVANCED OPERATING SYSTEMS	4	--	3
6	DATA WAREHOUSING AND DATA MINING	4	--	3
7	CSE LAB 1	--	3	2
Total Credits				**20**

II Semester

S.No.	SUBJECT	L	P	C
1	CYBER SECURITY	4	--	3
2	COMPUTER NETWORKS	4	--	3
3	BIG DATA ANALYTICS	4	--	3
4	ADVANCED UNIX PROGRAMMING	4	--	3
5	**Elective – 1** 1. SOFTWARE ENGINEERING 2. ARTIFICIAL INTELLIGENCE 3. COMPILER DESIGN 4. MACHINE LEARNING	4	--	3
6	**Elective – 2** 1. IMAGE PROCESSING 2. PARALLEL ALGORITHMS 3. CLOUD COMPUTING 4. MOBILE COMPUTING	4	--	3
7	CSE LAB 2	--	3	2
Total Credits				**20**

III Semester

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	**--**	**--**	2
2	Seminar – I	--	--	2
3	Project Work Part - I	--	--	16
Total Credits				**20**

IV Semester

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
Total Credits				**20**

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I Year – I SEMESTER	**4**	**0**	**3**

ADVANCED DATA STRUCTURES AND ALGORITHM ANAYLSIS

UNIT- I:
Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II:
Searching-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees(Infix,prefix,postfix).Graphs-Basic Concepts , Storage Structures and Traversals.

UNIT- III:

Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT- IV:
Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT –V:
Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching. Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:
1. Data Structures: A Pseudocode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.

2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCES BOOKS:
1. Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.

2. Data Structures And Algorithms, 3/e, Adam Drozdek, Cengage.

3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad, S Chand & Co,2009.

I Year – I SEMESTER

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MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

UNIT- I:

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

UNIT- II :

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

UNIT- III:

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

UNIT- IV:

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

UNIT- V:

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

TEXT BOOKS:

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

REFERENCE TEXTBOOKS:

1. Elements of Discrete Mathematics, C L Liu, D P Mohanpatra, TMH
2. Discrete Mathematics, Schaum's Outlines, Lipschutz, Lipson TMH.
3. Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI, 2009

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I Year – I SEMESTER	**4**	**0**	**3**

COMPUTER ORGANIZATION AND ARCHITECTURE

UNIT- I:

Number Systems And Computer Arithmetic Signed And Unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point Representation Logical Operation, Gray Code, BCD Code, Error Detecting Codes. Boolean Algebra, Simplification of Boolean Expressions- Maps.

UNIT- II:

Combinational and Sequential Circuits Decoders, Encoders, Multiplexers, Half and Full Adders, Shift Registers, Flip-Flops, Binary Counters, Memory Unit.

UNIT- III:

Memory Organisation Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory Concept.

UNIT- IV:

ALU Design Addition and Subtraction, Sign and Unsigned Numbers, Multiplication and Division Algorithms, BCD Adders.

UNIT- V :

Input –Output Organisation Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, DMA, Input Output Processor, Serial Communication.

TEXT BOOKS:

1. Computer System Architecture, 3/e, Moris Mano, Pearson/PHI.
2. Micro Processor and Interfacing, 2/e, Douglas V.Hall, TMH.

REFERENCE BOOKS:

1. Digital Logic and Computer Organisation, Rajaraman, Radha Krishnan, PHI.
2. Micro Computer Systems: 8086/8088 family, 2/e, Liu, Gibson, PHI.
3. Computer Organisation and Architecture, 7/e, Stallings, Pearson.

I Year – I SEMESTER

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DATABASE MANAGEMENT SYSTEMS

UNIT- I:

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

UNIT- II :

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

UNIT- III :

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional

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

UNIT- IV:

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

UNIT-V:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Database Management System Oracle SQL and PL/SQL,P.K.Das Gupta, PHI.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.

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I Year – I SEMESTER	**4**	**0**	**3**

ADVANCED OPERATING SYSTEMS

UNIT - I:
Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms - a comparative performance analysis.

UNIT - II:
Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT - III:
Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT - IV:
Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-public key cryptography - multiple encryption - authentication in distributed systems.

UNIT - V:
Multiprocessor operating systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCE Books:

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003

I Year – I SEMESTER

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DATA WAREHOUSING AND DATA MINING

UNIT 1: DATA WAREHOUSING:
Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT II: BUSINESS ANALYSIS:
Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III: DATA MINING:
Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV :ASSOCIATION RULE MINING AND CLASSIFICATION:
Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V : CLUSTERING AND TRENDS IN DATA MINING:
Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods – Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS:
1. Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.
AULibrary.com

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Aja, “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Daniel T. Larose, “Data Mining Methods and Models”, Wiley-Interscience, 2006.

I Year – I SEMESTER

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CS LAB 1

Data Structures Programs:

1. To implement Stacks& Queues using Arrays & Linked Lists
2. To implement Stack ADT, Queue ADT using arrays & Linked Lists
3. To implement Dequeue using Double Linked List & Arrays
4. To perform various Recursive & Non-recursive operations on Binary Search Tree
5. To implement BFS & DFS for a graph
6. To implement Merge & Heap sort of given elements
7. To perform various operations on AVL trees
8. To implement Krushkal's algorithm to generate a min-cost spanning tree
9. To implement Prim's algorithm to generate min-cost spanning tree
10. To implement functions of Dictionary using Hashing

Operating system programs:

1. Program to implement FCFS(First Come First Serve)scheduling Algorithms
2. Program to implement SJF(Shortest Job First)Scheduling Algorithm
3. Program to implement Priority Scheduling algorithm
4. Program to implement Round Robin Scheduling algorithm
5. Program to implement FIFO(First In First Out) Page Replacement Algorithm
6. Program to implement LRU(least Recently used)Page Replacement Algorithm
7. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
8. Write a program to implement how Disk Scheduling is done in operating system
9. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

Operating system programs:

10. Program to implement FCFS(First Come First Serve)scheduling Algorithms
11. Program to implement SJF(Shortest Job First)Scheduling Algorithm
12. Program to implement Priority Scheduling algorithm
13. Program to implement Round Robin Scheduling algorithm
14. Program to implement FIFO(First In First Out) Page Replacement Algorithm
15. Program to implement LRU(least Recently used)Page Replacement Algorithm
16. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
17. Write a program to implement how Disk Scheduling is done in operating system
18. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

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CYBER SECURITY

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II:

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III:

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

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

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

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

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I Year – 2nd SEMESTER	**4**	**0**	**3**

COMPUTER NETWORKS

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, 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 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.

TEXT BOOKS:

1. Computer Networks, Tanenbaum and David J Wetherall, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

REFERENCE BOOKS:

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

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I Year – 2nd SEMESTER	**4**	**0**	**3**

BIG DATA ANALYTICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE LINKS:

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

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I Year – 2nd SEMESTER	**4**	**0**	**3**

ADVANCED UNIX PROGRAMMING

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 Chgrp 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. 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:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

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

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I Year – 2nd SEMESTER	**4**	**0**	**3**

SOFTWARE ENGINEERING
(Elective – 1)

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 Characterise of 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

TEXT BOOKS:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw Hill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. 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, Pankaj Jalote, 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.

ARTIFICIAL INTELLIGENCE
(Elective – 1)

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

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
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

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I Year – 2nd SEMESTER	**4**	**0**	**3**

COMPILER DESIGN
(Elective – 1)

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.

UNIT – IV

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

UNIT – V

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.

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

MACHINE LEARNING
(Elective – 1)

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

IMAGE PROCESSING
(Elective -2)

UNIT I:
Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems
DDA line algorithms: Bresenhams line and circle derivations and algorithms

UNIT II:
2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations**- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

UNIT III:
Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy
Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

UNIT IV:
Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT V:
SEGMENTATION: Threshold detection methods, Optimal Thresholding, Edge based Segmentation- Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.
Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

Text Books:

1. Computer Graphics C Version, Donald Hearn, M Paulli Baker , Pearson (Unit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

References:

1. Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier

PARALLEL ALGORITHMS
(Elective – 2)

UNIT1: Introduction:

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file -system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

1. Parallel computing theory and practice, Michel J.Quinn
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

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I Year – 2nd SEMESTER	**4**	**0**	**3**

CLOUD COMPUTING
(Elective -2)

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

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

UNIT V:

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

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

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

TEXT BOOKS:

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

REFERNCE BOOK:

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

MOBILE COMPUTING
(Elective -2)

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.

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, Java Card, 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 BOOKS:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, “Mobile Computing, Technology Applications and Service Creation” Second Edition, Mc Graw Hill.
2. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,” Second Edition, Springer.

I Year – 2nd SEMESTER

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CS LAB-2

1. a) 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, 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 ls –l command.

4. Write a C program that illustrates how to execute two commands concurrently

   with a command pipe.

   Ex: - ls –l | 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 usingsemaphores

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.

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()).

9. Implementation of Connection oriented concurrent service (TCP).

10. Implementation of Connectionless Iterative time service (UDP).

11. Implementation of Select system call.

12. Implementation of gesockopt (), setsockopt () system calls.

13. Implementation of getpeername () system call.

14. Implementation of remote command execution using socket system calls.

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

COMPUTER SCIENCE & TECHNOLOGY

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

I Semester

S.No.	SUBJECT	L	P	C
1	ADVANCED DATA STRUCTURES	4	--	3
2	WEB TECHNOLOGIES	4	--	3
3	PARALLEL ALGORITHMS	4	--	3
4	DATA MINING AND KNOWLEDGE DISCOVERY	4	--	3
5	CYBER SECURITY	4	--	3
6	DISTRIBUTED SYSTEMS	4	--	3
7	CST LAB 1	--	3	2
Total Credits				**20**

II Semester

S.No.	SUBJECT	L	P	C
1	BIG DATA ANALYTICS	4	--	3
2	PYTHON PROGRAMMING	4	--	3
3	ADVANCED UNIX PROGRAMMING	4	--	3
4	COMPILER DESIGN	4	--	3
5	**Elective – 1** 1. ADVANCED GRAPH THEORY 2. SOFT COMPUTING 3. INFORMATION RETRIEVAL SYSTEMS 4. ADVANCED COMPUTER ARCHITECTURE	4	--	3
6	**Elective - 2** 1. ADVANCED DATA BASES 2. INTERNET OF THINGS 3. MACHINE LEARNING 4. CLOUD COMPUTING	4	--	3
7	CST LAB 2	--	3	2
Total Credits				**20**

III Semester

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	**--**	**--**	2
2	Seminar – I	--	--	2
3	Project Work Part - I	--	--	16
Total Credits				**20**

IV Semester

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
Total Credits				**20**

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I Year – 1st SEMESTER	**4**	**0**	**3**

ADVANCED DATA STRUCTURES

UNIT I:
Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT II:
Searching-Linear and Binary Search Methods.
Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort.
Trees- Binary trees, Properties, Representation and Traversals (DFT,BFT),Expression Trees(Infix,prefix,postfix).
Graphs-Basic Concepts, Storage Structures and Traversals.

UNIT III:
Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT IV:
Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .
Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT V:
Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations-, Insertion, Deletion and Searching.
Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, , Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:
1. Data Structures: A Pseudo Code Approach, 2/e, Richard F.Gilberg, Behrouz A.Forouzan, Cengage.
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCES BOOKS:
1. Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures And Algorithms, 3/e, Adam Drozdek, Cengage.

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I Year – 1st SEMESTER	**4**	**0**	**3**

WEB TECHNOLOGIES

UNIT-I:
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

UNIT-II:
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-III:
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. Working with forms and Databases such as MySQL.

UNIT-IV:
PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

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

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, 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.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. http://www.upriss.org.uk/perl/PerlCourse.html

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PARALLEL ALGORITHMS

UNIT1: Introduction :

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms :

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file - system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

1. Parallel computing theory and practice, Michel J.Quinn
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

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DATA MINING AND KNOWLEDGE DISCOVERY

UNIT- 1:
Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

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

UNIT- III:
Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical, Continuous attributes, Concept hierarchy, Sequential , Sub graph patterns

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

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

TEXT BOOKS:
1. Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipin kumar, Addision- Wesley.

2. Introduction to Data Mining with Case Studies: GK Gupta; Prentice Hall.

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

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I Year – 1st SEMESTER	**4**	**0**	**3**

CYBER SECURITY

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II:

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III:

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

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

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

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010

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DISTRIBUTED SYSTEMS

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 Kshemkalyani, 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

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CST LAB 1

1) By using Data mining tool Demonstration of preprocessing on dataset student.arff?
2) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using j48 algorithm
3) By using Data mining tool Demonstration of Association rule process on dataset test.arff using apriori algorithm?
4) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using naïve baye's algorithm?
5) By using Data mining tool Demonstration of clustering rule process on dataset iris.arff using simple k-means algorithms.
6) To perform various Recursive & Non-Recursive operations on Binary Search Tree
7) To implement BFS & DFS for a Graph
8) To implement Merge & Heap Sort of given elements
9) To perform various operations on AVL trees
10) To implement Krushkal's algorithm to generate a min-cost spanning tree
11) To implement Prim's algorithm to generate a min-cost spanning tree
12) To implement functions of Dictionary using Hashing.
13) Write Ruby program reads a number and calculates the factorial value of it and prints the Same.
14) Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.
15) Write a Ruby program that uses iterator to find out the length of a string.
16) Write perl program takes set names along the command line and prints whether they are regular files or special files
17) An example perl program to connect to a MySQl database table and executing simple commands.
18) Explain PHP program for cotactus page.

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BIG DATA ANALYTICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE LINKS:

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

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PYTHON PROGRAMMING

UNIT – I:

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

UNIT – II:

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

UNIT – III:

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

UNIT – IV:

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from ..import statement, name spacing,

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

UNIT – V:

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

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

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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ADVANCED UNIX PROGRAMMING

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 Chgrp 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.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:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

2. Unix and shell programmingby B.M. Harwani, OXFORD university press.

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COMPILER DESIGN

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.

UNIT – IV

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

UNIT – V

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.

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

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ADVANCED GRAPH THEORY
(Elective -1)

UNIT I:
Basic Concepts: Graphs and digraphs, incidence and adjacency matrices, isomorphism, the auto orphism group;
Trees: Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem,

UNIT II:
Connectivity: Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Manger's theorem;
Paths and Cycles: Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, circumference, the Chinese Postman Problem, the Traveling Salesman problem, diameter and maximum degree

UNIT III:
Matchings: Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f-factor theorem;
Extremal problems: Independent sets and covering numbers, Turan's theorem, Ramsey theorems;

UNIT IV:
Colorings: Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem;
Graphs on surfaces: Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces;

UNIT IV:
Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs
Networks and flows: Flow cuts, max flow min cut theorem
Selected topics: Dominating sets, the reconstruction problem

TEXT BOOKS:

1. Douglas B. West, Introduction to Graph Theory, Prentice Hall of India.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science. Prentice-Hall.

REFERENCE BOOKS:

1. Frank Harary, Graph Theory, Narosa.
2. R. Ahuja, T. Magnanti, and J. Orlin, Network Flows: Theory, Algorithms, and Applications, Prentice-Hall.

SOFT COMPUTING
(Elective -1)

UNIT- I

FUZZY SET THEORY: Introduction to Neuro – Fuzzy and Soft Computing, Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations,
Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

UNIT- II

OPTIMIZATION: Derivative based Optimization, Descent Methods, The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing, Random Search – Downhill Simplex Search.

UNIT -III

ARTIFICIAL INTELLIGENCE: Introduction, Knowledge Representation, Reasoning, Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainity Basic knowledge Representation Issues Knowledge acquisition, Heuristic Search: Techniques for Heuristic search Heuristic Classification
State Space Search: Strategies Implementation of Graph Search Search based on Recursion Patent-directed Search Production System and Learning.

UNIT -IV

NEURO FUZZY MODELING: Adaptive Neuro-Fuzzy Inference Systems, Architecture – Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy
Spectrum.

UNIT- V

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE: Printed Character Recognition, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Soft Computing for Color Recipe Prediction.

TEXT BOOKS:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press, 2006.

REFERENCES:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, Second Edition, Tata Mcgraw Hill Publishing Comp., 2006, New Delhi.
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
3. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.

INFORMATION RETRIEVAL SYSTEM
(Elective -1)

UNIT I: Introduction to Information storage and retrieval systems:
Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation
Introduction to Data structures and algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

UNIT II: Inverted Files and Signature Files:
Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques.
Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT III: New Indices for Text, Lexical Analysis and Stop lists:
PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Stop lists.

UNIT IV: Stemming Algorithms and Thesaurus Construction:
Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Compress Inverted Files.
Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

UNIT V: String Searching Algorithms:
Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

TEXT BOOKS

1. Modern Information Retrieval, Ricardo Baeza-Yates, Neto, PEA, 2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.

ADVANCED COMPUTER ARCHITECTURE
(Elective -1)

UNIT I:

Introduction to High Performance Computing: Overview, Pipeline vs Parallel Processing Parallel Architectures: Classification and Performance.

Pipeline Processing: Pipeline Performance, design of arithmetic pipelines, multifunction pipes, concept of reservation table, collision vector and hazards.

UNIT II:

Instruction Processing Pipes: Instruction and data hazard, hazard detection and resolution, delayed jumps, delayed execution. RISC Philosophy.

UNIT III:

Pipeline scheduling Theory: Greedy pipeline scheduling algorithm, state diagram, modified state diagram, Latency cycles, Optimal cycles, scheduling of static & dynamic Pipelines.

UNIT IV:

Implementation of pipeline schedulers Interconnection Networks: Interconnection network classification, Single stage/ Multistage Networks, crossbars, close Networks, Benes Networks, Routing algorithms. Omega, Cub-connected and other networks.

UNIT V:

Introduction to Neurocomputing Architectures Topics from the current literature as self study and presentations by students.

TEXTBOOKS:

1. M. R. Bhujade, "Parallel Computing", Newage International Pvt. Ltd., 1995.

2. Stallings, William, "Computer organization and architecture, designing for performance", Prentice Hall of India, 1997

REFERENCE BOOKS:

1. J. L. Hennessy and D. A. Patterson, "Computer architecture: a quantitative approach", Harcourt Asia, Singapore 1996

2. Kain, “Advanced Computer Architecture: a system Design approach”, PHI.

ADVANCED DATABASES
(Elective-2)

UNIT I: DISTRIBUTED DATABASES
Distributed DBMS Concepts and Design – Introduction – Functions and Architecture of DDBMS – Distributed Relational Database Design – Transparency in DDBMS – Distributed Transaction Management – Concurrency control – Deadlock Management – Database recovery – The X/Open Distributed Transaction Processing Model – Replication servers – Distributed Query Optimisation - Distribution and Replication in Oracle.

UNIT II: OBJECT ORIENTED DATABASES
Object Oriented Databases – Introduction – Weakness of RDBMS – Object Oriented Concepts Storing Objects in Relational Databases – Next Generation Database Systems – Object Oriented Data models – OODBMS Perspectives – Persistence – Issues in OODBMS – Object Oriented Database Management System Manifesto – Advantages and Disadvantages of OODBMS – Object Oriented Database Design – OODBMS Standards and Systems – Object Management Group – Object Database Standard ODMG – Object Relational DBMS –Postgres - Comparison of ORDBMS and OODBMS.

UNIT III: WEB DATABASES
Web Technology And DBMS – Introduction – The Web – The Web as a Database Application Platform – Scripting languages – Common Gateway Interface – HTTP Cookies – Extending the Web Server – Java – Microsoft's Web Solution Platform – Oracle Internet Platform – Semi structured Data and XML – XML Related Technologies – XML Query Languages

UNIT IV: INTELLIGENT DATABASES
Enhanced Data Models For Advanced Applications – Active Database Concepts And Triggers – Temporal Database Concepts – Deductive databases – Knowledge Databases.

UNIT V : CURRENT TRENDS
Mobile Database – Geographic Information Systems – Genome Data Management – Multimedia Database – Parallel Database – Spatial Databases - Database administration – Data Warehousing and Data Mining.

TEXT BOOKS:

1. Thomas M. Connolly, Carolyn E. Begg, "Database Systems - A Practical Approach to Design , Implementation , and Management", Third Edition , Pearson Education, 2003

REFERENCES:

1. Ramez Elmasri & Shamkant B.Navathe, "Fundamentals of Database Systems", Fourth Edition , Pearson Education , 2004.
2. M.Tamer Ozsu , Patrick Ualduriel, "Principles of Distributed Database Systems", Second Edition, Pearson Education, 2003.
3. C.S.R.Prabhu, "Object Oriented Database Systems", PHI, 2003.
4. Peter Rob and Corlos Coronel, "Database Systems – Design, Implementation and Management", Thompson Learning, Course Technology, 5th Edition, 2003.

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INTERNET OF THINGS
(Elective -2)

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

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

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

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

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

TEXTBOOKS:

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

REFERNCE BOOKS:

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

MACHINE LEARNING

(Elective -2)

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage

CLOUD COMPUTING
(Elective -2)

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

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

UNIT V:

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

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

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

TEXT BOOKS:

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

REFERNCE BOOK:

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

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I Year – 2nd SEMESTER

CST LAB 2

1. 1) a) Running instructions in Interactive interpreter and a Python Script
   b) Write a program to purposefully raise Indentation Error and correct it

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

3. 3) 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

4. Countdown from that number to zero.

   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.

5. 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.

6. 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?

7. frequency to tell whether the given file is a Python program file, C program file or a text

   file?

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.

8. 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.

9. Write a Program to count the number of words and lines supplied at standard input using

10. UNIX shell programming?

11. Write a shell script to find the factorial of a number entered through keyboard?

12. 11) Write a shell script to find the gross salary given that if the basic salary is less then 1500 then HRA =10% of basic salary and DA=90% if the basic salary is greater then or equal to 1500 then HRA=500 and DA=98% of basic salary. The employee's basic salary is the input through keyboard?

13. Write a shell script to display following information using case statement?

14. a. List users
15. b. Show date
16. c. Display file
17. d. Change working directory
18. e. Return to original directory
19. f. Quit

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

COMPUTER SCIENCE

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

I Semester

S.No.	SUBJECT	L	P	C
1	ADVANCED DATA STRUCTURES	4	--	3
2	FORMAL LANGUAGES AND AUTOMATA THEORY	4	--	3
3	COMPUTER ORGANIZATION	4	--	3
4	DATABASE INTERNALS	4	--	3
5	ADVANCED OPERATING SYSTEM	4	--	3
6	DATA WAREHOUSING AND DATAMINING	4	--	3
7	CS LAB 1	--	3	2
Total Credits				**20**

II Semester

S.No.	SUBJECT	L	P	C
1	CYBER SECURITY	4	--	3
2	BIG DATA ANALYTICS	4	--	3
3	WEB TECHNOLOGIES	4	--	3
4	ADVANCED UNIX PROGRAMMING	4	--	3
5	**Elective – 1** 1. SOFTWARE ENGINEERING 2. ARTIFICIAL INTELLIGENCE 3. COMPILER DESIGN 4. MACHINE LEARNING	4	--	3
6	**Elective - 2** 1. OBJECT ORIENTED ANALYSIS AND DESIGN 2. PARELLEL ALGORITHMS 3. CLOUD COMPUTING 4. IMAGE PROCESSING	4	--	3
7	CS LAB 2	--	3	2
Total Credits				**20**

III Semester

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	**--**	**--**	2
2	Seminar – I	--	--	2
3	Project Work Part - I	--	--	16
Total Credits				**20**

IV Semester

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
Total Credits				**20**

	L	P	C
I Year – I SEMESTER	**4**	**0**	**3**

ADVANCED DATA STRUCTURES AND ALGORITHM ANAYLSIS

UNIT- I:
Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II:
Searching-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT,BFT),Expression Trees(Infix,prefix,postfix).Graphs-Basic Concepts , Storage Structures and Traversals.

UNIT- III:
Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT- IV:
Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT –V:
Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching. Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:
1. Data Structures: A Pseudocode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCES BOOKS:
1. Data Structures and Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures and Algorithms, 3/e, Adam Drozdek, Cengage.
3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad, S Chand & Co, 2009.

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I Year – I SEMESTER	**4**	**0**	**3**

FORMAL LANGUAGE AND AUTOMATA THEORY

UNIT – I: Finite Automata

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, 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, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT – II: Regular Expressions

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

UNIT – III: Context Free Grammars

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, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

UNIT – IV: Pushdown Automata

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 – V: Turning Machine and Computability

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. 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:

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

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I Year – I SEMESTER	**4**	**0**

COMPUTER ORGANIZATION

UNIT -I:

Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

UNIT -II:

Machine Instruction and Programs:

Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,

Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

UNIT -III:

Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

UNIT -IV:

INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access,

Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

UNIT -V:

The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks, **Processing Unit:** Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control,

Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

TEXT BOOKS:

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.

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DATABASE INTERNALS

UNIT- I:

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

UNIT- II:

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

UNIT- III:

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional

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

UNIT- IV:

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

UNIT-V:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Database Management System Oracle SQL and PL/SQL,P.K.Das Gupta, PHI.
2. Database System Concepts ,Peter Rob & Carlos Coronel, Cengage Learning,2008.
3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.

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I Year – I SEMESTER	**4**	**0**	**3**

ADVANCED OPERATING SYSTEMS

UNIT - 1:
Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms - a comparative performance analysis.

UNIT - 2:
Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT - 3:
Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT - 4:
Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-public key cryptography - multiple encryption - authentication in distributed systems.

UNIT - 5:
Multiprocessor operating systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCE Books:

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003

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I Year – I SEMESTER	**4**	**0**	**3**

DATA WAREHOUSING AND DATA MINING

UNIT - 1: DATA WAREHOUSING

Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT - II: BUSINESS ANALYSIS

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT - III: DATA MINING

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT - IV: ASSOCIATION RULE MINING AND CLASSIFICATION

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification–Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT - V: CLUSTERING AND TRENDS IN DATA MINING

Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods – Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS:

1. Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Aja, “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Daniel T.Larose, “Data Mining Methods and Models”, Wiley-Interscience, 2006.

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I Year – I SEMESTER	**0**	**3**	**2**

CSE LAB 1

DATA STRUCTURES PROGRAMS:

1. To implement Stacks& Queues using Arrays & Linked Lists
2. To implement Stack ADT, Queue ADT using arrays & Linked Lists
3. To implement Dequeue using Double Linked List & Arrays
4. To perform various Recursive & Non-recursive operations on Binary Search Tree
5. To implement BFS & DFS for a graph
6. To implement Merge & Heap sort of given elements
7. To perform various operations on AVL trees
8. To implement Krushkal's algorithm to generate a min-cost spanning tree
9. To implement Prim's algorithm to generate min-cost spanning tree
10. To implement functions of Dictionary using Hashing

OPERATING SYSTEM PROGRAMS:

1. Program to implement FCFS(First Come First Serve)scheduling Algorithms
2. Program to implement SJF(Shortest Job First)Scheduling Algorithm
3. Program to implement Priority Scheduling algorithm
4. Program to implement Round Robin Scheduling algorithm
5. Program to implement FIFO(First In First Out) Page Replacement Algorithm
6. Program to implement LRU(least Recently used)Page Replacement Algorithm
7. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
8. Write a program to implement how Disk Scheduling is done in operating system
9. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

OPERATING SYSTEM PROGRAMS:

10. Program to implement FCFS(First Come First Serve)scheduling Algorithms
11. Program to implement SJF(Shortest Job First)Scheduling Algorithm
12. Program to implement Priority Scheduling algorithm
13. Program to implement Round Robin Scheduling algorithm
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16. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
17. Write a program to implement how Disk Scheduling is done in operating system
18. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

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I Year – 2nd SEMESTER	**4**	**0**	**3**

CYBER SECURITY

UNIT - I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT - II :

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT - III:

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

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT - IV:

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

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT - V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

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I Year – 2nd SEMESTER	**4**	**0**	**3**

BIG DATA ANALYTICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE LINKS:

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

	L	P	C
I Year – 2nd SEMESTER	**4**	**0**	**3**

WEB TECHNOLOGIES

UNIT-I:
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

UNIT-II:
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-III:
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. Working with forms and Databases such as MySQL.

UNIT-IV:
PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

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

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, 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.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. http://www.upriss.org.uk/perl/PerlCourse.html

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I Year – 2nd SEMESTER	**4**	**0**	**3**

ADVANCED UNIX PROGRAMMING

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 Chgrp 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. 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:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

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

	L	P	C
I Year – 2nd SEMESTER	**4**	**0**	**3**

SOFTWARE ENGINEERING
(Elective – 1)

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 Characterise of 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

TEXT BOOKS:

1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. 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, Pankaj Jalote, 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.

ARTIFICIAL INTELLIGENCE

(Elective – 1)

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

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
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

COMPILER DESIGN
(Elective – 1)

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.

UNIT – IV

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

UNIT – V

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.

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

MACHINE LEARNING
(Elective -1)

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbors and exemplars, Nearest Neighbors classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

OBJECT ORIENTED ANALYSIS & DESIGN USING UML
(Elective – 2)

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. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

TEXT BOOKS:

1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, 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

PARALLEL ALGORITHMS
(Elective -2)

UNIT-1: Introduction:

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT- II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT -III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file - system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT- IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladder's Algorithms for dictionary operations.

UNIT- V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

1. Parallel computing theory and practice, Michel J.Quinn
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

CLOUD COMPUTING
(Elective – 2)

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

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

UNIT V:

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

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

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

TEXT BOOKS:

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

REFERNCE BOOK:

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

DIGITAL IMAGE PROCESSING
(Elective -2)

UNIT- I:
Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems
DDA line algorithms: Bresenhams line and circle derivations and algorithms

UNIT- II:
2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations**- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

UNIT- III:
Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy
Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

UNIT- IV:
Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT- V:
SEGMENTATION: Threshold detection methods, Optimal Thres holding, Edge based Segmentation- Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.
Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

TEXT BOOKS:

1. Computer Graphics C Version, Donald Hearn, M Paulli Baker , Pearson (Uniit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

REFERENCES BOOKS:

1. Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier

I Year – 2nd SEMESTER

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CSE LAB-2

1. a) 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, 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 ls –l command.
4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.

   Ex: - ls –l | 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 usingsemaphores
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.
9. Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.
10. Write a Ruby program that uses iterator to find out the length of a string.
11. Write simple Ruby programs that uses arrays in Ruby.
12. Write programs which uses associative arrays concept of Ruby.

13. 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 id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ''.

Use init-parameters to do this.

14. Example PHP program for registering users of a website and login.

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

INFORMATION TECHNOLOGY

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

I Semester

S.No.	SUBJECT	L	P	C
1	ADVANCED DATA STRUCTURES	4	--	3
2	ADVANCED GRAPH THEORY	4	--	3
3	PARALLEL ALGORITHMS	4	--	3
4	DATA MINING AND KNOWLEDGE DISCOVERY	4	--	3
5	ADVANCED COMPUTER NETWORKS	4	--	3
6	WEB TECHNOLOGIES	4	--	3
7	IT LAB 1	--	3	2
Total Credits				**20**

II Semester

S.No.	SUBJECT	L	P	C
1	ADVANCED UNIX PROGRAMMING	4	--	3
2	CYBER SECURITY	4	--	3
3	BIG DATA ANALYTICS	4	--	3
4	CLOUD COMPUTING	4	--	3
5	**Elective – 1** 1. ADHOC & SENSOR NETWORKS 2. SEMANTIC WEBSERVICES 3. PRINCIPLES OF PROGRAMMING LANGUAGES 4. INTERNET OF THINGS	4	--	3
6	**Elective - 2** 1. MACHINE LEARNING 2. INFORMATION RETRIEVAL SYSTEM 3. IMAGE PROCESSING & PATTERN RECOGNITION 4. SOFTWARE TESTING METHODOLOGIES	4	--	3
7	IT LAB 2	--	3	2
Total Credits				**20**

III Semester

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	**--**	**--**	2
2	Seminar – I	--	--	2
3	Project Work Part - I	--	--	16
Total Credits				**20**

IV Semester

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
Total Credits				**20**

	L	P	C
I Year – 1st SEMESTER	**4**	**0**	**3**

ADVANCED DATA STRUCTURES

UNIT I:
Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT II:
Searching-Linear and Binary Search Methods.
Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort.
Trees- Binary trees, Properties, Representation and Traversals (DFT,BFT),Expression Trees(Infix,prefix,postfix).
Graphs-Basic Concepts , Storage Structures and Traversals.

UNIT III:
Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT IV:
Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .
Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT V:
Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations-, Insertion, Deletion and Searching.
Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, , Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:
1. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg,Behrouz A.Forouzon, Cengage.
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCES BOOKS:
1. Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures And Algorithms, 3/e, Adam Drozdek, Cenage.

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I Year – 1st SEMESTER	**4**	**0**	**3**

ADVANCED GRAPH THEORY

UNIT I:
Basic Concepts: Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group;
Trees: Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem,

UNIT II:
Connectivity: Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger's theorem;
Paths and Cycles: Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, circumference, the Chinese Postman Problem, the Traveling Salesman problem, diameter and maximum degree

UNIT III:
Matchings: Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f-factor theorem;
Extremal problems: Independent sets and covering numbers, Turan's theorem, Ramsey theorems;

UNIT IV:
Colorings: Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem;
Graphs on surfaces: Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces;

UNIT IV:
Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs
Networks and flows: Flow cuts, max flow min cut theorem
Selected topics: Dominating sets, the reconstruction problem

TEXT BOOKS:

1. Douglas B. West, Introduction to Graph Theory, Prentice Hall of India.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science. Prentice-Hall.

REFERENCE BOOKS:

1. Frank Harary, Graph Theory, Narosa.
2. R. Ahuja, T. Magnanti, and J. Orlin, Network Flows: Theory, Algorithms, and Applications, Prentice-Hall.

	L	P	C
I Year – 1st SEMESTER	**4**	**0**	**3**

PARALLEL ALGORITHMS

UNIT1: Introduction:

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file - system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel

search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

1. Parallel computing theory and practice, Michel J.Quinn
2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

	L	P	C
I Year – 1st SEMESTER	**4**	**0**	**3**

DATA MINING AND KNOWLEDGE DISCOVERY

Unit 1:
Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

Unit 2: Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classfier, Support vector Machines: Linear SVM, Separable and Non Separable case.

Unit 3: Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical , Continuous attributes, Concept hierarchy, Sequential , Sub graph patterns

Unit 4: Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

Unit 5: Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines :Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

TEXT BOOKS:
1. Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipinkumar, Addision-Wesley.
2. Introduction to Data Mining with Case Studies: GK Gupta; Prentice Hall.

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

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I Year – 1st SEMESTER	**4**	**0**	**3**

ADVANCED COMPUTER NETWORKS

Unit-I:
Network layer: Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets.
Routing Algorithm –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks-
congestion control algorithms-Load shedding, Congestion control in Data gram Subnet.

Unit-II:
IPV4 Address address space, notations, classful addressing, classless addressing network addressing translation(NAT) , **IPV6 Address** structure address space, **Internetworking** need for network layer internet as a data gram, internet as connection less network.
IPV4 datagram, Fragmentation, checksum, options.
IPV6 Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

Unit–III:
Process to process delivery: client/server paradigm, multiplexing and demultiplexing, connectionless versus connection oriented services, reliable versus reliable.
UDP: well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP
TCP: TCP services, TCP features, segement, A TCP connection, Flow control, error control, congestion control.
SCTP: SCTP services SCTP features, packet format, An SCTP association, flow control, error control.
Congestion control: open loop congestion control, closed loop congestion control, Congestion control in TCP, frame relay,
QUALITY OF SERVICE: flow characteristics, flow classes **TECHNIQUES TO IMPROVE QOS**: scheduling, traffic shaping, resource reservation, admission control.

Unit –IV:
Multimedia: introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MBone-the multicast back bone

Unit –V: Emerging trends Computer Networks:
Mobile Ad hoc networks: applications of Ad hoc networks, challenges and issues in MANETS,MAC layers issues, routing protocols in MANET, transport layer issues, Ad Hoc networks security.
Wireless sensors networks: WSN functioning, operation system support in sensor devices, WSN Characteristics, sensor network operation, sensor Architecture: cluster management;
Wireless mesh networks WMN design, Issues in WMNs;

TEXT BOOKS:

1. Data communications and networking 4th edtion Behrouz A Fourzan, TMH
2. Computer networks 4th editon Andrew S Tanenbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

REFERENCE BOOKS:

1. Computer networks, A system Approach, 5th ed, Larry L Peterson and Bruce S Davie, Elsevier

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WEB TECHNOLOGIES

UNIT-I:

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, Patttern Matching using Regular Expressions

UNIT-II:

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-III:

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.Working with forms and Databases such as MySQL.

UNIT-IV:

PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-V:

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

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, 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.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. http://www.upriss.org.uk/perl/PerlCourse.html

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I Year – 1st SEMESTER	**0**	**3**	**2**

IT LAB 1

1) Write a c program to implement one to one chat application using sockets?
2) Write a c program to implement redundancy check using CRC?
3) Write a java program to implement simulation of sliding window protocol?
4) Write a java program to get the MAC or Physical address of the system using Address Resolution Protocol?
5) By using Data mining tool Demonstration of preprocessing on dataset student.arff?
6) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7) By using Data mining tool Demonstration of Association rule process on dataset test.arff using apriori algorithm?
8) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using naïve baye's algorithm?
9) By using Data mining tool Demonstration of clustering rule process on dataset iris.arff using simple k-means algorithms.
10) To perform various Recursive & Non-Recursive operations on Binary Search Tree
11) To implement BFS & DFS for a Graph
12) To implement Merge & Heap Sort of given elements
13) To perform various operations on AVL trees
14) To implement Krushkal's algorithm to generate a min-cost spanning tree
15) To implement Prim's algorithm to generate a min-cost spanning tree
16) To implement functions of Dictionary using Hashing

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I Year – 2nd SEMESTER	**4**	**0**	**3**

ADVANCED UNIX PROGRAMMING

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 Chgrp 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. 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:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

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

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I Year – 2nd SEMESTER	**4**	**0**	**3**

CYBER SECURITY

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II :

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III :

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

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

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

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V :

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010

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BIG DATA ANALYTICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE LINKS:

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

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CLOUD COMPUTING

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

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

UNIT V:

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

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

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

TEXT BOOKS:

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

REFERNCE BOOK:

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

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I Year – 2nd SEMESTER	**4**	**0**	**3**

ADHOC & SENSOR NETWORKS
(Elective -1)

UNIT I: Introduction to Ad Hoc Wireless Networks
Cellular and Ad Hoc Wireless Networks, Characteristics of MANETs, Applications of MANETs, Issues and Challenges of MANETs, Ad Hoc Wireless Internet, MAC protocols for Ad hoc Wireless Networks-Issues, Design Goals and Classifications of the MAC Protocols

UNIT II: Routing Protocols for Ad Hoc Wireless Networks
Issues in Designing a Routing Protocol, Classifications of Routing Protocols, Topology-based versus Position-based Approaches, Issues and design goals of a Transport layer protocol, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Solutions for TCP over Ad Hoc Wireless Networks, Other Transport layer protocols.

UNIT III: Security protocols for Ad hoc Wireless Networks
Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks, Cooperation in MANETs, Intrusion Detection Systems.

UNIT IV: Basics of Wireless Sensors and Applications
The Mica Mote, Sensing and Communication Range, Design Issues, Energy Consumption, Clustering of Sensors, Applications, Data Retrieval in Sensor Networks-Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT V: Security in WSNs
Security in WSNs, Key Management in WSNs, Secure Data Aggregation in WSNs, Sensor Network Hardware-Components of Sensor Mote, Sensor Network Operating Systems–TinyOS, LA-TinyOS, SOS, RETOS, Imperative Language-nesC, Dataflow style language: Tiny GALS, Node-Level Simulators, NS-2 and its sensor network extension, TOSSIM.

TEXT BOOKS:

4. Ad Hoc Wireless Networks – Architectures and Protocols, C. Siva Ram Murthy, B. S. Murthy, Pearson Education, 2004
5. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Cordeiro Dharma P.Agrawal,* World Scientific Publications / Cambridge University Press, March 2006
6. Wireless Sensor Networks – Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010

REFERENCE BOOKS:

5. Wireless Sensor Networks: An Information Processing Approach, *Feng Zhao, Leonidas Guibas*, Elsevier Science imprint, Morgan Kauffman Publishers, 2005, rp2009
6. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008
7. Ad hoc Networking, *Charles E.Perkins*, Pearson Education, 2001
8. Wireless Ad hoc Networking, *Shih-Lin Wu, Yu-Chee Tseng,* Auerbach Publications, Taylor & Francis Group, 2007

SEMANTIC WEBSERVICES
(Elective -1)

Unit I: Web Intelligence

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artifical Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

Unit II: Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

Unit III: Ontology Engineering

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Unit IV: Semantic Web Applications, Services and Technology

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

Unit V:.Social Network Analysis and semantic web

What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCE BOOKS:

1. Semantic Web Technologies ,Trends and Research in Ontology Based Systems, J.Davies, Rudi Studer, Paul Warren, John Wiley&Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.

PRINCIPLES OF PROGRAMMING LANGUAGES
(Elective -1)

UNIT I:
Syntax and semantics: Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

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, blocks, dynamic scoping

UNIT IV:
Object- orientation, concurrency, and event handling: Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores,
Monitors, message passing, threads, statement level concurrency, exception handling, event handling

UNIT V:
Functional programming languages: Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, –
Programming with ML,
Logic programming languages: Introduction to logic and logic programming, –
Programming with Prolog, multi - paradigm languages

TEXT BOOKS:

1. Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

REFERENCE BOOKS:

1. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.
2. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
3. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
4. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.

INTERNET OF THINGS

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

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

UNIT II:

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

UNIT III:

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

UNIT IV:

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

UNIT V:

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

TEXTBOOKS:

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

REFERNCE BOOKS:

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

MACHINE LEARNING
(Elective -2)

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

INFORMATION RETRIEVAL SYSTEM
(Elective -2)

Unit I : Introduction to Information storage and retrieval systems:
Domain Analysis of IR systems, IR and other types of Information Systems, IR System Evaluation
Introduction to Data structures and algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

Unit II: Inverted Files and Signature Files:
Introduction, Structures used in Inverted Files, Building an Inverted file using a sorted array, Modifications to the Basic Techniques.
Signature Files: Concepts of Signature files, Compression, Vertical Partitioning, Horizontal Partitioning.

Unit III: New Indices for Text, Lexical Analysis and Stop lists:
PAT Trees and PAT Arrays: Introduction, PAT Tree structure, Algorithms on the PAT Trees, Building PAT Trees as PATRICA Trees, PAT representation as Arrays. Stop lists.

Unit IV: Stemming Algorithms and Thesaurus Construction:
Types of Stemming algorithms, Experimental Evaluations of Stemming, Stemming to Compress Inverted Files.
Thesaurus Construction: Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri.

Unit V: String Searching Algorithms:
Introduction, Preliminaries, The Naive Algorithm, The Knutt-Morris-Pratt Algorithm, The Boyer-Moore Algorithm, The Shift-Or Algorithm, The Karp-Rabin Algorithm.

TEXT BOOKS

1. Modern Information Retrieval, Ricardo Baeza-Yates, Neto, PEA,2007.
2. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark Academic Press, 2000.

IMAGE PROCESSING & PATTERN RECOGNITION
(Elective -2)

UNIT I:

Pattern Recognition: machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation.

Bayesian Decision Theory: Introduction, continuous features-two categories classifications, minimum error rate classification-zero-one loss function, classifiers, discriminate functions, and decision surfaces.

UNIT II:

Normal density: Univariate and multivariate density, discriminate functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context.

Component analyses: Principal component analysis, non-linear component analysis, Low dimensional representations, and multi dimensional scaling.

UNIT III:

Digitized Image and its properties: Basic concepts, Image Functions, the dirac distribution and convolution, the Fourier transform, Images as a Stochastic process, Images as linear systems.

Image Digitization: Sampling, Quantization, Colour Images.

Digital Image Properties: Metric and topological properties of Digital Images, Histograms, Visual perception of the Image, Image quality, Noise in Images.

UNIT IV:

Data Structures for Image Analysis: Levels of Image Data representation, traditional Image Data Structures- Matrices, Chains, Topological Data Structures, Relational Structures.

UNIT V:

Image Pre-processing: Pixel brightness transformation – Position dependent brightness correction, Gray scale transformation. Geometric Transformations -- Pixel co-ordinate transformation, Brightness interpolation. Local Pre-processing – Image smoothing, Edge-detectors, Zero crossings of the second deritives, scale in Image processing, canny edge detection, parametric edge models, edges in multi spectral images, other local pre-processing operators, adaptive neighborhood pre-processing.

Text Books:

1. Image Processing, Analysis and Machine Vision – Milan Sonka, Vaclav Hlavac, Roger Boyle,
   Second Edition – Vikas Publishing House.
2. pattern classification ,Richard o.Duda, peter E.Hart, David G.Stroke, Wiley student edition,2nd
   edition.
3. Digital Image processing , Rafeal C.Gonzalez,Richard E.Woods, 2nd edition, Pearson Education/PHI.

Reference:

1. Digital Image Processing And Analysis – Chanda & Majumder

SOFTWARE TESTING METHODOLOGIES
(Elective -2)

UNIT-I:

Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II:

Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.

Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

UNIT-III:

Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

UNIT-IV:

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT – V:

Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

TEXT BOOKS:

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing- Yogesh Singh, Camebridge

REFERENCE BOOKS:

1. The Craft of software testing - Brian Marick, Pearson Education.
2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.
4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.

	L	P	C
I Year – 2nd SEMESTER	**0**	**3**	**2**

IT LAB 2

1. Write a Program to count the number of words and lines supplied at standard input using UNIX shell programming?
2. Write a shell script to find the factorial of a number entered through keyboard?
3. Write a shell script to find the gross salary given that if the basic salary is less then 1500 then HRA =10% of basic salary and DA=90% if the basic salary is greater then or equal to 1500 then HRA=500 and DA=98% of basic salary. The employee's basic salary is the input through keyboard?
4. Write a shell script to display following information using case statement?
    a. List users
    b. Show date
    c. Display file
    d. Change working directory
    e. Return to original directory
    f. Quit
5. Write a c program to implement one to one chat application using sockets?
6. Write a c program to implement redundancy check using CRC?
7. Write a java program to implement simulation of sliding window protocol?
8. Write a java program to get the MAC or Physical address of the system using Address Resolution Protocol?
9. Write a java program to implement Play Fair Cipher to encrypt and decrypt a given message?
10. Write a java program to demonstrate public-key based asymmetric algorithms for encryption-based security of information?
11. Write a java program that implement secured Internet Protocol (IP) communications by using Internet Protocol Security (IPSec)?
12. Write a java program to implement RSA algorithm?

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

NEURAL NETWROKS

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

I Semester

S.No.	SUBJECT	L	P	C
1	ARTIFICIAL INTELLIGENCE	4	--	3
2	DATA WAREHOUSING AND MINING	4	--	3
3	WEB TECHNOLOGIES	4	--	3
4	NATURAL LANGUAGE PROCESSING	4	--	3
5	CYBER SECUIRTY	4	--	3
6	COMPUTATIONAL INTELLIGENCE	4	--	3
7	NN LAB 1	--	3	2
Total Credits				**20**

II Semester

S.No.	SUBJECT	L	P	C
1	MACHINE LEARNING	4	--	3
2	ARTIFICIAL NEURAL NETWORKS	4	--	3
3	BIG DATA ANALYTICS	4	--	3
4	ADVANCED ALGORITHMS	4	--	3
5	**Elective – 1** 1. OBJECT ORIENTED ANALYSIS AND DESIGN 2. SOFT COMPUTING 3. COGNITIVE SYSTEMS 4. EXPERT SYSTEMS	4	--	3
6	**Elective - 2** 1. COMPUTER VISION AND IMAGE PROCESSING 2. CLOUD COMPUTING 3. DECISION SUPPORT SYSTEMS 4. INFORMATION STORAGE MANAGEMENT	4	--	3
7	NN LAB 2	--	3	2
Total Credits				**20**

III Semester

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	**--**	**--**	2
2	Seminar – I	--	--	2
3	Project Work Part - I	--	--	16
Total Credits				**20**

IV Semester

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
Total Credits				**20**

	L	P	C
I Year – 1st SEMESTER	**4**	**0**	**3**

ARTIFICIAL INTELLIGENCE

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

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
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

	L	P	C
I Year – 1st SEMESTER	**4**	**0**	**3**

DATA WAREHOUSING AND DATA MINING

UNIT 1: DATA WAREHOUSING

Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT II: BUSINESS ANALYSIS

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III: DATA MINING

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV :ASSOCIATION RULE MINING AND CLASSIFICATION

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V :CLUSTERING AND TRENDS IN DATA MINING

Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods – Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS:

1. Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

AULibrary.com

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Aja, “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Daniel T.Larose, “Data Mining Methods and Models”, Wiley-Interscience, 2006.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

WEB TECHNOLOGIES

UNIT-I:

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

UNIT-II:

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-III:

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. Working with forms and Databases such as MySQL.

UNIT-IV:

PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

UNIT-V:

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

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, 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.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. http://www.upriss.org.uk/perl/PerlCourse.html

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I Year – 1st SEMESTER	**4**	**0**	**3**

NATURAL LANGUAGE PROCESSING

UNIT- I

Introduction: NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.

UNIT- II

N-gram Language Models: The role of language models, Simple Ngram models.Estimating parameters and smoothing. Evaluating language models.

Part of Speech Tagging and Sequence Labeling : Lexical syntax. Hidden Markov Models. Maximum Entropy Models. Conditional Random Fields

UNIT- III

Syntactic parsing: Grammar formalisms and tree banks. Efficient parsing for context-free grammars (CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs.

UNIT- IV

Semantic Analysis: Lexical semantics and word-sense disambiguation. Compositional semantics. Semantic Role Labeling and Semantic Parsing.

UNIT- V

Information Extraction (IE) and Machine Translation (MT): Named entity recognition and relation extraction. IE using sequence labeling. Basic issues in MT. Statistical translation, word alignment, phrasebased translation, and synchronous grammars. Dialogues: Turns and
utterances, grounding, dialogue acts and structures Natural Language Generation: Introduction to language generation, architecture, discourse planning (text schemata, rhetorical relations).

TEXT BOOK

1. D. Jurafsky & J. H. Martin – "Speech and Language Processing – An introduction to Languageprocessing, Computational Linguistics, and Speech Recognition", Pearson Education

REFERENCES

1. Allen, James. 1995. – "Natural Language Understanding". Benjamin/ Cummings, 2ed.
2. Bharathi, A., Vineet Chaitanya and Rajeev Sangal. 1995. Natural Language Processing- "A Pananian Perspective". Prentice Hll India, Eastern Economy Edition.
3. Eugene Cherniak: "Statistical Language Learning", MIT Press, 1993.
4. Manning, Christopher and Heinrich Schutze. 1999. "Foundations of Statistical Natural Language Processing". MIT Press.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

CYBER SECURITY

UNIT - I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT - II :

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT - III:

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

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT - IV:

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

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT - V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010

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I Year – 1st SEMESTER	**4**	**0**	**3**

COMPUTATIONAL INTELLIGENCE

UNIT -I

Introduction-Computational intelligences-agents,-example application domains-Representation and reasoning systems-Data log,-syntax and semantics-variables,-queries-recursion- Learning Issues, decision-tree, neural networks learning

UNIT -II

Proofs-soundness- completeness- top-down and bottom-up reasoning,- function symbols- Searching graphics, generic search engine- blind search strategies,-heuristic search,-A* search

UNIT- III

Pruning the search space-search direction-iterative deepening-dynamic programming-constraint satisfaction-consistency algorithms-hill climbing- randomized algorithms.

UNIT -IV

Knowledge representation issues- defining a solution- choosing a representation-semantic networks-frames-primitive and derived relations- Equality- inequality- unique names assumption,-complete knowledge assumption - negation as failure.

UNIT- V

STRIPS representation-situation calculus-forward planning-resolution and planning- Knowledge based systems - implementations- base language and meta language

TEXT BOOK:

1. Computational Intelligence: a logical approach by Poole, Mackworth and Goebel, 1998, Oxford University Press

REFERENCES:

1. David Poole, Alan Mackworth, Randy Goebel,"Computational Intelligence: a logical approach", Oxford University Press, 2004.

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I Year – 1st SEMESTER	**0**	**3**	**2**

NN LAB 1

Data Ware housing and Mining Lab:

1) By using Data mining tool Demonstration of pre-processing on dataset student.arff?
2) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using j48 algorithm
3) By using Data mining tool Demonstration of Association rule process on dataset test.arff using apriori algorithm?
4) By using Data mining tool Demonstration of classification rule process on dataset employee.arff using naïve baye's algorithm?
5) By using Data mining tool Demonstration of clustering rule process on dataset iris.arff using simple k-means algorithms.

Web Technologies Lab list:

1. Write Ruby program reads a number and calculates the factorial value of it and prints the Same.
2. Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.
3. Write a Ruby program that uses iterator to find out the length of a string.
4. Write Ruby program which uses Math module to find area of a triangle.
5. Write Ruby program which uses tk module to display a window
6. Define complex class in Ruby and do write methods to carry operations on complex objects.
7. Write perl program takes set names along the command line and prints whether they are regular files or special files
8. An example perl program to connect to a MySQl database table and executing simple commands.
9. Example PHP program for cotactus page.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

MACHINE LEARNING

UNIT -I: The ingredients of machine learning, Tasks: the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

UNIT- II: Beyond binary classification: Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

UNIT- III: Tree models: Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

UNIT -IV: Linear models: The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

UNIT- V: Probabilistic models: The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

TEXT BOOKS:

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
2. Machine Learning, Tom M. Mitchell, MGH.

REFERENCE BOOKS:

1. Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, and Cambridge.
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

ARTIFICIAL NEURAL NETWORKS

UNIT-I: Introduction and ANN Structure.

Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

UNIT-II

Mathematical Foundations and Learning mechanisms.Re-visiting vector and matrix algebra. State-space concepts. Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning.

UNIT-III

Single layer perceptrons. Structure and learning of perceptrons. Pattern classifier - introduction and Bayes' classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.

UNIT-IV: Feed forward ANN.

Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation - training and convergence. Functional approximation with back propagation. Practical and design issues of back propagation learning.

UNIT-V: Radial Basis Function Networks.

Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks.RBF network design and training. Approximation properties of RBF.

TEXT BOOKS:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

REFERENCE BOOKS:

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

	L	P	C
I Year – 2nd SEMESTER	**4**	**0**	**3**

BIG DATA ANALYTICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE LINKS:

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

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I Year – 2nd SEMESTER	**4**	**0**	**3**

ADVANCED ALGORITHMS

UNIT-I

Design Paradigms: Overview: Overview of Divide and Conquer, Greedy and Dynamic Programming strategies. Basic search and traversal techniques for graphs, Backtracking, Branch and Bound, Max Flow Problem

UNIT-II

String Matching: Introduction to string-matching problem, Naïve algorithm, Rabin Karp, Knuth Morris Pratt, Boyer-Moore algorithms and complexity analysis.

Theory of NP- Hard and NP-Complete Problems. : P, NP and NPC complete complexity classes; A few NP-Completeness proofs; Other complexity classes.

UNIT-III

Approximation Algorithms : Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

UNIT-IV

Parallel Algorithms: Introduction, Models, speedup and efficiency, Some basic techniques, Examples from graph theory, sorting, Parallel sorting networks. Parallel algorithms and their parallel time and processors complexity.

UNIT-V

Probabilistic Algorithms & Randomized Algorithms : Numerical probabilistic algorithms, Las Vegas and Monte Carlo algorithms, Game theoretic techniques, Applications on graph problems

TEXT BOOKS:

1. Introduction to Algorithms : T.H. Cormen, C.E.Leiserson and R.L. Rivest
2. Fundamentals of Algorithmics : G.Brassard and P.Bratley
3. Approximation Algorithms: Vijay V.Vazirani
4. Randomized Algorithms: R. Motwani and P.Raghavan

REFERENCE BOOK:

1. Algorithmic :The spirit of computing: D.Harel

	L	P	C
I Year – 1st SEMESTER	**4**	**0**	**3**

OBJECT ORIENTED ANALYSIS AND DESIGN
(Elective-I)

UNIT I:

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

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Head First Object Oriented Analysis & Design, Mclaughlin,SPD OReilly,2006
2. Object oriented Analysis& Design Using UML, Mahesh ,PHI
3. The Unified Modeling Language Reference Manual, 2/e, Rambaugh, Grady Booch,etc., PEA
4. Object Oriented Analysis & Design, Satzinger, Jackson, Thomson

SOFT COMPUTING
(Elective -1)

UNIT- I

FUZZY SET THEORY: Introduction to Neuro – Fuzzy and Soft Computing, Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations,
Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Surgeon Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

UNIT- II

OPTIMIZATION: Derivative based Optimization, Descent Methods, The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing, Random Search – Downhill Simplex Search.

UNIT -III

ARTIFICIAL INTELLIGENCE: Introduction, Knowledge Representation, Reasoning, Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainity Basic knowledge Representation Issues Knowledge acquisition, Heuristic Search: Techniques for Heuristic search Heuristic Classification
State Space Search: Strategies Implementation of Graph Search Search based on Recursion Patent-directed Search Production System and Learning.

UNIT -IV

NEURO FUZZY MODELING: Adaptive Neuro-Fuzzy Inference Systems, Architecture – Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy
Spectrum.

UNIT- V

APPLICATIONS OF COMPUTATIONAL INTELLIGENCE: Printed Character Recognition, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Soft Computing for Color Recipe Prediction.

TEXT BOOKS:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press, 2006.

REFERENCES:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, Second Edition, Tata Mcgraw Hill Publishing Comp., 2006, New Delhi.
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
3. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.

COGNITIVE SYSTEMS
(Elective -1)

UNIT 1:

Introduction to Knowledge Based Artificial Intelligence (KBAI) and Cognitive Systems. Where Knowledge-Based AI fits into AI as whole, Cognitive systems: what are they? Cognitive Science and Cognition, AI and cognition: how are they connected?

UNIT II:

Fundamentals: Semantic Networks, Generate & Test, Means-Ends Analysis, Problem Reduction, Production Systems

UNIT III:

Kinematics of Robot Manipulator: Introduction, General Mathematical Preliminaries on Vectors& Matrices, Direct Kinematics problem, Geometry Based Direct kinematics problem, Co-ordinate and vector transformation using matrices, Rotation matrix, Inverse Transformations, Problems, Composite Rotation matrix, Homogenous Transformations, Robotic Manipulator Joint Co-Ordinate System, Euler Angle & Euler Transformations, Roll-Pitch-Yaw(RPY) Transformation H Representation & Displacement Matrices for Standard Configurations, Jacobian Transformation in Robotic Manipulation. (SLE: Geometrical Approach to Inverse Kinematics.)

UNIT IV:

Visuospatial Reasoning Constraint Propagation, Visuospatial Reasoning Unit 8: Design & Creativity Configuration, Diagnosis, Design, Creativity Met cognition Learning by Correcting Mistakes, Meta-Reasoning, AI Ethics Module II (Cognitive Systems)Introduction: Automation and Robotics, Historical Development, Definitions, Basic Structure of Robots, Robot Anatomy, Complete Classification of Robots, Fundamentals about Robot Technology, Factors related to use Robot Performance, Basic Robot Configurations and their Relative Merits and Demerits, the Wrist & Gripper Subassemblies. Concepts about Basic Control System, ,Control Loops of Robotic Systems, Different Types of Controllers Proportional, Integral, Differential, PID controllers. (SLE: Types of Drive Systems and their Relative Merits)

UNIT V:

Robot Sensing & Vision: Various Sensors and their Classification, Use of Sensors and Sensor Based System in Robotics, Machine Vision System, Description, Sensing, Digitizing, Image Processing and Analysis and Application of Machine Vision System, Robotic Assembly Sensors and Intelligent Sensors.

TEXT BOOKS

1. Chris Forsythe el al. , Cognitive Systems: Human Cognitive Models in Systems Design, Kindle Edition
2. 2. G. F. Markus. The Algebraic Mind - Integrating Connectionism & Cognitive Science , MIT Press.
3. 3. Fu, Lee and Gonzalez, Robotics, control vision and intelligence. McGraw Hill . 4. John J. Craig, Introduction to Robotics, Addison Wesley

REFERENCES:

1. Henrik Christensen, Cognitive Systems (Cognitive Systems Monographs), Springer
2. Yoram Koren, Robotics for Engineers, McGraw Hill International, 1st edition, 1985.
3. Groover, Weiss, Nagel, Industrial Robotics, McGraw Hill International, 2nd edition, 2012. 4. Robotic Engineering -An Integrated approach, Klafter, Chmielewski and Negin, PHI, 1st edition, 2009

EXPERT SYSTEMS

(Elective -1)

UNIT- I:

Introduction What is AI? The Foundations of AI, What is an AI Technique?-Tic-Tac-Toe. Problems, Problem Spaces and Search Defining the problem as a state space search, Production systems, Problem characteristics, production system characteristics, Issues in the design of search programs.

UNIT -II:

Heuristic Search Techniques Generate-and-test, Hill climbing, Simulated Annealing, Best-First search, A* algorithm, AO* algorithm, Constraint satisfaction, Means-Ends Analysis.

UNIT –III:

First-Order Logic Syntax and Semantics, Extensions and Notational Variations, Using First-Order Logic, Representing Change in the world, Deducing hidden properties of the world. Interface in First-Order Logic Inference rules involving Quantifiers, An Example proof, Generalized Modus Ponens, Forward and Backward Chaining, Completeness, Resolution, Completeness of Resolution.

UNIT-IV:

Slot-and-Filler Structures Semantic Nets, Frames, Conceptual Dependency. Game Playing Overview, The Minimax Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening.

UNIT-V:

Natural Language Processing Introduction, Syntactic processing, Semantic analysis. Expert Systems Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

TEXT BOOKS:

1. Rich, Elaine and Knight, Kevin, Artificial Intelligence, Tata McGraw-Hill publications, 2nd Edition, 2006
2. Russell, Stuart and Norvig, Peter, Artificial Intelligence A Modern Approach, Pearson Education

REFERENCE BOOKS:

1. Eugene Charniak and Drew McDermott, Introduction to Artificial Intelligence, Addison Wesley, Pearson Education, 2005
2. George F Luger, Artificial Intelligence Structures and Strategies for Complex Problem Solving, Pearson Education Ltd., 2nd Edition, 2002. 3. Dan W Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice-Hall of India, 2001.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

COMPUTER VISION AND IMAGE PROCESSING
(Elective -2)

UNIT -I

Image Formation Models : Monocular imaging system, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems

UNIT- II

Image Processing and Feature Extraction: Image representations (continuous and discrete), Edge detection

UNIT- III

Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion

UNIT- IV

Shape Representation and Segmentation: Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, and Multiresolution analysis

UNIT- V

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal Component analysis, Shape priors for recognition

TEXT BOOKS:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall
2. Robot Vision, by B. K. P. Horn, McGraw-Hill.

REFERENCE BOOKS:

1. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

CLOUD COMPUTING
(Elective – 2)

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

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

UNIT V:

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

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

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

TEXT BOOKS:

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

REFERNCE BOOK:

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

DECISION SUPPORT SYSTEMS
(Elective -2)

UNIT -I

Basic Concepts: Decision making systems, Modeling and support, Basics and definition Systems models, Modeling process, Decision making, Intelligence phase, Design phase Choice phase, Evaluation, Implementation phase, Alternative decision making models, Decision support systems, Decision makers, Case applications.

UNIT- II

Decision Support System Development: Decision support system development, Basics, Life cycle, Methodologies, Prototype, Technology levels and tools, Development platforms, Tool selection, Developing DSS, Enterprise systems, Concepts and definition, Evolution of information systems, Information needs, Characteristics and capabilities, Comparing and integrating EIS and DSS, EIS data access, Data warehouse, OLAP, Multidimensional analysis,

Presentation and the Web, Including soft information enterprise on systems, Organizational DSS, Supply and value chains, Decision support, Supply chain problems and solutions, Computerized systems. MRP, ERP, SCM, Frontline decision support systems.

UNIT -III

Knowledge Management: Organizational learning and memory , Knowledge management, Development Methods, Technologies and tools, Success , Knowledge management and artificial intelligence, Electronic Document Management, Knowledge Acquisition and Validation, Knowledge Engineering – Scope, Acquisition Methods, Interviews, Tracking Methods, Observation and other Methods, Grid Analysis, Machine Learning, Rule Induction, Case-Based Reasoning, Neural Computing, Intelligent Agents, Selection of an appropriate Knowledge Acquisition Methods, Multiple Experts, Validation and Verification of the Knowledge Base-Analysis, Coding, Documenting, and Diagramming, Numeric and Documented.

UNIT -IV

Knowledge Acquisition, Knowledge Acquisition and the Internet/ Intranets, Knowledge Representation Basics, Representation in Logic and other Schemas, Semantic Networks, Production Rules, Frames, Multiple Knowledge Representation, Experimental Knowledge

Representations, Representing Uncertainty.

UNIT- V

Intelligent System Development: Inference Techniques, Reasoning in Artificial Intelligence, Inference with Rules, Inference Tree, Inference with Frames, Model Based and Case Based Reasoning, Explanation and Meta Knowledge, Inference with Uncertainty, Representing Uncertainty, Probabilities and Related Approaches, Theory of Certainty, Approximate Reasoning using Fuzzy Logic Intelligent Systems Development, Prototyping, Project Initialization, System Analysis and Design, Software Classification, Building Expert Systems with Tools, Shells and Environments, Software Selection, Hardware, Rapid Prototyping and a Demonstration Prototype, System Development, Implementation, Post Implementation.

TEXT BOOKS:

1. Decision Support Systems and Intelligent Systems, Sixth Edition, Efrain Turban and Jay E. Aronson, Pearson Education, 2001.

REFERENCES:

1. Knowledge Management Enabling business Growth, Ganesh Natarajan and Sandhya Shekhar, Tata McGraw Hill, 2002.
2. Decision Support System, George M. Marakas, Prentice Hall, India, 2003.
3. Decision Support and Data Warehouse Systems, Efrem A. Mallach, Tata McGraw,Hill, 2002.

INFORMATION STORAGE MANAGEMENT
(Elective -2)

UNIT-I
INTRODUCTION TO STORAGE TECHNOLOGY: Concepts of storage networking -Business applications defined for Storage - Sources of Data and states of data creation - Data center requirements and evolution - Managing complexity - Storage infrastructure – Evolution of storage - Information lifecycle management.

UNIT-II
STORAGE SYSTEMS ARCHITECTURE: Storage architectures - Peripheral connectivity- Components and concepts- Magnetic disk storage- Disk systems –Disk arrays- RAID storage arrays- Magnetic tape storage- Physical vs Logical disk organization - Caching properties
and algorithms - connectivity options - Differences in bus and network architectures.

UNIT-III
INTRODUCTION TO NETWORK STORAGE: Putting storage on the Network- The NAS Hardware- Software architecture- Network connectivity- NAS as a Storage system- NAS connectivity options- Connectivity protocols- Management principles- Storage Area Networks: Architecture- Hardware devices- Host bus adaptors- Connectivity - Content Addressable Storage (CAS) : Elements- Connectivity options- Standards and Management principles – Hybrid storage solutions overview.

UNIT-IV
INTRODUCTION TO INFORMATION AVAILABILITY: Business continuity and disaster recovery basics: Local business continuity techniques- Remote business continuity techniques - Storage design and implementations of Business continuity plan- Managing availability- Disaster recovery principles & techniques.

UNIT-V
MANAGING STORAGE VIRTUALIZATION: Managing Availability: Availability metrics – serviceability - capacity planning – Management tools: overview - information security virtualization – different virtualization technologies

TEXT BOOKS:
1. Robert Spalding, “Storage Networks: The Complete Reference”, Tata McGraw Hill Publishing Company, New Delhi, 2003.
2. Gerald J Kowalski and Mark T Mayburk,” Information storage and Retrieval Systems”, Springer International Edition, New Delhi, 2006.

REFERENCE BOOKS:
1. Ulf Troppens, Rainer Erkens and Wolfgang Müller “Storage Networks Explained” Wiley & Sons, USA, 2004.
2. Marc Farley Osborne, “Building Storage Networks”, Tata McGraw Hill Publishing Company, New Delhi, 2000.

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I Year – 2nd SEMESTER	**0**	**3**	**2**

NN LAB 2

Big Data Analytics lab:

1. (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.

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

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

3. Run a basic Word Count MapReduce program to understand MapReduce Paradigm**.**

4. Write a mapreduce 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.

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

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

OOAD lab:

1. create a UML diagram of ATM APPLICATION.
2. create a UML diagram of LIBRARY MANAGEMENT SYSTEM.
3. create a UML diagram of ONLINE BOOK SHOP
4. create a UML diagram of RAILWAY RESERVATION SYSTEM
5. create a UML diagram for BANKING SYSTEM

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

SOFTWARE ENGINEERING

(Applicable for batches admitted from 2016-2017)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

L P C

I Semester

S.No.	SUBJECT	L	P	C
1	SOFTWARE REQUIREMENTS AND ESTIMATION	4	--	3
2	SOFTWARE METRICS AND REUSE	4	--	3
3	SOFTWARE PROJECT AND PROCESS MANAGEMENT	4	--	3
4	WEB TECHNOLOGIES	4	--	3
5	BIG DATA ANALYTICS	4	--	3
6	SCRIPTING LANGUAGES	4	--	3
7	SE LAB 1	--	3	2
Total Credits				**20**

II Semester

S.NO	SUBJECT	L	P	C
1	SOFTWARE ARCHITECTURE AND DESIGN PATTERNS	4	--	3
2	SOFTWARE QUALITY ASSURANCE AND TESTING	4	--	3
3	CYBER SECURITY	4	--	3
4	SERVICE ORIENTED ARCHITECTURES	4	--	3
5	**Elective – 1** 1. SECURE SOFTWARE ENGINEERING 2. SYSTEMS ENGINEERING 3. ERP & SUPPLY CHAIN MANAGEMENT 4. E-COMMERCE	4	--	3
6	**Elective - 2** 1. USER INTERFACE DESIGN 2. CLOUD COMPUTING 3. SOFTWARE DEFINED NETWORKS 4. INTERNET OF THINGS	4	--	3
7	SE LAB 2	--	3	2
Total Credits				**20**

III Semester

S. No.	Subject	L	P	Credits
1	Comprehensive Viva-Voce	**--**	**--**	2
2	Seminar – I	--	--	2
3	Project Work – Part - I	--	--	16
Total Credits				**20**

IV Semester

S. No.	Subject	L	P	Credits
1	Seminar – II	--	--	2
2	Project Work Part - II	--	--	18
Total Credits				**20**

SOFTWARE REQUIREMENTS AND ESTIMATION

UNIT I:

Software Requirements: What and Why

Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management

UNIT II:

Software Requirements Engineering : Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality **Software Requirements Modeling:** Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames

UNIT III:

Software Requirements Management : Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain

Requirements Management Tools: Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation

UNIT IV:

Software Estimation: Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation.

Size Estimation: Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures,

UNIT V:

Effort, Schedule and Cost Estimation: What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation

Software Estimation Tools: Desirable features in software estimation tools, IFPUG, USC's COCOMO II, SLIM (Software Life Cycle Management) Tools

TEXT BOOKS:

1. Software Requirements and Estimation by Rajesh Naik and Swapna Kishore, Tata Mc Graw Hill

REFERENCES:

1. Software Requirements by Karl E. Weigers, Microsoft Press.
2. Managing Software Requirements, Dean Leffingwell & Don Widrig, Pearson Education, 2003.
3. Mastering the requirements process, second edition, Suzanne Robertson & James Robertson, Pearson Education, 2006.

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I Year – 2nd SEMESTER	**4**	**0**	**3**

SOFTWARE METRICS AND REUSE

UNIT- I

Introduction to software quality: Quality: Popular Views & Professional Views, Software Quality, Total quality management Fundamentals of Measurement Theory: Definition, Operational Definition and Measurement, Level of Measurement, Some Basic Measures, Reliability and Validity, Measurement Errors, Be Careful with Correlation, Criteria for Causality.

Software Quality Metrics Overview: Product Quality Metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metrics Programs, Collecting Software Engineering Data.

UNIT- II

Applying the Seven Basic Quality Tools in Software Development: Ishikawa's Seven Basic Tools, Checklist, Pareto Diagram, Histogram, Run Charts, Scatter Diagram, Control Chart, Cause-and-Effect Diagram, Relations Diagram.

Defect Removal Effectiveness: A closer look at Defect Removal Effectiveness, Defect Removal Effectiveness and Quality Planning, Cost Effectiveness of Phase Defect Removal

UNIT- III

In-Process Metrics for Software Testing: In-Process metrics for Software Testing, In-Process metrics and Quality Management, Possible Metrics for Acceptance Testing to evaluate Vendor Developed Software, How do you know Your Product is Good Enough to Ship?

Complexity Metrics and Models: Lines of Code, Halstead's Software Science, Cyclomatic Complexity, Syntactic Constructs, Structure Metrics, An Example of Module Design Metrics in Practice

UNIT- IV

Metrics and Lessons learned for Object-oriented projects: Object - oriented Concepts and Constructs, Design and Complexity metrics, productivity metrics, Quality and quality management metrics, Lessons learned for OO projects.

Using Function Point Metrics to Measure Software Process Improvement: Software Process Improvement Sequences, Process Improvement Economics, Measuring Process Improvements at Activity Levels.

UNIT V:

Reuse: Introduction, benefits of reuse, reuse landscape, design patterns, generator based reuse, application frame work for reuse, applications of system reuse, COTS product reuse

TEXT BOOKS:

1. Metrics and Models in Software Quality Engineering, Stephen H. Kan, Second Edition, Pearson Education Asia, 2003
2. Software Engineering, Sommerville, 7ed, Pearson

REFERENCES:

1. Software Engineering Measurement, John C. Munson Auerbach Publication, 2003
2. Estimating Software– intensive systems: projects, products and processes, Richards D. Stutzke, Addision – Wesley 2005
3. Software Metrics: A guide to planning, analysis and application, C. Ravindranath Pandian, Auerbach Publication, 2003
4. Practical Implementation of Software Metrics, Paul Goodman, Mc.Graw Hill, 1993

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I Year – 1st SEMESTER	**4**	**0**	**3**

SOFTWARE PROJECT AND PROCESS MANAGEMENT

UNIT I :
Software Process Maturity Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process. Process Reference Models Capability Maturity Model (CMM), CMMi, PCMM, PSP, TSP.

UNIT II :
Software Project Management Renaissance Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

UNIT III:
Life-Cycle Phases and Process artifacts Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures. Workflows and Checkpoints of process Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments.

UNIT IV:
Process Planning and Project Organizations Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning, line-of- business organizations, project organizations, evolution of organizations, process automation.

UNIT V :
Project Control and process instrumentation The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation. CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions

TEXT BOOKS:
1. Managing the Software Process, Watts S. Humphrey, Pearson Education, 1999
2. Software Project Management, Walker Royce, Pearson Education, 1998

REFERENCE BOOKS:
1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000 2. Process Improvement essentials, James R. Persse, O'Reilly,2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata Mc-Graw Hill,2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006. 5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly,2007

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I Year – 1st SEMESTER	**4**	**0**	**3**

WEB TECHNOLOGIES

UNIT-I:
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

UNIT-II:
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-III:
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. Working with forms and Databases such as MySQL.

UNIT-IV: PERL: Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.

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

TEXT BOOKS:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, 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.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
5. http://www.upriss.org.uk/perl/PerlCourse.html

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I Year – 1st SEMESTER	**4**	**0**	**3**

BIG DATA ANALYTICS

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE LINKS:

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

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SCRIPTING LANGUAGES

UNIT - I

Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT - II

Advanced perl Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT- III

PHP Basics PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT - IV

Advanced PHP Programming PHP and Web Forms, Files, PHP Authentication and Methodologies - Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the M crypt package, Building Web sites for the World.

UNIT -V

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures , strings , patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding , Perl-Tk.

Python Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling. Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech)

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Programming Python, M.Lutz, SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
4. PHP 5.1, I.Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.

6. Guide to Programming with Python, M.Dawson, Cengage Learning.
7. Perl by Example, E.Quigley, Pearson Education.

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I Year – 2nd SEMESTER	**0**	**3**	**2**

SE LAB 1

Web Technologies programs:

1. Write Ruby program reads a number and calculates the factorial value of it and prints the Same.
2. Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.
3. Write a Ruby program that uses iterator to find out the length of a string.
4. Write Ruby program which uses Math module to find area of a triangle.
5. Write Ruby program which uses tk module to display a window
6. Define complex class in Ruby and do write methods to carry operations on complex objects.
7. Write perl program takes set names along the command line and prints whether they are regular files or special files
8. An example perl program to connect to a MySQl database table and executing simple commands.
9. Example PHP program for cotactus page.

Big Data Analytics programs:

(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.

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

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

8. Run a basic Word Count MapReduce program to understand MapReduce Paradigm**.**

9. Write a mapreduce 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.

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

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

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SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

UNIT- I

Envisioning Architecture: The Architecture Business Cycle, Software Architecture, Designing the Architecture, Documenting the architecture, Reconstructing Software Architecture

UNIT- II

Creating Architecture: Quality Attributes, Moving from quality to architecture, Architectural styles and patterns, UNIT Operations, Achieving qualities, designing the Architecture, Documenting the architecture, Reconstructing Software Architecture, shared information systems

Analyzing Software Architecture: Analyzing development qualities at the architectural level, SAAM, ATAM, CBAM, Architecture Reviews

UNIT- III

Moving from Architecture to Systems: Software Product Lines, Building systems from off the shelf components, Reuse of Architectural assets within an organization.

UNIT- V

Patterns: What is pattern? Pattern categories, Pattern Description, Patterns and Software Architecture, Pattern Systems, Classification, Selection

Design Patterns Catalog: Creational Pattern, Structural Pattern, Behavioral Patterns, Pattern Community, Designing a document editor

UNIT- V

Case Studies : Key word in Context, The World Wide Web - a case study in interoperability, Instrumentation software, cruise control, three vignettes in mixed styles,

TEXT BOOKS:

1. Software Architecture in Practice, 2nd Edition by Len Bass, Paul Clements, Rick Kazman, Pearson Edition
2. Design Patterns, by Erich Gamma, Pearson Education

REFERENCE BOOKS:

1. Beyond Software architecture, Luke I-Iohmann, Addison weslcy, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR,200|
3. Pattern Oriented Software Architecture,F.Buschmann&others,John Wiley&Sons.
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006

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SOFTWARE QUALITY ASSURANCE AND TESTING

UNIT – I

Software quality assurance Framework and Standards SQA Frame work: What is Quality? Software Quality Assurance. Components of Software quality Assurance.

Software Quality Assurance Plan : Steps to develop and implement a Software quality Assurance Plan.

Standards: ISO9000, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma

UNIT II

Software Quality Assurance Metrics and Measurement Software Quality Assurance Metrics: Product Quality metrics, In- Process Quality metrics, Metrics for Software Maintenance. Examples of Metric Programs, Software quality indicators Fundamentals in Measurement Theory

UNIT -III

Building Software Testing Environment : Writing Policy for software testing, Economics of testing, Building a structured approach to software testing .

Software Testing process: Defects Hard to find, Functional and structured testing, Workbench concept, Customising the software testing process, testing tactics check list

UNIT -IV

Software Testing Techniques : Black-Box testing, Boundary value analysis, Bottom-up, Branch Coverage, Cause- Effect graphing, CRUD, Database, exception, Gray_box, Histogram, Inspections, JADs, Pareto Analysis, prototyping, random Testing, Risk based Testing, Regression Testing, Structured Walkthrough, Thread testing, Performance Testing,
White Box Testing

Software Testing Tools: Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win Runner and Rational Testing Tools, Java testing Tools, JMetra, JUNIT and Cactus

UNIT -V

Testing Process : Advantages of following a process, Cost of computer testing, Seven step software Testing Process, Define the scope of testing, Developing the test plan, Verification Testing. Validation Testing, Analysing and reporting test results, Acceptance and
operational Testing, Post Implementation Analysis

Testing Specialised Systems and Applications : Testing Client/Server System, Testing COTS and Contracted Software, Testing security, Testing Data Warehouse .

TEXT BOOKS:

1. William E.Perry:Effective Methods for Software Testing, 3rd Edition,Wiley Publication,

REFERENCE BOOKS:

1 Testing and Quality Assurance for Component-based Software, by Gao, Tsao and Wu, Artech House Publishers

2 Software Testing Techniques, by Bories Beizer, Second Edition, Dreamtech Press

3 Managing the Testing Process, by Rex Black, Wiley

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CYBER SECURITY

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II:

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III:

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

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

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

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V :

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010

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SERVICE ORIENTED ARCHITECTURES

UNIT - I

SOA Fundamentals: Defining SOA, Business Value of SOA, Evolution of SOA, SOA characteristics, concept of a service in SOA, misperceptions about SOA, Basic SOA architecture, infrastructure services, Enterprise Service Bus (ESB), SOA Enterprise Software models, IBM On Demand operating environment

UNIT - II

SOA Planning and Analysis: Stages of the SOA lifecycle, SOA Delivery Strategies, service-oriented analysis, Capture and assess business and IT issues and drivers, determining non-functional requirements (e.g., technical onstraints, business constraints, runtime qualities, no runtime qualities), business centric SOA and its benefits, Service modeling, Basic modeling building blocks, service models for legacy application integration and enterprise integration, Enterprise solution assets(ESA)

UNIT – III

SOA Design and implementation: Service-oriented design process, design activities, determine services and tasks based on business process model, choosing appropriate standards, articulate architecture,

UNIT - IV

mapping business processes to technology, designing service integration environment (e.g., ESB, registry), Tools available for appropriate designing, implementing SOA, security implementation, implementation of integration patterns, services enablement, quality
assurance

UNIT - V

Managing SOA Environment : Distributing service management and monitoring concepts, operational management challenges, Service-level agreement considerations, SOA governance (SLA, roles and responsibilities, policies, critical success factors, and metrices), QoS
compliance in SOA governance, role of ESB in SOA governance, impact of changes to services in the SOA lifecycle

TEXT BOOKS

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Prentice Hall Publication, 2005.
2. Norbert Bieberstein, Sanjay Bose, Marc Fiammante, Keith Jones, Rawn Shah, “Service-Oriented Architecture Compass: Business Value, Planning,and Enterprise Roadmap”, IBM Press Publication, 2005.

REFERENCES

1. Thomas Erl, “Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services”, Prentice Hall Publication, 2004
2. Dave Chappell, “Enterprise Service Bus”, O’Reilly Publications, 2004

3. Sanjiva Weerawarana, Francisco Curbera, Frank Leymann, Tony Storey, Donald F.Ferguson, “Web Services Platform Architecture: SOAP, WSDL, WS-Policy, WSAddressing, WS-BPEL, WS-Reliable essaging, and More”, Prentice Hall Publication, 2005

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SECURE SOFTWARE ENGINEERING
(Elective -1)

UNIT- I

Why Is Security a Software Issue? Introduction, The Problem, Software Assurance and Software Security, Threats to Software Security, Sources of Software Insecurity, The Benefits of Detecting Software Security Defects Early, Managing Secure Software Development

What Makes Software Secure? Introduction, Defining Properties of Secure Software, How to Influence the Security Properties of Software, How to Assert and Specify Desired Security Properties

UNIT -II

Requirements Engineering for Secure Software: Introduction, Misuse and Abuse Cases, The SQUARE Process Model, SQUARE Sample Outputs, Requirements Elicitation, Requirements Prioritization

UNIT- III

Secure Software Architecture and Design: Introduction, Software Security Practices for Architecture and Design: Architectural Risk Analysis, Software Security Knowledge for Architecture and Design: Security Principles, Security Guidelines, and Attack Patterns

Considerations for Secure Coding and Testing: Introduction, Code Analysis, Coding Practices, Software Security Testing, Security Testing Considerations Throughout the SDLC

UNIT -IV

Security and Complexity: System Assembly Challenges: Introduction, Security Failures, Functional and Attacker Perspectives for Security Analysis: Two Examples, System Complexity Drivers and Security, Deep Technical Problem Complexity

UNIT -V

Governance, and Managing for More Secure Software: Introduction, Governance and Security, Adopting an Enterprise Software Security Framework, How Much Security Is Enough?, Security and Project Management, Maturity of Practice

TEXT BOOKS:

1. Software Security Engineering: A Guide for Project Managers, Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, Addison-Wesley Professional

REFERENCE BOOKS:

1. Howard , M and Lipner,S : The Security Development Lifecycle , Microsoft Press, 2006
2. Swiderski, F and Snyder W. :, Threat Modeling, Microsoft Press, 2004.
3. Viega, J and MCGraw G., : Building Secure Software: How to avoid Security Problems in the Right Way, Addison-Wesley,2001
4. The Open Web Application Security Project: A Guide to Building Secure Web Applications and Web Services", 2.0 Black Hat Edition, 2005

SYSTEMS ENGINEERING
(Elective-1)

UNIT- I

Management Information Systems: A Framework: Importance of MIS, MIS: A Definition Nature and Scope of MIS ,

Structure and Classification of MIS : Structure of MIS, MIS Classification

Information and System Concepts: Information: A Definition, Types of Information, Dimensions of Information, System: A Definition, Kinds of Systems, System Related Concepts, Elements of a System, Human as an Information Processing System

Information Systems for Competitive Advantage: Introduction, Changing concepts of Information System, Competitive Advantage, Information systems Strategies for Dealing with competitive Force, Porter's Value Chain Model, Strategic Information Systems (SIS)

UNIT –II: BUSINESS APPLICATIONS OF IS

e – Commerce : Introduction, e – Commerce

ERP Systems : Introduction, Enterprise Information Systems

Decision – Support Systems: Decision – Making: A Concept, Simon's Model of Decision - Making Types of Decisions, Methods for Choosing Among Alternatives, Decision – Making and MIS, Decision Support Systems – Why?, Decision Support Systems: A framework,
Characteristics and Capabilities of DSS

Business Intelligence and knowledge Management System : Business Intelligence, Knowledge Management System

UNIT – III

Information System Planning : Information System Planning: WHY?, Planning Terminology
Information System Planning, The Nolan Stage Model, The Four –Stage Model of is planning
Selecting A Methodology, Information Resources Management (IRM), Organisation Structure and Location of MIS

System Acquisition : Acquisition of Information Systems , Acquisition of Hardware and Software

UNIT – IV

System Implementation: IMPLEMENTATION PROCESS, Organisational Change

Evaluation & Maintenance of IS : Evaluation of MIS , System Maintenance

IS Security and Control: IS Security Threats, Protecting Information System, IS Security Technology The Disaster Recovery Plan

UNIT – V : BUILDING OF IS

System Development Approaches: System Development Stages, System Development Approaches

System Analysis and Design: SYSTEM ANALYSIS - Introduction, Requirement Determination, Strategies for Requirement Determination, Structured Analysis Tools

SYSTEMS DESIGN: Design Objectives, Conceptual Design, Design Methods, Detailed System Design.

TEXT BOOKS:

1. Management Information System, Managerial Perspecives, D P Goyal, 3 ed, McMillan Publications.

REFERENCE BOOKS:

1. Information Systems for Modern Management, third edition by R. G. Murdick, J. E. Ross and J. R. Clagget, PHI – 1994.

ERP & SUPPLY CHAIN MANAGEMENT
(Elective -1)

UNIT- I

Introduction to ERP: Overview – Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining – On–line Analytical Processing, Supply Chain Management.

ERP Implementation: Implementation Life Cycle, Implementation Methodology, Hidden Costs, Organizing Implementation, Vendors, Consultants and Users, Contracts, Project Management and Monitoring.

UNIT- II

Business Modules: Business Modules in an ERP Package , Finance, Manufacturing, Human Resource, Plant Maintanance, Materials Management, Quality Management, Sales and Distribution.

Fundamentals of Supply Chain Management: Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

UNIT- III

SCM Strategies, Performance: Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

UNIT- IV

Planning and Managing Inventories: Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

Distribution Management: Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning.

UNIT- V

Strategic Cost Management in Supply Chain: The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

TEXT BOOKS:

1. ERP Demystified, 2/e, Alexis Leon, TMH, 2007.
2. Supply Chain Management: Strategy, Planning, Operation, Sunil Chopra, Peter Meindel, PEA, 2002

REFERENCE BOOKS:

1. Enterprise Resource Planning- Concepts and Practice; V.K. garg & N.K. V. Krishna, 1998. PHI.

E-COMMERCE
(Elective -1)

UNIT I:

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

UNIT II:

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

UNIT III:

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

UNIT IV:

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses.

Advertising and Marketing, Information based marketing, Advertising on Internet, on-line marketing process, market research.

UNIT V:

Consumer Search and Resource Discovery, Information search and Retrieval, Commerce Catalogues, Information Filtering.

Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing's, Desktop video conferencing.

TEXT BOOK:

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

REFERENCE BOOKS:

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

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USER INTERFACE DESIGN
(Elective 2)

UNIT - I

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

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

UNIT - II

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

UNIT -III

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

UNIT - IV

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

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

UNIT - V

Software tools : Specification methods, interface, Building Tools.

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

TEXT BOOKS :

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

REFERENCE BOOKS :

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

CLOUD COMPUTING
(Elective -2)

UNIT I:

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

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

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

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

UNIT V:

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

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

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

TEXT BOOKS:

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

REFERNCE BOOK:

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

SOFTWARE DEFINED NETWORKS
(Elective-2)

UNIT 1:
History and Evolution of Software Defined Networking (SDN):
Separation of Control Plane and Data Plane, IETF Forces, Active Networking. Control and Data Plane Separation: Concepts, Advantages and Disadvantages, the Open Flow protocol.

UNIT 2:
Network Virtualization: Concepts, Applications, Existing Network Virtualization Framework (VMware and others), Mininet based examples.

UNIT 3:
Control Plane: Overview, Existing SDN Controllers including Floodlight and OpenDaylight projects.

UNIT 4:
Customization of Control Plane: Switching and Firewall Implementation using SDN Concepts. Data Plane: Software-based and Hardware-based; Programmable Network Hardware.

UNIT 5:
Programming SDNs: Northbound Application Programming Interface,
Current Languages and Tools, Composition of SDNs.Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications.
Data Center Networks: Packet, Optical and Wireless Architectures, Network Topologies.

TEXT BOOKS:

1. SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies, By Thomas D. Nadeau, Ken Gray Publisher: O'Reilly Media, August 2013, ISBN: 978-1-4493-4230-2, ISBN 10: 1-4493-4230-2.

2. Software Defined Networks: A Comprehensive Approach, by Paul Goransson and Chuck Black, Morgan Kaufmann, June 2014, Print Book ISBN: 9780124166752, eBook ISBN : 9780124166844

REFERENCE BOOKS:

1. SDN and OpenFlow for Beginners by Vivek Tiwari, Sold by: Amazon Digital Services, Inc., ASIN: , 2013.

2. Network Innovation through OpenFlow and SDN: Principles and Design, Edited by Fei Hu, CRC Press, ISBN-10: 1466572094, 2014.

3. Open Networking Foundation (ONF) Documents, https://www.opennetworking.org, 2015.

4. OpenFlow standards, http://www.openflow.org, 2015.

5. Online Reading Lists, including: http://www.nec-labs.com/~lume/sdn-reading-list.html, 2015.

INTERNET OF THINGS
(Elective -2)

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

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

UNIT II:

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

UNIT III:

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

UNIT IV:

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

UNIT V:

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

TEXTBOOKS:

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

REFERNCE BOOKS:

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

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SE LAB 2

SOFTWARE TESTING LAB

1. Study of various tools Study various tools such as Win Runner, Load Runner, Test Director, Rational Rose Suite etc.
2. Perform experiments to do the following:
    a. Requirements Testing
    b. Use – case Scenario Testing
    c. Unit Testing
    d. Regression Testing
    e. Integration Testing
    f. Validation Testing
    g. Acceptance Testing
    h. System Testing
3. Prepare test plan and develop test case hierarchy
4. Generate Test cases and Test Documentation in the following case studies
    a. Library System
    b. Course Registration System
    c. Implement a Quiz System
    d. Student Marks Analyzing System
    e. Online Ticket Reservation System

DESIGN PATTERNS LAB:

1. Using UML design Abstract factory design pattern
2. Using UML design Builder Design pattern
3. Using UML design Facade Design pattern
4. Using UML design Bridge Design pattern
5. Using UML design Decorator Design pattern
6. User gives a print command from a word document. Design to represent this chain of responsibility design pattern.