VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING & TECHNOLOGY HYDERABAD
B.TECH. HONORS IN COMPUTER SCIENCE AND ENGINEERING

TENTATIVE COURSE STRUCTURE AND SYLLABUS
(Applicable from the academic year 2021-2022)

V SEMESTER (III YEAR I SEMESTER) **R19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
	Professional Elective-I:	3	0	0	3	3
19PE1IT02	Data Mining					
19PE1CS01	Mobile Computing					
19PE1IT04	Software Testing Methodologies					
19PE1CS02	Augmented Reality and Virtual Reality					
19PE1IT03	Cyber Security					
Total		**3**	**0**	**0**	**0**	**3**

VI SEMESTER (III YEAR II SEMESTER) **R19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
19HN1CS01	Research Methodologies	3	0	0	3	3
	Professional Elective-II:	3	0	0	3	3
19PE1CS03	Soft Computing					
19PE1IT10	Adhoc and Sensor Networks					
19PE1CS04	Software Project Management					
19PE1IT12	Distributed Systems					
19PE1CS05	Computer Graphics					
Total		**6**	**0**	**0**	**6**	**6**

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(Applicable from the academic year 2021-2022)

VII SEMESTER (IV YEAR I SEMESTER) **R19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
	Professional Elective-III:	3	0	0	3	3
19PE1CS06	Scripting Languages					
19PE1IT13	Network Security					
19PE1CS07	Software Quality Assurance and Testing					
19PE1CS08	Information Security Management					
19PE1CS09	Android Application Development					
	Professional Elective-IV:					
19PE1CS10	Neural Networks and Deep Learning	3	0	0	3	3
19PE1EC05	Internet of Things					
19PE1CS11	Software Architecture and Design Patterns					
19PE1CS12	Quantum Computing					
19PE1CS13	Open Source Technologies					
Total		**6**	**0**	**0**	**6**	**6**

VIII SEMESTER (IV YEAR II SEMESTER) **R19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
19HN4TP01	Technical Paper Writing	0	0	4	4	2
	Professional Elective-V:	3	0	0	3	3
19PE1CS14	Information Retrieval Systems					
19PE1CS20	Cloud Technologies					
19PE1IT16	Software Defined Networks					
19PE1CS15	Information Security Assessments and Audits					
19PE1EC04	Digital Image Processing					
	Professional Elective-VI:					
19PE1CS16	Natural Language Processing					
19PE1CS17	Distributed Trust and Blockchain Technologies					
19PE1CS18	Software Metrics and Measures					
19PE1IT15	Data Visualization					
19PE1CS19	Cognitive Engineering					
Total		**3**	**0**	**4**	**7**	**5**

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B.Tech. (Honors) CSE V Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PE1IT02) DATA MINING

COURSE OBJECTIVES:

- To familiarize to the concepts and techniques for building a Data Warehouse
- To apply pre-processing techniques to extract information from raw data
- To understand the datamining skills for resolving practical problems
- To implement the algorithms in supervised and unsupervised learning

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

CO-1: Appraise raw input and process to generate relevant data for a range of data mining algorithms

CO-2: Extract and measure interesting patterns from heterogeneous databases

CO-3: Identify the appropriate data-mining algorithm for resolving the real-time applications

CO-4: Design and implement data-mining projects using sample, realistic data sets and modern tools

UNIT – I:

Introduction: Fundamentals of data mining, KDD process, Data Mining functionalities, Classification of Data Mining systems, Data Mining task primitives, Integration of a Data mining system with a Database or a Data warehouse, Major issues in Data Mining.

Data Preprocessing: Need for data preprocessing, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT – II:

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse architecture, Data Warehouse implementation, From Data Warehousing to Data Mining.

Data Cube Computation and Data Generalization: Efficient methods for Data Cube computation, Further Development of data cube and OLAP Technology, Characterization and Discrimination: Attribute-Oriented Induction

UNIT – III:

Mining Frequent, Associations and Correlations: Basic concepts, Frequent Itemset mining methods, Mining multilevel association rules from Transaction Databases, Mining Multidimensional association rules from Relational databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT – IV:

Classification and Prediction: Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Support Vector Machines (SVMs), Other Classification Methods. Prediction, Classifier Accuracy.

UNIT – V:

Cluster Analysis Introduction: Types of Data in Cluster Analysis, Major Clustering methods, Partitioning Methods, Density-Based methods, Grid-Based methods, Model-Based Clustering methods.

UNIT – VI:

Outlier Analysis: Statistical Distribution-Based Outlier detection, Distance-based Outlier detection, Density-based local Outlier detection, Deviation-Based Outlier detection.

Mining Complex Types of Data: Social Network Analysis, Spatial Data Mining, Multimedia Data Mining, Mining Time-Series data, Mining sequence Patterns in Transactional Databases, Text Mining, Mining the World Wide Web.

TEXT BOOKS:

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006
2. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Addison-Wesley, 2005, ISBN: 0321321367

REFERENCES:

1. Data Mining Techniques, Arun K. Pujari, University Press
2. Mining Introductory and Advanced Topics, Margaret H. Dunham, Pearson Education
3. Lecture Notes on Data Mining, Michael W. Berry, Murray Browne, World Scientific Publishing Co
4. Data Warehousing in the Real World, Sam Anahory & Dennis Murray, Pearson Education, Asia

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(19PE1CS01) MOBILE COMPUTING

COURSE OBJECTIVES:

- To understand the basic concepts of mobile computing and mobile telecommunication system
- To be familiar with the network layer protocols and Ad-Hoc networks
- To know the basis of transport and application layer protocols
- To gain knowledge about different mobile platforms and application development

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Illustrate the basics of mobile telecommunication systems
CO-2: Determine the functionality of medium access control and Network layer
CO-3: Analyze the functionality of Transport and Application layer and issues related to database management in mobile computing
CO-4: Identify a routing protocol for a given ad hoc network

UNIT – I:
Introduction to Mobile Communications: Introduction to Mobile Computing, Novel applications, Limitations and Architecture, Generations of mobile communication technologies.
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services-GPRS.

UNIT – II:
Medium Access Control: (Wireless) Medium Access Control (MAC): Motivation for a Specialized MAC (Hidden and Exposed Terminals, Near and Far Terminals), Multiplexing-SDMA- TDMA- FDMA- CDMA.

UNIT – III:
Mobile Network Layer: WIRELESS LAN: Infra-red Vs radio transmission, Infrastructure and Ad-hoc Network, IEEE 802.11: System Architecture, Protocol Architecture, Bluetooth: User Scenarios, Architecture

UNIT – IV:
Mobile Network and Transport Layer:
Mobile IP Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).
Mobile Transport Layer: Traditional TCP, Classical TCP improvements- Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/ time-out freezing, Selective retransmission, Transaction oriented TCP

UNIT – V:
Mobile Ad Hoc Networks: Characteristics of Mobile Ad-hoc Networks (MANETs), Applications of MANETs, Routing, Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV, Hybrid routing –ZRP, Multicast Routing- ODMRP

UNIT – VI:

Database Issues: Database Issues: Hoarding techniques, caching invalidation mechanisms. Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques

TEXT BOOKS:

1. Mobile Communications, Jochen Schiller, Second Edition, PHI, 2003
2. Mobile Computing, Raj Kamal, Oxford University Press, 2007

REFERENCES:

1. Fundamentals of Mobile Computing, Prasant Kumar Pattnaik, Rajib Mall, PHI Learning Pvt. Ltd, New Delhi – 20
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic and Cacute, Wiley, 2002
3. Introduction to Wireless and Mobile systems, Dharma Prakash Agarval, Qing and An Zeng, Thomson Asia Pvt. Ltd., 2005
4. Principles of Mobile Computing, Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Springer, 2003

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(19PE1IT04) SOFTWARE TESTING METHODOLOGIES

COURSE OBJECTIVES:

- To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods
- To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing
- To understand the software testing methodologies such as flow graphs and path testing, transaction flows testing, data flow testing, domain testing and logic base testing
- To identify the techniques and skills on how to use modern software testing tools to support software testing projects

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Know the basic concepts of software testing and its essentials
CO-2: Able to identify the various bugs and correcting them after knowing the consequences of the bug
CO-3: Able to test a domain or an application and identifying the nice and ugly domains
CO-4: Apply appropriate software testing tools, techniques and methods for even more effective systems during both the test planning and test execution phases of a software development project

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 and ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT – IV:
Paths, Path products and Regular Expressions: Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing: Overview, decision tables, path expressions, k v charts, specifications.

UNIT – V:

State, State Graphs and Transition Testing: State graphs, good and bad state graphs, state testing, Testability tips.

UNIT – VI:

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

Usage of JMeter and Winrunner tools for functional / Regression testing, creation of test script for unattended testing, synchronization of test case, Rapid testing, Performance testing of a data base application and HTTP connection for website access.

TEXT BOOKS:

1. Software Testing Techniques, Boris Beizer, 2nd Edition, Dreamtech
2. Software Testing Tools, Dr. K. V. K. K. Prasad, Dreamtech

REFERENCES:

1. The Craft of Software Testing, Brian Marwick, Pearson Education
2. Software Testing, P. C. Jorgenson, 3rd Edition, Aurbach Publications (Dist.by SPD)
3. Software Testing, N. Chauhan, Oxford University Press
4. Introduction to Software Testing, P. Ammann, J. Offutt, Cambridge University Press
5. Effective methods of Software Testing, Perry, 2nd Edition, John Wiley, 1999

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(19PE1CS02) AUGMENTED REALITY AND VIRTUAL REALITY

COURSE OBJECTIVES:

- To understanding of the concepts of Virtual Reality (VR)
- To studying geometric modelling concepts
- To building VR applications
- To perception on future needs

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand geometric modelling and Virtual environment
CO-2: Study about Virtual Hardware and Software
CO-3: Develop Virtual Reality applications
CO-4: Explain AR and VR business cases

UNIT – I:
Introduction to Virtual Reality:
Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark
3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer

UNIT – II:
Geometric Modelling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation
Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances
Generic VR System: Introduction, Virtual environment, Computer environment, VR technology

UNIT – III:
Introduction to AR: Definition and Scope A brief history of AR, Examples, Related Fields, MR continuum, Virtual Reality, Ubiquitous Computing

UNIT – IV:
Tracking, Coordinate Systems, Characteristics of Tracking technology, Stationary Tracking systems, Mobile Sensors, Optical Tacking, Sensor Fusion

UNIT – V:
Computer Vision for AR, Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Incremental Tracking

UNIT – VI:
The Future: Driving forces of Business Cases, AR developer's Wish List, Tracking AR Outdoors, Interface with Smart Objects

TEXT BOOKS:

1. Virtual Reality Systems, John Vince, Pearson Education Asia, 2007
2. Augmented Reality, Principles and Practices, Dieter Schmalstieg, Tobias Hollerer Pearson, 2017
3. Augmented and Virtual Reality, Anand R., Khanna Publishing House, Delhi

REFERENCES:

1. Visualizations of Virtual Reality, Adams, Tata McGraw Hill, 2000
2. Virtual Reality Technology, Grigore C. Burdea, Philippe Coiffet, 2nd Edition, Wiley InderScience, 2006
3. Understanding Virtual Reality: Interface, William R. Sherman, Alan B. Craig
4. Application and Design, Morgan Kaufmann, 2008

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(19PE1IT03) CYBER SECURITY

COURSE PRE-REQUISITES: Basic Knowledge of Computers, Basic Knowledge of Networking and Internet, Hands-on Windows Operating System

COURSE OBJECTIVES:
- To identify the key components of cyber security in network
- To describe the techniques in protecting Information security
- To define types of analyzing and monitoring potential threats and attacks
- To access additional external resources to supplement knowledge of cyber forensics and laws

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand, appreciate, employ, design and implement appropriate security technologies
CO-2: Demonstrate policies to protect computers and digital information
CO-3: Identify & Evaluate Information Security threats and vulnerabilities in Information Systems
CO-4: Understanding computer forensics and cyber laws and analyzing them

UNIT – I:
Introduction to Cyber Crime: Introduction Cybercrime: Definition and Origins of the word, Cybercrime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, E-mail Spoofing, Spamming, Cyber defamation, Internet Time Theft, Salami Attack/ Salami Technique, Data Diddling, Forgery, Web Jacking, Newsgroup Spam/ Crimes Emanating from Usenet Newsgroup, Industrial Spying/Industrial Espionage, Hacking, Online Frauds, Pornographic Offenses, Software Piracy, Computer Sabotage, EMail Bombing/Mail Bombs, Usernet Newsgroup as the Source of Cybercrimes, Computer Network Intrusions, Password Sniffing, Credit Card Frauds, Identity Theft.

UNIT – II:
Cyber Offenses:
How Criminals Plan Them: Introduction, Categories of Cybercrime, How Criminals Plan the Attacks, Reconnaissance, Passive Attacks, Active Attacks, Scamming and Scrutinizing Gathered Information, Attack (Gaining and Maintaining the System Access), Social Engineering, Classification of Social Engineering, Cyber stalking, Types of Stalkers, Cases Reported on Cyber stalking, How Stalking Works?, Real-Life Incident of Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The fuel for Cybercrime, Botnet, Attack Vector, Cloud Computing, Why Cloud Computing?, Types of Services, Cybercrime and Cloud Computing.

UNIT – III:
Tools and Methods Used In Cyber Crime: Introduction, Proxy Servers and Anonymizers, Phishing, How Phishing Works, Password Cracking, Online Attacks, Offline Attacks, Strong, Weak and Random Passwords, Random Passwords, Keyloggers and Spywares, Software Keyloggers, Hardware Keyloggers, Antikeylogger, Spywares, Virus and

Worms, Types of Viruses, Trojan Horses and Backdoors, Backdoor, How to Protect from Trojan and Backdoors, Steganography, Steganalysis, Dos and DDos Attacks, Dos Attacks, Classification of Dos Attacks, Types of Levels of Dos Attack, Tools Used to Launch Dos Attacks, Ddos Attacks, How to protect from Dos/Ddos Attacks, SQL Injection, Steps for SQL Injection Attack, How to Prevent SQL Injection Attacks.

UNIT – IV:

Understanding Computer Forensics: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, The Rules of Evidence, Forensics Analysis of E-Mail, RFC2822, Digital Forensics Life Cycle, The Digital Forensics Process, The Phases in Computer Forensics/Digital Forensics, Precautions to be Taken when Collecting Electronic Evidence, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Typical Elements Addressed in a Forensics Investigation Engagement Contract , Solving a Computer Forensics Case, Computer Forensics and Steganography, Rootkits, Information Hiding, Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics, Technical Challenges: Understanding the Raw Data and its Structure, The Legal Challenges in Computer Forensics and Data Privacy Issues, Special Tools and Techniques, Digital Forensics Tools Ready Reckoner, Special Technique: Data Mining used in Cyber forensics, Forensics Auditing.

UNIT – V:

Cybercrime and Cyberterrorism:

Social,Political, Ethical and Psychological Dimensions: Introduction, Intellectual Property in the Cyberspace, Copyright, Patent, Trademarks, Trade Secret, Trade Name, Domain Name, The Ethical Dimension of Cybercrimes, Ethical Hackers: Good Guys in Bad Land, The Psychology, Mindset and Skills of Hackers and Other Cybercriminals, Inside the Minds and Shoes of Hackers and Cybercriminals, Hackers and Cybercriminals: Evolution of Technical prowess and Skills, Ethical Hackers, Sociology of Cybercriminals, Personality Traits of Cybercriminals and Younger Generation's views about Hacking, Information Warfare: Perception or An Eminent Reality?, Cyberwar Ground is HOT, Cyber Jihadist on the Rise

UNIT – VI:

Fundamentals of Cyber Law: Evolution of the IT Act, Genesis and Necessity , Salient features of the IT Act, 2000, various authorities under IT Act and their powers, Penalties & Offences, amendments, Impact on other related Acts Cyber Space Jurisdiction - Jurisdiction issues under IT Act, 2000- Traditional principals of Jurisdiction - Extra-terrestrial Jurisdiction- Case Laws on Cyber Space Jurisdiction

Sensitive Personal Data or Information (SPDI) in Cyber Law (a) SPDI Definition and Reasonable Security Practices in India (b) Reasonable Security Practices – International perspective.

TEXT BOOKS:

1. Cyber Security - Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunit Belpure, Wiley
2. Cyber Law & Cyber Crimes, Advocat Prashant Mali, Snow White Publications, Mumbai

REFERENCES:

1. Management of Information Security, M. E. Whitman, H. J. Mattord, Nelson Education, 3rd Edition, Cengage Learning, 2011
2. Guide to Computer Forensics and Investigations, B. Nelson, A. Phillips, F. Enfinger, C. Steuart, 4th Edition, Nelson Education / Cengage Learning, 2010
3. Cyber Law in India, Farooq Ahmad, Pioneer Books
4. Information Technology Law and Practice, Vakul Sharma, Universal Law Publishing Co. Pvt. Ltd

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	3	**0**	**3**

(19HN1CS01) RESEARCH METHODOLOGIES

UNIT-I:
Research Methodology: Objectives and Motivation of Research, Types of Research, Research Approaches, Significance of Research, Research Methods verses Methodology, Research and Scientific Method, Important of Research Methodology, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India, Benefits to the society in general.
Defining the Research Problem: Definition of Research Problem, Problem Formulation, Necessity of Defining the Problem, Technique involved in Defining a Problem

UNIT-II:
Literature Survey: Importance of Literature Survey, Sources of Information, Assessment of Quality of Journals and Articles, Information through Internet.
Literature Review: Need of Review, Guidelines for Review, Record of Research Review

UNIT-III:
Research Design: Meaning of Research Design, Need of Research Design, Feature of a Good Design Important Concepts Related to Research Design, Different Research Designs, Basic Principles of Experimental Design, Developing a Research Plan, Design of Experimental Set-up, Use of Standards and Codes.

UNIT-IV:
Data Collection: Collection of primary data, Secondary data, Data organization, Methods of data grouping, Diagrammatic representation of data, Graphic representation of data. Sample Design, Need for sampling, some important sampling definitions, Estimation of population, Role of Statistics for Data Analysis, Parametric V/s Non-parametric methods, Descriptive Statistics, Measures of central tendency and Dispersion, Hypothesis testing, Use of Statistical software

UNIT-V:
Data Analysis: Deterministic and random data, Uncertainty analysis,
Tests for significance: Chi-square, Student's t-test, Regression modeling, Direct and Interaction effects, ANOVA, F-test, Time Series analysis, Autocorrelation and Autoregressive modeling.

UNIT-VI:
Research Report Writing: Format of the Research report, Synopsis, Dissertation, Thesis its Differentiation, References/Bibliography/Webliography, Technical paper writing/Journal report writing, making presentation, Use of visual aids.
Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing Research Grant Proposal.

TEXT BOOKS:

1. Research Methodology, Methods & Technique, C. R. Kothari, New Age International Publishers, 2004
2. Research Methodology for Engineers, R. Ganesan, MJP Publishers, 2011
3. Research Methodology, Ratan Khananabis and Suvasis Saha, Universities Press, Hyderabad, 2015

REFERENCES:

1. Statistical Methods: Concepts, Application and Computation, Y. P. Agarwal, Sterling Pub. Pvt., Ltd., New Delhi, 2004
2. Research Methodology, Vijay Upagade and Aravind Shende, S. Chand & Company Ltd., New Delhi, 2009
3. Research Methodology and Quantitative Methods, G. Nageswara Rao, BS Publications, Hyderabad, 2012
4. Business Research Methods, Naval Bajjai, Pearson, 2011
5. Business Research Methods, Prahalad Mishra, Oxford, 2016

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(19PE1CS03) SOFT COMPUTING

COURSE OBJECTIVES:

- To familiarize with soft computing concepts
- To introduce and use the idea of fuzzy logic and use of heuristics based on human experience
- To familiarize the Fuzzy modeling using Classification and Clustering techniques
- To learn the concepts of Genetic algorithm and its applications
- To acquire the knowledge of Rough Sets

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

CO-1: Identify the difference between Conventional Artificial Intelligence to Computational Intelligence

CO-2: Understand fuzzy logic and reasoning to handle and solve engineering problems

CO-3: Apply the Classification and clustering techniques on various applications

CO-4: Perform various operations of genetic algorithms, Rough Sets

UNIT – I:

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT – II:

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT – III:

Fuzzy Decision Making, Particle Swarm Optimization.

UNIT – IV:

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT – V:

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix.

UNIT -VI:

Integration of Soft Computing Techniques, applications and case studies.

TEXT BOOKS:

1. Soft Computing – Advances and Applications, B. K. Tripathy and J. Anuradha, Cengage Learning, 2015
2. Principles of Soft Computing, S. N. Sivanandam & S. N. Deepa, 2nd Edition, Wiley India, 2008
3. Neuro-Fuzzy and Soft Computing, J. S. R. Jang, C. T. Sun and E. Mizutani, Pearson Education, 2004

REFERENCES:

1. Fuzzy Sets & Fuzzy Logic, G. J. Klir & B. Yuan, PHI, 1995
2. An Introduction to Genetic Algorithm, Melanie Mitchell, PHI, 1998
3. Fuzzy Logic with Engineering Applications, Timothy J. Ross, McGraw-Hill International Edition, 1995
4. Genetic Algorithms-In Search, Optimization and Machine Learning, David E. Goldberg, Pearson Education

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(19PE1IT10) AD HOC AND SENSOR NETWORKS

COURSE OBJECTIVES:

- To learn about the issues and challenges in the design of wireless adhoc networks
- To understand the working of MAC and Routing Protocols for adhoc and sensor networks
- To learn about the Transport Layer protocols and their QoS for adhoc and sensor networks
- To understand various security issues in ad hoc and sensor networks and the corresponding solutions

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify different issues in wireless ad hoc and sensor networks
CO-2: Analyse protocols developed for ad hoc and sensor networks
CO-3: Identify and understand security issues in ad hoc and sensor networks
CO-4: Analyse the applications and challenges of Ad hoc sensor networks

UNIT - I:
MAC & Routing in Ad Hoc Networks: Introduction – Issues and challenges in adhoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Adhoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols

UNIT – II:
Transport & QoS in Ad Hoc Networks: TCP's challenges and Design Issues in AdHoc Networks – Transport protocols for adhoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model

UNIT – III:
MAC & Routing in Wireless Sensor Networks: Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zigbee – Topology Control – Routing Protocols

UNIT – IV:
Transport & QoS in Wireless Sensor: Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control in network processing – Operating systems for wireless sensor networks – Examples.

UNIT – V:
Security in Ad Hoc and Sensor Networks: Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks – Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

UNIT – VI:

Applications and Challenges of Ad Hoc and Sensor Networks: Mobile ad hoc networks (MANETs), Vehicular adhoc networks (VANETs), Smart phone ad hoc networks (SPANs), Wireless mesh networks Army tactical MANETs, Air Force UAV Ad hoc networks, Navy adhoc networks, Ad hoc home smart lighting, Ad hoc street light networks, Ad hoc networked of robots, Disaster rescue ad hoc network, Hospital ad hoc network, Challenges.

TEXT BOOKS:

1. Ad Hoc Wireless Networks – Architectures and Protocols, C. Siva Ram Murthy and B.S. Manoj, Pearson Education, 2006
2. Protocols and Architectures for Wireless Sensor Networks, Holger Karl, Andreas Willing, John Wiley & Sons, Inc., 2005

REFERENCES:

1. Ad Hoc Mobile Wireless Networks, Subir Kumar Sarkar, T. G. Basavaraju, C Puttamadappa, Auerbach Publications, 2008
2. Ad Hoc and Sensor Networks: Theory and Applications, Carlos De Morais Cordeiro, Dharma Prakash Agrawal, 2nd Edition, World Scientific Publishing, 2011
3. Fundamentals of Wireless Sensor Networks Theory and Practice, Waltenegus Dargie, Christian Poellabauer, John Wiley and Sons, 2010
4. Wireless Ad Hoc and Sensor Networks: Theory and Applications, Xiang-Yang Li, 127th Edition, Cambridge University Press, 2008

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(19PE1CS04) SOFTWARE PROJECT MANAGEMENT

COURSE OBJECTIVES:

- To identify and discuss the conventional and contemporary software project management principles
- To the ability to assess and plan project schedule and assign resources
- To apply an appropriate project development methodology among various alternating processes
- To identify project risks, understand the responsibilities, monitor and track project deadlines and the capability to work in a team environment

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

CO-1: Describe the conventional s/w management and explain how to improve s/w economics

CO-2: Identify and discuss the key phases of project management and the key skills associated with each

CO-3: Relate an appropriate project management approach through an evaluation of context and project scope and knowledge of agile and traditional and Global project management approaches, risk and quality management

CO-4: Apply the knowledge of the key project management skills, such as product and work break-down structure, schedule; governance, progress reporting and People Focused Process Models

UNIT – I:

Conventional Software Management: The waterfall model, conventional software Management performance. Overview of Project Planning – Stepwise Project Planning.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT – II:

The Old Way and the New Way: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, Inception, Elaboration, Construction, Transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT – III:

Workflows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major milestones, Minor Milestones, Periodic status assessments. Globalization Issues in Project management.

UNIT – IV:

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Process Automation: Automation Building blocks.

UNIT – V:

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

UNIT – VI:

Project Organizations and Responsibilities: Line-of-Business Organizations, Understanding Behavior – Organizational Behavior

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

TEXT BOOKS:

1. Software Project Management, Walker Royce, Pearson Education, 2005
2. Managing and global Software Projects, Ramesh Gopalaswamy, Tata McGraw Hill, 2003

REFERENCES:

1. Software Project Management, Bob Hughes and Mike Cotterell, Tata McGraw-Hill Edition
2. Software Project Management, Joel Henry, Pearson Education
3. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2005

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(19PE1IT12) DISTRIBUTED SYSTEMS

COURSE OBJECTIVES:

- To understand foundations of Distributed Systems
- To introduce the idea of peer-to-peer services and file system
- To understand in detail the system level and support required for distributed system
- To understand the issues involved in studying process and resource management

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Comprehend and design a new distributed system with the desired features
CO-2: Understand and design a new load balancing, load sharing approaches
CO-3: Understand time synchronization, distributed scheduling, and deadlock
CO-4: Understand distributed file systems and distributed shared memory

UNIT – I:
Introduction:
Introduction to Distributed Systems Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Examples of Distributed Systems, Trends in Distributed Systems, Challenges.

UNIT – II:
Process & Resource Management: Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

UNIT – III:
Memory Management in Distributed System: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing.

UNIT – IV:
Time and Global States: Introduction, Clocks, events and process states, Synchronizing physical clocks, Logical time and logical clocks, Global states.

UNIT – V:
Distributed Scheduling and Deadlock Distributed Scheduling- Coordination and Agreement – Introduction - Distributed mutual exclusion, Deadlock-Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms.
Transactions and Concurrency Control: Introduction, Transactions, Nested transactions, Locks, Optimistic concurrency control, Timestamp ordering

UNIT – VI:

Distributed File System: Introduction, File service architecture – case study: Andrew File system, Name Services: Introduction, Name services and the Domain Name System, Directory services Case study: The Global Name Service.

TEXT BOOKS:

1. Distributed Systems: Principles and Paradigms, Tanenbaum A. S., Van Steen M., Pearson Education, 2007
2. Distributed Operating Systems: Concepts and Design, Pradeep K. Sinha, Prentice Hall of India, 2007
3. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and Tim Kindberg, 5th Edition, Pearson Education, 2012

REFERENCES:

1. Distributed Computing, Principles and Applications, Liu M. L., Pearson Education, 2004
2. Advance Concept in Operating System, Singhal & Shivratari, McGraw Hill
3. Distributed Computing, Attiya & Welch, Wiley Pub

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(19PE1CS05) COMPUTER GRAPHICS

COURSE OBJECTIVES:
- To analyze the basics of graphics and its representations
- To identify various 2D and 3D transformation techniques used in graphics
- To understand the principles of Visible Surface Detection Methods
- To discuss the animation design sequence

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the various basic algorithms to draw the object
CO-2: Differentiate 2D and 3D Transformations and Viewing
CO-3: Apply the various techniques to eliminate hidden surfaces of an object
CO-4: Create animation sequences of an object

UNIT – I:
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and workstations and input devices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood fill algorithms.

UNIT – II:
2-D Geometrical Transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms
2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to viewport coordinate transformation, viewing functions, Cohen-Sutherland line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT – III:
Three-dimensional Geometric Transformations: Translation, Rotation, Scaling, Reflections, Shear, composite transformations
Three-dimensional Viewing: viewing pipeline, viewing coordinates, Projections, Clipping.

UNIT – IV:
Three-dimensional Object Representations: Polygon surfaces, Polygon tables, Plane equations, Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations

UNIT – V:
Visible Surface Detection Methods: Classification, back-face detection, depth-buffer, scanline, depth sorting, BSP-tree methods, area sub-division and octree methods.

UNIT – VI:

Computer Animation: Design of Animation Sequence, General computer Animation functions, Raster animation, Computer animation languages, key frame systems, motion specifications

TEXT BOOKS:

1. Computer Graphics C Version, Donald Hearn & M. Pauline Baker, Pearson Education, New Delhi, 2004
2. Computer Graphics Principles & Practice, Second Edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education

REFERENCES:

1. Procedural Elements for Computer Graphic, David Rogers, 2nd Edition, Tata McGraw Hill
2. Computer Graphics, Steven Harington, TMH
3. Principles of Interactive Computer Graphics, Neuman and Sproul, TMH

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(19PE1CS06) SCRIPTING LANGUAGES

COURSE OBJECTIVES:

- To appreciate the nature of scripting and the role of scripting languages
- To effectively apply knowledge of scripting to new situations and learn from the experience
- To analyze requirements of software systems for the purpose of determining the suitability of implementation of PERL and Ruby
- To design and implement software solutions that accommodate specified requirements and constraints, based on analysis or modeling or requirements specification

COURSE OUTCOMES: After Completion of the course, the student should be able to

CO-1: Classify Scripting Languages and application programming languages

CO-2: Apply the syntax and semantics of languages for effective scripting

CO-3: Develop a Web applications for decision making

CO-4: Design and implement Scripting Languages for software solutions

UNIT – I:

Introduction to Scripting Language: Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages.

UNIT – II:

Fundamentals of Perl: PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT – III:

Advanced Perl: Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT – IV:

Facets of Ruby: Ruby new, Classes, Objects and Variables, Containers, Blocks and Iterators, Standard Types, Methods, Expressions, Exceptions, Catch, And Through, Modules, Basic Input and Output.

UNIT – V:

Ruby in its Setting: The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices

UNIT – VI:

RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling.

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter

TEXT BOOKS:

1. The World of Scripting Languages, David Barren, Wiley Publications
2. Programming Ruby, The Pragmatic Programmers Guide, Dabve Thomas 2nd Edition

REFERENCES:

1. Perl by Example, E. Quigley, Pearson Education
2. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD
3. Ruby Progamming Language, David Flanagan and Yukihiro Matsumoto O'Reilly

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(19PE1IT13) NETWORK SECURITY

COURSE OBJECTIVES:

- To understand security concepts, threats, attacks, services and mechanisms
- To describe various cryptosystems- symmetric key cryptography, public key cryptography
- To apply authentication services, mechanisms and Email security
- To be familiar with the concepts of IP Security, web security, SNMP, viruses and firewalls

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

CO-1: Analyze security issues, services, goals and mechanism of security

CO-2: Develop a security model to prevent, detect the attacks, using various mechanisms

CO-3: Examine the authenticity of the messages, communicate securely and investigate non-repudiation

CO-4: Apply concepts of IP Security, SET, firewalls and establish trusted system

UNIT – I:

Introduction: Security Attacks, Services Mechanisms, A model for Internetwork security, Classical Encryption techniques, Fiestel Cipher Structure, Data Encryption Standard, Block Cipher Design Principles and Modes of Operation, Triple DES, RC-4, Evaluation criteria for AES, AES Cipher, Placement of Encryption Function, Traffic Confidentiality.

UNIT – II:

Public Key Cryptography: Confidentiality using Symmetric Encryption – Principles of Public key Cryptosystems, RSA algorithm, Key Management, Diffie-Hellman key Exchange, Elliptic Curve Cryptography. Buffer overflow, TCP session hijacking, ARP attacks, route table modification, UDP hijacking and man-in-the-middle attacks.

UNIT – III:

Authentication and Hash Functions: Authentication requirements, Authentication functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs, MD5 message Digest algorithm, Secure Hash Algorithm, HMAC.

UNIT – IV:

Digital Signatures and SNMP: Digital Signatures, Authentication Protocols, Digital Signature Standard, Authentication Applications: Kerberos, X.509 Authentication Service, Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3

UNIT – V:

Email Security and Web Security: Electronic Mail Security – PGP/ SMIME, IP security- Architecture, Authentication Header, Encapsulating Security Payload, Key Management, Web Security- Secure Socket Layer, Transport Layer Security and Secure Electronic Transaction

UNIT – VI:

System Level Security: Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

TEXT BOOKS:

1. Cryptography And Network Security – Principles and Practice, William Stallings, 4th Edition, Prentice Hall of India, 2005
2. Hack Proofing Your Network, Ryan Russell, Dan Kaminsky, Rain Forest, Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W. Manzuik and Ryan Permeh, Wiley Dreamtech

REFERENCES:

1. Network Security Essentials: Applications and Standards William Stallings, Prentice Hall, Hardcover, 1999
2. Security in Computing, Charles B. Pfleeger, Shari Lawrence Pfleeger, 3rd Edition, Pearson Education, 2003
3. Cryptography: Theory and Practice, Douglas R. Stinson, CRC Press, 1995
4. Applied Cryptography, Bruce Schneier, John Wiley & Sons Inc., 2001

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(19PE1CS07) SOFTWARE QUALITY ASSURANCE AND TESTING

COURSE OBJECTIVES:

- To define quality and understand various quality standards
- To recognize metrics, measurements and methodology for assessing software quality
- To understand steps involved in testing process and identify the appropriate testing technique
- To state steps involved in testing process and testing specialized systems

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

CO-1: Identify and analyze the importance of Software Quality Assurance process and Standards

CO-2: Demonstrate Quality Metrics and it's methodology

CO-3: Illustrate test documentation policies and compare different testing techniques

CO-4: Outline testing process of specialized systems

UNIT – I:

Software Quality Assurance Framework and Standards SQA Framework: What is Quality? Software Quality Assurance Plan, Quality Standards: ISO 9000 and Companion ISO Standards, CMMI, 6 Sigma.

UNIT – II:

Software Quality Assurance Metrics and Measurement Software Quality Metrics: Product Quality metrics. Software Quality metrics methodology: Establish quality requirements, Identify Software quality metrics, Implement the Software quality metrics.

UNIT – III:

Software Testing Strategy and Environment: Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing Software Testing Methodology.

Defects hard to find, verification and validation, eight considerations in developing testing methodologies, testing tactics checklist.

UNIT – IV:

Software Testing Techniques: Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing

UNIT – V:

Software Testing Tools: Taxonomy of Testing tools. Methodology to evaluate automated testing tools, Load Runner, QTP and Rational Testing Tools, Silk test.

UNIT – VI:

Testing Process:

Eleven Step Testing Process: Overview, Testing Client/ Server Web applications. Testing Security, Testing a Data Warehouse.

TEXT BOOKS:

1. Software Testing and continuous Quality Improvement, William E. Lewis, Gunasekaran Vcerapillai, Second Edition, Auerbach Publications
2. Effective Methods for Software Testing, William E. Perry, Second Edition, Wiley India, 2006
3. Metrics and Models for Software Quality Engineering, Stephen II. Kan, Pearson Education Publication

REFERENCES:

1. Software Testing Tools, K. V. K. K. Prasad, Dreamtech Press, 2008
2. Testing and Quality Assurance for Component-based Software, Gao, Tsao and Wu, Artech House Publishers
3. Software Testing Techniques, Bories Beizer, 2nd Edition, Dreamtech Press
4. Managing the Testing Process, Rex Black, Wiley
5. Handbook of Software Quality Assurance, G. Gordon Schulmeyer, James McManus, 2nd Edition, International Thomson Computer Press

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(19PE1CS08) INFORMATION SECURITY MANAGEMENT

COURSE OBJECTIVES:

- To introduce the terminology, technology and fundamentals of Information Security Management
- To prevent Data Leakage and introduce DLP
- To introduce Information security Policies procedures and guidelines
- To introduce information security management roles, responsibilities and information security performance metrics

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explain the fundamentals of Information Security Management.
CO-2: Identify the areas of data leakage and implements the DLP system
CO-3: Design and explain Information security Policies procedures and guidelines
CO-4: Illustrate information security management roles, responsibilities and Develop Information security performance metrics

UNIT – I:
Information Security Management: Information Security Overview, Threats and Attack Vectors, Types of Attacks, Common Vulnerabilities and Exposures (CVE), Security Attacks, Fundamentals of Information Security.

UNIT – II:
Fundamentals of Information Security: Key Elements of Networks, Logical Elements of Network, Elements of information Security, Principles and concepts, Types of controls.

UNIT – III:
Data Leakage: What is Data Leakage and statistics, Data Leakage Threats, Reducing the Risk of Data Loss, Key Performance Indicators (KPI), Organizational data classification, Content Awareness, Content Analysis techniques, Data Protection, DLP Limitations.

UNIT – IV:
Information Security Policies, Procedures and Guidelines: Information Security Policies-necessity-key elements & characteristics, Configuration, Security Standards-Guidelines & Frameworks etc. Laws, Regulation and Guide lines.

UNIT – V:
Information Security Management-Roles and Responsibilities: Security Roles & Responsibilities, Accountability, Roles and Responsibilities of Information Security Management, information Data security team structure, security incident response team.

UNIT – VI:
Information security Performance Metrics: Introduction -security Metrics, Types of security Metrics, Using Security Metrics, Developing the metric process, Metrics and reporting,

TEXT BOOKS:

1. Management of Information Security, Michael E. Whitman and Herbert J. Mattord, 4th Edition, CENGAGE Learning
2. Security Analyst Facilitator, Version 3, NASSCOM

REFERENCES:

1. Security Analyst Student Book, Version 3, NASSCOM

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(19PE1CS09) ANDROID APPLICATION DEVELOPMENT

COURSE OBJECTIVES:

- To describe the essentials of mobile apps development
- To examine and illustrate J2ME, Android and SQLite databases in relevance to Mobile applications
- To understand how Android applications work, manifest, Intents, and using external resources
- To learn to develop applications for current and emerging mobile computing devices

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Describe the Mobility landscape
CO-2: Identify Mobile apps development aspects
CO-3: Design and develop mobile apps, using Android as development platform, with key focus on user experience design, native data handling and background tasks and notifications
CO-4: Summarize and Compose Testing, Signing, Packaging and Distribution of mobile apps

UNIT – I:
Introduction to Mobile: A brief history of Mobile, The Mobile Ecosystem, Why Mobile?, Types of Mobile Applications, Mobile Information Architecture, Mobile Design, Mobile 2.0, Mobile Web development, Small Computing Device Requirements.

UNIT – II:
Introduction to Android: History of Mobile Software Development, The Open Handset Alliance, Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT – III:
Introduction to Android SDK: The Android Platform, Android SDK, Eclipse Installation, Android Installation, installation of Android Studio, working with android studio, Building a Sample Android application.

UNIT – IV:
Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy, Working with different types of resources

UNIT – V:

Android User Interface Design: Essentials User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation, Using Android Data and Storage APIs, Sharing Data between Applications with Content Providers, managing data using SQLite.

UNIT – VI:

Using Common Android APIs: Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World. Packaging and deployment – Interaction with server-side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

TEXT BOOKS:

1. Android Wireless Application Development, Lauren Darcey and Shane Conder, 2nd Edition, Pearson Education, 2011
2. Mobile Design and Development, Brian Fling, 1st Edition, O'Reilly, 2009
3. Professional Android 2 Application Development, Reto Meier, Wiley India Pvt. Ltd.

REFERENCES:

1. Beginning Android, Mark L. Murphy, Wiley India Pvt. Ltd.
2. Pro Android, Sayed Y. Hashimi and Satya Komatineni, Wiley India Pvt. Ltd.
3. Teach Yourself Android Application Development in 24 Hours, Edition, I, Publication, SAMS

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(19PE1CS10) NEURAL NETWORKS AND DEEP LEARNING

COURSE OBJECTIVES:
- To introduce to the basic concepts of neural networks
- To identify and analyze the various types of neural networks and models of neuron and apply accordingly
- To introduce the concept of deep learning and its types
- To explore the concepts of applications of deep learning

COURSE OUTCOMES: After completion of the course the student is able to
CO-1: Analyze and apply the basic the concepts of neural networks
CO-2: Analyze various types of neural networks and use various activation functions to solve complex problems
CO-3: Relate the concept of deep learning and its architecture
CO-4: Design and carry out empirical analysis for various types of applications of deep learning systems

UNIT – I:
Introduction to Neural Networks: Characteristics of Neural Networks, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws**.**

UNIT – II:
Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization.

UNIT – III:
Feed Forward Neural Networks: Introduction, Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Storage Networks. Analysis of Pattern Mapping Networks.

UNIT – IV:
Feedback Neural Networks: Introduction, Analysis of Pattern Storage Networks. Competitive Learning Neural Networks
Introduction, Analysis of Pattern Clustering Networks, Analysis of Feature Mapping Networks, Associative Memory.

UNIT – V:
Fundamentals of Deep Learning: Defining Deep Learning, Common architectural principles of Deep Networks, Building Blocks of Deep Networks, and Major architectures of Deep Networks.

UNIT – VI:
Convolution Neural Networks: The convolution operation, pooling, Recurrent neural networks, Introduction to Auto encoders and decoders

Applications of deep learning: Computer vision, Speech Recognition, Natural Processing.

TEXT BOOKS:

1. Neural Networks, Simon Haykin, PHI
2. Artificial Neural Networks, B. Yagna Narayana, PHI
3. Deep Learning: A Practitioner's Approach, Josh Patterson, Adam Gibson

REFERENCES:

1. Deep Learning, Bengio Yoshua, Ian J. Goodfellow, and Aaron Courville, An MIT Press book, 2015
2. Deep Learning (Adaptive Computation & Machine Learning), Ian Good Fellow, Yoshua Bengio, Aran Courville
3. Fundamentals of Neural Networks: Architectures, Algorithms and Applications, Fausett
4. Neural Networks and Deep Learning, Michael Nielsen, Determination Press, 2015

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(19PE1EC05) INTERNET OF THINGS

COURSE OBJECTIVES:
- To understand the concepts of Internet of Things
- To explore the various IoT Platforms and protocols
- To implement the web-based services on IoT devices
- To design an IoT application

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the use of Devices, Gateways and Data Management in IoT
CO-2: Analyze various protocols for IoT
CO-3: Familiarize various IoT Development frameworks
CO-4: Develop various applications in IoT

UNIT – I:
Introduction: Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Deployment Templates.

UNIT – II:
IoT Protocols: Message Queuing Telemetry Transport (MQTT), Secure Message Queuing Telemetry Transport (SMQTT), Constrained Application Protocol (CoAP), Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP).

UNIT – III:
Connectivity Technologies: IEEE802.15.4, Zigbee, 6LOWPAN, Wireless HART, Z-Wave, ISA 100, Bluetooth, NFC, RFID, LoRa and LoRaWAN

UNIT – IV:
IoT Physical Devices and Endpoints: Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT – V:
IoT Platforms: Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API, Web Services for IoT.

UNIT – VI:
Domain Specific IoT Applications: Introduction, home automation, smart cities, environment, energy, retail, logistics, agriculture, industry, Health and Lifestyle.
Design Methodology for Home Automation and Weather Monitoring.

TEXT BOOKS:
1. Internet of Things: A Hands-on Approach, Vijay Madisetti, Arshdeep Bahga

2. The Internet of Things – Key Applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi, Wiley, 2012
3. The Internet of Things in the Cloud: A Middleware Perspective, Honbo Zhou, CRC Press, 2012

REFERENCES:

1. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers
2. Building the Internet of Things, Sara Cordoba, Wimer Hazenberg, Menno Huisman BIS Publishers, 2011
3. Designing the Internet of Things, Adrian Mcewen, Hakin Cassimally, 2015

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(19PE1CS11) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

COURSE OBJECTIVES:

- To outline the fundamentals of software architecture and quality requirements of a software system
- To define the fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks
- To identify the methods, techniques, and tools for software architecture and document different software product lines
- To relate various design patterns for software architecture system

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

CO-1: Construct and design suitable Software architecture for small software systems

CO-2: Analyze major Software architectural styles, design patterns, and frameworks

CO-3: Elaborate Software architecture using various documentation approaches and architectural description languages

CO-4: Demonstrate a number of the fundamental patterns and principles of software architectural styles and design any case study

UNIT – I:

Envisioning Architecture: The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, Reference architectures, architectural structures and views.

Creating an Architecture, Quality Attributes, Achieving qualities. Architectural styles and patterns, designing the Architecture, Documenting Software architectures, Reconstructing Software Architecture.

UNIT – II:

Analyzing Architectures: Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

UNIT – III:

Moving from one system to many, Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT – IV:

Patterns: Pattern Description, Organizing catalogs, role in solving design problems. Selection and usage.

Creational and Structural Patterns: Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, facade, flyweight Proxy.

UNIT – V:

Behavioral Patterns: Chain of responsibility, command. Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

UNIT – VI:

Case Studies: A-7E -A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability. Air Traffic Control - a case study in designing for high availability, Celsius Tech - a case study in product line development.

TEXT BOOKS:

1. Software Architecture in Practice, Len Bass, Paul Clements & Rick Kaman, 2nd Edition, Pearson Publication, 2003
2. Design Patterns, Erich Gamma, Pearson Education, 1995

REFERENCES:

1. Beyond Software Architecture, Luke I-lohmann, Addison Weslcy, 2003
2. Software Architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
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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(19PE1CS12) QUANTUM COMPUTING

COURSE OBJECTIVES:

- To the basics of quantum computation and its necessity
- To the background of mathematics for this kind of computation
- To implication of quantum circuits and
- To explore various Quantum algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Explore the quantum computation environment
CO-2: Identify the implications of quantum computation in the field of mathematics and associated fields
CO-3: Demonstrate building blocks and programming methodologies for quantum computing
CO-4: Apply quantum computation algorithms and use them

UNIT – I:

Introduction to Quantum Computing: Motivation for studying Quantum Computing, Major players in the industry (IBM, Microsoft, Rigetti, D-Wave etc.), Origin of Quantum Computing, Overview of major concepts in Quantum Computing, Qubits, and multi-qubits states, Bra-ket notation Bloch Sphere representation,

UNIT – II:

Math Foundation for Quantum Computing: Matrix Algebra: basis vectors and orthogonality, inner product and Hilbert spaces, matrices and tensors, unitary operators and projectors, Dirac notation, Eigen values and Eigen vectors.

UNIT – III:

Building Blocks for Quantum Program: Architecture of a Quantum Computing platform, Details of q-bit system of information representation: Block Sphere, Multi-qubits States Quantum superposition of qubits (valid and invalid superposition), Quantum Entanglement, Useful states from quantum algorithmic perceptive e.g. Bell State, Operation on qubits: Measuring and transforming using gates, Quantum Logic gates and Circuit: Pauli, Hadamard, phase shift.

UNIT – IV:

Programming model for a Quantum Computing Program, Steps performed on classical computer, Steps performed on Quantum Computer, Moving data between bits and qubits.

UNIT – V:

Quantum Algorithms: Basic techniques exploited by quantum algorithms, Amplitude amplification, Quantum Fourier Transform, Phase Kick-back, Quantum Phase estimation, Quantum Walks

UNIT – VI:

Major Algorithms: Shor's Algorithm, Grover's Algorithm, Deutsch's Algorithm, Deutsch -Jozsa Algorithm.

TEXT BOOKS:

1. Quantum Computation and Quantum Information, Michael A. Nielsen, Cambridge University Press
2. Quantum Computing Explained, David McMahon, Wiley

REFERENCES:

1. IBM Experience: https://quantumexperience,ng,bluemix.net
2. Microsoft Quantum Development Kit https://www.microsoft.com/en-us/quantum/development-kit
3. Forest SDK PyQuil: https://pyquil.readthedocs.io/en/stable/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. (Honors) CSE VII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PE1CS13) OPEN SOURCE TECHNOLOGIES

COURSE OBJECTIVES:

- To realize the role of Open-Source Technologies in real world applications
- To experiencing on Apache and MySQL configurations in building applications
- To effectively apply knowledge of PHP, TCL and Tk to new situations and learn from the experience
- To providing ability for programs to interact with other programs and also for acting as an embeddable interpreter

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Discriminate typical Open-Source Languages & application programming languages
CO-2: Apply the syntax and semantics of scripting languages in the configured environment
CO-3: Develop a Web applications for decision making
CO-4: Design and implement Open-Source Technologies for software solutions

UNIT – I:
Introduction to Open-Source: Open Source, Need and Principles of OSS, Open-Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open-Source Software, Public Domain. History of free software, Proprietary Vs Open-Source Licensing Model, use of Open- Source Software, FOSS does not mean no cost.

UNIT – II:
Configuring Your Environment: Installation Prerequisites, Installing Apache and PHP on Linux, Installing Apache and PHP on Windows Testing Your Installation, Configuring PHP, Run-Time Configuration.
MySQL: Introducing MySQL, Installing and Configuring MySQL, MySQL Storage Engines and Datatypes: Storage Engines, Datatypes and Attributes, Working with Databases and Tables

UNIT – III:
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 MCrypt package, Building Web sites for the World

UNIT – V:

TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, Event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

UNIT – VI:

Tk: Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk

TEXT BOOKS:

1. Open-Source Technology, Kailash Vadera & Bhavyesh Gandhi, University Science Press, Laxmi Publications, 2009
2. Beginning PHP and MySQL from Novice to Professional, W. Jason Gilmore, Third Edition, Apress Publications
3. The World of Scripting Languages, David Barren, Wiley Publications

REFERENCES:

1. PHP6 and MySQL Bible, Steve Suehring, Tim Converse and Joyce Park, Wiley Publishing, Inc
2. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J. Lee and B. Ware, Pearson Education Addison Wesley)
3. Tcl and the Tk Tool kit, Ousterhout, Pearson Education

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B.Tech. (Honors) CSE VIII Semester	**L**	**T/P/D**	**C**
	0	**4**	**2**

(19HN4TP01) TECHNICAL PAPER WRITING

1. The student shall take up a problem/topic of engineering branches (inter-disciplinary nature) and apply the knowledge which they acquired while pursuing their engineering branch. It is expected to analyse, design and develop an application for the identified problem and write a technical paper/document.

2. Alternatively, the student shall
i) identify a research topic, analyse the problem, carryout the experiments, write a technical paper and publish in /communicate for a Scopus indexed journal/any journal with decent reputation
OR
ii) Demonstrate a talent/an idea/development of an innovative product.

3. The evaluation shall be done by the same committee which is constituted for project evaluation, along with the final semester project work.

4. The students should start exploration for the Technical Paper Writing immediately after the semester exams of VI semester (III year II semester). Only the evaluation part shall be carried in VIII semester (IV year II semester).

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B.Tech. (Honors) CSE VIII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PE1CS14) INFORMATION RETRIEVAL SYSTEMS

COURSE OBJECTIVES:

- To describe the differences between repositories like Base Management Systems, Information retrieval systems and data warehouse
- To discover various pre-processing techniques which can apply on text documents to outline the structure of queries and documents
- To articulate fundamental functions used in information retrieval such as automatic indexing, abstracting, and clustering
- To learn the important concepts, algorithms, and data/file structures that are necessary to specify, design, and implement Information Retrieval (IR) systems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify and understand the relationships between various Repository Systems
CO-2: Apply knowledge of data structures and indexing methods in information retrieval Systems
CO-3: Implement various clustering, searching techniques and algorithms on Information systems
CO-4: Analyze clustering techniques and algorithms using evaluation measures

UNIT – I:
Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses, Information Retrieval System Capabilities – Search, Browse, Miscellaneous.

UNIT – II:
Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction
Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N – gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT – III:
Automatic Indexing: Classes of automatic indexing, Statistical Indexing, Natural language, Concept indexing, Hypertext linkages.
Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

UNIT – IV:
User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean Systems, Searching the Internet and hypertext.

UNIT – V:
Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.

UNIT – VI:

Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

TEXT BOOKS:

1. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T. Maybury, Springer
2. Modern Information Retrieval, Ricardo Baeza-Yates, Pearson Education, 2007

REFERENCES:

1. Information Retrieval: Algorithms and Heuristics, David A. Grossman and Ophir Frieder, 2nd Edition, Springer
2. Information Retrieval Data Structures and Algorithms, Frakes W. B., Ricardo Baeza-Yates, Prentice Hall, 1992

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B.Tech. (Honors) CSE VIII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PE1CS20) CLOUD TECHNOLOGIES

COURSE OBJECTIVES:

- To explain the evolving computer model called cloud computing
- To introduce the various levels of services that can be achieved by cloud
- To analyze the concepts of IaaS, PaaS, SaaS, Public and Private Clouds
- To host applications for which the services can be delivered to consumers rapidly at minimal cost

COURSE OUTCOMES: After completion of the course, the student should be able to
CO1: Explain cloud computing, virtualization and classify services of cloud computing
CO2: Illustrate architecture and programming in cloud
CO3: Build virtual machines in a datacenter/hypervisor environment
CO4: Describe the platforms for development of cloud applications and list the application of cloud

UNIT – I:
Introduction: Cloud computing at a glance, the vision of cloud computing, Defining a Cloud, A closer Look, Cloud computing reference model, Characteristics and benefits, Challenges ahead, Historical developments: Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments: Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjra soft Aneka

UNIT – II:
Cloud Computing Architecture: Introduction, The Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges, Aneka: Framework overview Anatomy of the Aneka container, Building Aneka clouds, Cloud programming and management

UNIT – III:
Virtualization: Introduction to Virtualization: Objectives of virtualization, history of virtualization, benefits of virtualized technology, the virtual service desk, what can be virtualized, related forms of computing, cloud computing, software as a service – SaaS, grid computing, utility computing, virtualization processes.

UNIT – IV:
Virtualization Technologies: Ubuntu (server edition), Altiris, windows, server, software virtualization, VMware, intel virtualization, red hat virtualization, SoftGrid application, Linux virtualization, desktop virtualization, hardware virtualization, resource virtualization, processor virtualization, application virtualization.

UNIT – V:
Concurrent Computing: Introducing parallelism for single-machine computation, Programming applications with threads, Multithreading with Aneka, Programming

applications with Aneka threads, High-Throughput Computing: Task computing, Task-based application models, Aneka task-based programming, Data-Intensive Computing: What is data-intensive computing? Technologies for data-intensive computing.

UNIT – VI:

Cloud Platforms in Industry: Amazon web services, Google AppEngine, Microsoft Azure

Cloud Applications: Scientific applications, Business and consumer applications, Energy efficiency in clouds, Market-based management of clouds, Federated clouds/Intercloud, Third - party cloud services

TEXT BOOKS:

1. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, McGraw Hill Education
2. Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book, Ivanka Menken ,Gerard Blokdijk, 2009

REFERENCES:

1. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Tata McGraw Hill, 2011
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010

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B.Tech. (Honors) CSE VIII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PE1IT16) SOFTWARE DEFINED NETWORKS

COURSE OBJECTIVES:

- To provide a comprehensive introduction to Software Defined Networking (SDN) and presents SDN in context with more familiar network services and challenges
- To offer a unique perspective of the business case and technology motivations for considering SDN solutions
- To identify the impact of SDN on traffic management and the potential for network service growth
- To provide students with the basic concepts and explains the importance of virtualization, particularly the impact of virtualization on servers and networks, service providers, legacy networks, and network vendors

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

CO-1: Demonstrate the main concepts, Virtual and Physical Memory Mapping and motivation towards Software Defined Networking

CO-2: Understand the implementation and design of SDN (Software Defined Networks)

CO-3: Describe the Open Flow Switch Specification and the SDN Controllers

CO-4: Illustrate the concepts of visualization, particularly the impact of visualization on servers and networks, service providers, legacy networks, and network vendors

UNIT – I:

Introduction to Software Defined Networking: Virtualization, Virtual Memory, Virtual Memory Operation, Virtual and Physical Memory Mapping, Server Virtualization, Storage Virtualization, Software Defined Networking, Network Limitations, Network Control Plane.

UNIT – II:

SDN Implementation: Introduction, SDN Implementation, SDN Design, Separation of the Control and Data Planes, Edge-Oriented Networking, SDN Operation, Service Providers and SDN

UNIT – III:

Open Flow: Introduction, Overview of the OpenFlow Switch Specification, OpenFlow Ports, OpenFlow Packet-Processing Pipeline, OpenFlow Channel, Message Handling, OpenFlow Channel Connections, Controller Modes, Auxiliary Connection Use for Performance and Reliability, Flow Table Synchronization, Bundle Messages, OpenFlow Configuration-and- Management Protocol, Remote Configuration and The OpenFlow Conformance Testing Program

UNIT – IV:

SDN Controllers, Network Programmability, The Management Interface, The Application- Network Divide Modern Programmatic Interfaces, Virtualization and Data Plane I/O, Services Engineered Path, Service Locations and Chaining.

UNIT – V:

SDN Evolution Introduction, SDN and Enterprise Networks, SDN and Transport Networks, SDN and Optical Transport Networks, Increasing WAN Utilization with SDN, SDN Scalability Issues, Controller Designs for Scalability, Potential SDN Scalability Issues, Network Types.

UNIT – VI:

SDN Management, Load Adaptation, Google and SDN, Google's G-Scale Network, Google's G-Scale Network Hardware, Google SDN Deployment, Implementation Challenges.

TEXT BOOKS:

1. Software Defined Networking: Design and Deployment, Patricia A. Morreale and James M. Anderson, 1st Edition, CRC Press
2. SDN: Software Defined Networks, Thomas D. Nadeau and Ken Gray, Orielly

REFERENCES:

1. Software Defined Networking with OpenFlow, Siamak Azodolmolky Wiley
2. Software Defined Networks: A Comprehensive Approach, Paul Goransson, Chuck Black, Morgan Kaufmann

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(19PE1CS15) INFORMATION SECURITY ASSESSMENT AND AUDITS

COURSE OBJECTIVES:

- To introduce the technology and fundamentals of Information Security and performance metrics
- To introduce Security audit, reporting
- To introduce Security Vulnerability and Vulnerability Assessments
- To introduce Information Security Risk and Configuration Management

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Outline the fundamentals of Information Security Metrics and Audit
CO-2: Identify the areas for security auditing, Perform security auditing and report the information
CO-3: Illustrate Vulnerability Management and provide solutions
CO-4: Summarize Risk treatment, Management and Provide control Policies for Configuration Management

UNIT – I:

Information Security Performance Metrics and Audit: Security Metrics and Reporting, Common Issues and Variances of Performance Metrics, Introduction to Security Audit, Servers and Storage devices, Infrastructure and Networks, Communication Routes, Phases of Information Security Audit and Strategies, Ethics of an Information Security Auditor.

UNIT – II:

Information Security Audit Tasks, Reports and Post Auditing Actions: Pre-audit checklist, Information Gathering, Vulnerability Analysis, External Security Audit, Internet Network Security Audit, Firewall Security Audit, IDS Security Auditing, Social Engineering Security Auditing, Web Application Security Auditing, Information Security Audit Deliverables &Writing Report, Result Analysis, Post Auditing Actions, Report Retention.

UNIT – III:

Vulnerability Management: Information Security Vulnerabilities – Threats and Vulnerabilities, Human-based Social Engineering, Computer-based Social Engineering, Social Media Countermeasures, Vulnerability Management- Vulnerability Scanning, Testing, Threat management.

UNIT – IV:

Information Security Assessments: Vulnerability Assessment, Classification, Types of Vulnerability Assessment, Vulnerability Assessment Phases, Vulnerability Analysis

Stages, Characteristics of a Good Vulnerability Assessment Solutions & Considerations, Vulnerability Assessment Reports

UNIT – V:

Information Security Risk Assessment, Risk Treatment, Residual Risk, Risk Acceptance, Risk Management.

UNIT – VI:

Configuration Reviews: Introduction to Configuration Management, Configuration Management requirements -Plan-Control, Development of configuration Control Policies, Testing Configuration Management.

TEXT BOOKS:

1. Assessing Information Security (Strategies, Tactics, Logic and Framework), A. Vladimirov, K. Gavrilenko, and A. Michajlowski
2. The Art of Computer Virus Research and Defense, Peter Szor

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	3	**0**	**3**

(19PE1EC04) DIGITAL IMAGE PROCESSING

COURSE PRE-REQUISITES: Digital Signal Processing

COURSE OBJECTIVES:
- To introduce fundamentals of digital image processing and study image transforms
- To learn enhancement & restoration techniques in spatial and frequency domains
- To study and compare various image compression image segmentation and Morphological algorithms
- To understand image analysis methods

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the basic principles of digital image processing and perform image transforms
CO-2: Understand and perform basic image processing methods such as Image filtering operations, Image enhancement and restoration
CO-3: Analyze and compare various image compression image segmentation and Morphological techniques and their applications
CO-4: Design and implement various algorithms for image analysis

UNIT – I:
Fundamentals of Image Processing: Digital Image Fundamentals, Basic steps of Image Processing System, Sampling and Quantization of an image, relationship between pixels, Imaging Geometry.
Image Transforms: 2 D- Discrete Fourier Transform, Discrete Cosine Transform (DCT), Haar Transform, Hadmard Transform, Hotelling Transform and slant transform.

UNIT – II:
Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.
Frequency Domain Methods: Basics of filtering in frequency domain, Image smoothing, Image sharpening, Selective filtering.

UNIT – III:
Image Segmentation: Segmentation concepts, Point, Line and Edge Detection, Edge Linking using Hough Transform, Thresholding, Region Based segmentation.
Wavelet Based Image Processing: Introduction to wavelet Transform, Continuous wavelet Transform, Discrete wavelet Transform, Filter banks, Wavelet based image segmentation.

UNIT – IV:
Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models - Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane coding, Transform coding, Predictive coding, JPEG Standards.

UNIT – V:

Image Restoration: Image Restoration Degradation model, Algebraic approach to restoration, Inverse Filtering, Least Mean square filters.

Morphological Image Processing: Dilation and Erosion, Opening and closing, The Hit or Miss Transformation, Morphological algorithms.

UNIT – VI:

Representation and Description: Boundary following, chain codes, polygonal approximation using minimum - perimeter polygons, boundary segments, skeleton, simple boundary descriptors, shape number, simple regional descriptors.

TEXT BOOKS:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, 4th Edition, Pearson, 2018
2. Digital Image Processing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, 5th Edition, TMH, 2015

REFERENCES:

1. Digital Image Processing, William K. Pratt, 3rd Edition, John Willey, 2007
2. Fundamentals of Digital Image Processing, A. K. Jain, 3rd Edition, PHI, 1989
3. Digital Image Processing using MATLAB, Rafael C. Gonzalez, Richard E. Woods and Steven L. Edding, 2nd Edition, TMH, 2010
4. Digital Image Processing and Computer Vision, Sonka, Hlavac, Boyl, Cengage Learning, 2008
5. Introduction to Image Processing and Analysis, John C. Russ, J. Christian Russ, CRC Press, 2008

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	3	**0**	**3**

(19PE1CS16) NATURAL LANGUAGE PROCESSING

COURSE PRE-REQUISITES: Data Structures, Finite Automata and Probability Theory

COURSE OBJECTIVES:

- To introduce the fundamental concepts and ideas in Natural Language Processing (NLP)
- To introduce some of the problems and solutions of NLP and their relation to linguistics and statistics
- To provide an understanding of the algorithms available for the processing of linguistic information and the underlying computational properties of natural languages
- To study and compare various NLP algorithms and design modelling techniques

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

CO-1: Describe the underlying concepts of Natural Language, Language Model Evaluation, Parameter Estimation

CO-2: Explain the various Issues and Challenges in finding the structure of a word, Morphological Models Finding the Structure of Documents, A Data-Driven Approach to Syntax and Syntactic Structure and Language-Specific Modelling Problems

CO-3: Formulate Parsing Algorithms, Models for Ambiguity Resolution in Parsing, N-Gram Models, Language Model Adaptation

CO-4: Familiarize Multilingual Issues, Word Sense Disambiguation Systems, Multilingual and Cross lingual Language Modelling

UNIT – I:

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

UNIT – II:

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

UNIT – III:

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

UNIT – IV:

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT – V:

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and structure.

UNIT – VI:

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

TEXT BOOKS:

1. Multilingual Natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U. S. Tiwary

REFERENCES:

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

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B.Tech. (Honors) CSE VIII Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PE1CS17) DISTRIBUTED TRUST AND BLOCKCHAIN TECHNOLOGIES

COURSE OBJECTIVES:

- To get the terminologies and overview of block chain technologies
- To study the concepts and foundation of blockchain Technology
- To understand Security Mechanism and Consensus in blockchain
- To design Use Cases and Architecture blockchain Technology

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

CO-1: Understand the concepts related to digital distributed ledger

CO-2: Classify the Byzantine model of fault tolerance mechanisms

CO-3: Apply blockchain scripting language to build Ethereum and its Smart Contracts in application development

CO-4: Design Hyperledger and analyze privacy and security issues

UNIT – I:

Need for Distributed Record Keeping, Byzantine Generals problem Consensus algorithms and their scalability problems, Technologies Borrowed in Blockchain – hash pointers, consensus, digital cash etc.

UNIT – II:

Byzantine Models of fault tolerance, Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems

UNIT – III:

Bitcoin blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use

UNIT – IV:

Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts

UNIT – V:

Hyperledger fabric, Fabric Membership, Fabric Membership, plug and play platform and mechanisms in permissioned blockchain

UNIT – VI:

Pseudo-anonymity vs. anonymity, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks.

TEXT BOOKS:

1. Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University Press, 2019
2. Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming, Josh Thompson, Create Space Independent Publishing Platform, 2017

REFERENCES:

1. Blockchain Quick Reference, Brenn Hill, Samanyu Chopra, Paul Valencourt, Packt Publishing, 2018
2. Blockchain: Blueprint for a New Economy, Melanie Swa, 2015
3. Mastering Bitcoin: Programming the Open Blockchain, Andreas M. Antonopoulos, 2017

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	3	**0**	**3**

(19PE1CS18) SOFTWARE METRICS AND MEASURES

COURSE OBJECTIVES:

- To understand the basic techniques of data collection and how to apply them
- To learn software metrics that define relevant metrics in a rigorous way
- To understand software quality metrics
- To understand management metrics

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

CO-1: Identify and analyze the importance of Software metrics and Measurements

CO-2: Categorize and demonstrate product metrics, quality metrics, and management metrics for quality control and assurance.

CO-3: Illustrate and explain management models for software management.

CO-4: Outline and evaluate quality management models

UNIT – I:

Measurement Theory: Fundamentals of measurement – Measurements in Software Engineering – Scope of Software metrics – Measurement theory – Goal based framework – Software measurement validation.

UNIT – II:

Data Collection and Analysis: Empirical investigation – Planning experiments – Software metrics data collection – Analysis methods – Statistical methods.

UNIT – III:

Product Metrics: Measurement of internal product attributes – Size and structure – External product attributes – Measurement of quality.

UNIT – IV:

Quality Metrics: Software quality metrics – Product quality – Process quality – Metrics for software maintenance – Case studies of Metrics Program – Motorola – HP and IBM.

UNIT – V:

Management Metrics: Quality management models – Rayleigh Model – Problem Tracking report (PTR) model

UNIT – VI:

Reliability growth model – Model evaluation – Orthogonal defect classification.

TEXT BOOKS:

1. Software Metrics- A Rigorous and Practical Approach, Norman E., Fenton, Shari Lawrence, Pflleger, International Thomson Computer Press, 1997

REFERENCES:

1. Metric and Models in Software Quality Engineering, Stephen H. K., Addison Wesley,1995
2. Measuring Software Process, William A. Floracand Aretitor DCarletow, Addison–Wesley,1995

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	3	**0**	**3**

(19PE1IT15) DATA VISUALIZATION

COURSE OBJECTIVES:

- To identify the need of core skills for visual analysis
- To describe the techniques in time-series, ranking models
- To define the different types of analysis like deviation, distribution, correlation & multivariate
- To know how to design information dashboards

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

CO-1: Understand the principles of visual perception

CO-2: Apply core skills for visual analysis

CO-3: Analyze visualization techniques for various data analysis tasks

CO-4: Design information dashboard

UNIT – I:

Core Skills for Visual Analysis: Information visualization – effective data analysis – traits of meaningful data – visual perception – making abstract data visible – building blocks of information visualization – analytical interaction – analytical navigation – optimal quantitative scales – reference lines and regions – trellises and crosstabs – multiple concurrent views – focus and context – details on demand – over-plotting reduction – analytical patterns – pattern examples

UNIT – II:

Time-Series, Ranking: Time-series analysis – time-series patterns – time-series displays – time-series best practices – part-to-whole and ranking patterns – part-to-whole and ranking displays – best practices

UNIT – III:

Deviation & Distribution Analysis: deviation analysis – deviation analysis displays – deviation analysis best practices, Distribution analysis – describing distributions – distribution patterns – distribution displays – distribution analysis best practices

UNIT – IV:

Correlation & Multivariate Analysis: Correlation analysis – describing correlations – correlation patterns – correlation displays – correlation analysis techniques and best practices – multivariate analysis – multivariate patterns – multivariate displays – multivariate analysis techniques and best practices

UNIT – V:

Information Dashboard Design-I: Information dashboard – categorizing dashboards – typical dashboard data – dashboard design issues and best practices – visual perception – limits of short-term memory – visually encoding data – Gestalt principles – principles of visual perception for dashboard design

UNIT – VI:

Information Dashboard Design-II: Characteristics of dashboards – key goals in visual design process – dashboard display media – designing dashboards for usability – meaningful organization – maintaining consistency – aesthetics of dashboards – testing for usability – case studies: sales dashboard, CIO dashboard, Telesales dashboard, marketing analysis dashboard

TEXT BOOKS:

1. Now You See It: Simple Visualization Techniques for Quantitative Analysis, Stephen Few, Analytics Press, 2009
2. Information Dashboard Design: The Effective Visual Communication of Data, Stephen Few, O'Reilly, 2006

REFERENCES:

1. The Visual Display of Quantitative Information, Edward R. Tufte, 2nd Edition, Graphics Press, 2001
2. Data Points: Visualization that Means Something, Nathan Yau, Wiley, 2013
3. Visualizing Data: Exploring and Explaining Data with the Processing Environment, Ben Fry, O'Reilly, 2008
4. Business Analytics for Managers: Taking Business Intelligence Beyond Reporting, Gert H. N. Laursen and Jesper Thorlund, Wiley, 2010
5. The Value of Business Analytics: Identifying the Path To Profitability, Evan Stubbs, Wiley, 2011

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. (Honors) CSE VIII Semester	**L**	**T/P/D**	**C**
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(19PE1CS19) COGNITIVE ENGINEERING

COURSE OBJECTIVES:

- To identify the basics of Artificial Intelligence and Cognitive science engineering with focus on knowledge representation, and its use by individual minds, brains, and machines
- To analyze the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics
- To analyze the basics of language acquisition skills and language processing techniques
- To relate the role of Neuro science in Cognitive field and robotics applications

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

CO-1: Describe the major concepts and role of computers in Cognitive Science, Nature of Artificial Intelligence, Psychology, Neuroscience, Language Acquisition, Neuropsychology etc

CO-2: Explain the philosophical and theoretical perspectives, Cognitive Architecture, Cognitive Processes, mind organization, cognitive organization, Computation of Cognitive Functioning at machines level.

CO-3: Analyze the Information Processing Models of the Mind, Strategies for Brain mapping, various function Nervous System.

CO-4: Demonstrate the use of neuroscience in cognitive domain in present industry and also familiar with Cognitive function measurement tools, Robotics and various Challenges.

UNIT – I:

Introduction to Cognitive Science and Cognitive Psychology: The Cognitive view – Some Fundamental Concepts – Computers in Cognitive Science – Applied Cognitive Science – The Interdisciplinary Nature of Cognitive Science

Cognitive Psychology – The Architecture of the Mind - The Nature of Cognitive Psychology- A Global View of The Cognitive Architecture.

UNIT – II:

Cognitive Neuroscience: Cognitive Processes, Working Memory, and Attention- The Acquisition of Skill- Brain and Cognition Introduction to the Study of the Nervous System – Neural Representation – Neuropsychology- Computational Neuroscience - The Organization of the mind.

UNIT – III:

Language Acquisition, Semantics and Processing Models:

Language Acquisition: Milestones in Acquisition – Theoretical Perspectives- Semantics and Cognitive Science – Meaning and Entailment, Computational Models of Semantic Processing.

UNIT – IV:

Natural Language Processing and Cognitive Process: Preliminaries, Role of Grammar in Language Processing. Connectionist Models, Information Processing Models of the Mind- Physical symbol systems and language of thought- Applying the Symbolic Paradigm.

UNIT – V:

Higher-Level Cognition and Challenges: Dynamical systems and situated cognition-Challenges – Emotions and Consciousness – Computation of Cognitive Functioning in machines: Robotics, Human-Robotics Interaction.

UNIT – VI:

Cognitive Science for Vision/Image Processing: Perception and sensing: visual cognition, cognitive mechanisms of vision, Feature Extraction from Images, Information Processing in Perception and Visual Behavior, Cognitive function measurement tools and software.

TEXT BOOKS:

1. Cognitive Science: An Introduction, Neil Stillings, Steven E. Weisler, Christopher H. Chase and Mark H. Feinstein, Second Edition, 1995
2. Cognitive Science: An Introduction to the Science of the Mind, José Luis Bermúdez, Cambridge University Press, New York, 2010
3. Cognitive Science: An Introduction to the Study of Mind, J. Friedenberg and G. Silverman, 2006

REFERENCES:

1. Computational Vision: Information Processing in Perception and Visual Behavior, Hanspeter A. Mallot, Translated John S. Allen
2. How the Mind Works, Steven Pinker, 2009
3. Cognitive Science: An Interdisciplinary Approach, Carolyn Panzer, Sobel and Paul Li, 2013
4. Mind: Introduction to Cognitive Science, Paul Thagard, 2nd Edition, MIT Press, 200
5. The MIT Encyclopedia of the Cognitive Sciences (MITECS), Wilson Robert A., & Keil, Frank C, (eds.), MIT Press, 2001