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B.TECH – COMPUTER SCIENCE & ENGINEERING
Course Structure R-20

Semester- VII

S.No	Class	Course Code	Name of the Subject	L	T	P	C
1	PC	C57PC1	Linux Programming	3	0	0	3
2	PC	C57PC2	Information Security	3	0	0	3
3	PE	C57PE3	A. Big Data Analytics B. Soft Computing C. Storage Area Networks D. Cyber Security E. Software Quality Assurance F. Mobile Application Development	3	0	0	3
4	PE	C57PE4	A. Predictive Analytics B. Pervasive Computing C. Semantic Web D. Computer Forensics E. Software Testing Methodologies F. Internet of Things	3	0	0	3
5	OE	C57OE5	Open Elective II	3	0	0	3
6	PC	C57PC6	Linux Programming Lab	0	0	2	1
7	PC	C57PC7	Information Security Lab	0	0	2	1
8	PW	C57PW8	Major Project Phase-I	0	0	4	2
9	MC	MC007	Competitive Exams	0	0	0	**S**
TOTAL							**19**

Major Project Phase I: Students can form a group of minimum of two or maximum of four under the allocated guide, students group should choose a project title, for the chosen project title carryout a detailed literature survey, problem formulation, planning higher level design. The project evaluation will be Continuous Internal Evaluation will be made by the PRC Committee. The PRC committee consists of Head,
Project Coordinator, One Senior Professor, One Associate Professor, and guide.

Mandatory Course: Competitive Exams:
For completion of this course the student can submit the proof of appearing the competitive exams like, GATE, IELTES, GRE, TOEFL, CDAC, CDS, CAT, or any examination organized by NATIONAL TESTING AGENCY (NTA), or college in the level of NTA.(or)The student should request for the provision of conducting Technical Seminar by the department. The topic of seminar should be the current technology of respective Engineering Branch. The evaluation will be done by the Departmental Academic Committee (DAC) based on rubrics framed.

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B.TECH – COMPUTER SCIENCE & ENGINEERING
Course Structure R-20

Semester-VIII

S.No	Class	Course Code	Name of the Subject	L	T	P	C
1	PE	C58PE1	A. Data Science B. Quantum Computing C. Social Networks D. Blockchain Technology E. Agile Software Development F. Stack Technologies	3	0	0	3
2	OE	C58OE2	Open Elective III	3	0	0	3
3	OE	C58OE3	Open Elective IV	3	0	0	3
4	PW	C58PW4	Major Project Phase II	0	0	20	10
TOTAL							**19**

Major Project Phase II: The approved project in Major Project Phase I should be implemented, student should submit the progress of his implementation work in 2 phases, tot he PRC(Project Review Committee). The PRC consists of Head, Project Coordinator, One Senior Professor, One Associate Professor, and guide. Upon approval in both the phases, the student is eligible to submit the final project report by completing proper documentation to the external viva voce.

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COMPUTER SCIENCE AND ENGINEERING-R20

B.Tech VII Semester **L/T/P C**
3/0/0 3

LINUX PROGRAMMING (C57PC1)

Course Objective:
To provide students with a comprehensive understanding of fundamentals of the Linux operating system, including installation, configuration, administration, file management, and security**.**

Course Outcomes:
After completion of the course the student will be able to:

1. Examine the fundamental commands within the Linux operating system and shell scripts to assess their functionality and relevance. L4
2. Analyze file system concepts and directories to understand their structure and Functionality. L4
3. Develop and Analyze skills essential for system programming encompassing file system programming, process and signal management, as well as Inter Process Communication using pipes and signals. L4
4. Utilize semaphores, shared memory, and message queues for advanced inter-process communication and synchronization. L3
5. Construct network programs utilizing socket-based communication, demonstrating proficiency in their development and implementation. L3

UNIT I
Introduction: UNIX, Linux, and GNU, Programming Linux
Shell Programming: What is Shell, Pipes and Redirection, The Shell as a Programming Language, Shell Syntax.

UNIT II FILES:
Working with Files: Linux File Structure, System Calls and Device Drivers, Library Functions, Low-Level File Access, The Standard I/0 Library, Formatted Input and Output, File and Directory Maintenance, Scanning Directories, Errors
The Linux Environment: Program Arguments, Environment Variables, Time and Date, Temporary Files, User Information, Host Information, Logging, Resources and Limits

UNIT III
Process and Signals: What Is a Process?, Process Structure, Starting New Processes, Signals
IPC Pipes: What is a Pipe?, Process Pipes, Sending Output to open, The Pipe Call, Parent and Child Processes, Named Pipes: FIFOS, The CD Database Application

UNIT IV
IPC: Semaphores, Shared Memory, and Message Queues
Semaphores, Shared Memory, Message queues, The CD Database Application, IPC Status Commands

UNIT V
Sockets
What Is a Socket? Socket Connections, Network Information, Multiple Clients, Datagrams.

Text Books:

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Willey India Edition.

Reference Books:

1. Linux System Programming. Robert Love, O'Reilly,SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX Network Programming, W.R.Steven, PHI.
4. UNIX for Programming and users, 3rd Edition, Graham Glass, King Ables, Pearson
5. Unix concepts and Applications, 4th Edition, Sumitabha Das,TMH.
6. Unix System Programming using C++, T. Chan,PHI. Edition.

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COMPUTER SCIENCE & ENGINEERING

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INFORMATION SECURITY (C57PC2)

Course Objective:
To provide students with a comprehensive understanding of principles, practices, and technologies of information security, enabling them to identify and address security threats, and uphold legal, ethical, and professional standards in protecting information systems.

Course Outcomes:
Upon completion of the course the student will be able to:

1. Identify the need and approaches to Information Security implementation. L3
2. Analyze legal, ethical, professional issues, standards, policies and practices involved in securing the information. L4
3. Distinguish risk management issues evolved during planning for securing the information. L4
4. Examine Encryption mechanisms, technical and nontechnical aspects for information security. L4
5. Examine security management maintenance models and the technologies that are useful for securing the information. L4

UNIT I
Introduction to Information Security:
The History of Information Security, What Is Security?, CNSS Security Model, Components of an Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, Security in the Systems Development Life Cycle, Security Professionals and the Organization, Communities of Interest.
Need for Security:
Threats and Attacks, Compromises to Intellectual Property, Deviations in Quality of Service, Espionage or Trespass, Forces of Nature, Human Error or Failure, Information Extortion, Sabotage or Vandalism, Software Attacks, Technical Hardware Failures or Errors, Technical Software Failures or Errors, Technological Obsolescence, Theft.

UNIT II
Legal, Ethical, and Professional Issues in Information Security:
Law and Ethics in Information Security, Relevant U.S. Laws, International Laws and Legal Bodies, Ethics and Information Security, Codes of Ethics of Professional Organizations.
Planning for Security:
Information Security Planning and Governance, Information Security Policy, Standards, and Practices, the Information Security Blueprint Security Education, Training, and Awareness Program, Continuity Strategies.

UNIT III
Risk Management:
An Overview of Risk Management, Risk Identification, Risk Assessment, Risk Control, Quantitative Versus Qualitative Risk Management Practices, Recommended Risk Control Practices.

UNIT IV

Encryption: A Brief History of Encryption, Early Codes, More Modern Codes, Symmetric-Key Cryptography, Key Exchange, Public Key Cryptography, Key Exchange, Public Key Infrastructure, Structure and Function.

Implementing Information Security:

Information Security Project Management, Technical Aspects of Implementation, Nontechnical Aspects of Implementation, Information Systems Security Certification and Accreditation.

UNIT V

Information Security Maintenance:

Security Management Maintenance Models, Digital Forensics

Security Technology: Access Controls, Firewalls, and VPNs, Intrusion Detection and Prevention Systems, and Other Security Tools.

Text Books:

1. Principles of Information Security, Michael E Whitman, Sixth Edition, Cengage Learning
2. Information Security, The Complete Reference, Mark Rhodes-Ousley.

Reference Book:

1. Information Security by VS Bagade & I.A. Dhotre First Edition Technical Publications Pune.

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COMPUTER SCIENCE & ENGINEERING

B.Tech.VII Semester **L/T/P C**
3/0/0 3

BIG DATA ANALYTICS (C57PE3A)

Course Objective:
To provide an overview of Apache Hadoop, HDFS Concepts and Interfacing with HDFS, Map Reduce Jobs and to provide hands on Hadoop Eco System.

Course Outcomes:
Upon completion of the course the student will able to:

1. Apply the introductory concepts of big data, methodologies used for setting up big data. L3
2. Analyze different NoSQL databases and select the most appropriate one for specific use cases. L4
3. Analyze data acquisition and data storage for managing large-scale data environments. L4
4. Implement MapReduce programs for basic data processing tasks. L3
5. Analyze relational and non-relational databases and a case study involving the development of a Django application for viewing weather data. L4

UNIT I
Introduction to Big Data: What is Analytics, What is Big Data, Characteristics of Big Data, Domain Specific Examples of Big Data, and Analytics for Big Data, Big Data Stack.
Setting up big data Stack: Horton works Data Platform (HDP)**,** Cloudera CDH Stack**,** Amazon Elastic MapReduce (EMR)**,** Azure HDInsight.

UNIT II
Big data Patterns: Analytics architecture components and Design styles, Map Reduce Patterns. No SQL: Key-Value Databases, Document Databases, Column Family Databases, Graph Databases.

UNIT III
Big Data Implementations
Data Acquisition: Data Acquisition Considerations**,** Publish - Subscribe Messaging Frameworks**,** Big Data Collection Systems**,** Messaging Queues**,** Custom Connectors
Big Data Storage: HDFS

UNIT IV
Batch Analysis: Hadoop and MapReduce, Hadoop - MapReduce Examples, Pig, Case Study: Batch Analysis of News Articles, Apache Oozie, Apache Spark, Search.

UNIT V
Serving Databases and Web frameworks: Relational (SQL) Databases, Non-Relational (NoSQL) Databases, Python Web Application Framework – Django, Case Study: Django application for viewing weather data.

Text Book:

1. Big Data Science and Analytics A Hands-on Approach. By Arshdeep Bahga, Vijay Madisetti.

Reference Book:

1. Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data EMC Education Services.

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COMPUTER SCIENCE & ENGINEERING

B.Tech. VII Semester **L/T/P C**
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SOFT COMPUTING (C57PE3B)

Course Objective:
To provide students with a comprehensive understanding of fundamentals of artificial and neural networks, fuzzy sets, fuzzy logic and genetic algorithms.

Course Outcomes:
Upon completion of the course, the student will be able to:

1. Analyze and implement supervised learning approaches across a neural network. L4
2. Associate patterns by training algorithms and build various associative memory networks. L3
3. Analyze and implement unsupervised learning approach across a neural network. L4
4. Develop fuzzy logic to handle uncertainty problems. L3
5. Apply principles and methods of membership functions, fuzzification, defuzzification, and associated computational techniques to solve real-world problems involving uncertainty and imprecision. L3

UNIT I
Supervised Learning Network:
Introduction, Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neurons, Back Propagation Network, Radial Based Function Network.

UNIT II
Associative Memory Networks:
Introduction, Training Algorithms for Pattern Association, Auto associative Memory Network, Hetero Associative Memory Network, Bidirectional Associative Memory (BAM), Hopfield Networks, Iterative Auto associative Memory Networks, Temporal Associative Memory Network.

UNIT III
Unsupervised Learning Networks:
Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Network.

UNIT IV
Introduction to Classical Sets and Fuzzy Sets: Introduction, Classical Sets, Fuzzy Sets.
Classical Relational and Fuzzy Relations: Introduction, Cartesian Product of Relation, Classical Relation, Fuzzy Relations, Tolerance and Equivalence Relations, Non interactive Fuzzy Sets.

UNIT V
Membership Functions:
Introduction, Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments, Rank Ordering, Angular, Fuzzy Sets, Neural Networks, Genetic Algorithms, Induction Reasoning.
Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods.

Text Books:

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007.

Reference Books:

1. Soft Computing and Intelligent System Design -Fakhreddine O Karray,Clarence D Silva, Pearson Edition, 2004.
2. Artificial Intelligence and Soft Computing- Behavioural and Cognitive Modelling of the Human Brain- AmitKonar, CRC press,
3. Taylor and Francis Group Artificial Intelligence – Elaine Rich and Kevin Knight, TMH, 1991,rp2008.
4. Artificial Intelligence – Patric Henry W inston – Third Edition, Pearson Education.
5. A first course in Fuzzy Logic-Hung T Nguyen and Elbert A Walker,CRC. Press
6. Taylor and Francis Group Artificial Intelligence and Intelligent Systems,N.P.Padhy, Oxford Univ.Press.

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COMPUTER SCIENCE & ENGINEERING

B.Tech.VII Semester **L/T/P C**
3/0/0 3

STORAGE AREA NETWORKS (C57PE3C)

Course Objectives:
To provide students with a comprehensive understanding of storage networks, their products and mechanisms for the backup and recovery.

Course Outcomes:
Upon completion of the course, the student will be able to:

1. Apply the knowledge of information storage principles and data center infrastructure to design and manage efficient storage solutions. L3
2. Apply the principles of Storage Area Network (SAN) architectures and Fiber Channel technologies to design, implement, and manage SAN solutions in an enterprise environment. L3
3. Apply the concepts and technologies of Network-Attached Storage (NAS) and unified storage solutions to effectively deploy and optimize file and object storage systems in diverse IT environments. L3
4. Apply business continuity and backup strategies to develop and implement implement effective information availability and Archive using local and remote replication concepts. L3
5. Apply security and management frameworks to safeguard and optimize storage infrastructure in various IT environments. L3

UNIT I
Introduction to Information Storage:
Information Storage, Data, Types of Data, Big Data, Information, Storage, Evolution of Storage Architecture, Data Center Infrastructure, Core Elements of a Data Center, Key Characteristics of a Data Center, Managing a Data Center
Data Center Environment:
Connectivity, Physical Components of Connectivity, Interface Protocols, Storage, Disk Drive Components, Disk Drive performance, Direct-Attached Storage, DAS Benefits and Limitations Storage Design Based on Application Requirements and Disk Performance, Disk Native Command Queuing, Introduction to Flash Drives, Components and Architecture of Flash Drives, Features of Enterprise Flash Drives, Types of Intelligent Storage Systems

UNIT II
Introduction to Storage Area Network (SAN): Properties of SANs, Storage networking architecture.
Fibre Channel Storage Area Networks: Fibre Channel: Overview, The SAN and Its Evolution, FC Connectivity, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN, iSCSI, FCIP, FCoE

UNIT III

Network-Attached Storage:

General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance, File-Level Virtualization,

Object-Based and Unified Storage: Object-Based Storage Devices**,** Content-Addressed Storage, CAS Use Cases, Unified Storage.

UNIT IV

Introduction to Business Continuity:

Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions

Backup and Archive:

Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Data Archive, Archiving Solution, Architecture

Local and Remote Replication:

Uses of Local Replicas, Replica Consistency, Local Replication Technologies, Tracking Changes to Source and Replica, Restore and Restart Considerations, Creating Multiple Replicas, Modes of Remote Replication, Remote Replication Technologies, Three-Site Replication

UNIT V

Securing the Storage Infrastructure:

Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking.

Managing the Storage Infrastructure:

Monitoring the Storage Infrastructure, Storage Infrastructure Management Activities, Storage Infrastructure Management Challenges, Developing an Ideal Solution, Information Lifecycle Management, Storage Tiering.

Text Book:

1. Information, Storage and Management, Second Edition, Soma Sundaram, Gnana Sundaram, Alok Shrivastava, EMC education services, Wiley Inc.

Reference Book:

1. Storage Area Network Essentials, Richard Barker and Paul Massiglia, Wiley Computer Publishing.

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COMPUTER SCIENCE & ENGINEERING

B.Tech.VII Semester **L/T/P C**
3/0/0 3

CYBER SECURITY (C57PE3D)

Course Objective:
To provide students with a comprehensive understanding of cyber-attacks, types of cybercrimes, cyber laws and also how to protect themselves and ultimately the entire Internet community from such attacks.

Course Outcomes:
Upon completion of the course, the student will be able to:

1. Analyze the phenomenon of cybercrime based on classification in line to Indian regulations. Learn the essence to eradicate cyber offenses and criminal plans. L4
2. Identify the challenges posed by mobile and wireless devices in terms of attacks and policies framed for handling mobile and wireless devices. L3
3. Analyze the tools and methods used for committing cybercrimes. L4
4. Identify the legal perspectives with respect to the phenomenon of cyber crimes and cyber security acts. L3
5. Identify the organizational implications caused in view of cybercrimes and understand the causes of cyber terrorism like psychology, Mind-set and skill of Hackers, role of social, political, ethical, and intellectual property in the cyberspace. L3

UNIT I
Introduction to Cybercrime:
Introduction, Cybercrime and Information Security, Cybercriminals, Classification of Cybercrimes, The legal Perspectives, An Indian Perspective, Cybercrime and the Indian ITA 2000, Global Perspective on Cybercrimes, Cybercrime Era.
Cyber offenses: **Criminal Plans:**
Introduction, Criminal Plans the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets, Attack Vector, Cloud Computing,

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

UNIT III
Tools and Methods Used in Cyber Crime:
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Network

UNIT IV

Cyber Crimes and Cyber Security: The Legal Perspectives:

Introduction, Cybercrime and the Legal Landscape around the World, Need of Cyber laws, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students Indian Scenario

UNIT V

Cyber Security: Organizational Implications

Introduction, Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling,

Cybercrime and Cyber Terrorism: Social, Political, Ethical and Psychological Dimensions Intellectual Property in the Cyberspace, The ethical dimensions of the cybercrimes, The Psychology, Mindset and Skills of Hackers and Other Cybercriminals,Sociology of Cybercriminals, Information Warfare

Text Books:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

Reference Books:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.
3. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

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COMPUTER SCIENCE & ENGINEERING

B.Tech.VII Semester **L/T/P C**
3/0/0 3

SOFTWARE QUALITY ASSURANCE (C57PE3E)

Course Objective:
To equip students with a comprehensive understanding of software quality assurance principles and practices and the skills needed to enhance software quality, prevent defects, and improve overall software development processes.

Course Outcomes:
Upon completion of course, the student will be able to:

1. Apply quality assurance techniques for defect prevention and reduction and evaluate the role of verification and validation in software processes. L3
2. Apply root cause analysis and training techniques for defect prevention and evaluate formal verification methods and their effectiveness in software quality Assurance. L3
3. Analyze quality assurance techniques and activities, fault tolerance and failure Containment. L4
4. Analyze Models for Quality Assessment, Generalized Models, Product-Specific Models. L4
5. Compare various risk identification, software reliability techniques for defects to improve quality and reliability. L4

UNIT I
Software Quality: Perspectives and Expectations, Frameworks and ISO-9126, Definitions, Properties and Measurements.
Quality Assurance: Classifications, Defect Prevention, Defect Reduction, Defect Containment.
Quality Assurance in Context: Handling Discovered Defect During QA Activities, QA Activities in Software Processes, Verification and Validation Perspectives, Reconciling the Two Views.
Quality Engineering: Activities and Process, Goal Setting and Strategy Formation, Quality Assessment and Improvement, Quality Engineering in Software Processes

UNIT II
Defect Prevention and Process improvement: Basic Concepts and Generic Approaches, Root Cause Analysis for Defect Prevention, Education and Training for Defect Prevention, Other Techniques for Defect Prevention, Focusing on Software Processes.
Software Inspection: Basic Concepts and Generic Process, Fagan inspection, Other Inspections and Related Activities, Defect Detection Techniques, Tool/Process Support, and Effectiveness.
Formal Verification: Basic Concepts, Formal Verification, Other Approaches, Applications, Effectiveness, and Integration Issues.

UNIT III
Fault Tolerance and Failure Containment: Basic Ideas and Concepts, Fault Tolerance with Recovery Blocks, Fault Tolerance with N-Version Programming, Failure Containment: Safety Assurance and Damage Control, Application in Heterogeneous Systems.
Comparing Quality Assurance Techniques and Activities: General Questions, Applicability to Different Environments, Effectiveness Comparison, Cost Comparison.

UNIT IV

Quantifiable Quality Improvement: QA Monitoring and Measurement, Immediate Follow-up Actions and Feedback, Analyses and Follow-up Actions, Implementation, Integration, and Tool Support, Models for Quality Assessment, Generalized Models, Product-Specific Models, Model Comparison and Interconnections, Data Requirements and Measurement, Selecting Measurements and Models.

UNIT V

Defect Classification and Analysis: General Types of Defect Analyses, Defect Classification and ODC, Defect Analysis for Classified Data.

Risk Identification for Quantifiable Quality Improvement: Basic Ideas and Concepts, Traditional Statistical Analysis Techniques, New Techniques for Risk Identification, Comparisons and Integration, Risk Identification for Classified Defect Data.

Software Reliability Engineering: Basic Concepts and General Approaches, Large Software Systems and Reliability Analyses, Reliability Snapshots Using IDRMs, Longer-Term Reliability Analyses Using SRGMs, TBRMs for Reliability Analysis and Improvement, Implementation and Software Tool Support.

Text Books:

1. Software Quality Engineering, Testing, Quality Assurance and Quantifiable Improvement- Jeff Tian, Wiley Inter Science, IEEE Computer Society.

Reference Books:

1. Software Testing and Quality Assurance, Theory and Practice, Kshir Sagar Naik, Priyadarshi Tripathy, John Wiley & Sons, 208.

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MOBILE APPLICATION DEVELOPMENT (C57PE3F)

Course Objective:
Provide students to understand, model and manage mobile application development using a range of methods and a chosen application development framework.

Course Outcomes:
Upon completion of the course, the student will be able to:

1. Analyze the concepts related to Android OS design, development framework, application components, and its lifecycle. L4
2. Apply various UI components to implement effective event handling strategies and proficiently manage fragments to develop multi-screen Activities. L3
3. Utilize Intents, Broadcast Receivers, Notifications and toasts in Android application development. L3
4. Analyze and construct solutions using different forms of persistent storage in android application development. L4
5. Apply iOS programming concepts and practices using Objective-C in iOS app development. L3

UNIT I

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components: Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes

Android Application Lifecycle: Activities, Activity lifecycle, activity states, monitoring state changes.

UNIT II

Android User Interface: Measurements – Device and pixel density independent measuring UNITs Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers.

Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data.

UNIT V

iOS Programming*:* Apps for a Mobile Platform, iOS Benefits, iOS App Development Essentials, The Application Model., Examining an Objective-C Program., Defining Classes, Using Classes, Objects, Methods, and Variables, Managing Memory, Handling Exceptions, Organizing Program Files, Analyzing Objective-C‘s Object-Orientation Capabilities.

Text Books:

1. Professional Android4 Application Development, Reto Meier, Wiley India, (Wrox), 202.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 203.
3. Beginning iOS Programming for Dummies a Wiley Brand.

Reference Book:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2003.

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B.Tech.VII Semester **L/T/P C**
3/0/0 3

PREDICTIVE ANALYTICS (C57PE4A)

Course Objective:
Provide students to understand the basic principles involved in analyzing the predictive behavior for business activities.

Course Outcomes:
Upon completion of the course the student will be able to:

1. Apply predictive analytics and linear regression techniques, including data modeling, variable rationalization, and least squares estimation, to solve business problems and create effective models. L3
2. Apply logistic regression techniques and decision tree methodologies, including model fit statistics, overfitting management, and tree pruning, to address various business analytics challenges. L3
3. Analyze and develop effective segmentation strategies and decision tree models, including handling overfitting and pruning techniques, and evaluate training and development policies to enhance knowledge, skills, and competencies in organizational settings. L4
4. Analyze time series forecasting methods and feature extraction techniques, such as ARIMA and STL, and evaluate the accuracy of forecasts by extracting and interpreting features like height, average, and energy from generated models. L4
5. Analyze and develop various types of documents, including case studies, technical reports, and standard operating procedures, while evaluating document preparation tools and practices for effective knowledge sharing and version control. L4

UNIT I
Introduction to Predictive Analytics & Linear Regression: What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modelling. Regression — Concepts, Blue property-assumptions-Least Square Estimation. Variable Rationalization and Model Building etc.

UNIT II
Logistic Regression: Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc. Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Overfitting, Pruning and complexity. Multiple Decision Trees etc.

UNIT III
Objective Segmentation: Regression Vs Segmentation — Supervised and Unsupervised Learning, Tree Building — Regression, Classification, Overfitting, Pruning and complexity, Multiple Decision Trees etc. Develop Knowledge, Skill and Competences (NOS 905) Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping, etc.

UNIT IV

Time Series Methods Forecasting, Feature Extraction: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average, Energy etc and Analyze for prediction. Project.

UNIT V

Working with Documents: Standard Operating Procedures for documentation and knowledge sharing. Defining purpose and scope documents, Understanding structure of documents — case studies, articles, white papers, technical reports, minutes of meeting etc., Style and format, Intectual Property and Copyright, Document preparation tools — Visio, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base. Peer review and feedback.

Text Book:

1. Student‘s Handbook for Associate Analytics-III..

Reference Book:

1. Gareth James, Daniela Witten, Trevor Hastie Robert Tib shirani. An Introduction to Statistical Learning with Applications in R.

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PERVASIVE COMPUTING (C57PE4B)

Course Objective:
To provide a sound conceptual foundation in the area of Pervasive Computing aspects and developing a design thinking approach towards problem-solving in this domain.

Course Outcomes:
Upon completion of the course, the student will:

1. Classify and analyze the structure and elements of pervasive computing systems, including infrastructure and middleware and apply resource management techniques such as efficient allocation and task migration in pervasive computing. L4
2. Analyze the methods for efficient resource allocation, HCI Service Selection and HCI migration framework. L4
3. Compare various pervasive mobile applications. L4
4. Illustrate User Preferences and Recommendations. L3
5. Design and develop pervasive application systems. L3

UNIT I
Pervasive Computing Concepts: Perspectives of Pervasive Computing, Challenges, Technology;
The Structure and Elements of Pervasive Computing Systems: Infrastructure and Devices, Middleware for Pervasive Computing Systems, Pervasive Computing Environments.
Context Collection, User Tracking, and Context Reasoning; Resource Management in Pervasive Computing: Efficient Resource Allocation in Pervasive Environments, Transparent Task Migration, Implementation and Illustrations.

UNIT II
Resource Management in Pervasive Computing: Efficient Resource Allocation in Pervasive Environments, Transparent Task Migration.
HCI interface in Pervasive Environments: HCI Service and Interaction Migration, Context- Driven HCI Service Selection, Scenario Study: Video Calls at a Smart Office, A Web Service– Based HCI Migration Framework.

UNIT III
Pervasive Mobile Transactions: Mobile Transaction Framework, Context-Aware Pervasive Transaction Model, Dynamic Transaction Management, Formal Transaction Verification, Evaluations.

UNIT IV
User Preferences and Recommendations: Content-Based Recommendation in an RSS Reader, A Collaborative Filtering-Based Recommendation, Preference-Based Top-*K* Recommendation in Social Networks

UNIT V
Case Studies: iCampus Prototype, IPSpace: An IPv6-Enabled Intelligent Space.

Text Books:

1. Minyi Guo, Jingyu Zhou, Feilong Tang, Yao Shen ,‖Pervasive Computing: Concepts, Technologies and Applications‖,CRC Press, 2016.

Reference Books:

1. Obaidat, Mohammad S., Mieso Denko, and Isaac Woungang, eds. Pervasive computing and networking. John Wiley & Sons, 2011.
2. Laurence T. Yang, Handbook on Mobile And Ubiquitous Computing Status and Perspective, 2012, CRC Press.

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SEMANTIC WEB (C57PE4C)

Course Objective:
The underlying knowledge representation formalisms in use on the Semantic Web, the Linked Web of Data, common ontology design patterns and common application vocabularies in use on the Semantic Web.

Course Outcomes:
Upon completion of the course, the student will be able to:

1. Understand the concepts of semantic web, modelling, aggregating and knowledge representation. L2
2. Describe the web resources. L2
3. Develop queries using basics of SPARQL. L5
4. Understand web ontology language. L2
5. Develop logic and inference rules. L5

UNIT I
The Semantic Web
Introduction to Semantic Web, Limitations of current Web The Semantic solution, Development of Semantic Web, Semantic Web Technologies, A Layered Approach
Modelling, Aggregating and Knowledge Representation
Ontology and their role in the Semantic Web, Resource Description Framework – Web Ontology Language – Modelling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.

UNIT II
Describing Web Resources: RDF Introduction, RDF: Data Model, RDF Syntaxes, RDFS: Adding Semantics, RDF Schema: The Language, RDF and RDF Schema in RDF Schema, An Axiomatic Semantics for RDF and RDF Schema, A Direct Inference System for RDF and RDFS.

UNIT III
Querying the Semantic Web
SPARQL Infrastructure, Basics: Matching Patterns, Filters, Constructs for Dealing with an Open World, Organizing Result Set, Other Forms of SPARQL Queries, Querying Schemas, Adding Information with SPARQL Update, The Follow Your Nose

UNIT IV
Web Ontology Language: OWL2
Introduction, Requirements for Ontology Languages, Compatibility of OWL2 with RDF/RDFS, The OWL Language, OWL2 Profiles 4

UNIT V

Logic and Inference: Rules

Introduction, Example of Monotonic Rules: Family Relationships, Monotonic Rules: Syntax Monotonic Rules: Semantics, OWL2 RL: Description Logic Meets Rules, Rule Interchange Format: RIF , Semantic Web Rules Language (SWRL), Rules in SPARQL: SPIN Non monotonic Rules: Motivation and Syntax, Example of Non monotonic Rules: Brokered Trade, Rule Markup Language (RuleML).

Text Books:

1. A semantic web primer: Grigoris Antoniou, Frank Van Harmelen and Rinke Hoekstra, Third edition, MIT press.
2. Peter Mika, ―Social Networks and the Semantic Web, First Edition, Springer 207.

Reference Books:

1. Borko Furht, ―Handbook of Social Network Technologies and Applications, 1st Edition, Springer,200.
2. Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking –Techniques and applications, First Edition, Springer, 201.
3. Dion Goh and Schubert Foo - Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 208.
4. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet, 209.
5. John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 209.

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COMPUTER FORENSICS (C57PE4D)

Course Objectives:
The main focus of the course will be on forensic investigation of Network and Web Server and Web Applications, Databases since they are the main source of getting evidence and using various tools and tricks.

Course Outcomes:
Upon completion, of course the student will be able to

1. Learn fundamentals of computer forensics till data recovery solution. L2
2. Gather evidences and notify the types of evidences, implement data seizure techniques. L3
3. Understand the methods used for computer forensic analysis and validation. L2
4. Use various tools for detecting cybercrimes caused using computers, mobile devices. L3
5. Use windows and DOS operating systems to avoid cyber-attacks. L3

UNIT I
Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

UNIT II
Evidence collection and Data seizure: Why Collect Evidence? Collection Options — Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital, Autopsy Tool, Encase Tool
Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication — Practical Consideration — Practical Implementation.

UNIT III
Computer forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, and performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project. Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.

UNIT IV

Current Computer Forensic Tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cellphone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

Text Books:

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

Reference Books:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education.
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.
3. Computer Evidence Collection & Presentation by Christopher L.T. Brown, Firewall Media.
4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media.
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M. Slade, TMH205.
6. Windows Forensics by Chad Steel, WileyIndia.

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SOFTWARE TESTING METHODOLOGIES (C57PE4E)

Course Objective:
To learn the methodologies like flow graphs and path testing, transaction flow testing data flow testing, domain testing and logic base testing adapted in a Software Testing Process.

Course Outcomes:
After completion of the course the student will be able to:

1. Analyze various types of bugs and their consequences, and apply flow graph and path testing techniques, including path sensitizing and instrumentation, to effectively identify and manage achievable paths in software testing. L4
2. Analyze the process involved in testing transaction flow and data flow scenarios. L4
3. Apply domain testing techniques to evaluate and enhance the testability of Software interfaces. L3
4. Analyze the reduction procedures and flow anomaly detection using regular expressions, and apply logic based testing techniques, including decision tables and path expressions, to ensure comprehensive test coverage. L4
5. Utilize graph matrices, state, state graphs, transaction testing methods, and tools like Test Director or Bad Boy for practical applications in testing. L3

UNIT I
INTRODUCTION:
Purpose of Testing, Dichotomies, Model for testing, consequences of bugs, taxonomy of bugs,
FLOW GRAPHS AND PATH TESTING:
Basic concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT II
TRANSACTION FLOW TESTING:
Transactions flows, transaction flow testing techniques.
DATA FLOW TESTING:
Basics of Data flow testing, strategies in data flow testing, applications of dataflow testing.

UNIT III
DOMAIN TESTING:
Domains and paths, Nice & Ugly domains, domain testing, domains and interfaces testing, domain and testability.

UNIT IV
PATHS, PATH PRODUCTS AND REGULAR EXPRESSIONS:
Path products & path expression, reduction procedure, applications, regular expressions and flow anomaly detection.
LOGIC BASED TESTING:
Overview, decision tables, path expressions.

UNIT V

STATE, STATE GRAPHS AND TRANSITION TESTING:

State graphs, good and bad state graphs, state testing, testability tips.

GRAPH MATRICES AND APPLICATIONS:

Motivational Overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Exposure to tools like Test Director or Bad Boy)

Text Books:

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

Reference Books:

1. The craft of software testing- Brain Marick, Pearson Education.
2. Introduction to Software Testing: P. Ammam & J.Offutt. Cambridge Univ. Press.
3. Software Testing M.G.Limaye TMH
4. Foundations of Software Testing, D. Grahm & Others, Cengage Learning.

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INTERNET OF THINGS (C57PE4F)

Course Objective:

To provide students to design and develop comprehensive IoT solutions by understanding and applying IoT concepts, communication models, enabling technologies, networking protocols, hardware platforms such as Arduino and Raspberry Pi, and cloud-based IoT platforms.

Course Outcomes:

Upon completion of this course students will be able to:

1. Apply foundational concepts of the Internet of Things (IoT), including its physical and logical design, communication models, enabling technologies, and deployment templates, to implement basic IoT solutions and applications. L3
2. Apply knowledge of IoT and M2M communication, SDN, NFV, and NETCONF-YANG to manage and differentiate between IoT and M2M systems effectively. L3
3. Apply various IoT networking concepts and connectivity technologies, including IEEE 802.15.4, ZigBee, 6LoWPAN, and others, to implement effective IoT Networks and wireless sensor networks (WSNs). L3
4. Analyze the features and components of Arduino and Raspberry Pi, evaluate their programming environments and architectures, and design effective IoT solutions based on these platforms. L4
5. Analyze and build IoT solutions using various cloud platforms and storage models, including WAMP-AutoBahn, Xively, and Amazon Web Services, to meet specific project requirements. L4

UNIT I

INTRODUCTION TO INTERNET OF THINGS:

Introduction, physical design of IoT, logical design of IoT-functional blocks, communicational models, communication APIs, IoT enabling technologies, IOT levels & deployment templates, Characteristics of IoT, Applications of IoT, IoT Enablers and Connectivity Layers, Baseline Technologies, Sensors, Actuators, IoT Components and Implementation, Challenges of IoT.

UNIT II

IoT AND M2M:

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Origin of SDN, SDN Architecture, Rule Replacement, IoT System Management with NETCONF-YANG: Need for IOT systems management, simple network management protocol, network operator requirements, NETCONF, YANG, IoT system management with NETCONF- YANG

UNIT III

IoT networking:

Connectivity Terminologies, Gateway Prefix Allotment, Impact of Mobility on Addressing, Multihoming, Deviations from regular Web, IoT Identification and Data Protocols. Connectivity technologies: IEEE 80.15.4, ZigBee, 6LoWPAN, RFID, HART and Wireless HART, NFC, Bluetooth, Z-Wave, ISA 10.11A

Wireless Sensor networks: Components of a Sensor Node, Modes of Detection, Challenges in WSN, Sensor Web.

UNIT IV

ARDUINO:

Features of Arduino, Components of Arduino Board, Arduino IDE, Program Elements, Function Libraries, Random Numbers, Interupts.

RASPBERRY: Introduction, Architecture, PIN Configuration.

UNIT V

IoT Platforms Design Methodology

IoT Physical Servers & Cloud Offerings: Cloud Storage Models & Communication APIs, WAMP-AutoBahn for IoT, Xively Cloud for IoT, Amazon Web Services for IoT.

Text Books:

1. Internet of Things by Arshadeep Bagha, Madisetty Vijay, University Press
2. Internet of Things by Jiva jose, Khanna Book Publishing Co. (P) Ltd.

Reference Books:

1. Getting Started with Raspberry Pi, 2nd Edition, Matt Richardson and Shawn Wallance, SPD.
2. Internet of Things Principles and Paradigms, Rajkumar Buyya and Amir Vahid Dastjerdi, ELSEVIER.

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LINUX PROGRAMMING LAB (C57PC6)

Course Objective:
To write shell script programs for simple problems and to implement some standard Linux utilities such as ls, cp etc using system calls and to develop network based applications.

Course Outcomes:
After completion of course the students will be able to,

1. Develop shell scripts to perform tasks such as line extraction, word counting, common file operations, file manipulation etc. L3
2. Develop programs to implement process management techniques, IPC mechanisms including named pipes, message queues, and sockets. L3
3. Develop C programs to implement Unix commands, system calls, file handling and process management techniques. L3

Experiments

1) Write a shell script that accept a file name starting and ending line numbers as arguments and display all the lines between given line no:
2) Write a shell script that delete all lines containing a specified word
3) Write a shell script that displays a list of all the files in the current directory
4) Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file or directory.
5) Write a shell script that accept a list of file names as arguments count and report the occurrence of each word.
6) Write a shell script to find the factorial of given integer
7) Write a shell script that list the all files in a directory.
8) Write a awk script to find the number of characters, words and lines in a file? 16 linked list respectively.
9) Write a C Program that makes a copy of a file using standard I/O and system calls?
10) Implement in C the following Unix commands using system calls A) cat B) mv
11) Write a C program to emulate the UNIX ls-l command?
12) Write a C program to list for every file in a directory, its inode number and filename?
13) Write a C Program that demonstrates redirection of standard output to a file.
14) Write a C program to create a child process and allow the parent to display "parent" and the child to display "child" on the screen
15) Write a C program to create a Zombie process.?
16) Write a C program that illustrates how an orphan is created
17) Write a program that illustrates how to execute two commands concurrently with a command pipe?
18) Write C programs that illustrate communication between two unrelated processes using named pipe.

19) Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers?
20) Write a C program that illustrates suspending and resuming processes using signals
21) Write client and server programs (using c) for interaction between server and client processes using Unix Domain sockets
22) Write a client and server programs (using c) for interaction between server and client processes using Internet Domain sockets?
23) Write a program to implement the shared memory
24) Write a C program that illustrates two processes communicating using shared memory?

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INFORMATION SECURITY LAB (C57PC7)

Course Objective:
To equip students with practical skills in implementing and analyzing various cryptographic algorithms and information security principles through hands-on programming in Java and C.

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

1. Implement various cryptographic algorithms by applying Ceaser Cipher, Substitution Cipher, and Hill Cipher for text encryption and decryption in both Java and C to ensure secure data transmission. L3
2. Apply XOR and AND bitwise operations to string manipulation in C and Examining the effects of these operations on character data. L3
3. Implement advanced encryption standards by applying DES, BlowFish, and Rijndael algorithms in Java/C, and compare the effectiveness of different cryptographic techniques, and their practical application in secure communications. L3

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value \Hello World‘. The program should XOR
2. each character 1 in this string with 0 and displays the result.
3. Write a C program that contains a string (char pointer) with a value \Hello World‘. The program should AND
4. or and XOR 2 each character in this string with 127 and display the result
5. Write a Java program to perform encryption and decryption using the following algorithms:

a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher

6. Write a Java program to implement the DES algorithm logic 10-12
7. Write a C/JAVA program to implement the BlowFish algorithm logic
8. Write a C/JAVA program to implement the Rijndael algorithm logic.
9. Using Java Cryptography, encrypt the text ―Hello world‖ using BlowFish. Create your own key using Java key tool.
10. Write a Java program to implement RSA Algoithm
11. Implement the Diffie-Hellman Key Exchange Mechanism using HTML and JavaScript..
12. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
13. Calculate the message digest of a text using the MD5algorithm in JAVA.

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DATA SCIENCE (C58PE1A)

Course objective:
To provide students an understanding of data science concepts and techniques, including statistical inference, machine learning algorithms, feature generation, recommendation systems, and data visualization, and apply these methods to real-world data science problems and case studies.

Course Outcomes:
Upon completion of the course the student will be able to,

1. Apply data science concepts and statistical inference techniques using exploratory data analysis tools and The data science process to interpret and model data effectively. L3
2. Apply basic machine learning algorithms and data wrangling techniques to preprocess and analyze data effectively. L3
3. Apply feature generation and selection techniques to extract meaningful insights from data, and utilize these methods to address practical applications such as user retention. L3
4. Analyze and develop recommendation systems by analyzing algorithmic components and to create effective user-facing data products. L4
5. Analyze and design data-driven solutions by mining social-network graphs and to create effective data visualizations of complex datasets, and apply various machine learning algorithms and tools in practical case studies. L4

UNIT I
Introduction: What is Data Science, Big Data and Data Science hype - and getting past the hype, why now – Data classification, Current landscape of perspectives, Skill sets needed. Statistical Inference - Populations and samples, Statistical modeling, probability distributions, fitting a model, Introduction to R.
Exploratory Data Analysis and the Data Science Process- Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process.

UNIT II
Three Basic Machine Learning Algorithms- Linear Regression, k-Nearest Neighbors (k-NN), k-means, Filtering Spam and Naïve Bayes. Data Wrangling: APIs and other tools for scrapping the Web.

UNIT III
Feature Generation and Feature Selection (Extracting Meaning From Data)- Motivating application: user (customer) retention, Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms- Filters, Wrappers, Decision Trees, Random Forests.

UNIT IV
Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, - Principal Component Analysis.

UNIT V

Mining Social-Network Graphs- Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighborhood properties in graphs.

Data Visualization- Basic principles, ideas and tools for data visualization, Examples of inspiring (industry) projects, Exercise: create your own visualization of a complex dataset.

Practical exposure:

Case Study: Real direct (online real estate firm). R to Filtering spam using linear regression, k-NN, Naïve Bayes. Tools for data wrangling, User retention and brainstorming case studies w.r.t filters, wrapers, decision trees, random forests. Building recommendation system. Creating visualization of a complex dataset.

Text Books:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline.O'Reilly.204.

Reference Books:

1. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 204. (free online)
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0620800. 203.
3. Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323.203.
4. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition. ISBN 087952845. 209. (free online)
5. Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science. (Note: this is a book currently being written by the three authors. The authors have made the first draft of their notes for the book available online. The material is intended for a modern theoretical course in computer science.)
6. Mohammed J. Zaki and Wagner Miera Jr. Data Mining and Analysis: Fundamental Concepts and Algorithms. Cambridge University Press.204.
7. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 023814790.201.

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QUANTUM COMPUTING (C58PE1B)

Course Objective:
Paradigm change between conventional computing and quantum computing, and introduce several basic quantum algorithms.

Course Outcomes:
After completion of this course, the student will be able to:

1. Understand the concepts of quantum computing. L2
2. Explain the concepts of quantum model of computation. L2
3. Analyze Quantum algorithms I. L4
4. Analyze the Quantum algorithms II. L4
5. Able to apply computational complexity methods and error detection codes. L3

UNIT I
FOUNDATION:
Overview of traditional computing – Church-Turing thesis – circuit model of computation reversible computation – quantum physics – quantum physics and computation – Dirac notation and Hilbert Spaces – dual vectors – operators – the spectral theorem –functions of operators – tensor products – Schmidt decomposition theorem.

UNIT II
QUBITS AND QUANTUM MODEL OF COMPUTATION
State of a quantum system – time evolution of a closed system – composite systems – measurement – mixed states and general quantum operations – quantum circuit model –quantum gates – universal sets of quantum gates – unitary transformations – quantum circuits.

UNIT III
QUANTUM ALGORITHMS-I
Super dense coding, quantum teleportation: applications of teleportation, probabilistic versus quantum algorithms: phase kick-back, the Deutsch algorithm, the Deutsch- Jozsa algorithm,Simon's algorithm, Quantum phase estimation and quantum Fourier Transform: Eigen value Estimation.

UNIT IV
QUANTUM ALGORITHMS – II
Order-finding problem – eigen value estimation approach to order finding – Shor‘s algorithm for order finding – finding discrete logarithms – hidden subgroups – Grover‘squantum search algorithm – amplitude amplification – quantum amplitude estimation – quantum counting – searching without knowing the success probability

UNIT V
QUANTUM COMPUTATIONAL COMPLEXITY AND ERROR CORRECTION
Computational complexity – black-box model – lower bounds for searching – general black-box lower bounds – polynomial method – block sensitivity – adversary methods –classical error correction – classical three-bit code – fault tolerance – quantum error correction – three- and nine-qubit quantum codes – fault-tolerant quantum computation.

Text Books:

1. P. Kaye, R. Laflamme, and M. Mosca, ―An introduction to Quantum Computing‖, Oxford University Press, 1999.

Reference Book:

1. V. Sahni, ―Quantum Computing‖, Tata McGraw-Hill Publishing Company, 207.

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SOCIAL NETWORKS (C58PE1C)

Course Objective:
Concept of networks has come to pervade modern society, as we routinely make use of online social networking services, as business gets organized into network forms, and as warfare increasingly targets a loose network of combatants.

Course Outcomes:
Upon completion of the course, the student will be able to:

1. Know the parameters for establishment of social networks. L2
2. Learn to extract and mine the information in web social networks. L2
3. Develop communities based on social network infrastructures. L5
4. Understand the prediction of uman behavior and identify the privacy issues in social networks. L2
5. Gain the insights of visualizing the social networks and apply the same to develop digitalization of the social networks. L3

UNIT I
Social Network analysis: History, concepts and research Development of Social Network Analysis – Key concepts and measures in network analysis –Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis.

UNIT II
Extraction and Mining Communities in Web Social Networks
Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities –Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi-Relational characterization of dynamic social network communities

UNIT III
Social network Infrastructures and communities
Decentralized online social networks, Multi Relational characterization of dynamic social network communities, Accessibility testing of social websites.

UNIT IV
Predicting Human Behaviour and Privacy Issues
Understanding and predicting human behaviour for social communities – User data management – Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness – Privacy in online social networks – Trust in online environment – Trust models basedon subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures.

UNIT V

Visualization and Applications of Social Networks

Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation –Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications –Cover networks – Community welfare – Collaboration networks – Co-Citation networks.

Text Books:

1. Peter Mika, ―Social Networks and the Semantic Web, First Edition, Springer 207.
2. Borko Furht, ―Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 200.

Reference Books:

1. Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking – Techniques and applications, First Edition, Springer, 201.
2. Dion Goh and Schubert Foo - Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 208.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modeling, IGI Global Snippet, 209.
4. John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 209.

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COMPUTER SCIENCE & ENGINEERING

B.Tech.VIII Semester **L/T/P C**
3/0/0 3

BLOCKCHAIN TECHNOLOGY (C58PE1D)

Course Objective:
To provide conceptual understanding of block chain technology and how it can be used in Industry 4.0 and the technological underpinning of block Chain operations in both theoretical and practical implementation of solutions using Ethereum**.**

Course Outcome:
Upon completion of the course, the student will be able to:

1. Know the aspects, and learn to recognize the potential need of block chain by understanding the ownership, by spending money twice. L2
2. Learn to protect, user accounts created during planning of block chain construction, documenting ownership, authorizing and storing transactions data. L2
3. Gain knowledge, to use, store, and protect data among peers; to add transactions using the history of transactions by paying for integrity and bringing pieces together. L3
4. Understand the limitations and possibilities to overcome them using the block chain and summary. L2
5. Compare and contrast between different currencies and understand the various Challenges of business, public, government and personal records. L4

UNIT I
Terminology and Technical Foundations:
Thinking in Layers and Aspects, Seeing the Big Picture, Recognizing the Potential
Why the Blockchain Is Needed:
Discovering the Core Problem, Disambiguating the Term, Understanding the Nature of Ownership, Spending Money Twice

UNIT II
How the Blockchain Works-1:
Planning the Blockchain, Documenting Ownership, Hashing Data, Hashing in the Real World, Identifying and Protecting User Accounts, Authorizing Transactions, Storing Transaction Data

UNIT III
How the Blockchain Works-2
Using the Data Store, Protecting the Data Store, Distributing the Data Store Among Peers, Verifying and Adding Transactions, Choosing a Transaction History, Paying for Integrity, Bringing the Pieces Together

UNIT IV
Limitations and How to Overcome Them: Seeing the Limitations, Reinventing the Blockchain **Using the Blockchain & Summary**
Using the Blockchain, Summarizing and Going Further

UNIT V

Advanced Concepts:

Currency, Token, Tokenizing, Currency Multiplicity: Monetary and Nonmonetary Currencies, Demurrage Currencies: Potentially Incitory and Redistributable

Limitations:

Technical Challenges, Business Model Challenges, Scandals and Public Perception, Government Regulation, Privacy Challenges for Personal Records

Text Books:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st ed. Edition, by Daniel.
2. Blockchain Blue print for Economy by Melanie Swan.

Reference Book:

1. The Collected Writings of Bitcoin Creator Satoshi Nakomoto.

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COMPUTER SCIENCE & ENGINEERING

B.Tech.VIII Semester **L/T/P C**
3/0/0 3

AGILE SOFTWARE DEVELOPMENT (C58PE1E)

Course Objective:
The agile ways of working including the Agile Manifesto, managing the flow of requirements from vision to reality, organizing requirements with user stories and backlogs.

Course Outcomes:
Upon completion of the course, the student will be able to:

1. Understand the concept of development agility and the Agile Manifesto. L2
2. Analyze each of the major agile development methods underscoring their strengths and weaknesses. L4
3. Understand to manage an agile environment even within a structured organizational approach. L2
4. Understand the architecture vision on team velocity and software quality, release and sprints planning to parallel software development. L2
5. Demonstrate team spirit, agile and scrum. L3

UNIT I
Introduction to Agile Process:
What exactly Agile is? Agile Concepts, the most popular Agile methods, Agile Tools, Agile Stockholder Engagement, Agile Documentation

UNIT II
The Agile:
Agile Tracking and Reporting, Agile Project Management Process, Agile Value, Agile Risk Management, Agile People Skills, Agile Teams.

UNIT III
Do with Agile:
Setting the Stage, Finance Speak, Secure Top Management Support but Make Sure to ObtainMiddle Management Buy-In, A Visual Requirements Gathering for the Product Backlog,

UNIT IV
Insights:
Making the Story Point Estimate Comparable for Scrum Enterprise-Wide Implementation, The Influence of Architecture Vision on Team Velocity and Software Quality, From Architecture Vision to Release and Sprints Planning to Parallel Software Development, Did You Say Product Owner?

UNIT V
Team Spirit, The Agile and The Scrum:
The Importance of Automated, Regression, and Integration Tests, The Importance of Teamwork, The New Nature of Management and Leadership on a Scrum Project, How to Adapt Scrum, ScrumProject Readiness Self-Assessment, When Do You Need a Scrum Master.

Text Books:

1. Agile for Project Managers-Denise Canty-CRC Publishers.
2. Scrum in Action-Agile Software Project Mgmt & Development-Andrew Pham, Phuong-Van Pham Cengage Learning.

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COMPUTER SCIENCE & ENGINEERING

B.Tech. VIII Semester **L/T/P C**
3/0/0 3

STACK TECHNOLOGIES (C58PE1F)

Course Objective:
Develop web sites and apply the basic design principles to implement ideas, information, products, and services on websites.

Course Outcomes:
Upon completion of this course students can able to

1. Understand that how to use hibernate to develop web applications. L2
2. Build spring web applications by connecting to databases with spring and JDBC, REST APIs with spring MVC. L5
3. Explain Spring Boot basics, MVC, Data Access. L2
4. Use React JS in web application development. L3
5. Analyze Micro Services and Simple Spring boot micro services application. L4

UNIT I
Hibernate:
An Introduction to Hibernate 3, Integrating and Configuring Hibernate, Building a Simple Application, The Persistence Life Cycle, An Overview of Mapping, Mapping with Annotations, Creating Mappings with Hibernate XML Files, Using the Session, Searches and Queries, Advanced Queries Using Criteria.

UNIT II
Spring:
Springing into Action, Wiring beans, Advanced wiring (3.3,3.4), Building Spring web applications, Hitting the database with Spring and JDBC, Persisting data with object-relational mapping, Creating REST APIs with Spring MVC

UNIT III
Spring Boot:
Spring Boot Introduction, Spring-boot basics, Spring MVC, Data Access

UNIT IV
React JS:
Introduction to Meet React, <Hello World />: our first component, Data and data flow in React, Rendering and lifecycle methods in React, w o r k i n g with forms in React, Integrating third-party libraries with React.

UNIT V

Micro Services and Simple Spring boot micro services application integrating with React.JS

Text Books:

1. Hibernate in Action CHRISTIAN BAUER GAVIN KING MANNING
2. Spring Boot in Action Craig Walls MANNING
3. Spring Micro services in Action JOHN CARNELL MANNING
4. React JS In Action Mark Tielens Thomas MANNING

Reference Books:

1. Designing Applications with Spring Boot 2.2 and React JS: Step-by-step guide to design and develop intuitive full stack web applications by Dinesh Rajput.