PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. To prepare students to acquire excellent knowledge in software engineering fundamentals
II. To train students in software industry related practices and disciplines
III. To prepare students to take up advance core and applied research related to software engineering research
IV. To provide students with a solid foundation in mathematical fundamentals required to solve software engineering problems
V. To train students with good domain engineering knowledge so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.
VI. To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and ability to relate software engineering issues to broader social context.
VII. To provide students with an academic environment which will lead to achieving excellence, leadership qualities, following ethical codes and guidelines, life-long learning for a successful professional career.

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,
1. Graduates will demonstrate an ability to identify, formulate and solve software engineering problems.
2. Graduates would be able to apply mathematics to solve problems in software engineering.
3. Graduates would be able to design and conduct experiments, analyze and interpret data.
4. Graduates would possess the ability to design a system, component or process as per needs and specifications.
5. Graduates would acquire skills to use automation softwares and tools to analyze problems.
6. Graduates would be able to communicate effectively in both verbal and written forms.
7. Graduates will know the impact of engineering solutions on the society and will be aware of contemporary issues.
MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES:

A broad relation between the programme objective and the outcomes is given in the following table:

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# ANNA UNIVERSITY, CHENNAI
## UNIVERSITY DEPARTMENTS
### M.E. SOFTWARE ENGINEERING
#### REGULATIONS – 2015
##### CHOICE BASED CREDIT SYSTEM
###### CURRICULA AND SYLLABI

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DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025
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# EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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<th>SL. No</th>
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OBJECTIVES:
- To understand the basics of random variables and standard distributions
- To understand the arrival process and various queuing and server models
- To appreciate the use of simulation techniques
- To apply testing of hypothesis to infer outcome of experiments
- To apply mathematical linear programming techniques to solve constrained problems.

UNIT I    RANDOM VARIABLES  12

UNIT II   QUEUING MODELS  12

UNIT III  SIMULATION  12
Discrete Event Simulation – Monte – Carlo Simulation – Stochastic Simulation – Applications to Queuing systems.

UNIT IV   TESTING OF HYPOTHESIS  12
Sampling distributions – Estimation of parameters - Statistical hypothesis – Tests based on Normal, t, Chi-square and F distributions for mean, variance and proportion.

UNIT V    LINEAR PROGRAMMING  12

OUTCOMES:
Upon completion of the course, the student will be able to
- Identify the type of random variable and distribution for a given operational conditions/scene
- Design appropriate queuing model for a given problem/system situation
- Simulate appropriate application/distribution problems
- Differentiate/infer the merit of sampling tests.
- Formulate and find optimal solution in the real life optimizing/allocation/assignment problems involving conditions and resource constraints.

REFERENCES:
OBJECTIVES:
- To extend the students' knowledge of algorithms and data structures
- To enhance their expertise in algorithmic analysis and algorithm design techniques.
- To learn a variety of useful algorithms and techniques
- To extrapolate from them in order to apply those algorithms and techniques to solve problems

UNIT I  FUNDAMENTALS

UNIT II  HEAP STRUCTURES
Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps

UNIT III  SEARCH STRUCTURES

UNIT IV  GEOMETRIC ALGORITHMS

UNIT V  PARALLEL ALGORITHMS
Flynn’s Classifications – List Ranking – Prefix computation – Array Max – Sorting on EREW PRAM – Sorting on Mesh and Butterfly – Prefix sum on Mesh and Butterfly – Sum on mesh and butterfly – Matrix Multiplication – Data Distribution on EREW, Mesh and Butterfly

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Have a basic ability to analyze algorithms and to determine algorithm correctness and time efficiency
- Master a variety of advanced data structures and their implementations and different algorithm design techniques in computational geometry and in parallel algorithms
- Apply and implement the learnt algorithm design techniques and data structures to solve problems

REFERENCES:
OBJECTIVES:
The student should be able to
- Understand the fundamentals of software architecture.
- Study the various software development methodologies.
- Learn the various software architecture design components.
- Relate software architecture and software quality.

UNIT I  INTRODUCTION

UNIT II  DESIGN METHODOLOGIES

UNIT III  ARCHITECTURE DESCRIPTION DOCUMENTATION AND EVALUATION
Early Architecture Description Languages –Domain and Style Specific ADLs –Extensible ADLs - Documenting Software architecture -Architecture Evaluation –ATAM.

UNIT IV  ARCHITECTURE DESIGN

UNIT V  CREATING ANARCHITECTURE

OUTCOMES:
At the end the student will be able to
- Develop Software applications starting from software architecture and design.
- Learn and evaluate existing software architectures.
- Design methods for improving software quality from the perspective of software architecture.

REFERENCES:
OBJECTIVES

- To understand the concepts of distributed systems
- To get an insight into the various issues and solutions in distributed operating systems
- To learn about mobile and real-time operating systems
- To gain knowledge on the design concepts of mainframe operating systems

UNIT I  
BASICS OF OPERATING SYSTEMS  9

UNIT II  
DISTRIBUTED OPERATING SYSTEMS  9

UNIT III  
DISTRIBUTED RESOURCE MANAGEMENT  9

UNIT IV  
MOBILE AND REAL TIME OPERATING SYSTEMS  9

UNIT V  
MAINFRAME AND LINUX OPERATING SYSTEMS  9

TOTAL : 45 PERIODS

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

- Demonstrate the various protocols of distributed operating systems
- Identify the different features of mobile and real-time operating systems
- Discuss the various features of mainframe operating systems
REFERENCES:

SW7101 SOFTWARE REQUIREMENTS ENGINEERING L T P C 3 0 0 3

OBJECTIVES
The student should be able to
- Understand the basics of requirements engineering
- Learn different techniques used for requirements elicitation
- Know the role played by requirements analysis in requirement integration
- Appreciate the use of various methodologies for requirements development
- Study the current trends in requirements prioritization and validation.

UNIT I REQUIREMENTS ENGINEERING OVERVIEW

UNIT II REQUIREMENTS ELICITATION

UNIT III REQUIREMENTS ANALYSIS

UNIT IV REQUIREMENTS DEVELOPMENT
UNIT V  
REQUIREMENTS VALIDATION

Validation objectives – Analysis of requirements validation – Activities – Properties – Requirement reviews – Requirements testing – Case tools for requirements engineering.

OUTCOMES

At the end the student will be able to:
- Prepare SRS including the details of requirements engineering
- Describe the stages of requirements elicitation
- Analyze software requirements gathering

REFERENCES


CP7161  ADVANCED DATA STRUCTURES AND ALGORITHMS  L T P C
LAB  0 0 4 2

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

1. Min/Max Heap
2. Leftist Heap
3. AVL Trees
4. Red-Black Trees
5. B-Trees
6. Segment Trees
7. Line segment intersection
8. Convex Hull
9. Voronoi Diagram

OUTCOMES

Upon completion of this course, the student should be able to
- Implement heap and various tree structure like AVL, Red-black, B and Segment trees
- Solve the problems such as line segment intersection, convex shell and Voronoi diagram

TOTAL : 45 PERIODS

TOTAL : 60 PERIODS
OBJECTIVES:
- To facilitate analysis, design and problem solving skills
- To have a thorough domain knowledge
- To understand the best Industry practices by reading case studies
- To kindle innovative and professional thinking
- To explore possible alternative solutions
- To estimate feasibility, cost, risk and ROI

Identify an application (may be of social relevance) – Understand customer requirements – analyze and understand customers and stakeholders – value additions – innovations and research component – preparing plan / SRS document indicating feasibility, cost, risk, ROI and related design – suggest implementation methodology – perform risk assessment and management

TOTAL : 30 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Identify and formulate the problem
- Describe the background of the problem
- Assess the needs of stakeholders
- Make estimates like cost, risk, ROI etc., to justify the business opportunity.
- Describe the industry standards and procedures
- Predict the business opportunity
- Suggest system implications

SW7251 SOFTWARE TESTING AND QUALITY ASSURANCE

OBJECTIVES
The student should be able to
- Know what is software and the usage of different types of softwares.
- Know the Quality Metrics of various Softwares.
- Know the methodologies in making Software.
- Test the product finally to check the product Quality.

UNIT I INTRODUCTION

UNIT II TESTING METHODOLOGIES
UNIT III TEST STRATEGIES

UNIT IV TEST AUTOMATION AND MANAGEMENT

UNIT V SQA IN PROJECT MANAGEMENT

TOTAL: 45 + 30 = 75 PERIODS

OUTCOMES
At the end the student will be able to
- Analyze the product Quality.
- Use various testing methods.
- Assess Quality standards.

REFERENCES

CP7253 MACHINE LEARNING TECHNIQUES

OBJECTIVES:
- To understand the concepts of machine learning
- To know supervised and unsupervised learning and their applications
- To learn the theoretical and practical aspects of Probabilistic Graphical Models
- To appreciate the concepts and algorithms of reinforcement learning
- To learn aspects of computational learning theory

UNIT I INTRODUCTION
UNIT II  SUPERVISED LEARNING  10+6

UNIT III  UNSUPERVISED LEARNING  8+6

UNIT IV  PROBABILISTIC GRAPHICAL MODELS  10 + 6
Graphical Models - Undirected graphical models - Markov Random Fields - Directed Graphical Models -Bayesian Networks - Conditional independence properties - Inference – Learning- Generalization - Hidden Markov Models - Conditional random fields(CRFs)

UNIT V  ADVANCED LEARNING  9+6

TOTAL : 45 + 30 = 75 PERIODS

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

- Design a neural network for an application of your choice
- Implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results
- Implement typical clustering algorithms for different types of applications
- Design and implement an HMM for a sequence model type of application
- Identify applications suitable for different types of machine learning with suitable justification

REFERENCES:
OBJECTIVES
The student should be able to
- Learn different definitions of software quality
- Know different notions of defects and classify them
- Understand the basic techniques of data collection and how to apply them
- Learn software metrics that define relevant metrics in a rigorous way.
- Gain confidence in ultra-high reliability

UNIT I  INTRODUCTION TO SOFTWARE RELIABILITY  9

UNIT II  SOFTWARE RELIABILITY MODELING  9
Concepts – General Model Characteristic – Historical Development of models – Model Classification scheme – Markovian models – General concepts – General Poisson Type Models – Binomial Type Models – Poisson Type models – Fault reduction factor for Poisson Type models.

UNIT III  COMPARISON OF SOFTWARE RELIABILITY MODELS  9

UNIT IV  FUNDAMENTALS OF MEASUREMENT  9

UNIT V  MEASURING SOFTWARE PRODUCT  9

TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Perform some simple statistical analysis relevant to software measurement data.
- Use from practical examples both the benefits and limitations of software metrics for quality control and assurance

REFERENCES:
SW7202 SOFTWARE SECURITY

OBJECTIVES
The student should be able to
- Know the importance and need of software security
- Know about various attacks
- Learn about secure software design
- Understand risk management in secure software development
- Know the working of tools related to software security

UNIT I INTRODUCTION
Need for software security – Memory based attacks – low level attacks against heap and stack - stack smashing – format string attacks – stale memory access attacks – ROP (Return oriented programming) – malicious computation without code injection. Defense against memory based attacks – stack canaries – non-executable data - address space layout randomization (ASLR), memory-safety enforcement, control-flow Integrity (CFI) – randomization

UNIT II SECURE DESIGN

UNIT III SECURITY RISK MANAGEMENT

UNIT IV SECURITY TESTING
Traditional software testing – comparison - secure software development life cycle - risk based security testing – prioritizing security testing with threat modeling – shades of analysis: white, grey and black box testing.

UNIT V ADVANCED SOFTWARE SECURITY

TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Use tools for securing software
- Apply security principles in software development
- Involve selection of testing techniques related to software security in testing phase of software development
REFERENCES:

SO7251 ADVANCED DATABASE MANAGEMENT SYSTEMS

OBJECTIVES:
- To understand the underlying principles of Relational Database Management System.
- To understand and implement the advanced features of DBMS.
- To develop database models using distributed databases.
- To implement and maintain an efficient database system using emerging trends.

UNIT I RELATIONAL MODEL

UNIT II PARALLEL AND DISTRIBUTED DATABASES

UNIT III XML DATABASES

UNIT IV MULTIMEDIA DATABASES

UNIT V CURRENT ISSUES
Active Databases – Deductive Databases – Data Warehousing – Data Mining – Database Tuning – Database Security

TOTAL : 45 PERIODS
OUTCOMES:
On successful completion of this course, the student will be able to:
- Design and implement relational databases, distributed databases, XML databases and multimedia databases.
- Implement the concept of database connectivity with the applications.

REFERENCES

SW7211 SOFTWARE DEVELOPMENT LAB

OBJECTIVES:
- To learn the stages of software development
- To know about preparing software project documentation

LIST of EXERCISES: 60
Choose any one application for performing the following phases.

1. Program Analysis and Project Planning.
   Thorough study of the problem – Identify project scope, Objectives, Infrastructure. – PROJECT PLAN DOCUMENTATION

2. Software requirement Analysis
   Describe the individual Phases / Modules of the project, Identify deliverables. – SRS DOCUMENTATION

3. Data Modeling
   Use work products – Data dictionary, Use case diagrams and activity diagrams, build and test class diagrams, Sequence diagrams, add interface to class diagrams. – DESIGN DOCUMENTATION

4. Software Development and Debugging
   Use technology of your choice to develop and debug the application – CODE DOCUMENTATION

5. Software Testing
   Perform validation testing, Coverage analysis, memory leaks, develop test case hierarchy, Site check and Site monitor. – TEST CASE DOCUMENTATION

TOTAL : 60 PERIODS
SUGGESTED LIST OF APPLICATIONS:

Student Marks Analyzing System.
Quiz System.
Online Ticket Reservation System
Payroll System
Course Registration System
Stock Maintenance.

OUTCOMES:

At the end the student will be able to
- Prepare project plan, SRS, design document, code document and test case documentations at appropriate stages of software development.

SW7301 INTEGRATED SOFTWARE PROJECT MANAGEMENT

OBJECTIVES

The student should be able to
- Understand the basic concept of project management.
- Learn the various costing and life cycle management.
- Understand the role played by risk in software project.
- Appreciate the use of metrics for software project management.
- Know the challenges in people management.

UNIT I PROJECT MANAGEMENT & COSTING


UNIT II PROCESS MODELS & LIFECYCLE MANAGEMENT

SLIM (Software Life cycle Management) – PLM (Product Lifecycle Management) – PDM (Product Data Management) - PLM, PDM Applications – Pre-PLM Environment – Change Management.

UNIT III RISK MANAGEMENT


UNIT IV METRICS

UNIT V  PEOPLE MANAGEMENT  9

TOTAL : 45 PERIODS

OUTCOMES
At the end the student will be able to
- Identify the various elements of software management process framework
- Use available open source estimation tools for cost estimation
- Identify existing risk and perform risk assessment
- Design a software metric for software project management
- Modify the art of interviewing people for a given scenario.

REFERENCES

SW7001  AGILE SOFTWARE ENGINEERING  L  T  P  C
3  0  0  3

OBJECTIVES:
The student should be able to
- Understand agile software development practices
- Demonstrate Agile development and testing techniques
- Know the benefits and pitfalls of working in an Agile team
- Understand agile development and testing.

UNIT I  AGILE METHODOLOGY  9
Theories for Agile management – agile software development – traditional model vs. agile model - classification of agile methods – agile manifesto and principles – agile project management – agile team interactions – ethics in agile teams - agility in design, testing – agile documentations – agile drivers, capabilities and values.

UNIT II  AGILE PROCESSES  9

UNIT III  AGILITY AND KNOWLEDGE MANAGEMENT  9
UNIT IV   AGILITY AND REQUIREMENTS ENGINEERING  9

UNIT V   AGILITY AND QUALITY ASSURANCE  9

TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
• The know importance of interacting with business stakeholders in determining the requirements for a software system.
• Apply iterative software development process
• Apply the impact of social aspects on software development success.

REFERENCES:

SW7002   BUSINESS INTELLIGENCE
L T P C
3 0 0 3

OBJECTIVES:
The student should be able to
• Identify the enormous opportunities that currently exists in providing business intelligence services
• Gain a practical understanding of the key data mining methods of classification, prediction, data reduction and exploration
• Understand and help develop the strategies of modern enterprise decision makers
• Acquire knowledge in many scientific and technological fields including data warehouses, data mining, content analytics, business process management, visual analytics
• Gain competences in information systems, web science, decision science, software engineering, and innovation and entrepreneurship.
UNIT I  INTRODUCTION  

UNIT II  BI BIG PICTURE  

UNIT III  BI ARCHITECTURE  

UNIT IV  BI TECHNOLOGIES  

UNIT V  FUTURE OF BI  
Knowledge Discovery for BI – Markov Logic Networks – BI Search and Text Analytics – Advanced Visualisation – Semantic Web Technologies for building BI - Service oriented BI – Collaborative BI - Evaluating BI – Stakeholder model of BI.

TOTAL: 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Assess the business intelligence potential of today’s data rich environment
- Plan how to decide when to use which technique
- Outline how to implement major techniques using Excel add-ins
- Gain the intellectual capital required to provide business analytics services.

REFERENCES:
UNIT I INTRODUCTION

UNIT II ENTERPRISE INTEGRATION ARCHITECTURE

UNIT III SERVICE AND INFORMATION INTEGRATION ARCHITECTURE

UNIT IV PROCESS AND APPLICATION INTEGRATION ARCHITECTURE

UNIT V PATTERNS OF ENTERPRISE APPLICATION INTEGRATION

TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Use object-oriented concepts for developing web applications
- Demonstrate the enterprise application integration
- Deploy the components of EIA with solutions

REFERENCES
1. David S.Linthicum, —Enterprise Application Integration, Addison-Wesley Professional, 2000
OBJECTIVES:
The student should be able to:
- Know the concepts and knowledge of ERP.
- Focus on illustrating procurement, production, and sales business processes using ERP software.
- Bridge the gap between the need of business process knowledge and its application to the business environment.
- Learn ERP Implementation Success & Failure for an application.
- Appreciate ERP in various public and private sector.

UNIT I  INTRODUCTION TO ERP

UNIT II  ERP IMPLEMENTATION

UNIT III  BUSINESS MODULES

UNIT IV  ERP MARKET

UNIT V  ERP – APPLICATIONS
Lean manufacturing and ERP - Turbo Charge the ERP System – EIA Study of ERP selection process – Big Bang ERP implementation – Impact of ERP systems on organizational effectiveness – Knowledge management for enterprise systems – Managing ERP security.

TOTAL : 45 PERIODS
OUTCOMES:
At the end the student will be able to
- Become a manager of computer service offerings, across business processes of an organization.
- Understand the structure of an ERP system
- Prepare them to become knowledgeable ERP user professionals suitable to Industry and Information Technology Companies.

REFERENCES:

SW7005 FORMAL METHODS IN SOFTWARE ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
The student should be able to
- Translate the informal diagrammatic and textual notations into formal interpretation sufficient for particular forms of automated reasoning.
- Understand the formal semantics and tools.
- Understand VDM and Z notations.

UNIT I INTRODUCTION

UNIT II FORMAL SPECIFICATION STYLE
Model-Oriented – Specifications – Concurrency-Based Specifications – Example Specification Languages.

UNIT III VDM
Introduction to VDM – Basic Types – Quote Types – Compound Types – Optional Types – Functions – Operations – Additional Constructs – Modules.

UNIT IV THE Z NOTATION
The Interchange Language – User-Defined Identifiers – Data Types – Basic Types – Compound Types – Schemas – Additional Constructs.

UNIT V FORMAL SEMANTICS AND TOOLS

TOTAL : 45 PERIODS
OUTCOMES
At the end the student will be able to
- Apply knowledge of logic, formal methods and software engineering methods.
- Use VDM and Z notation in the context of software engineering
- Assess the software against semantics and tools.

REFERENCES:

SW7006 KNOWLEDGE MANAGEMENT

L T P C
3 0 0 3

OBJECTIVES
The student should be able to
- Learn knowledge engineering basics
- Know the knowledge models
- Know the techniques of knowledge management and implementation
- Learn the knowledge elicitation techniques
- Learn scope of knowledge management in project management.

UNIT I INTRODUCTION

UNIT II KNOWLEDGE MODELS

UNIT III TECHNIQUES OF KNOWLEDGE MANAGEMENT
Knowledge Elicitation Techniques – Modeling Communication Aspects – Knowledge Management and Organizational Learning.

UNIT IV KNOWLEDGE SYSTEM IMPLEMENTATION

UNIT V ADVANCED KNOWLEDGE MANAGEMENT

TOTAL : 45 PERIODS
OUTCOMES:
At the end the student will be able to
- Apply knowledge engineering basics.
- Design the knowledge models.
- Apply the techniques of knowledge management and implementation.

REFERENCES:

SW7007 MANAGING HUMAN RESOURCE

OBJECTIVES:
The student should be able to
- Know the importance of resources for a task.
- Compare all the resources with Human resources so the employee constraints are checked to meet the completion of the task.
- Study Training types
- Forecast Human Resource requirement.
- Know the selection procedures.

UNIT I PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT

UNIT II THE CONCEPT OF BEST FIT EMPLOYEE

UNIT III TRAINING AND EXECUTIVE DEVELOPMENT

UNIT IV SUSTAINING EMPLOYEE INTEREST
UNIT V PERFORMANCE EVALUATION AND CONTROL PROCESS

OUTCOMES:
At the end the student will be able to
• Apply recruitment techniques in employee selection process.
• Apply appropriate training process
• Motivate employees by sustaining employee Interests.

REFERENCES:

SW7009 PRINCIPLES OF SUPPLY CHAIN MANAGEMENT
OBJECTIVES
The student should be able to
• Learn about the E-business environment driven by the Automation Software in quick movement of supply of products
• Study the fundamentals of supply chain management comprising of Inventory management and warehousing etc as co parts of entire business
• Learn the cost management for the supply of products
• Improve the overall organization performance and customer satisfaction by improving product or service delivery to consumer.

UNIT I FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT
Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

UNIT II SCM STRATEGIES, PERFORMANCE
Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.
UNIT III       PLANNING AND MANAGING INVENTORIES
Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multi echelon Inventory Systems. Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

UNIT IV       DISTRIBUTION MANAGEMENT
Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning.

UNIT V       STRATEGIC COST MANAGEMENT IN SUPPLY CHAIN
The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Learn about the e-business for supply of products managed with the appropriate methodologies and management techniques
- Know Supply Chain Management consisting of all parties (Including Manufacturer, Marketer, Suppliers, transporters, Warehouses, Retailers and even customers) directly or indirectly involved in fulfilment of a customer
- Ensure that the supply chains deliver varying degrees of six outcomes — the traditional cost-related benefit plus responsiveness, security, sustainability, resilience and innovation — depending on key customers’ needs
- Know automated back office software systems
- Know basic business process.

REFERENCES:
OBJECTIVES
The student should be able to
- Have an overview of the agent systems and software agents.
- Understand the basic concepts of intelligent software agents.
- Design and build a multiagent system.
- Have a basic understanding about software agent technology and to be familiar with some of the communicating languages, standardization and applications.
- Learn the use of software agents to represent and share information to coordinate activities of the agents for the purpose of group problem solving.

UNIT I AGENTS – OVERVIEW
Agent Definition – Agent Programming Paradigms – Agent Vs Object – Aglet – Mobile Agents – Agent Frameworks – Agent Reasoning.

UNIT II JAVA AGENTS

UNIT III MULTIAGENT SYSTEMS

UNIT IV INTELLIGENT SOFTWARE AGENTS
Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications.

UNIT V AGENTS AND SECURITY

TOTAL: 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Create / develop an agent based system for a particular task.
- Design an application that uses different security issues for intelligent agents.
- Effectively apply agent-based technologies in the development and application of distributed information systems that use software agents.

REFERENCES
OBJECTIVES
The student should be able to
- Understand the basics of test automation
- Appreciate the different aspects of test tool evaluation and test automation approach selection
- Understand the role played by test planning and design in test execution
- Appreciate the use of various testing tools for testing varied applications
- Understand test automation using case studies

UNIT I  INTRODUCTION

UNIT II  TEST FRAMEWORK AND AUTOMATION
Test Tool Evaluation and selection – organisations’ system engineering environment – tools that support the testing life cycle – test process analysis – test tool consideration Test framework – Test Library Management –selecting the test automation approach - test team management

UNIT III  TEST PLANNING AND DESIGN
Test planning – Test program scope – Test requirements management – Test Events, Activities and Documentation – Test Environment – Evolving a Test plan Test analysis and design – Test requirements analysis – Test program design – Test procedure design – Test development architecture – guidelines – automation infrastructure – test execution and review – test metrics

UNIT IV  TESTING THE APPLICATIONS

UNIT V  CASE STUDIES

TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Identify the different test tools
- Use available testing tools to test some software applications
- Modify existing test metrics based on functionality or features used
- Design test cases and execute them
- Implement test scripts for automating test execution
REFERENCES:


SW7014 USER INTERFACE DESIGN AND EVALUATION

OBJECTIVES
The student should be able to
- Understand how to study the tasks that the user needs to accomplish with the software system.
- Learn the constraints that affect the UI design.
- Study the importance of human-computer interaction.
- Identify the various facilities provided in WINDOWS including multimedia.

UNIT I INTRODUCTION

UNIT II HUMAN COMPUTER INTERACTION

UNIT III WINDOWS

UNIT IV MULTIMEDIA
UNIT V EVALUATION


TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
• Design a more user friendly software.
• Utilize the existing functionalities provided and develop a better design.
• Predict the need of the end user and design the interface accordingly.

REFERENCES:

SW7015 WEB DESIGN AND MANAGEMENT

OBJECTIVES
The student should be able to
• Know the importance of web technologies for the real world applications
• Learn appropriate scripting languages
• Know the testing techniques to test the product
• Gain the skills and project-based experience needed for entry into web design and development careers.
• To use a variety of strategies and tools to create websites.

UNIT I SITE ORGANIZATION AND NAVIGATION

UNIT II ELEMENTS OF PAGE DESIGN

UNIT III SCRIPTING LANGUAGES

UNIT IV PRE-PRODUCTION MANAGEMENT
UNIT V PRODUCTION, MAINTENANCE AND EVALUATION


TOTAL : 45 PERIODS

OUTCOMES:
At the end the student will be able to
- Apply various scripting languages for the development of web applications
- Follow Web design standards
- Develop websites for local community organizations.

REFERENCES:

UNIT I INTRODUCTION

UNIT II VIRTUALIZATION

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UNIT III  VIRTUALIZATION INFRASTRUCTURE


UNIT IV  PROGRAMMING MODEL

Map Reduce Hadoop Distributed File Systems – Hadoop I/O – Developing Map Reduce Applications – Working of Map Reduce – Types and Formats – Setting up Hadoop Cluster.

UNIT V  CLOUD INFRASTRUCTURE AND SECURITY


TOTAL : 45 PERIODS

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

- Articulate the main concepts, key technologies, strengths and limitations of cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Explain the core issues of cloud computing such as security, privacy and interoperability
- Choose the appropriate technologies, algorithms and approaches for the related issues

REFERENCES:

OBJECTIVES:

- To learn real time operating system concepts and the associated issues & techniques.
- To understand design and synchronization problems in Real Time System.
- To understand the evaluation techniques present in Real Time System.

UNIT I  REAL TIME SPECIFICATION AND DESIGN TECHNIQUES  

UNIT II SOFTWARE REQUIREMENTS ENGINEERING  

UNIT III INTERTASK COMMUNICATION AND MEMORY MANAGEMENT  

UNIT IV REAL TIME DATABASES  
Real time Databases – Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two – phase Approach to improve Predictability – Maintaining Serialization Consistency – Databases for Hard Real Time Systems

UNIT V PROGRAMMING LANGUAGES  

TOTAL : 45 PERIODS

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

- Apply principles of real time systems design.
- Make use of architectures and behavior of real time operating systems and database in real time applications.
REFERENCES:

SW7012 SOFTWARE VERIFICATION AND VALIDATION

OBJECTIVES
The student should be able to
- Understand the principles of verification and validation
- Appreciate the different verification and validation techniques
- Understand the various stages of testing
- Appreciate the use of tools for verification and validation
- Appreciate the benefits of using metrics for verification and validation

UNIT I INTRODUCTION

UNIT II METHODS OF SOFTWARE VERIFICATION

UNIT III TESTING

UNIT IV TOOLS FOR SOFTWARE VERIFICATION

UNIT V ADVANCED APPROACHES
Automatic approach for verification and validation – validating UML behavioral diagrams – probabilistic model checking of activity diagrams in SysML – metrics for verification and validation

TOTAL : 45 PERIODS
OUTCOMES:
At the end the students will be able to:
- Identify the different techniques for verification and validation
- Use available traceability analysis tools on sample requirements
- Modify existing coverage analysers in terms of functionality or features used
- Design system test cases
- Use test case generators and test management tools

REFERENCES:
3. ESA Board for Software Standardisation and Control (BSSC), “Guide to software verification and validation”, European Space Agency ESA PSS-05-10 Issue 1 Revision 1, 1995

CP7092 SOCIAL NETWORK MINING AND ANALYSIS

OBJECTIVES
- To gain knowledge about the current web development and emergence of social web
- To study about the modeling, aggregating and knowledge representation of semantic web
- To appreciate the use of machine learning approaches for web content mining
- To learn about the extraction and mining tools for social networks
- To gain knowledge on web personalization and web visualization of social networks

UNIT I INTRODUCTION TO SOCIAL NETWORK ANALYSIS AND KNOWLEDGE REPRESENTATION


UNIT II SOCIAL MEDIA MINING


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UNIT III  EXTRATION 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 & 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 IV  HUMAN BEHAVIOR ANALYSIS AND PRIVACY ISSUES


UNIT V  VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS


TOTAL : 45 PERIODS

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

- Apply knowledge for current Web development in the era of social Web
- Model, aggregate and represent knowledge for Semantic Web
- Use machine learning approaches for Web Content Mining
- Design extraction and mining tools for Social networks
- Develop personalized web sites and visualization for Social networks

REFERENCES:

OBJECTIVES

- To understand the mathematical foundations of security principles
- To appreciate the different aspects of encryption techniques
- To understand the role played by authentication in security
- To appreciate the current trends of security practices

UNIT I  CLASSICAL CIPHERS  9

Classical Cryptography - Shift Cipher - Substitution Cipher - Affine Cipher – Cryptanalysis - Cryptanalysis of the Affine Cipher - Cryptanalysis of the Substitution Cipher - Cryptanalysis of the Vigenere Cipher - Shannon’s Theory

UNIT II  SYMMETRIC CIPHERS AND HASH FUNCTIONS  9


UNIT III  PUBLIC-KEY ENCRYPTION TECHNIQUES  9

Introduction to Public–key Cryptography - Number theory - RSA Cryptosystem - Attacks on RSA – El-Gamal Cryptosystem - Shanks’ Algorithm - Elliptic Curves over the Reals - Elliptical Curves Modulo a Prime - Signature Scheme – Digital Signature Algorithm

UNIT IV  KEY MANAGEMENT  9

Identification Scheme and Entity Attenuation - Challenge and Response in the Secret-key Setting - Challenge and Response in the Public key Setting - Schnorr Identification Scheme - Key distribution - Diffie-Hellman Key - Pre-distribution - Unconditionally Secure key Pre-distribution - Key Agreement Scheme - Diffie-Hellman Key agreement - Public key infrastructure - PKI, Certificates, Trust Models

UNIT V  SECURITY PRACTICES  9


TOTAL : 45 PERIODS

OUTCOMES:

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

- Use the mathematical foundations in security principles
- Identify the features of encryption and authentication
- Use available security practices

REFERENCES:

OBJECTIVES

- To understand data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- To expose the students to the concepts of data warehousing architecture and implementation
- To study the overview of developing areas – web mining, text mining and ethical aspects of data mining
- To identify business applications and trends of data mining

UNIT I  INTRODUCTION TO DATA WAREHOUSING  9
Evolution of Decision Support Systems- Data warehousing Components – Building a Data warehouse, Data Warehouse and DBMS, Data marts, Metadata, Multidimensional data model, OLAP vs OLTP, OLAP operations, Data cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations

UNIT II  DATA WAREHOUSE PROCESS AND ARCHITECTURE  9
Types of OLAP servers, 3–Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation, tuning and testing of data warehouse. Data Staging (ETL) Design and Development, data warehouse visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications- tools-SAS

UNIT III  INTRODUCTION TO DATA MINING  9
Data mining-KDD versus data mining, Stages of the Data Mining Process-task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data cleaning, Data transformation, Feature selection, Dimensionality reduction, Discretization and generating concept hierarchies-Mining frequent patterns- association-correlation

UNIT IV  CLASSIFICATION AND CLUSTERING  9

UNIT V  PREDICTIVE MODELING OF BIG DATA AND TRENDS IN DATAMINING  9

TOTAL : 45 PERIODS

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

- Evolve multidimensional intelligent model from typical system
- Discover the knowledge imbibed in the high dimensional system
- Evaluate various mining techniques on complex data objects
REFERENCES:
1. Jiawei Han, Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann, Third edition, 2011.

CP7095 VIRTUALIZATION TECHNIQUES AND APPLICATIONS  L T P C 
OBJECTIVES  3 0 0 3
- To understand the concepts of virtualization and virtual machines
- To understand the implementation of process and system virtual machines
- To explore the aspects of high level language virtual machines
- To gain expertise in server, network and storage virtualization.
- To understand and deploy practical virtualization solutions and enterprise solutions

UNIT I OVERVIEW OF VIRTUALIZATION  9

UNIT II PROCESS VIRTUAL MACHINES  9

UNIT III HIGH LEVEL LANGUAGE VIRTUAL MACHINES AND SERVER VIRTUALIZATION  9
HLL virtual machines: Pascal P-Code – Object Oriented HLLVMs - Java VM architecture - Java Native Interface - Common Language Infrastructure. Server virtualization: Partitioning techniques - virtual hardware - uses of virtual servers - server virtualization platforms

UNIT IV NETWORK AND STORAGE VIRTUALIZATION  9

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UNIT V APPL YING VIRTUALIZATION


TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student should be able to
- Deploy legacy OS on virtual machines.
- Analyze the intricacies of server, storage and network virtualizations
- Design and develop applications on virtual machine platforms

REFERENCES:

CP7082 INFORMATION RETRIEVAL TECHNIQUES

OBJECTIVES:
- To understand the basics of information retrieval with pertinence to modeling, query operations and indexing
- To get an understanding of machine learning techniques for text classification and clustering.
- To understand the various applications of information retrieval giving emphasis to multimedia IR, web search
- To understand the concepts of digital libraries

UNIT I INTRODUCTION: MOTIVATION

UNIT II MODELING
UNIT III  INDEXING
Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations - Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency

UNIT IV  CLASSIFICATION AND CLUSTERING
Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering – Matrix decompositions and latent semantic indexing – Fusion and Meta learning

UNIT V  SEARCHING THE WEB

OUTCOMES:
Upon completion of this course, the student should be able to
- Build an Information Retrieval system using the available tools
- Identify and design the various components of an Information Retrieval system
- Apply machine learning techniques to text classification and clustering which is used for efficient Information Retrieval
- Design an efficient search engine and analyze the Web content structure

REFERENCES:

CP7083  INTERNET OF THINGS IN THE CLOUD

OBJECTIVES:
- To understand the basics of Internet of things and protocols
- To get an idea of some of the application areas where Internet of Things can be applied
- To understand the middleware for Internet of Things
- To understand the concepts of Web of Things
- To understand the concepts of Cloud of Things with emphasis on Mobile cloud computing
UNIT I  INTRODUCTION  

UNIT II  IOT PROTOCOLS  

UNIT III  WEB OF THINGS  

UNIT IV  INTEGRATED  

UNIT V  APPLICATIONS  
The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging

OUTCOMES:  
Upon completion of this course, the student should be able to  
- Identify and design the new models for market strategic interaction  
- Design business intelligence and information security for WoB  
- Analyze various protocols for IoT  
- Design a middleware for IoT  
- Analyze and design different models for network dynamics

REFERENCES:
The student should be able to
- Understand TDD and MDD
- Learn fundamentals of refactoring
- Perform unit testing in TDD
- Apply TDD
- Appreciate the emphasis of TDD in extreme programming.

UNIT I  BACKGROUND

UNIT II  REFACTORING

UNIT III  UNIT TESTING

UNIT IV  PATTERNS FOR TEST DRIVEN DEVELOPMENT
Test Driven Development Patterns – Red Bar Patterns – Testing Patterns – Green Bar Patterns – xUnit Patterns – Design Patterns – Mastering TDD.

UNIT V  EXTREME PROGRAMMING

OUTCOMES:
At the end the student will be able to
- Differentiate Test Driven Development and Model Driven Development
- Apply Refactoring for improving code
- Use Test Driven Development patterns in project development.
REFERENCES:
2. Fowler, Martin, “Refactoring: improving the design of existing code”, Pearson Education India, 2002

SW7008 PERSONAL SOFTWARE PROCESS

OBJECTIVES
The student should be able to
- Understand the nature of PSP
- Apply PSP principles in measuring software
- Appreciate the role of PSP in assessing software quality
- Relate PSP and TSP in software development
- Learn to use PSP in Software engineering

UNIT I INTRODUCTION

UNIT II PSP SIZE ESTIMATION

UNIT III PSP QUALITY MANAGEMENT

UNIT IV PSP DESIGN TEMPLATE
UNIT V  TEAM SOFTWARE PROCESS


TOTAL : 45 PERIODS

OUTCOMES

At the end the student will be able to

- Analyse software using PSP
- Use PSP tools to measure software quality
- Use PSP in software design

REFERENCES: