CS 5101

ADVANCED ALGORITHMS

Instruction 3 Hours/Week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

UNIT-I

Algorithm Analysis: Asymptotic Notation, Amortization.
Basic Data Structures: Stacks and Queues, Vectors, Lists and Sequences, Trees, Priority Queues, Heaps, Dictionaries and Hash Tables.

UNIT-II

Graphs: The Graph Abstract Data Type, Data Structures for Graphs, Graph Traversal, Directed Graphs.

UNIT-III


UNIT-IV


UNIT-V


Suggested Reading:

CS 5102

ADVANCED OPERATING SYSTEMS

Instruction 3 Hours/Week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

UNIT-I


UNIT-II

Distributed Mutual Exclusion: Classification, requirement, performance, non-token based algorithms, Lamport's algorithm, the Richart-Agarwala algorithm, token-based algorithm-Suzuki liasamil's broadcast algorithm, Singhals heuristic algorithm.

Deadlock Detection: Resource Vs Communication deadlock, A graph - theoretic model, prevention, avoidance, detection, control organization, centralized deadlock-detection algorithm, the completely centralized algorithm, the HO-Ramamoorthy algorithm. Distributed deadlock detection algorithm - path - pushing, edge-chasing, hierarchical deadlock detection algorithm, menace-muntz and Ho-Ramamoorthy algorithm. Agreement Protocols: The system model, the Byzantine agreement, the consensus problem.

UNIT-III


Distributed Shared Memory: Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues.

Case Studies: IVY, Mirage, Clouds.

UNIT IV

**Failure Recovery:** Backward, Forward Error Recovery in Concurrent Systems, Consistent Set of Check Points, Synchronous and Asynchronous Check Pointing and Recovery.

**Fault Tolerance:** Commit Protocols, Non-Blocking Commit Protocols, Voting Protocols.

**Protection and Security:** Access Matrix, Private Key, Public key, Kerberos System.

UNIT -V

**Multiprocessor Operating Systems:** Motivation, Basic Multiprocessor System Architecture, Interconnection Networks for Multiprocessor Systems, Caching, Hypercube Architecture. Threads, Process Synchronization, Processor Scheduling, Memory Management.

**Database Operating System:** Concurrence Control, Distributed Databases, Concurrency Control Algorithms.

**Suggested Reading:**

3 Andrew S. Tanenbaum, "Distributed Operating Systems", Pearson Education India, 2011
CS 5103

ARTIFICIAL INTELLIGENCE

Instruction 3 Hours/Week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

UNIT - 1

Introduction: History Intelligent Systems, Foundations of Artificial Intelligence, Sub areas of AI, Applications.


UNIT – II


UNIT - III


UNIT - IV


**Artificial Neural Networks:** Introduction Artificial Neural Networks, Single - Layer Feed Forward Networks, Multi - Layer Feed Forward Networks, Radial - Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks

UNIT - V

**Advanced Knowledge Representation Techniques:** Case Grammars, Semantic Web.

**Natural Language Processing:** Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

**Suggested Reading :**


CS5104

OBJECT ORIENTED SOFTWARE ENGINEERING

Instruction  
Duration of Semester End Examination  
SEE  
CIE  
Credits  

3 Hours/Week  
3 Hours  
70 Marks  
30 Marks  
3

UNIT-I


UNIT-II

Requirement Capture, Requirement Analysis, Refining the Requirement Models, Object Interaction.

UNIT-III

Operations, Control, Design, System Design.

UNIT-IV

Object design, Design Patterns, Human Computer Interaction, Designing Boundary Classes

UNIT-V


Suggested Reading:

With effect from Academic Year 2015-2016

CS 5105

DISTRIBUTED COMPUTING

Instruction 3 Hours/Week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

UNIT -I


UNIT II


UNIT -III


UNIT -IV

UNIT-V

**Globe:** Philosophy, Communication, Processes, Naming, Synchronization, Caching and Replication Fault Tolerance, Security, MTN

**Distributed Multimedia Systems:** Introduction, Characteristics of Multimedia Data, Quality of Service Management: Quality of Service negotiation, Admission Control, Resource Management Resource Scheduling.

**Suggested Reading:**


With effect from Academic Year 2015-2016

CS 5106

ADVANCED DATABASES

Instruction: 3 Hours/Week
Duration of Semester End Examination: 3 Hours
SEE: 70 Marks
CIE: 30 Marks
Credits: 3

UNIT-I

Object Based Databases: Overview, Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance, Array and Multi-set. Types in SQL, Object-Identity and Reference Types in SQL, Implementing O-R features, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational.

UNIT-II


UNIT-III


UNIT-IV


Distributed Databases: Homogeneous and Heterogeneous Database, Distributed Data Storage, Distributed Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing, Heterogeneous Distributed Databases, Cloud-Based Databases, Directory Systems.

UNIT-V


Spatial and Temporal Data and Mobility: Motivation, Time in Databases, Spatial and Geographic Data, Multimedia Databases, Mobility and Personal Databases.
Suggested Reading:


With effect from the academic year 2015-2016

CS-5151

MOBILE COMPUTING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I


UNIT-II

Telecommunication Systems: GSM, GPRS, Satellite Networks, Basics, Parameters and Configurations, Capacity Allocation, FAMA and DAMA, Broadcast Systems, DAB, DVB, CDMA and 3G.

UNIT-III


UNIT-IV


Mobile IP - Dynamic Host Configuration Protocol.

Traditional TCP - Classical TCP Improvements – WAP, WAP 2.0.

UNIT-V


File System Support for Mobility: Distributed File Sharing for Mobility support, Coda and other Storage Manager for Mobility Support.

Suggested Reading:

With effect from the academic year 2015-2016

CS-5152

REAL TIME SYSTEMS

Instruction: 3 Periods per week
Duration of Semester End Examination: 3 Hours
SEE: 70 Marks
CIE: 30 Marks

UNIT-I


UNIT-II

Real Time Scheduling: Different Approaches- Clock Driven, Priority Driven, Scheduling of Periodic and Sporadic Jobs in Priority-Driven Systems.

UNIT-III


UNIT-IV


UNIT-V

Case Studies: Vx – Works, RT Linux.

Suggested Reading:

CS 5153

ADVANCED COMPUTER GRAPHICS

Instruction: 3 Periods per week
Duration of Semester End Examination: 3 Hours
SEE: 70 Marks
CIE: 30 Marks

UNIT-I

**Raster Graphics System and its Working:** Line-Drawing Algorithms (DDA and Bresenham’s algorithms), Polygon Filling, 2-D Transformations.

UNIT-II


UNIT-III


UNIT -TV


UNIT-V


**Suggested Reading:**

With effect from the academic year 2015-2016

CS-5154

WEB ENGINEERING

Instrucion 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I


UNIT-II


UNIT-III

Web Metrics and Quality: Models and Methods.


UNIT-IV

Web Resource Management: Models and Techniques, Ontology Supported Web Content Management, Design Principles and Applications of XRML.
UNIT-V

**Web Maintenance and Evolution**: Techniques and Methodologies.

**Web Intelligence**: Techniques and Applications
Analysis and Customization of Web-Based Electronic Catalogs, Data Mining using Qualitative Information on the Web.

**Suggested Reading**:

CS 5155

PARALLEL COMPUTER ARCHITECTURE

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I


Programming for Performance: Partitioning for Performance, Data Access and Communication in a Multi memory System, Implications for Programming Models.

UNIT-II


Snoop-Based Multiprocessor Design: Correctness Requirements, Multilevel Cache Hierrarchies, Split-Transaction Bus, Extending Cache Coherence.

UNIT-III


UNIT-IV


UNIT -V

Latency Tolerance: Overview of Latency Tolerance, Latency Tolerance in Explicit Message Passing, Latency Tolerance in a Shared Address Space, Block Data Transfer in a Shared Address Space, Proceeding Past Long-Latency Events, Pre communication in a Shared Address Space, Multithreading in a Shared Address Space, Lockup-Free Cache Design.
Suggested Reading:

With effect from academic year 2015-2016

CS 5156

MULTIMEDIA TECHNOLOGIES

Instruction: 3 periods per week
Duration of semester: End Examination 3 Hours
SEE: 70 Marks
CIE: 30 Marks

UNIT-I

Media and Data Streams: Properties of multimedia systems, Data streams characteristics: Digital representation of audio, numeric instruments digital interface Bark concepts, Devices, Messages, Timing Standards Speech generation, analysis and transmission.

UNIT-II

Video: Representation, Digitalization transmission
Animations: Basic concepts, animation languages, animations control transmission

UNIT-III

Data Compression Standards: JPEG, H-261, MPEG DVI
Optical storage devices and Standards: WORHS, CDDA, CDROM, CDWO, CDMO.
Real Time Multimedia, Multimedia file System.

UNIT-IV

Multimedia Communication System: Collaborative computing session management, transport subsystem, QOS, resource management.
Multimedia Databases: Characteristics, data structures, operation, integration in a database model.
A Synchronization: Issues, presentation requirements, reference to multimedia synchronization, MHEG

UNIT-V

Multimedia Application: Media preparation, Composition, integration communication, consumption, entertainment.
Suggested Reading:

With effect from Academic Year 2015-2016

CS 5157

EMBEDDED SYSTEMS

Instruction 3 periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I

UNIT –II
Embedded System Architecture: Instruction Set Architecture, CISC and RISC instruction set architecture, Basic Embedded Processor/Microcontroller Architecture, C1SE Examples-Motorola (68HCI1), RISC Example- ARM, DSP Processors, Harvard Architecture Microcontroller Example - PIC.

UNIT -III
Embedded Hardware Design and Development : VLSI and Integrated Circuit Design, EDA tools, usage of ED A tools and PCB layout.
Embedded firmware and Design and Development : Embedded Firmware Design Approaches and Development languages and Programming in Embedded in C.

UNIT -IV

UNIT-V

Suggested Reading:
CS-5158 DATA MINING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I

Introduction: Challenges – Origins of Data Mining and Data mining Tasks

Data: Types of Data Quality – Data Preprocessing – Measures of similarity and Dissimilarity OLAP and Multidimensional Data Analysis.

UNIT-II


UNIT-III


UNIT-IV


UNIT-V


Suggested Reading:

With effect from Academic Year 2015-2016

CS 532

SEMINAR - 1

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for systematic independent study of state of the art topics in broad area of his/her specialization.

Seminar topics can be choosen by the students with the advice from the faculty members. Students are to be exposed to following aspects of seminar presentations.

- Literature survey
- Organization of material
- Preparation of OHP slides / PC Presentation
- Technical writing

Each student is required to

1. Submit one page of synopsis of the seminar talk two days before for display on notice board.
2. Give 20 minutes presentation through MS-PowerPoint Presentation Slides followed by 10 minutes discussion.
3. Submit a report on the seminar topic with a list of references and slides used within a week.

Seminars are to be scheduled from the 3rd week of the last week of the semester and any change in schedule should be discouraged.

The CIE marks will be awarded to the students by atleast 2 faculty members on the basis of an oral presentation and report as well as their involvement in the discussion.
With effect from Academic Year 2015-2016

CS 5159

NETWORK SECURITY

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I


UNIT-II

Secret Key Cryptography : DES, Triple DES, AES, Key distribution, Attacks

Public Key Cryptography: RSA, ECC, Key Exchange (Diffie-Hellman), Java Cryptography Extensions, Attacks

UNIT-III

Integrity, Authentication and Non-Repudiation : Hash Function (MD5, SHA5), Message Authentication Code (MAC), Digital Signature (RSA, DSA Signatures), Biometric Authentication.

UNIT-IV

PKI Interface : Digital Certificates, Certifying Authorities, POP Key Interface, System Security using Firewalls and VPN's.

Smart Cards : Application Security using Smart Cards, Zero Knowledge Protocols and their use in Smart Cards, Attacks on Smart Cards

UNIT-V

Applications: Kerberos, Web Security Protocols (SSL), IPSec, Electronic Payments, E-cash, Secure Electronic Transaction (SET), Micro Payments, Case Studies of Enterprise Security (.NET and J2EE)
Suggested Reading:

With effect from Academic Year 2015-2016

CS 5160

MACHINE LEARNING

Instructor: 3 Periods per week
Duration of Semester End Examination: 3 Hours
SEE: 70 Marks
CIE: 30 Marks

UNIT-I

**Introduction:** Learning, Types of Machine Learning.
**Concept learning:** Introduction, Version Spaces and the Candidate Elimination Algorithm.
**Learning with Trees:** Constructing Decision Trees, CART. Classification Example

UNIT-II

**Linear Discriminants:** The Perceptron, Linear Separability, Linear Regression

**Multilayer Perceptron (MLP):** Going Forwards, Backwards, MLP in practices, Deriving back Propagation SUPPORT Vector Machines: Optimal Separation, Kernels

UNIT-III

**Some Basic Statistics:** Averages, Variance and Covariance, The Gaussian, The Bias-Variance Tradeoff

**Graphical Models:** Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm.

UNIT-IV

**Evolutionary Learning:** Genetic Algorithms, Genetic Operators, Genetic Programming
Ensemble learning: Boosting, Bagging

**Dimensionality Reduction:** Linear Discriminant Analysis, Principal Component Analysis

UNIT-V

**Clustering:** Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison
Suggested Reading:

4. Galit Shmueli, Nitin R Patel, Peter C Bruce, "Data Mining for Business Intelligence". Wiley India Edition, 2007
CS 5161

GRID COMPUTING

Instruction: 3 Periods per week
Duration of Semester End Examination: 3 Hours
SEE: 70 Marks
CIE: 30 Marks

UNIT-I


Job Submission: Introduction, Globus Job Submission, Transferring Files

UNIT-II

Schedulers: Scheduler Features, Scheduler Examples, Grid Computing Meta-Schedule Distributed Resource Management Application (DRMAA)


UNIT-III

System Infrastructure I: Web Services: Service-Oriented Architecture, Web Services and Service Implementation

System Infrastructure II: Grid Computing Services: Grid Computing and Standardization Bodies Interacting Grid Computing Components, Open Grid Services Architecture (OGSA), WSRF

User-Friendly Interfaces: Introduction Grid Computing Workflow Editors, Grid Portals

UNIT-IV
Grid-Enabling Applications: Introduction, Parameter Sweep, Using an Existing Program on Multiple Grid Computers, Writing an Application Specifically for a Grid, Using Multiple Grid Computers to Solve a Single Problem

UNIT-V

Case Studies:

Globus: Overview of Globus Toolkit 4, Installation of Globus, GT4 Configuration; Main Components and programming Model, Using Globus

gLite: Introduction, Internal Workings of gLite, Logging and Bookkeeping (LB), Security Mechanism Using gLite Resource management using Gridway and Gridbus Scheduling using Condor, SGE, PBS, LSF Grid scheduling with QoS.

Suggested Reading:


4. Ian Foster, carl Kesselman, "The Grid 2 :: Blueprint for a new computing Infrastructure", Elsevir Series, 2004


CS 5162

INFORMATION RETRIEVAL SYSTEMS

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-1

Introduction

Retrieval Strategies: Vector Space Model, Probabilistic Retrieval Strategies

Language Models: Simple Term Weights. Non Binary Independence Model

UNIT-II

Retrial Utilities: Relevance Feedback, Clustering. N-grams, Regression Analysis. Thesauri

UNIT-III

Retrieval Utilities: Semantic Networks, Parsing

Cross-language Information Retrieval: Introduction, Crossing the Language Barrier

UNIT-IV

Efficiency: Inverted Index, Query Processing, Signature Files. Duplicate Document Detection

UNIT V


Suggested Reading:

CS 5163

NATURAL LANGUAGE PROCESSING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I

Introduction of Elementary Probability Theory, Essential Information Theory

UNIT-II

Linguistic Essentials Corpus-Based Work Collocations.

UNIT-III


UNIT-IV

Evaluation Measures


UNIT-V

Probabilistic Context Free Grammars: Introduction of Clustering

Information Retrieval: Background, The Vector Space Model

Suggested Reading:

With effect from the academic year 2015-2016

CS-5164

SOFTWARE QUALITY & TESTING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I

UNIT - II
Quality tools in Software Development, Seven Basic Tools, Check List, Pareto Diagram, Histogram, Run Charts, Scatter Diagram, Control Chart, Cause and Effect Diagram, Defect Removal, Effect Removal Effectiveness, Quality Planning, Cost Effectiveness of Phase Effect Removal.

UNIT – III

UNIT - IV

UNIT - V
Planning Your Test Effort, Writing and Tracking Test Cases, Reporting Measuring SQA.

Suggested Reading:
CS5165

SOFTWARE ENGINEERING FOR REAL TIME SYSTEMS

Instruction
Duration of Semester End Examination
SEE
CIE

3 periods per week
3 Hours
70 Marks
30 Marks

UNIT-I


UNIT-II


UNIT-III


UNIT-IV


UNIT-V


Suggested Reading:

With effect from the academic year 2015-2016

CS-5166

CLOUD COMPUTING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT I


Cloud Formations: From One Computer to the Grid of Many, Server Virtualization, Parallel Processing, Symmetric Multiprocessing Systems, Massively Parallel Processing Systems.

UNIT II

Web services and the cloud: Communication-as-a-Service(CaaS), Infrastructure-as-a-Service(IaaS), Monitoring-as-a-Service(MaaS), Platform-as-a-Service(PaaS), Software-NIS-as-a-Service(SaaS)

Building Cloud Networks: The Evolution from the MSP Model to cloud, Computing and Software-as-a-Service, The cloud Data Center, Collaboration i. Service-Oriented Architectures as a Step Toward Cloud Computing, Basic Approach to a Data Center-Based SOA

The Role of Open Source Software in Data Centers, Where Open Source Software Is Used Case Studies: Amazon web services, Google App Engine.

UNIT III

Virtualization: Introduction, types and technologies, Accomplishing Virtualization, importance of virtualization in Cloud Computing,

Case studies: Xen Virtual machine monitor-Xen API, VMware- VMware products- VMware Features, Microsoft Virtual Server-Features of Microsoft Virtual server

UNIT IV


UNIT V


**Mobile Internet Devices and the Cloud:** Mobile Operating Systems for Smartphones. Mobile Platform Virtualization I Collaboration Applications for Mobile Platforms.

**Suggested Reading:**

2. Virtualization Specialist level complete Certification kit-Study guide from www.theartofservice.org

**Web resources:**

With effect from the academic year 2015-2016

CS-5167 SOFT COMPUTING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I

Introduction to Soft Computing and Neural Networks:

UNIT II

Genetic Algorithms:
Introduction to Genetic Algorithms (GA) –Applications of GA in Machine Learning-Machine Learning Approach to Knowledge Acquisition.

UNIT III

Neural networks:

UNIT IV

Fuzzy Logic:

UNIT V

Suggested Reading:

With effect from the academic year 2015-2016

CS 5168

NEURAL NETWORKS

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT -I


UNIT-II


UNIT-III


UNIT-IV


UNIT -V


Suggested Reading :


2. Jacek M.Zurada "Introduction to Artificial Neural Systems", Jaico Publishing
With effect from the academic year 2015-2016

CS 5169

PARALLEL ALGORITHMS

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I


UNIT-II


UNIT-III

Parallel Sorting - Issues in Sorting on Parallel Computers, Sorting Networks, Bubble Sort and its Variants, Quicksort, Bucket and Sample Sort.

UNIT-IV


UNIT-V


Suggested Reading:


CS-5170

SIMULATION AND MODELING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I


UNIT-II

Overview of Statistical Models and Queuing Systems, Programming languages for Simulation: Continuous and Discrete Simulation Languages – FORTAN, GPSS, SIMAN, SIMSCRIPT, SLAM and MODSIM.

UNIT-III


UNIT-IV

Input Data Analysis: Data Collection: Identify the Distribution, Parameter and Estimation.

Goodness of fit tests: Chi-Square Test – KS Test; Multivariate and time series input models, Verification and Validations of Simulation Models, Model Building, Verification and Validation: Verification of Simulation Models, Calibration and Validation of Models, face validity, Validation of Model Assumptions. Validation Input/output Transformations, Input/output Validation using Historical Input Data, Input/output Validation Sing Turning Test.

UNIT-V

Suggested Reading:

With effect from the academic year 2015-2016

CS-5171

SOFTWARE PROJECT MANAGEMENT

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I


UNIT-II

Life – Cycle phases, Artifacts of the process, Model Based Software Architectures, Workflows of the Process, Checkpoints of the process.

UNIT-III


UNIT-IV

Modern Project profiles, Next Generation Software Economics, Modern process Transitions, Managing Contacts, Managing People & Organizing Terms.

UNIT-V

Process improvement & mapping to the CMM, ISO 12207 – an overview, programme management.

Suggested Reading:

CS 5172

IMAGE PROCESSING

Instruction 3 Periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT I

Image Processing: Introduction, Examples, Fundamental steps, Components, Elements of visual perception, Light and Electromagnetic Spectrum, Image sensing and Acquisition, Image Sampling and Quantization, Basic relationships between pixels.

Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters, Combining Spatial Enhancement Methods.

UNIT II


Image Restoration: Noise Models, Restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering.


UNIT III


UNIT IV

**Image Compression:** Fundamentals, Image Compression Models, Elements of Information Theory, Error-free Compression, Lossy Compression, Image Compression Standards, Some Basic Compression Methods.

**Morphological Image Processing:** Preliminaries, Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms, Some Basic Gray-Scale Morphological Algorithms.

UNIT V

**Image Segmentation:** Fundamentals, Point, Line and Edge Detection, Thresholding, Region-based Segmentation, Segmentation using Morphological Watersheds, The use of Motion in Segmentation.

**Object Recognition:** Patterns and Pattern Classes, Recognition based on Decision-theoretic Methods, Structural Methods.

**Suggested Reading:**


With effect from the academic year 2015-2016

CS-5173

SOFTWARE REUSE TECHNIQUES

Instruction: 3 Periods per week
Duration of Semester End Examination: 3 Hours
SEE: 70 Marks
CIE: 30 Marks

UNIT-I

Software Reuse Success Factors, Reuse Driven Software Engineering Business, Object Oriented Software Engineering. Applications and Component Subsystem, Use case Components, Object Components

UNIT-II

Design Patterns: Introduction

UNIT-III

Structural Patterns: Adapter, Bridge, Composite, Decorator, Fiacade, Flyweight, Proxy.
Behavioral Patterns: Chain of Responsibility, Command, Interpreter.

UNIT-IV

Behavioral Patterns: Iterator, Mediator, Momento, Observer, State, Strategy, Template, Visitor, Other Design Pattern: Whole Part, Master-Slave, View Handler-ReCIEver, Client-Dispatcher-Server, Publisher-Subscriber.

UNIT-V

Architectural Patterns: Layers, Pipes and Filters, Black Board, Broker, Model View Controller.
Presentation: Abstraction-Control, Micro Kernel, Reflection.

Suggested Reading:

2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides “Design Patterns”, Addison, 1995, Pearson Education,
3. Frank Buschmann etc. – Pattern Oriented Software Architecture – Volume 1, Wiley 1996.
CS5174

RELIABILITY AND FAULT TOLERANCE

Instruction 3 periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

UNIT-I

Introduction to Reliability Engineering:
Reliability, Repairable and Non-repairable Systems, Maintainability and Availability, Designing, Reliability, Repairable and Non-repairable Systems, MTBF MTBF, MTTF MDT, k out of i systems.

UNIT-II

Software Reliability:

Software Reliability Approaches:

UNIT-III

Software Reliability Modeling:
Introduction to Software Reliability Modeling, Parameter Determination and Estimation, Model Selection, Markovian Models, Finite and Infinite failure category Models, Comparison of Models, Calendar Time Modeling.

UNIT-IV


UNIT-V

Suggested Reading:

CS5175

WEB MINING

Instruction 3 periods per week
Duration of Semester End Examination 3 Hours
SEE 70 Marks
CIE 30 Marks

Objectives:

• To have a foundation in data mining
• To understand information retrieval and web search
• To expose the students to the applications of web mining

Unit-I

Introduction: The World Wide Web, History of the Web and the Internet, Web Data Mining

Association Rules and Sequential Patterns: Basic Concepts, Apriori Algorithm, Data Formats for Association Rule Mining, Mining with Multiple Minimum Supports, Mining Class Association Rules

Supervised Learning: Basic Concepts, Decision Tree Induction, Classifier Evaluation, Naïve Bayesian Classification, Naïve Bayesian Text Classification, K-Nearest Neighbor Learning, Ensemble of Classifiers

Unit-II

Unsupervised Learning: Basic Concepts. K-means Clustering, Representation of Clusters, Hierarchical Clustering, Distance Functions, Data Standardization, Handling of Mixed Attributes, Which Clustering Algorithm to Use? Cluster Evaluation

Information Retrieval and Web Search: Basic Concepts, Relevance Feedback, Evaluation Measures, Text and Web Page Pre-Processing, Inverted Index and Its Compression

Unit-III

Information Retrieval and Web Search: Web Search, Meta-Search: Combining Multiple Rankings, Web Spamming

Link Analysis: Social Network Analysis, Co-Citation and Bibliographic Coupling, PageRank, HITS, Community Discovery
Unit-IV

Web Crawling: A Basic Crawler Algorithm, Implementation Issues, Evaluation, Crawler Ethics and Conflicts

Structured Data Extraction: Wrapper Generation: Preliminaries, Wrapper Induction, Instance-Based Wrapper Learning, Automatic Wrapper Generation, String Matching and Tree Matching, Building DOM Trees

Information Integration: Introduction to Schema Matching, Pre-Processing for Schema Matching, Schema-Level Match, Domain and Instance-Level Matching, Combining Similarities, 1:m Match,

Unit-V

Opinion Mining and Sentiment Analysis: Sentiment Classification, Feature-Based Opinion Mining and Summarization, Comparative Sentence and Relation Mining, Opinion Search, Opinion Spam

Web Usage Mining: Data Collection and Pre-Processing, Data Modeling for Web Usage Mining

Suggested Reading:

With effect from the academic year 2015-2016

CS-5176

HUMAN COMPUTER INTERACTION

Instruction : 3 Periods per week
Duration of Semester End Examination : 3 Hours
SEE : 70 Marks
CIE : 30 Marks

UNIT- I

Interaction Frameworks and Styles: Frameworks for Understanding Interaction, Coping with Complexity, Interaction Styles

UNIT- II

Discovery: Discovery Phase Framework, Collection, Interpretation, Documentation

UNIT- III

Interaction Design Models: Model Human Processor, Keyboard Level Model, GOMS, Modeling Structure, Modeling Dynamics, Physical Models
Usability Testing: Usability, Usability Test, Design the Test, Prepare for the Test, Perform the Test, Process the Data

UNIT- IV

Interface Components: The WIMP Interface, Other Components

UNIT- V

Speech and Hearing: The Human Perceptual System, Using Sound in Interaction Design, Technical Issues Concerning Sound
Suggested Reading:
CS 5124

SEMINAR -II

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for systematic independent study of state of the art topics in broad are his/her specialization.

Seminar topics can be chosen by the students with the advice from the faculty members.

Students are to be exposed to following aspects of seminar presentation.

- Literature Survey
- Organization of material
- Preparation of OHP Slides / PC Presentation
- Technical Writing

Each Student is required to:

1. Submit one page of synopsis of the seminar talk two days before for display on notice board.
2. Give 20 minutes presentation through OHP, PC and Slide Projector followed by 10 minutes discussion.
3. Submit a report on the seminar topic with a list of references and slides used within a week.

Seminar are to be scheduled from the 3rd week to the last week of the semester and any change in schedule should be discouraged.

The CIE marks will be awarded to the students by at least 2 faculty members on the basis of oral and a written presentation as well as their involvement in the discussion.