DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Scheme of Instruction and Syllabi of M.Tech(Computer Science and Engineering) 2017-2018

UNIVERSITY COLLEGE OF ENGINEERING (AUTONOMOUS)

OSMANIA UNIVERSITY

HYDERABAD – 500 007, TELANGANA
# SCHEME OF INSTRUCTION

M.TECH (COMPUTER SCIENCE AND ENGINEERING)

Proposed from the Academic year 2017-18

## SEMESTER - I

<table>
<thead>
<tr>
<th>S.No</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Scheme of Instruction</th>
<th>Contact Hrs/Wk</th>
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## SEMESTER - II

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<td>18 6</td>
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<td>280 420</td>
<td>22</td>
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SCHEME OF INSTRUCTION
M.TECH (COMPUTER SCIENCE AND ENGINEERING)
Proposed from the Academic year 2017-18

SEMESTER III

<table>
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<tr>
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<th>Contact Hrs/Wk</th>
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**Project Seminar Evaluation:** 50 marks to be awarded by Supervisor and 50 marks to be awarded by Viva-Voce committee comprising Head, Supervisor and an Examiner.

SEMESTER – IV

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<tr>
<th>S.No</th>
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**Note:** Six Core subjects, Six Elective subjects, Two Laboratory Courses and Two Seminars must be offered in Semester I and II.
### List of Core Subjects:

<table>
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<td>2</td>
<td>CS 5102</td>
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<td>3</td>
<td>CS 5103</td>
<td>Artificial Intelligence</td>
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<td>4</td>
<td>CS 5104</td>
<td>Object Oriented Software Engineering</td>
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### List of Elective Subjects:

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<td>3</td>
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<td>4</td>
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<td>Multimedia Technologies</td>
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<td>5</td>
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ADVANCED ALGORITHMS

Credits: 3:

Instruction: 3L hrs per week
Duration of SEE: 3 hours

CIE: 30 Marks
SEE: 70 Marks

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:

ADVANCED OPERATING SYSTEMS

Credits: 3:

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 Marks

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, Singhal's 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, and 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.


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

UNIT -V


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

Suggested Reading:

ARTIFICIAL INTELLIGENCE

Credits: 3

Instruction : 3L hrs per week  Duration of SEE : 3 hours

CIE : 30 Marks  SEE : 70 Marks

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:**

OBJECT ORIENTED SOFTWARE ENGINEERING

Credits: 3

Instruction : 3L hrs per week

Duration of SEE : 3 hours

CIE : 30 Marks

SEE : 70 Marks

UNIT-I


UNIT-II


UNIT-III


UNIT-IV

UNIT-V


Suggested Reading:

CS 5105

With effect from the Academic year 2017-2018

DISTRIBUTED COMPUTING

Credits: 3 Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 Marks

UNIT -I


UNIT II


UNIT -III


UNIT -IV

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

**UNIT-V**

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

**Suggested Reading:**

ADVANCED DATABASES

Credits: 3

Instruction : 3L hrs per week  
Duration of SEE : 3 hours

CIE : 30 Marks  
SEE : 70 Marks

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:


CS 5121

With effect from the Academic year 2017-2018

SOFTWARE LAB-I

Credits: 2

Instruction: (3L) hrs per week
CIE: 50 marks


I. Implement the following using C/C++:
   1. Single Source Shortest Path algorithms
   2. All pairs shortest path algorithms
   3. Minimal Spanning Tree algorithms
   4. String and Pattern matching algorithms
   5. Maximum Flow/ Minimum cut algorithms
   6. Binary Search Tree- insertion and deletion
   7. AVL trees

II. Object Oriented Software Engineering

   1. Do the following for any two projects as a case study.
      a) Write the problem statement, Software Requirement Specification, entity relationship diagram,
      b) dataflow diagrams for level 0 and level 1,
      c) Draw use-case diagram
      d) Draw the activity diagram of all use cases.
      e) Draw sequence diagram of all use cases
      f) Draw collaboration diagram of all use cases, and Assign objects in Sequence diagram to classes and make class diagrams

Suggested Reading:


Note: The students have to submit a report at the end of the semester.
SEMINAR - I

Credits: 2

Instruction: (3L) hrs per week
CIE: 50 marks

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 Power point Presentation slides
- 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 oral presentation and report as well as their involvement in the discussion.
SOFTWARE LAB – II

Credits: 2

Instruction: (3L) hrs per week
CIE: 50 marks

DISTRIBUTED COMPUTING:

1. Design a Distributed Application using RMI for remote computation
2. Design a Distributed Application using Message passing Interface for remote computation
3. Design a Distributed application which consist of a server and client using threads
4. Design a Distributed application which consist of a stateless server using socket primitives.
5. Installation & Configuration of Hadoop.
6. Using Hadoop for counting word frequency with Map Reduce.
7. Write a Map Reduce Application which processes a log file of a system. List out the users who have logged for max period on the system. Use sample Log file from the internet and process it using a pseudo distribution mode on Hadoop platform.

Advanced Databases: An application involving above technologies and database has to be developed

Note: The students have to submit a report using LateX at the end of the semester.
SEMINAR –II

Credits: 2

Instruction: (3L) hrs per week
CIE: 50 marks

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 areas of 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 Power point Presentation slides and 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-Power Point 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

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 atleast 2 faculty members on the basis of oral and a written presentation as well as their involvement in the discussion.
MOBILE COMPUTING

Credits: 3

Instruction : 3L hrs per week

Duration of SEE : 3 hours

CIE : 30 Marks

SEE : 70 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:

REAL TIME SYSTEMS
Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 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, and RT Linux.

Suggested Reading:

WEB ENGINEERING

Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 Marks

UNIT-I


UNIT-II


UNIT-III


UNIT-IV

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

UNIT-V


Suggested Reading:

CS 5054

With effect from the Academic year 2017-2018

MULTIMEDIA TECHNOLOGIES

Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 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

Digital Image: Analysis, recognition, transmission, 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:

1. Ralf Steninmetz, Klara Hahrstedt, Multimedia: Computing, Communication and Applications,
PHI PTR Innovative Technology Series.
DATA MINING
Credits: 3

Instruction : 3L hrs per week

Duration of SEE : 3 hours

CIE : 30 Marks

SEE : 70 Marks

Introduction: Why Data Mining? What is Data Mining? What kinds of data can be mined? What kinds of patterns can be mined? Which technologies are used? Which kinds of applications are Targeted? Major issues in Data Mining. Getting to know your data: Data objects and attributed types. Basic statistical descriptions of data. Data visualization, Measuring data similarity and dissimilarity.

UNIT-II

Mining frequent patterns, Associations and correlations, Basic concepts and methods, Basic concepts, Frequent Item set Mining Methods, Which patterns are interesting? Pattern evaluation methods.

UNIT-III

Classification : Basic concepts, Decision tree induction, Bayes classification methods,

Classification: Advance methods, Bayesian Belief Network, Classification by back propagation, Support vector machine,

UNIT-IV

Cluster Analysis: Concepts and Methods: Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of clustering.

UNIT-V

Data Mining Trends and Research Frontiers, Mining Complex Data Types, Other Methodologies of Data Mining, Data Mining Applications, Data Mining and Society, Data Mining trends.

Suggested Reading:

1. Jiawei Han, Micheline Kamber, Jin Pei, Data Mining: Concepts & Techniques, 3rd Edition, Morgan Koffman, 2011
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:


MACHINE LEARNING
Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 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


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:

CS 5058

INFORMATION RETRIEVAL SYSTEM

Credits: 3

Instruction: 3L hrs per week
Duration of SEE: 3 hours

CIE: 30 Marks
SEE: 70 Marks

Boolean Retrieval: An example information, Building an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval.

The term vocabulary and postings lists: Document delineation and character sequence decoding, determining the vocabulary of terms, Faster postings list intersection via skip pointers, Positional postings, and Phrase queries.

Dictionaries and tolerant retrieval: Search structures for dictionaries, Wildcard queries, Spelling correction.

Index Construction: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Other types of indexes.

UNIT-III

Index Compression: Statistical properties of terms in information retrieval, Dictionary compression, Postings file compression.

Scoring, term weighting and the vector space model: Parametric and zone indexes, Term frequency and weighting, The vector space model for scoring, and Variant tf-idf functions.

Computing scores in a complete search system: Efficient scoring and ranking, Components of an information retrieval system, Vector space scoring and query operator interaction.


UNIT-IV

Relevance feedback and query expansion: Relevance feedback and pseudo relevance feedback, Global methods for query reformulation.


Language models for information retrieval: Language models, The query likelihood model.
UNIT-IV


Vector space classification: Document representations and measures of relatedness in vector spaces, Rocchio classification, k-nearest neighbor, Linear versus nonlinear classifiers.

Flat clustering: Clustering in information retrieval, Problem statement, Evaluation of clustering, k-means.

Hierarchical clustering: Hierarchical agglomerative clustering, Single-link and complete-link clustering, Group-average agglomerative clustering, Centroid clustering, Divisive clustering.

UNIT-V


Web search basics: Background and history, Web characteristics, Advertising as the economic model, The search user experience, Index size and estimation, Near-duplicates and shingling.

Web crawling and Indexes: Overview, Crawling, Distributing indexes, Connectivity servers.

Link analysis: The Web as a graph, Page Rank, Hubs and Authorities.

Suggested Reading:

CS 5059  

NATURAL LANGUAGE PROCESSING  

Credits: 3  

Instruction : 3L hrs per week  

Duration of SEE : 3 hours  

CIE : 30 Marks  

SEE : 70 Marks  

UNIT-I  

Introduction of Elementary Probability Theory, Essential Information Theory  

UNIT-II  

Linguistic Essentials Corpus-Based Work Collocations.  

UNIT-III  


Word Sense Disambiguation: Methodological Preliminaries, Supervised and unsupervised learning, Pseudo words, Upper and lower bounds on performance, Supervised Disambiguation, Bayesian classification.  

UNIT-IV  


UNIT-V  


Suggested Reading:  

SOFTWARE QUALITY AND TESTING

Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 Marks

UNIT - I


UNIT - II

Integrating Quality Activities in the Project Life Cycle, Assuring the Quality of Software Maintenance Components, CASE Tools and their effect on Software Quality, Procedure and Work Instructions, Supporting Quality Devices, Configuration Management, Documentation Control, Project Progress Control.

UNIT - III


UNIT - IV


UNIT - V

**Suggested Reading:**


**Web Resources:**

4. [java-source.net/open-source/testing-tools](http://java-source.net/open-source/testing-tools)
5. [www.junit.org](http://www.junit.org)
6. [java-source.net/open-source/web-testing-tools](http://java-source.net/open-source/web-testing-tools)
CS 5061

CLOUD COMPUTING

Credits: 3

Instruction: 3L hrs per week  Duration of SEE: 3 hours

CIE: 30 Marks  SEE: 70 Marks

Unit-I

Introduction, Benefits and challenges, Cloud computing services, Resource Virtualization, Resource pooling sharing and provisioning

Unit-II

Scaling in the Cloud, Capacity Planning, Load Balancing, File System and Storage,

Unit-III


Unit-IV

Portability and Interoperability Issues, Cloud Management and a Programming Model Case Study, Popular Cloud Services

Unit-V


Suggested Reading:


CS 5062  

With effect from the Academic year 2017-2018

SOFT COMPUTING

Credits: 3

Instruction : 3L hrs per week  
Duration of SEE : 3 hours

CIE : 30 Marks  
SEE : 70 Marks

UNIT-I


UNIT II


UNIT III


UNIT IV


UNIT V


Suggested Reading:

ARTIFICIAL NEURAL NETWORKS

Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours
CIE : 30 Marks
SEE : 70 Marks

Unit-I

Background to ANN: Introduction to artificial neural networks (ANN), intelligence, learning and knowledge. Historical development of Artificial Intelligence (AI) leading to ANN. PDP models -- Interactive and competition (IAC) and Constraint Satisfaction (CS) models.

Unit-II

Basics of ANN: Basics of ANN, terminology, models of neurons, topology, basic learning laws, activation and synaptic dynamics models

Unit-III

Analysis of Feedforward Neural Networks (FFNN): Overview, linear associative networks, perceptron network, multilayer perceptron, gradient descent methods, backpropagation learning

Unit-IV

Analysis of Feedback Neural Networks (FBNN): Overview, Hopfield model, capacity, energy analysis, state transition diagrams, stochastic networks, Boltzmann-Gibbs Law, simulated annealing, Boltzmann machine

Unit-V

Applications of ANN: Travelling salesman problem, image smoothing, speech recognition and texture classification.

Suggested Reading:

1. B Yegnanarayana, Artificial Neural Networks, Prentice-Hall of India, New Delhi, 1999
SOFTWARE PROJECT MANAGEMENT

Credits: 3

Instruction : 3L hrs per week  Duration of SEE : 3 hours

CIE : 30 Marks  SEE : 70 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:

With effect from the Academic year 2017-2018

IMAGE PROCESSING
Credits: 3

Instruction: (3L) hrs per week
CIE: 30 marks

Duration of SEE: 3 hours
SEE: 70 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:**


CS 5066

SOFTWARE REUSE TECHNIQUES

Credits: 3

Instruction : 3L hrs per week

Duration of SEE : 3 hours

CIE : 30 Marks

SEE : 70 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


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, Stazte, 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 Kernet, Reflection.

Suggested Reading:

CS 5067

With effect from the Academic year 2017-2018

RELIABILITY AND FAULT TOLERANCE

Instruction : 3L  hrs per week  
Duration of SEE : 3 hours

Credits: 3

CIE : 30 Marks  
SEE : 70 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 n systems.

UNIT-II


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:

CS 5068

With effect from the Academic year 2017-2018

Web Mining
Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 Marks

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, Universal Crawlers, Focused Crawlers, Topical Crawlers, 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, Multiple Alignment, Building DOM Trees, Extraction based on a single list page, extraction based on a single list page : Nested doda records, Extraction based on multiple pages, Some other issues.
**Information Integration:** Introduction to Schema Matching, Pre-Processing for Schema Matching, Schema-Level Match, Domain and Instance-Level Matching, Combining Similarities, 1: Match, Some other issues, Integration of Web Query Interfaces, Constructing a Unified Global Query Interface.

**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, Discovery & analysis of web usage patterns.

**Suggested Reading:**

Human Computer Interaction
Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 Marks

UNIT- I

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 5151

Advanced Computer Graphics

Credits: 3

Instruction : 3L hrs per week
Duration of SEE : 3 hours

CIE : 30 Marks
SEE : 70 Marks

UNIT-I


UNIT-II


UNIT-III


UNIT -IV

Graphics Standards: GKS, PHIGS-their salient features.

OpenGL-the new graphics standard, important OpenGL functions, advantages of OpenGL, Sample graphics programs showing the use of OpenGL functions.

UNIT-V


Suggested Reading:

CS 5153  

Software Engineering for RTS  

Credits: 3  

Instruction : 3L hrs per week  

Duration of SEE : 3 hours  

CIE : 30 Marks  

SEE : 70 Marks  

UNIT-I  


UNIT-II  


UNIT-III  


UNIT-IV  


UNIT-V  


Suggested Reading:  

CS 5154

Parallel Algorithms
Credits: 3

With effect from the Academic year 2017-2018

Instruction : 3L hrs per week

Duration of SEE : 3 hours

CIE : 30 Marks

SEE : 70 Marks

UNIT-I


UNIT-II


Dense Matrix algorithms: Matrix vector Multiplication and Matrix-matrix multiplication

UNIT-III


UNIT-IV


UNIT-V


Suggested Reading:


Parallel Computer Architecture

Credits: 3

Instruction : 3L hrs per week

Duration of SEE : 3 hours

CIE : 30 Marks

SEE : 70 Marks

UNIT I

Instruction Level Parallelism: Concepts and challenges, Instruction Pipeline Design, Hardware and software approaches, Dynamic scheduling, Speculation, Compiler techniques for exposing ILP, Branch Handling Techniques.

UNIT-II

Advanced Processor Technologies: CISC and RISC Architectures, Superscalar Processors, and VLIW Architectures.

Memory Hierarchy Design: Cache basics and Cache performance, Reducing miss rate and Miss penalty, Multilevel cache hierarchies, Main memory organizations, and Design of Memory Hierarchies.

UNIT-III

Parallel Computer Models: Classification of Parallel Computers, Multiprocessors and Multicomputer, and Multi-vector and SIMD computers.

Shared Memory Multiprocessors: Cache Coherence, Memory Consistency, Snoopy-based Cache coherence protocols (MSI, MESI, MOESI).

UNIT-IV


UNIT -V

Interconnection Network Design: Basic Definitions, Basic Communication Performance, Organizational Structure, Interconnection Topologies, Routing, Switch Design, and Flow Control.

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

Grid Computing

Credits: 3

Instruction: 3L hrs per week  
Duration of SEE: 3 hours

CIE: 30 Marks  
SEE: 70 Marks

UNIT-I


Job Submission: Introduction, Globus Job Submission. Transferring Files.

UNIT-II


UNIT-III


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


UNIT-IV


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:

CS 5301

Embedded System Design

Credits: 3

Instruction : 3L hrs per week

Duration of SEE : 3 hours

CIE : 30 Marks

SEE : 70 Marks

UNIT-I


UNIT –II

Embedded System Architecture: Instruction Set Architecture, CISC and RISC instruction set architecture, Basic Embedded Processor/Microcontroller Architecture, CISC Examples-Motorola (68HC11), 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 EDA 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

Introduction to Real Time Operating System: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer functions, Events, Memory Management, Interrupt Routines in an RTOS Environment, OS Security Issues and Mobile OS.

UNIT-V


Suggested Reading:

Real Time Operating Systems

Credits: 3

Instruction: 3L hrs per week
Duration of SEE: 3 hours

CIE: 30 Marks
SEE: 70 Marks

UNIT I


Portable Operating System Interface (POSIX) – IEEE Standard 1003.13 & POSIX real time profile. POSIX versus traditional Unix signals, overheads and timing predictability.

UNIT II


UNIT III


UNIT IV

VxWorks – POSIX Real Time Extensions, timeout features, Task Creation, Semaphores (Binary, Counting), Mutex, Mailbox, Message Queues, Memory Management – Virtual to Physical Address Mapping.

UNIT V

Debugging Tools and Cross Development Environment – Software Logic Analyzers, ICES.

Comparison of RTOS – VxWorks, µC/OS-II and RT Linux for Embedded Applications.

Suggested Reading:

CS 5305

Simulation and Modeling

Credits: 3

Instruction: 3L hrs per week

Duration of SEE: 3 hours

CIE: 30 Marks

SEE: 70 Marks

UNIT-I


UNIT-II

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

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

Output Data Analysis, Stochastic, Nature of output data, Types of Simulation with respect to output Analysis, Measures of Performance and their Estimation, output Analysis for Terminating Simulations, Output Analysis for steady – State Simulations.

**Comparison and Evaluation of Alternative System Designs:** Comparison of several system Designs, Statistical Models for Estimating the Effect of Design Alternatives

**Suggested Reading:**