

# M.TECH. (COMPUTER SCIENCE AND ENGINEERING)

## SEMESTER III

Paper Code	Paper Name	Weekly Contact Paper Period (WCP)				Marks
		Lecture	Tutorial	Practical	Total	
<b>Theoretical:</b>						
MTCSE320	Design and Analysis of Parallel Algorithms	3	0	0	3	100
E2	Elective 2	3	0	0	3	100
E3	Elective 3	3	0	0	3	100
<b>Practical:</b>						
MTCSE323	Parallel Algorithms Lab	2	0	2	2	50
MTCSE324	Project Work (Phase I)	0	0	12	12	200
Total Marks: 550						

### Elective 2 (III Semester)

Paper Code	Paper Name
MTCSE3210	Ad-hoc Networks
MTCSE3211	Agent Based Intelligent System
MTCSE3212	Grid Computing

### Elective 3 (III Semester)

Paper Code	Paper Name
MTCSE3220	Software Project Management
MTCSE3221	Component Based Technology
MTCSE3222	Digital Image Processing

# **DESIGN AND ANALYSIS OF PARALLEL ALGORITHMS**

## **MTCSE320**

### **UNIT I**

Introduction to Parallel computers - SIMD - EREW, CREW SM-SIMD algorithms – shared memory SIMD, Tree and mesh interconnection computers.

### **UNIT II**

Sorting - Sorting on a Linear Array, Sorting on a Mesh, Sorting on EREW SIMD computer, MIMD Enumeration Sort, MIMD Quick sort. Sorting on other Networks.

### **UNIT III**

Matrix operations - Mesh Transpose, Shuffle Transpose, EREW transpose - Mesh multiplication, Cube multiplication - Matrix by vector Multiplication Tree Multiplication.

### **UNIT IV**

Numerical problems- Linear. Equations - SIMD algorithm- Roots of Nonlinear Equations - MIMD algorithm- partial Differential Equations, computing Eigen values.

### **UNIT V**

Graph Theoretical Problems - computing the connectivity matrix. Finding connected components, Traversing. The minimal Alpha-Beta Tree, Storage requirements.

### **TEXT BOOKS**

1. S.G. Akl, "The Design and Analysis of Parallel Algorithms", Prentice Hall of India. 1989.
2. S. G. Akl, "Parallel Sorting Algorithms ", Academic Press, 1985.

### **REFERENCE BOOKS**

1. S. Lakshmivarahan and S.Kdhal, "Analysis and Design of Parallel Algorithms - Arithmetic and Matrix Problems ", McGraw Hill, 1990.

## **AD-HOC NETWORKS**

### **MTCSE3210**

#### **UNIT I**

##### **AD-HOC MAC**

Introduction – Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi-channel MAC & Power control MAC protocol.

#### **UNIT II**

##### **AD-HOC NETWORK ROUTING & TCP**

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-Bus, Ad Hoc TCP, and Split TCP.

#### **UNIT III**

##### **WSN -MAC**

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

#### **UNIT IV**

##### **WSN ROUTING, LOCALIZATION & QOS**

Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

#### **UNIT V**

##### **MESH NETWORKS**

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

#### **REFERENCES:**

1. C.Siva Ram Murthy and B. Smanoj, “ Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2004.
2. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.
3. C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2002.
4. Thomas Krag and Sebastin Buettrich, “Wireless Mesh Networking”, O’Reilly Publishers, 2007.

# **AGENT BASED INTELLIGENT SYSTEMS**

## **MTCSE3211**

### **UNIT I**

#### **INTRODUCTION**

Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching - Heuristics  
- Constraint Satisfaction Problems - Game playing.

### **UNIT II**

#### **KNOWLEDGE REPRESENTATION AND REASONING**

Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution  
Strategies-Knowledge Representation-Objects-Actions-Events

### **UNIT III**

#### **PLANNING AGENTS**

Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic  
Domains-Conditional Planning-Continuous Planning-Multi Agent Planning.

### **UNIT IV**

#### **AGENTS AND UNCERTAINTY**

Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks Other  
Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network –  
Complex Decisions.

### **UNIT V**

#### **HIGHER LEVEL AGENTS**

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement  
Learning- Communication-Formal Grammar-Augmented Grammars- Future of AI.

#### **TEXT BOOK:**

1. Stuart Russell and Peter Norvig, “Artificial Intelligence - A Modern Approach”, 2nd Edition, Prentice Hall, 2002

#### **REFERENCES:**

1. Michael Wooldridge, “An Introduction to Multi Agent System”, John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, III Edition, AW, 1999.
3. Nils.J. Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992.

# **GRID COMPUTING**

## **MTCSE3212**

### **UNIT I**

#### **INTRODUCTION TO GRID COMPUTING**

Introduction – The Grid – Past, Present and Future – Applications of grid computing organizations and their roles.

### **UNIT II**

#### **GRID COMPUTING ARCHITURE**

Grid computing anatomy – Next generation of Grid computing initiatives–Merging the Grid services architecture with Web services architecture.

### **UNIT III**

#### **GRID COMPUTING TECHNOLOGIES**

OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF– OGSA Basic Services – Security standards for grid computing.

### **UNIT IV**

#### **GRID COMPUTING TOOL KIT**

Globus Toolkit –Versions – Architecture –GT Programming model –A sample grid service implementation.

### **UNIT V**

#### **HIGH LEVEL GRID SERVICES**

High level grid services – OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

#### **TEXT BOOKS:**

1. Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson/PHI PTR-2003.

#### **REFERENCES:**

1. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, “Grid Computing: Making the Global Infrastructure a reality“, John Wiley and sons, 2003.
2. Ahmar Abbas, “Grid Computing: A Practical Guide to Technology and Applications”, Charles River media, 2003.

# **SOFTWARE PROJECT MANAGEMENT**

## **MTCSE3220**

### **UNIT I**

#### **BASIC CONCEPTS**

Product, Process and Project – Definition – Product Life Cycle – Project Life Cycle Models.

### **UNIT II**

#### **FORMAT PROCESS MODELS AND THEIR USE**

Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

### **UNIT III UMBRELLA ACTIVITIES IN PROJECTS**

Metrics – Configuration Management – Software Quality Assurance – Risk Analysis.

### **UNIT IV IN STREAM ACTIVITIES IN PROJECTS**

Project Initiation – Project Planning – Execution and Tracking – Project Wind up – Concept of Process/Project Database.

### **UNIT V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT**

Phases (Requirements, Design, Development, Testing , Maintenance, Deployment) – Engineering Activities and Management Issues in Each Phase – Special Considerations in Project Management for India and Geographical Distribution Issues.

### **REFERENCES:**

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Humphrey, Watts, "Managing the Software Process", Addison Wesley, 1986.
3. Pressman, Roger, "Software Engineering", A Practitioner's approach. McGraw Hill, 1997.
4. Bob Hughes and Mike Cottrell, "Software Project Management".
5. 5. Wheelwright and Clark, "Revolutionizing product development", The Free Press, 1993.

# **COMPONENT BASED TECHNOLOGY**

## **MTCSE3221**

### **UNIT I**

#### **INTRODUCTION**

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware.

### **UNIT II**

#### **JAVA COMPONENT TECHNOLOGIES**

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP.

### **UNIT III CORBA TECHNOLOGIES**

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture.

### **UNIT IV**

#### **COM AND .NET TECHNOLOGIES**

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting.

### **UNIT V**

#### **COMPONENT FRAMEWORKS AND DEVELOPMENT 9**

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

#### **TEXT BOOKS:**

1. “Component Software: Beyond Object-Oriented Programming”, Pearson Education publishers, 2003.

#### **REFERENCES:**

1. Ed Roman, “Enterprise Java Beans”, Third Edition , Wiley , 2004.

# DIGITAL IMAGE PROCESSING

## MTCSE3222

### UNIT I

**INTRODUCTION:** Goal of Image processing and computer vision, Human visual perception – phenomena, Digital Image basics- Tessellation, Pixel and spatial resolutions, Image formation, Relations between pixels – neighborhoods, connectivity, distances, Basic problems in IP – enhancement, compression, restoration, image analysis.

### UNIT II

**SPATIAL DOMAIN PROCESSING:** Point and neighborhood operations Image enhancement using above operations – contrast stretching, histogram proc., filtering, Geometric transformations, zooming.

**IMAGE ARITHMETIC:** Addition, subtraction, multiplication and division of images, Implementation issues.

**COLOUR IP:** Colour definitions and models, False and Full colour IP

### UNIT III

**IMAGE TRANSFORMS:** Basis images and expansion of images using them Unitary transforms, DFT – properties and freq domain filtering (LPF, HPF etc), Directional filtering, DCT, Walsh Hadamard transform

**IMAGE RESTORATION:** Restoration vs enhancement, Type of degradations, Geometric correction, Linear degradation models – Inverse filtering, Deconvolution.

### UNIT IV

**IMAGE COMPRESSION:** Principles behind compression – types of redundancies, Entropy, compression ratios, SNR of compression, Lossy vs Lossless methods, Spatial approaches – Coding based, Transform based – DCT, JPEG.

### UNIT V

**MORPHOLOGICAL PROCESSING:** Morphological processing – erosion, dilation, opening, closing, skeletonisation, boundary detection

**IMAGE ANALYSIS:** Edge detection, Segmentation – thresholding, region-based, edge based approaches.

### PREFERRED TEXT BOOK:

Digital Image Processing by Gozalez and Woods; Addison- Wesley, Fundamentals of digital Image Processing by AK Jain; Prentice Hall.

### \*REFERENCE BOOK:

Digital Image processing using Matlab by r Gonzalez; Addison- Wesley, Image Processing: The fundamentals by M Petrou; Wiley and Sons.



**PARALLEL ALGORITHMS LAB**  
**MTCSE323**

Programs, assignments covering the need of Design and Analysis of Parallel Algorithms  
(MTCSE320).