

**Elective - III****Human Computer Interaction****Course Objectives:**

The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.

**Course Outcomes:**

1. Explain the capabilities of both humans and computers from the viewpoint of human information processing.
2. Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
3. Apply an interactive design process and universal design principles to designing HCI systems.
4. Describe and use HCI design principles, standards and guidelines.
5. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
6. Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

**Syllabus:****UNIT I:**

**Introduction:** Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession

**Managing Design Processes:** Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories

**UNIT II:**

**Menu Selection, Form Fill-In and Dialog Boxes:** Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

**UNIT III:**

**Command and Natural Languages:** Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing

**Interaction Devices:** Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

**UNIT IV:**

**Quality of Service:** Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences

**Balancing Function and Fashion:** Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color

**UNIT V:**

**User Documentation and Online Help:** Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process

**UNIT VI:**

**Information Search:** Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces

**Information Visualization:** Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

**Text Books:**

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

**Reference Books:**

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

# Advanced Operating Systems

## Course Objectives:

The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.

## Course Outcomes:

1. Outline the potential benefits of distributed systems
2. Summarize the major security issues associated with distributed systems along with the
3. range of techniques available for increasing system security

## Syllabus:

### UNIT-I:

**Introduction to Distributed systems:** Goals of distributed system, hardware and software concepts, design issues.

**Communication in Distributed systems:** Layered protocols, ATM networks, the Client - Server model, remote procedure call and group communication.

### UNIT-II:

**Synchronization in Distributed systems:** Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions,

### UNIT-III:

**Deadlocks:** deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

### UNIT-IV:

**Processes:** Processes and Processors in distributed systems: Threads, system models, Processor allocation, Scheduling in distributed system, Fault tolerance and real time distributed systems.

### UNIT-V:

**Distributed file systems:** Distributed file systems design, distributed file system implementation, trends in distributed file systems.

**Distributed shared memory :** What is shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, object based DSM.

### UNIT-VI:

**Case study MACH :** Introduction to MACH, process management in MACH, memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE : Introduction to DCE threads, RPC's, Time service, Directory service, security service, Distributed file system.

## TEXT BOOKS:

1. Distributed Operating System - Andrew. S. Tanenbaum, PHI
2. Operating Systems' – Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI

## REFERENCE BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne  
7<sup>th</sup> Edition, John Wiley.
2. Modern Operating Systems, Andrew S Tanenbaum 2<sup>nd</sup> edition Pearson/PHI

# Mobile Adhoc & Sensor Networks

## Course Objectives:

- 1) To make the student understand the concepts of MOBILE AD HOC NETWORKS (Manets) as well as Wireless Sensor Networks (WSN), their characteristics, novel applications, and technical challenges.
- 2) To understand the issues and solutions of various layers of Manets, namely MAC layer, Network Layer & Transport Layer in Manets and WSN.
- 3) To understand the platforms and protocols used in Manets and WSN.
- 4) To make the student take up further research as part of his higher studies

## Course Outcomes:

- 1) Able to think and develop new applications in Manets and WSN.
- 2) Able to take any new technical issue related to these new thrust areas and come up with a solution(s).
- 3) Able to develop algorithms/protocols for Manets and WSN.

## Syllabus:

### UNIT I :

*Introduction to Ad Hoc Networks:* Characteristics of MANETs, applications of MANETs, and challenges of MANETs.

*Routing in MANETs:* Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms,

### UNIT II:

*Data Transmission:* Broadcast storm problem, Broadcasting, Multicasting and Geocasting

### UNIT III:

*TCP over Ad Hoc:* TCP protocol overview, TCP and MANETs, and Solutions for TCP over Ad hoc

### UNIT IV:

*Basics of Wireless Sensors and Applications:* Applications, Classification of sensor networks, Architecture of sensor networks, Physical layer, MAC layer, Link layer

### UNIT V :

*Data Retrieval in Sensor Networks:* Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, and Sensor Networks and mobile robots.

### UNIT VI :

*Security:* Security in ad hoc networks, Key management, Secure routing, Cooperation in MANETs, and Intrusion detection systems.

*Sensor Network Platforms and Tools:* Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms, TinyOS, NS-2 and TOSSIM.

## Textbook:

1. *Ad hoc and Sensor Networks - Theory and Applications*, by Carlos Cordeiro and Dharma P. Agrawal, World Scientific Publications, March 2006, ISBN 981-256-681-3.
2. *Wireless Sensor Networks: An Information Processing Approach*, Feng Zhao, Leonidas Guibas, Elsevier Science ISBN: 978-1-55860-914-3, (Morgan Kauffman)

# Pattern Recognition

## Course Objectives:

The course is designed to introduce students to theoretical concepts and practical issues associated with pattern recognition

## Course Outcomes:

1. Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM),
2. Analyse classification problems probabilistically and estimate classifier performance,
3. Understand and analyse methods for automatic training of classification systems,
4. Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models,
5. Understand the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models

## Syllabus:

### UNIT-I:

**Introduction:** Machine perception, pattern recognition example, pattern recognition systems, the Design cycle, learning and adaptation

**Bayesian Decision Theory:** Introduction, continuous features – two categories classifications, minimum error-rate classification-zero-one loss function, classifiers, discriminant functions, and decision surfaces

### UNIT-II:

**Normal density:** Univariate and multivariate density, discriminant functions for the normal Density different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context

### UNIT-III :

**Maximum likelihood and Bayesian parameter estimation:** Introduction, maximum likelihood Estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case

### UNIT-IV :

**Un-supervised learning and clustering:** Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering – similarity measures, criteria function for clustering

### UNIT-V :

**Pattern recognition using discrete hidden Markov models:** Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs

### UNIT-VI :

**Continuous hidden Markov models :**

Continuous observation densities, multiple mixtures per state, speech recognition applications.

## Text Books:

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Pattern Recognition, An Introduction, V Susheela Devi, M Narsimha Murthy, Universiy Press

## Reference Books:

1. R.C Gonzalez and R.E. Woods, “Digital Image Processing”, Addison Wesley, 1992.
2. Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004
3. Fundamentals of speech Recognition, Lawerence Rabiner, Biing – Hwang Juang Pearson education.
4. Pattern Recognition, Sergios Theodoridis, Konstantinos Koutroumbas, Academic Press, Elsevier, 4ed,

# Digital Image Processing

## Course Objectives:

To make the students to understand

1. The fundamentals of Computer Graphics and Image Processing
2. The concepts related edge detection, segmentation, morphology and image compression methods.

## Course Outcomes:

1. understanding of digital image processing fundamentals: hardware and software, digitization, enhancement and restoration, encoding, segmentation, feature detection
2. ability to apply image processing techniques in both the spatial and frequency (Fourier) domains
3. Ability To understand (i.e., be able to describe, analyse and reason about) how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation

## SYLLABUS:

### UNIT I:

**Introduction:** Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems

**DDA line algorithms:** Bresenham's line and circle derivations and algorithms

### UNIT II:

**2-D Transformations:** Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations-** Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

### UNIT III:

**Digital Image Properties:** Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy

**Color Images:** Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

### UNIT IV:

**Mathematical Morphology:** Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning , Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

### UNIT V:

**SEGMENTATION:** Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.

### UNIT VI:

**Image Data Compression:** Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predictive Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

## Text Books:

1. Computer Graphics C Version, Donald Hearn, M Paulli Baker , Pearson ( Unit I and Unit II)
2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, ( Unit III, Unit IV, Unit V and Unit VI)

## References:

1. Computer & Machine Vision, Theory , Algorithms , Practicles, E R Davies, Elsevier, 4ed
2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier
3. Digital Image Processing, R C Gonzalez &R E woods, Addison Pearson, 3ed.

# Microprocessors and Multi core systems

## Course objectives:

The objective of this course is to provide extensive knowledge of microprocessor based systems. The student will

- learn how the hardware and software components of a microprocessor-based system work together to implement system-level features;
- learn both hardware and software aspects of integrating digital devices (such as memory and I/O interfaces) into microprocessor-based systems;

## Course Outcomes:

1. able to solve basic binary math operations using the microprocessor.
2. able to demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor.
3. able to program using the capabilities of the stack, the program counter, and the status register and show how these are used to execute a machine code program.
4. able to apply knowledge of the microprocessor's internal registers and operations by use of a PC based microprocessor simulator.
5. able to write assemble assembly language programs, assemble into machine a cross assembler utility and download and run their program on the training boards.

## Syllabus:

### UNIT-I:

overview of microcomputer structure and operation., execution of a three instruction program, microprocessor evolution and types, the 8086 micro processor family , 8086 internal architecture , introduction to programming the 8086,

**8086 family assembly language programming** :Program development steps , constructing the machine codes for 8086 instructions, writing programs for use with an assembler, assembly language program development tools.

( Text Book 1)

### UNIT-II:

#### Implementing standard program structures in 8086 assembly language

Simple sequence programs, jumps, flags and conditional jumps, if-then, if-then-else and multiple if-then-else programs, while-do programs, repeat-until programs, instruction timing and delay loops.

( Text Book 1)

### UNIT-III:

#### Strings, procedures and macros

The 8086 string instructions, writing and using procedures, writing and using assembler macros.

#### 8086 instruction descriptions and assembler directives

Instruction descriptions, assembler directives , DB, DD, DQ, DT, DW, end-program, endp, ends, equ ,even-align on even memory address, extrn , global, public / extrn, group, include, label, length- not implemented IBM MASM, name – off set, ORG, proc, ptr, segment, short, type

( Text Book 1)

### UNIT-IV:

#### 8086: 8086 interrupts and interrupt applications

8086 interrupts and interrupt responses, hardware interrupt applications, Software Interrupts, priority of interrupts, software interrupt applications, programming.

**8086 assembly language programmes** - Bit & Logic operations, strings, procedures, Macros, Number Format, Conversions, ASCII operations, signed Numbers Arithmetic, Programming using High level language constructs.

( Text Book 1)

### UNIT-V:

CPU: architecture of Intel 80286 CPU, Intel 80386, and 32-bit CPU- 80486-Microprocessor( No instruction set).( Text Book 2)

### UNIT-VI:

**The Pentium Family and Core 2 Microprocessors:**

Introduction to the Pentium Processor, Pentium II Microprocessor, Pentium III, Pentium IV and Core2 Processors.(  
Text Book 2)

**TEXT BOOKS:**

1. Microprocessors and Interfacing, Douglas V Hall, Revised 2<sup>nd</sup> ed, TMH
2. The Intel Microprocessors, Architecture, programming and interfacing, 8ed, Barry Bray, Pearson
3. The X86 Microprocessors, architecture, Programming and Interfacing(8086 to Pentium), Lyla B Das, PEA

**REFERENCE BOOKS:**

1. The 8088 and 8086 Microprocessors, Programming, Interfacing, Hardware and Applications, Walter A Triebel, Avtar Singh, 4 ed, Pearson



## Elective - IV

### Embedded and Real Time Systems

**Course Objectives:**

Develop an understanding of the technologies behind the embedded computing systems

1. technology capabilities and limitations of the hardware, software components
2. methods to evaluate design tradeoffs between different technology choices.
3. design methodologies

**Course Outcomes:**

Understand the basics of an embedded system

1. Program an embedded system
2. Design, implement and test an embedded system.

Identify the unique characteristics of real-time systems

1. Explain the general structure of a real-time system
2. Define the unique design problems and challenges of real-time systems

**Syllabus:****Unit-I:**

**Introduction to Embedded systems:** What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

**UNIT-II:**

**8-bit microcontrollers architecture:** Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

**UNIT-III:**

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

**UNIT-IV:**

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

**UNIT-V:**

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

**UNIT-VI:**

Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

**TEXT BOOK:**

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

**REFERENCE BOOKS:**

1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE

2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

# Neural Networks & Soft Computing

## Course Objectives:

1. To have a detailed study of neural networks, Fuzzy Logic and uses of Heuristics based on human experience.
2. To Familiarize with Soft computing concepts.
3. To introduce the concepts of genetic algorithm and its applications to soft computing using some applications

## Course Outcomes:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Recognize the feasibility of applying a soft computing methodology for a particular problem.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.

## Syllabus:

### UNIT I:

**INTRODUCTION:** what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural

### UNIT II:

**LEARNING PROCESS:** Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process.

### UNIT III:

**CLASSICAL & FUZZY SETS:** Introduction to classical sets – properties, operations and relations; Fuzzy sets – memberships, uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions.

### UNIT IV:

**FUZZY LOGIC SYSTEM COMPONENTS:** Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods

### UNIT V:

**CONCEPT LEARNING:** Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm

**DECISION TREE LEARNING:** Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning

### UNIT VI:

**GENETIC ALGORITHMS:** Motivation, Genetic Algorithms, an Illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

## TEXT BOOKS:

1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd edition 2004
2. Neural Networks, Fuzzy Logic, Genetic Algorithms: Synthesis and Applications by Rajasekharan and Pai, PHI Publications
3. Machine Learning, Tom M. Mitchell, MGH

## References:

# Social Networks and the Semantic Web

## Course Objectives:

This course addresses the issues needed to realize the vision of the *Semantic Web* through the use of *Intelligent Agents*. The objectives are :

- to understand semantic web
- to understand the role of ontology and inference engines in semantic web

## Course Outcomes:

Students will

1. demonstrate knowledge and be able to explain the three different “named” generations of the web.
2. demonstrate the ability to participate materially in projects that develop programs relating to Web applications and the analysis of Web data.
3. be able to understand and analyze key Web applications including search engines and social networking sites.
4. be able to understand and explain the key aspects of Web architecture and why these are important to the continued functioning of the World Wide Web.
5. be able to analyze and explain how technical changes affect the social aspects of Web-based computing.
6. be able to develop “linked data” applications using Semantic Web technologies.

## Syllabus:

### UNIT-I:

**The Semantic web:** Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web.

### UNIT-II:

**Social Network Analysis:** What is network analysis?, Development of Social Network Analysis, Key concepts and measures in network analysis.

**Electronic sources for network analysis:** Electronic discussion networks, Blogs and online communities, Web-based networks.

### UNIT-III:

**Knowledge Representation on the Semantic Web:** Ontologies and their role in the Semantic Web, Ontology languages for the semantic Web.

### UNIT-IV:

**Modeling and Aggregating Social Network Data:** State of the art in network data representation, Ontological representation of Social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

### UNIT-V:

**Developing social semantic applications:** Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web community, Open academia: distributed, semantic-based publication management.

### UNIT-VI:

**Evaluation of Web-Based Social Network Extraction:** Differences between survey methods and electronic data extraction, context of the empirical study, Data collection, Preparing the data, Optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

## Text Book:

1. Social Networks and the *Semantic Web*, Peter Mika, Springer, 2007.
2. *Semantic Web Technologies*, Trends and Research in *OntologyBased Systems*, J.Davies, Rudi Studer, Paul Warren, John Wiley & Sons.

## Reference Books:

1. Semantic Web and Semantic Web Services –Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
2. Information Sharing on the semantic Web– Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications

# Cloud Computing

**Course Objectives:** The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including IaaS, PaaS, SaaS, and developing cloud based software applications on top of cloud platforms.

## Course Outcomes:

1. Understanding the key dimensions of the challenge of Cloud Computing
2. Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
3. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
4. Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas

## Syllabus:

### UNIT I: Systems modeling, Clustering and virtualization:

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

### UNIT II: Virtual Machines and Virtualization of Clusters and Data Centers:

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

### UNIT III: Cloud Platform Architecture:

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

### UNIT IV: Cloud Programming and Software Environments:

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

### UNIT V: Cloud Resource Management and Scheduling:

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

### UNIT VI:

**Storage Systems:** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, BigTable, Megastore, Amazon Simple Storage Service(S3)

**TEXT BOOKS:**

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

**REFERNCE BOOK:**

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

## Distributed Systems

### Course Objectives:

1. provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
2. Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles

### Course Outcomes:

1. Develop a familiarity with distributed file systems.
2. Describe important characteristics of distributed systems and the salient architectural features of such systems.
3. Describe the features and applications of important standard protocols which are used in distributed systems.
4. Gaining practical experience of inter-process communication in a distributed environment

### Syllabus:

#### UNIT-I:

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

#### UNIT-II:

**Interprocess Communication:** Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

#### UNIT-III:

**Distributed Objects and Remote Invocation:** Introduction, Communication between Distributed Objects- Object Model, Distributed Object Model, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

#### UNIT-IV:

**Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

#### UNIT-V:

**Distributed File Systems:** Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

#### UNIT-VI:

**Transactions & Replications:** Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

### TEXT BOOKS:

1. Ajay D Kshemkalyani, Mukesh Sigal, “Distributed Computing, Principles, Algorithms and Systems”, Cambridge
2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems- Concepts and Design”, Fourth Edition, Pearson Publication



## Management Science

### Unit I

**Introduction to Management:** Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure

### Unit II

**Operations Management:** Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and Cchart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis)

### Unit III

**Functional Management:** Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

### Unit IV

**Project Management:** (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

### Unit V

**Strategic Management:** Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives

### Unit VI

**Contemporary Management Practice:** Basic concepts of MIS, MRP, Justin-Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

### Text Books

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science*' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, '*Management Science*' TMH 2011.

### References

1. Koontz & Weihrich: '*Essentials of management*' TMH 2011
2. Seth & Rastogi: '*Global Management Systems*, Cengage learning , Delhi, 2011
3. Robbins: '*Organizational Behaviour*, Pearson publications, 2011
4. Kanishka Bedi: '*Production & Operations Management*, Oxford

Publications, 2011

5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications

6. Biswajit Patnaik: Human Resource Management, PHI, 2011

7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning

**Objective:** To familiarize with the process of management and to provide basic insights into select contemporary management practices.

**Codes/ Tables:** Normal Distribution Function Tables need to be permitted into the examination Halls

**IV Year – II SEMESTER**

**Project**

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