

## INFORMATION TECHNOLOGY

### VII SEMESTER

COURSE CODE	THEORY/LAB	L	T	P	C
ACT1121	Embedded Systems	4	1	0	4
ACT1122	Multimedia and Application Development	4	0	0	4
ACT1124	Unix Network Programming	4	1	0	4
ACT1132	Mobile Communications	4	1	0	4
	<b>Elective-I</b>	4	0	0	4
ACT1125	Information Retrieval Systems				
AIT1107	Information Security				
ACT1131	Artificial Intelligence				
ACT1135	Information Storage Systems				
AEE1140	Electrical Safety Management				
AME1135	Non-Conventional Sources of Energy				
	<b>Elective-II</b>	4	1	0	4
ACT1126	Software Project Management				
AIT1108	Advanced Computing Concepts				
ACT1114	Formal Languages and Automata Theory				
ACT1136	Digital Forensics				
AEC1132	Satellite Communication				
ACE1152	Architectural Planning of Buildings				
AIT1109	Multimedia and Application Development Lab	0	0	3	2
AIT1110	Network Programming Lab	0	0	3	2
AIT11MP	Industry Oriented Mini Project				2
	<b>Total</b>	<b>24</b>	<b>4</b>	<b>6</b>	<b>30</b>

\* Mini Project to be carried out during the summer vacation after VI Semester examination

\* Evaluation at the beginning of the VII Semester

## EMBEDDED SYSTEMS

(Common to CSE & IT)

**Course Code: ACT1121**

L	T	P	C
4	1	0	4

### AIM :

To provide the student with a basic understanding of the principles of Embedded Systems and their practical applications.

### OBJECTIVE :

1. To acquaint the student with a number of Embedded System architectures
2. To help the student become conversant with an integrated development environment (IDE) for development, simulation and debugging of programmes.

### UNIT-I

The ARM Instruction Set Architecture. The bus structure and the peripherals. Memory organization and processor initialization [startup code]. Load store instruction set. Assembly programming using Assemblers. Linkers, Loaders and Debuggers.

### UNIT-II

ARM/THUMB architecture. Program structure to Supervisor, Kernel, and User modes. Peripherals and their control: GPIO, Timers, Counters, PWM, ADC and serial communication channels. Assembly example applications.

### UNIT-III

Application coding examples: Measurement and control of time, frequency velocity acceleration, power control and gesture and touch monitoring.

### UNIT-IV

Modern communication protocols starting with addressable USART, SPI

bus, I2C bus and USB; their characteristics protocols and usage in high speed communication.

### **UNIT-V**

Introduction to MIPS processor architecture in PIC 32 bit family, CPU architecture and a detailed introduction to peripherals, present. GPIO, timers, capture control and PWM features. Instruction set usage with application examples.

( <http://ww1.microchip.com/downloads/en/DeviceDoc/61146B.pdf> )

### **UNIT-VI**

Simulation and debugging of programs using MPLAB Integrated Development Environment. Interrupts, modes and vectored interrupt priority processing using the many shadow registers. Challenges in development of intelligent programs.

### **UNIT-VII**

Introduction to RTOS and its need in real time applications: in industry, particularly in robots, automobiles and gesture identification.

### **UNIT-VIII**

Introduction to In Circuit Emulation techniques using JTAG. Watching CPU activity, and techniques of in circuit flash programming.

### **TEXT BOOKS:**

1. B.Kanta Rao, "Embedded Systems," 1<sup>st</sup> Edition, PHI Learning Private Limited, 2011. (Units 1, 3, 7)
2. Trevor Martin, "Introduction to the LPC2000," 1<sup>st</sup> Edition, Hitex (UK) Ltd, 2005. (Units 1, 2, 4)
3. Lucio Di Jasio, "Programming 32-bit Microcontrollers in C Exploring the PIC 32," 1<sup>st</sup> Edition, Newnes, 2008. (Units 6,8)

### **REFERENCE BOOKS:**

1. A.N.Sloss, D.Symes and C. Wright, "RM system's Developer Guide, Designing and Optimizing system software", 1<sup>st</sup> Edition, Morgann Kaufmann Publishers, 2004.

2. Steve Furber, “ARM system on Chip Architecture”, 2<sup>nd</sup> Edition, Addison Wesley Publishers, 2000.
3. David Seal, “ARM Architecture reference Manual”, 2<sup>nd</sup> Edition, Addison Wesley Publishers, 2001.

**WEB REFERENCE BOOK:**

1. <http://ww1.microchip.com/downloads/en/DeviceDoc/61146B.pdf> (Unit 5)



## MULTIMEDIA AND APPLICATION DEVELOPMENT

(Common to CSE & IT)

**Course Code:ACT1122**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

### AIM :

To introduce core concepts of multimedia to the students and to make them capable of developing multimedia application using FLASH CS 5.

### OBJECTIVES :

- To give an overview of different multimedia data formats and their internal storage mechanism.
- To enable the students to understand different issues of multimedia communication.
- To make the students capable of developing multimedia applications in FLASH CS5 using Action script 3.0.

### UNIT-I

**INTRODUCTION TO MULTIMEDIA:** What is Multimedia? Multimedia and Hypermedia, World Wide Web, Overview of Multimedia Software Tools. Graphics and Image Data Representations: Graphics/Image Data Types, Popular File Formats.

**ACTION SCRIPT 3.0 CORE CONCEPTS:** Tools for writing action script code, Flash client runtime environments, compilation, just in time compilation, classes and objects, creating a program, packages, defining a class, variable and values, constructor parameters and arguments.

### UNIT-II

**COLOR IN IMAGE AND VIDEO:** color science, color models in images, color models in video.

**ACTION SCRIPT 3.0 CONDITIONALS, LOOPS AND FUNCTIONS:** conditionals, loops, Boolean logic. Functions: package

-level functions, nested functions, source-file-level functions, accessing definitions from within a function, functions as values.

### UNIT-III

**FUNDAMENTAL CONCEPTS IN VIDEO AND DIGITAL AUDIO:** Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

#### **ACTION SCRIPT 3.0 DATA TYPES AND TYPE CHECKING :**

Data types and type annotations, untyped variables, parameters, return values, strict modes three special cases, warnings for missing type annotations, detecting reference errors at compile time, casting ,conversion to primitive types, default variable values, null and undefined.

### UNIT-IV

**MULTIMEDIA DATA COMPRESSION :** Lossless compression algorithms: Run-Length Coding, Variable Length Coding, and Dictionary Based Coding. Lossy compression algorithms: Quantization, Transform Coding, Wavelet-Based Coding.

**ACTION SCRIPT 3.0 INHERITANCE :** A primer on inheritance, overriding instance methods, constructor methods in sub classes, preventing classes from being extended and methods from being overridden.

### UNIT-V

**BASICS OF VIDEO COMPRESSION :** Introduction to Video Compression, Video Compression with Motion Compensation, Search for Motion Vectors

**ACTION SCRIPT 3.0 INTERFACES :** The case for interfaces, interfaces and multiple data type classes, interface syntax and use, another multiple type example.

### UNIT-VI

**VIDEO CODING :** Overview of MPEG-1, MPEG-2 and MPEG-4. Motion compensation in MPEG-1, MPEG-2 Profiles, Object-based Visual Coding in MPEG-4, Synthetic Object Coding in MPEG-4, MPEG-4 Object types, Profile and Levels.

**ACTION SCRIPT 3.0 ARRAYS :** What is an array?, the anatomy of an array, creating an array, using single dimensional and ,multi dimensional arrays.

## **UNIT-VII**

**MULTIMEDIA NETWORKS :** Basics of Multimedia Networks, Quality of Multimedia Data Transmission.

**ACTION SCRIPT 3.0 EVENTS AND EVENT HANDLING :** Action script event basics, accessing the target Object, Accessing the object that registered the listener, preventing default event behavior, Event Listener priority, Event listeners and memory management.

## **UNIT-VIII**

**MULTIMEDIA COMMUNICATION :** Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD).

**ACTION SCRIPT 3.0 :** The exception handling cycle, handling multiple types of exceptions, exception bubbling, The finally block, nested exceptions.

### **TEXT BOOKS:**

1. Ze-Nian Li and Mark S.Drew, “Fundamentals of Multimedia”, 1<sup>st</sup> Edition, PHI/Pearson Education, 2004.
2. Colin Mook, “ Essential ActionScript 3.0”, 1<sup>st</sup> Edition, SPD O’Reilly, 2007.

### **REFERENCE BOOKS:**

1. Nigel Chapman and Jenny Chapman, “Digital Multimedia”, 3<sup>rd</sup> Edition, Wiley Dreamtech, 2009.
2. Steve Heath, “Multimedia and communications technology”, 2<sup>nd</sup> Edition, Elsevier(Focal Press), 1999.
3. Steinmetz, Ralf, Nahrstedt, “Multimedia Applications”, 1<sup>st</sup> Edition, Springer, 2004.
4. Weixel, “Multimedia Basics”, 2<sup>nd</sup> Edition, Thomson Press, 2006.



## UNIX NETWORK PROGRAMMING

(Common to CSE & IT)

**Course Code: ACT1124**

L	T	P	C
4	1	0	4

### AIM:

To teach the students how to write programs that communicate with other programs across a computer network.

### OBJECTIVE:

The students shall be able to write their own network programs in UNIX, e.g. client and server programs using TCP sockets, UDP sockets, and all types of IPC.

### UNIT-I

**INTRODUCTION TO NETWORK PROGRAMMING:** OSI model, Unix standards, TCP and UD, TCP connection establishment and termination, Buffer sizes and limitations, Standard Internet services, Protocol usage by common internet applications.

### UNIT-II

**SOCKETS :** Address structures, Value – result arguments, Byte ordering and manipulation functions and related functions. Elementary TCP sockets – *socket*, *connect*, *bind*, *listen*, *accept*, *fork* and *exec* functions, concurrent servers, *close* function and related functions.

### UNIT-III

**TCP CLIENT SERVER EXAMPLE:** Introduction, TCP Echo server and client functions, Normal startup and Termination, Signal handling, Server process termination, Crashing and Rebooting of server host, Shutdown of server host.

### UNIT-IV

**I/O MULTIPLEXING :** I/O Models, *select* function, Batch input, *shutdown* function, *poll* function, TCP Echo server.



## UNIT-V

**ELEMENTARY UDP SOCKETS** : Introduction, *recvfrom* and *sendto* functions, UDP Echo server and client functions, Lost datagrams, , Lack of flow control with UDP, determining outgoing interface with UDP, TCP and UDP echo server using *select*.

## UNIT-VI

**ELEMENTARY NAME AND ADDRESS CONVERSIONS**: DNS, *gethostbyname* function, Resolver option, *gethostbyname2* function and IPV6 support, *uname* function, *getserverbyname* and *getservbyport* functions, other networking information.

## UNIT-VII

**IPC** : Introduction, File and record locking, Pipes, FIFOs, streams and messages, Name spaces, system V IPC, Message queues, Semaphores, Shared memory.

## UNIT-VIII

**REMOTE LOGIN**: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

### TEXT BOOKS:

1. W.Richard Stevens, “UNIX Network Programming, Sockets API”, Volume 1, 3<sup>rd</sup> Edition, Pearson Edn. Asia, 2004.
2. W.Richard Stevens, “UNIX Network Programming”, 1<sup>st</sup> Edition, PHI. 2010.

### REFERENCE BOOKS:

1. T Chan, “UNIX Systems Programming using C++”, 1<sup>st</sup> Edition, PHI, 2010.
2. Graham Glass, King abls, “UNIX for Programmers and Users”, 3<sup>rd</sup> Edition, Pearson Education, 2010.
3. M. J. Rochkind, “Advanced UNIX Programming”, 2<sup>nd</sup> Edition, Pearson Education, 2008.



# MOBILE COMMUNICATIONS

(Common to CSE & IT)

**Course Code: ACT1132**

L	T	P	C
4	1	0	4

## AIM:

To teach the students about the fundamentals of mobile communications.

## OBJECTIVE:

The student shall be able to learn about wireless MAC, mobile IP, mobile TCP, database issues in mobile networks, MANETs.

## UNIT-I

**INTRODUCTION TO MOBILE COMMUNICATIONS AND COMPUTING:** Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture.

**GSM :** Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

## UNIT-II

**(WIRELESS) MEDIUM ACCESS CONTROL :** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

## UNIT-III

**MOBILE NETWORK LAYER:** Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

## UNIT-IV

**MOBILE TRANSPORT LAYER :** Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

## UNIT-V

**DATABASE ISSUES :** Hoarding techniques, caching invalidation

mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

## UNIT-VI

**DATA DISSEMINATION:** Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

## UNIT-VII

**MOBILE AD HOC NETWORKS (MANETS):** Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETS.

## UNIT-VIII

**PROTOCOLS AND TOOLS :** Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

## TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, 2<sup>nd</sup> Edition, Addison-Wesley, 2004 (Chapters 4, 7, 9, 10, 11).
2. Ivan Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, 1<sup>st</sup> Edition, Wiley Publications, 2002, (Chapters 11, 15, 17, 26 and 27).

## REFERENCE BOOKS:

1. Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, 1<sup>st</sup> Edition, Cambridge University Press, 2008.
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, “Fundamentals of Mobile and Pervasive Computing”, 1<sup>st</sup> Edition, McGraw-Hill Professional, 2008.
3. Hansmann, Merk, Nicklous, Stober, “Principles of Mobile Computing”, 2<sup>nd</sup> Edition, Springer, 2003.
4. Martyn Mallick, “Mobile and Wireless Design Essentials”, 1<sup>st</sup> Edition, Wiley DreamTech, 2008.

# INFORMATION RETRIEVAL SYSTEMS

(ELECTIVE-I)

(Common to CSE & IT)

**Course Code: ACT1125**

L	T	P	C
4	1	0	4

Pre-requisite: Databases Management Systems

## AIM:

To introduce fundamental concepts of information retrieval and the procedures for evaluating information retrieval tools.

## OBJECTIVE:

To give a detailed understanding of the working of information retrieval tools and make students capable of developing their own information retrieval systems.

## UNIT-I

**BOOLEAN RETRIEVAL :** An example information retrieval problem, A first take at building an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval.

## UNIT-II

**THE TERM VOCABULARY AND POSTINGS LISTS :** Document delineation and character sequence decoding, Obtaining the character sequence in a document, Choosing a document unit, Determining the vocabulary of terms, Tokenization, Dropping common terms: stop words, Normalization (equivalence classing of terms) stemming and lemmatization, Faster postings list intersection via skip pointers, Positional postings and phrase queries, Biword indexes, Positional indexes, Combination schemes

## UNIT-III

**DICTIONARIES AND TOLERANT RETRIEVAL :** Search structures for dictionaries, Wildcard queries, General wildcard queries

,  $k$ -gram indexes for wildcard queries, Spelling correction , Implementing spelling correction, Forms of spelling correction , Edit distance ,  $k$ -gram indexes for spelling correction, Context sensitive spelling correction , Phonetic correction .

#### UNIT-IV

**INDEX CONSTRUCTION :** Hardware basics , Blocked sort-based indexing , Single-pass in-memory indexing , Distributed indexing , Dynamic indexing , Other types of indexes

#### UNIT-V

**INDEX COMPRESSION :** Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms , Zipf's law: Modeling the distribution of terms , Dictionary compression , Dictionary as a string , Blocked storage , Postings file compression, Variable byte codes ,  $\tilde{a}$  codes .

#### UNIT-VI

**SCORING, TERM WEIGHTING :** Parametric and zone indexes, Weighted zone scoring, Learning weights, The optimal weight  $g$ , Term frequency and weighting , Inverse document frequency, Tf-idf weighting.

#### UNIT-VII

**THE VECTOR SPACE MODEL :** The vector space model for scoring, Dot products , Queries as vectors , Computing vector scores, Variant tf-idf functions , Sublinear tf scaling, Maximum tf normalization, Document and query weighting schemes , Pivoted normalized document length

#### UNIT-VIII

**EVALUATION IN INFORMATION RETRIEVAL :** Information retrieval system evaluation , Standard test collections , Evaluation of unranked retrieval sets , Evaluation of ranked retrieval results, Assessing relevance , Critiques and justifications of the concept of Relevance, A broader perspective: System quality and user utility , System issues , User utility , Refining a deployed system, Results snippets

**TEXT BOOKS:**

Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, “An Introduction to Information Retrieval”, 1<sup>st</sup> Edition, Cambridge University Press, 2008.

**REFERENCE BOOKS:**

1. G.G. Chowdhurry, “Introduction to Modern Information Retrieval”, 1<sup>st</sup> Edition, Neal-schuman publishers, 2010.
2. Gerald J.Kowalski, Mark T.Maybury, “Information storage and Retrieval systems : Theory and Implementation”, 2<sup>nd</sup> Edition, Kluwer Academic publishers, 2009.



# INFORMATION SECURITY

(ELECTIVE-I)

**Course Code: AIT1107**

L	T	P	C
4	0	0	4

Pre-requisite: Computer Networks

## AIM:

To give an idea about the security issues and how to secure the information from unauthorized users and implement the respective algorithms.

## OBJECTIVE:

Students may have the idea about Encryption and Decryption algorithms, Overview of PGP etc.

## UNIT-I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

## UNIT-II

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

## UNIT-III

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

## UNIT-IV

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT-V**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**UNIT-VI**

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**UNIT-VII**

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats.

**UNIT-VIII**

Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

**TEXT BOOK:**

1. Stallings, “Cryptography and network Security”, 3<sup>rd</sup> Edition, PHI/Pearson, 2010.
2. William Stallings, “Network Security Essentials (Applications and Standards)”, 3<sup>rd</sup> Edition, Pearson Education, 2010.

**REFERENCE BOOKS:**

1. Eric Maiwald, “Fundamentals of Network Security”, 1<sup>st</sup> Edition, Dreamtech press, 2008.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security Private Communication in a Public World”, 2<sup>nd</sup> Edition, Pearson/PHI, 2009.
3. Whitman, “Principles of Information Security”, 3<sup>rd</sup> Edition, Thomson, 2008.
4. Robert Bragg, Mark Rhodes, “Network Security The complete reference”, 4<sup>th</sup> Edition, TMH, 2009.
5. Buchmann, “Introduction to Cryptography”, 2<sup>nd</sup> Edition, Springer, 2009.
6. Ryan Russell, Dan Kaminsky, Rain Forest, Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W. Manzuik and Ryan Permech: Hack Proofing your network, 1<sup>st</sup> Edition, wiley Dreamtech, 2009



# ARTIFICIAL INTELLIGENCE

(ELECTIVE-I)

(Common to CSE & IT)

**Course Code: ACT1131**

L	T	P	C
4	0	0	4

Pre-requisite: None

## AIM:

To become acquainted with the various aspects of AI.

## OBJECTIVE:

To understand various concepts of AI such as searching, knowledge representation, logic, planning, uncertainty, probabilistic reasoning, and learning.

## UNIT-I

**INTRODUCTION:** AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

## UNIT-II

**SEARCHING:** Searching for solutions, uninformed search strategies- Breadth first search, depth first search, Search with partial information (Heuristic search) Greedy best first search , A\*search. Game Playing: Adversarial search, Games, minimax algorithm, optimal decisions in multiplayer games, Alpha Beta pruning, Evaluation functions, cutting of search.

## UNIT-III

Knowledge Representation and Reasons logical Agents, Knowledge Based agents, the Wumpus world, logic, propositional logic, Resolution patterns in propositional logic, Resolution, Forward and Backward chaining.

## UNIT-IV

First order logic. Inference in first order logic, propositional vs. first order inference, unification and lifts, forward chaining, backward chaining, resolution

## UNIT-V

Planning-Classical planning problem, Language of planning problems, Expressiveness and extension, planning with state-space search, Forward state space search, Backward state space search, Heuristics for state space search. Planning search, planning with state space search, partial order planning graphs.

## UNIT-VI

**UNCERTAINTY:** Acting under uncertainty, Basic probability notation, axioms of probability, Inference using full joint distributions, Baye's Rule and its use. Probabilistic Reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian Networks, Efficient representation of conditional distributions. Exact inference in Bayesian networks.

## UNIT-VII

**PROBABILISTIC REASONING OVER TIME:** Time and Uncertainty, Inference in Temporal models, Hidden Markov models, Kalman Filters, Dynamic Bayesian Networks, Speech Recognition.

## UNIT-VIII

Learning-Forms of learning, Induction learning, Learning Decision trees, statistical learning methods, learning with complex data, learning with hidden variables-the EM algorithm, instance based learning, neural networks.

## TEXT BOOKS:

Stuart Russel, Peter Norvig, "Artificial Intelligence-A Modern Approach", 2<sup>nd</sup> Edition PHI/Pearson Education , 2003. ( Units: 1 to 8)

## REFERENCE BOOKS:

1. Patrick Henry Winston, "Artificial Intelligence", 3rd Edition, Pearson Edition, 2001.

2. E.Rich and K.Knight, “Artificial Intelligence”, 3<sup>rd</sup> Edition, TMH, 2008.
3. Patterson, “Artificial Intelligence and Expert Systems”, 2<sup>nd</sup> Edition, PHI, 2008.
4. Giarrantana Riley, Thomson, “Expert systems-Principles and Programming”, 4<sup>th</sup> Edition, Thomson, 2007.
5. Ivan Bratika, “PROLOG Programming for Artificial Intelligence”, 3<sup>rd</sup> Edition, Pearson Education, 2003.

**WEB REFERENCE BOOKS:**

[http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Artificial%20intelligence/New\\_index1.html](http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Artificial%20intelligence/New_index1.html)



# INFORMATION STORAGE SYSTEMS

(ELECTIVE-I)

(Common to CSE & IT)

**Course Code: ACT1135**

L	T	P	C
4	1	0	4

Pre-requisite: Databases Management Systems

## AIM:

Describes the challenges found in today's complex information management environment.

## OBJECTIVE:

- Describe storage technology solutions
- Describe common storage management and roles
- Understand the concept of information availability and its measurement

## UNIT-I

### INTRODUCTION TO INFORMATION STORAGE AND MANAGEMENT INFORMATION STORAGE :

Data, Types of Data, Information, Storage. Evolution of Storage Technology and Architecture. Data Center Infrastructure: Core Elements, Key Requirements for Data Center Elements, Managing Storage Infrastructure. Key Challenges in Managing Information. Information Lifecycle: Information Lifecycle Management, ILM Implementation, ILM Benefits .Summary.

## UNIT-II

**STORAGE SYSTEM ENVIRONMENT :** Components of a Storage System Environment: Host, Connectivity, Storage. Disk Drive Components: Platter Spindle, Read/Write Head, Actuator Arm Assembly, Controller, Physical Disk Structure, Zoned Bit Recording, logical Block Addressing. Disk Drive Performance: Disk Service Time. Fundamental Laws Governing Disk Performance, Logical Components of the Host: Operating System, Device Driver, Volume Manager, File System, Application. Application

Requirements and Disk Performance. Summary.

### UNIT-III

**DATA PROTECTION: RAID** Implementation of RAID: Software RAID, Hardware RAID 52. RAID Array Components. RAID Levels: Striping, Mirroring, Parity, RAID 0, RAID 1, Nested RAID, RAID, RAID 4, RAID 5, RAID 6. RAID Comparison. RAID Impact on Disk Performance: Application IOPS and RAID Configurations: Hot Spares: Summary.

### UNIT-IV

**INTELLIGENT STORAGE SYSTEM**: Components of an Intelligent Storage System: Front End, Cache, Back End, Physical Disk. Intelligent Storage Array: High-end Storage Systems, Midrange Storage System. Concepts in Practice: EMC CLARiiON and Symmetrix: CLARiiON Storage Array, CLARiiON CX4 Architecture, Managing the CLARiiON, Symmetrix Storage Array, Symmetrix Component Overview, Direct Matrix Architecture. Summary.

### UNIT-V

**DIRECT-ATTACHED STORAGE AND INTRODUCTION TO SCSI**: Types of DAS, Internal DAS, External DAS. DAS Benefits and Limitations. Disk Drive Interfaces, IDE/ATA, SATA, Parallel SCSI. Introduction to Parallel SCSI: Evolution of SCSI, SCSI Interfaces, SCSI-3 Architecture Parallel SCSI Addressing. SCSI Command Model, CDB Structure, Operation Code, Control Field, Status. Summary.

### UNIT-VI

**STORAGE AREA NETWORKS**: Fibre Channel: Overview, The SAN and Its Evolution, Components of SAN 120: Node Ports, Cabling, Interconnect Devices, Storage Arrays, SAN Management Software: FC Connectivity: Point-to-Point, Fibre Channel Arbitrated Loop, Fibre Channel Switched Fabric. Fibre Channel Ports. Fibre Channel Architecture, Fibre Channel Protocol Stack, Fibre Channel Addressing, FC Frame, Structure and Organization of FC Data, Flow Control, Classes of Service, Zoning, Fibre Channel Login Types. FC Topologies. Core-Edge Fabric: Mesh Topology. Concepts in Practice: EMC Connectrix. Summary.

## UNIT-VII

**NETWORK-ATTACHED STORAGE :** General-Purpose Servers vs. NAS Devices. Benefits of NAS. NAS File I/O: File Systems and Remote File Sharing , Accessing a File System , File Sharing. Components of NAS . NAS Implementations: Integrated NAS, Gateway NAS , Integrated NAS Connectivity , Gateway NAS Connectivity. NAS File-Sharing Protocols: NFS, CIFS. NAS I/O Operations :Hosting and Accessing Files on NAS. Factors Affecting NAS Performance and Availability. Concepts in Practice: EMC Celerra : Architecture, Celerra Product Family . Summary.

## UNIT-VIII

**IP SAN iSCSI:** Components of iSCSI, iSCSI Host Connectivity , Topologies for iSCSI Connectivity, iSCSI Protocol Stack, iSCSI Discovery , iSCSI Names , iSCSI Session, iSCSI PDU, Ordering and Numbering , iSCSI Error Handling and Security .FCIP: FCIP Topology, FCIP Performance and Security . Summary.

### TEXT BOOKS:

1. G. Somasundaram, A. Shrivastava:EMC Corporation, “Information Storage and Management”, 1<sup>st</sup> Edition, Wiley Publication, 2009.
2. Robert Spalding, “Storage Networks: The Complete Reference”, 1<sup>st</sup> Edition, Tata McGraw Hill/Osborne, 2003.

### REFERENCE BOOKS:

1. Marc Farley, “Building Storage Networks”, 2<sup>nd</sup> Edition, Tata McGraw Hill/Osborne, 2001.
2. Meeta Gupta: “Storage Area Network Fundamentals”, 1<sup>st</sup> Edition, Pearson Education, 2002.



# ELECTRICAL SAFETY MANAGEMENT

(ELECTIVE- I)

(Common to all branches)

Pre-requisites: None

**Course Code: AEE1140**

L	T	P	C
4	1	0	4

## AIM :

To familiarize the student with Electrical Safety in hazardous areas and to provide basic precautions in engineering practices.

## OBJECTIVE :

To understand various electrical rules and acts, safety precautions in electrical systems

## UNIT-I

**INTRODUCTION TO ELECTRICAL SAFETY :** Terms and definitions, objectives of safety and security measures, Hazards associated with electric current, and voltage, who is exposed, principles of electrical safety, Approaches to prevent accidents, scope of subject electrical safety, fire prevention and fire fighting.

## UNIT-II

**ELECTRICAL SHOCKS THEIR PREVENTION AND FIRST AID :** Primary and secondary electrical shocks, possibilities of getting electrical shock and its severity, medical analysis of electric shocks and its effects, shocks due to flash/ spark overs, prevention of shocks, safety precautions against contact shocks, flash shocks, burns, residential buildings and shops.

First Aid: first principles of actions after electric shocks, Artificial respiration, External Cardiac massage, Control of bleeding, burns and scalds and Heat exhaustion.

### UNIT-III

#### **ELECTRICAL SAFETY IN RESIDENTIAL, COMMERCIAL AND AGRICULTURAL INSTALLATIONS :**

Wiring and fitting – Domestic appliances – water tap giving shock – shock from wet wall – fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

### UNIT-IV

#### **SAFETY DURING INSTALLATION, TESTING AND COMMISSIONING, OPERATION AND MAINTENANCE :**

Preliminary preparations – safe sequence – risk of plant and equipment – safety documentation – field quality and safety - personal protective equipment – safety clearance notice – safety precautions – safeguards for operator's safety.

### UNIT-V

#### **ELECTRICAL SAFETY IN HAZARDOUS AREAS :**

Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations – Classification of equipment enclosure for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

### UNIT-VI

#### **EQUIPMENT EARTHING AND SYSTEM NEUTRAL EARTHING :**

Introduction, Distinction between system grounding and Equipment Grounding, Equipment Earthing, Functional Requirement of earthing system, description of a earthing system, , neutral grounding( System Grounding), Types of Grounding, Methods of Earthing Generators Neutrals.

### UNIT-VII

#### **SAFETY MANAGEMENT OF ELECTRICAL SYSTEMS :**

Principles of Safety Management, Management Safety Policy, Safety organization, safety auditing, Motivation to managers, supervisors, employees.



## UNIT-VIII

**REVIEW OF IE RULES AND ACTS AND THEIR SIGNIFICANCE :** Objective and scope – ground clearances and section clearances – standards on electrical safety - safe limits of current, voltage – earthing of system neutral – Rules regarding first aid and fire fighting facility.

The Electricity ACT, 2003, (Part1, 2, 3,4 & 5)

### TEXT BOOKS :

1. S. Rao, Prof. H.L. Saluja, “Electrical safety, fire safety Engineering and safety management”, Khanna Publishers. New Delhi, 1988.
2. Pradeep Chaturvedi, “Energy management policy, planning and utilization”, Concept Publishing company, New Delhi, 1997.
3. [www.apeasternpower.com/downloads/elecact2003.pdf](http://www.apeasternpower.com/downloads/elecact2003.pdf)



## NON CONVENTIONAL SOURCES OF ENERGY

(ELECTIVE- I)

(Common to all branches)

Pre-requisites: None

**Course Code: AME1135**

L	T	P	C
4	0	0	4

### AIM:

To introduce and familiarize the student with the various renewable sources of energy.

### OBJECTIVE:

Renewable sources of energy is an area of research and development especially for countries like India. So the student should be in a position to take up small scale projects, as entrepreneurs, since the cost of investment is minimal in some cases.

### UNIT-I

Introduction to various renewable sources of energy.

**SOLAR RADIATIONS:** Extra terrestrial radiation, Spectral distribution, Solar constant, Solar radiations on earth, Measurement of solar radiations, Solar radiation geometry, Longitude, Latitude, Declination angle, Surface azimuth angle, Hour angle, Zenith angle, Solar altitude angle expression for angle between incident beam and the normal to a plane surface (no derivation), Local apparent time, Apparent motion of sun, Day length, Solar radiation data for India.

### UNIT-II

**SOLAR ENERGY :** Solar thermal power and its conversion, Solar collectors, Flat plate, Performance analysis of flat plate collector, Solar concentrating collectors, Types of concentrating collectors, Cylindrical collectors, Thermal analysis of solar collectors, Tracking CPC and solar swing . Solar thermal energy storage, Different systems, Solar pond.

Applications - Water heating, Space heating & cooling, Solar distillation, solar pumping, solar cooking, Greenhouses, Solar power plants.

**SOLAR PHOTOVOLTAIC SYSTEM :** Photovoltaic effect, Efficiency of solar cells, Semiconductor materials for solar cells, Solar photovoltaic system, Standards of solar photovoltaic system, Applications of PV system, PV hybrid system.

### UNIT-III

**WIND ENERGY:** Properties of wind, Availability of wind energy in India, wind velocity, Wind machine fundamentals, Types of wind machines and their characteristics, Horizontal and Vertical axis wind mills, Elementary design principles, performance characteristics, Betz criteria Coefficient of performance of a wind mill rotor, Aerodynamic considerations in wind mill design, Selection of a wind mill, Wind energy farms, Economic issues, Recent developments.

### UNIT-IV

**BIO-MASS AND BIO-GAS :** Principles of Bio-Conversion, Photosynthesis, Bio gas production, Aerobic and anaerobic bio-conversion process, Raw materials, Properties of bio gas, Producer gas, Transportation of bio gas, bio gas plant technology & status, Community biogas plants, Problems involved in bio gas production, Bio gas applications, Biomass conversion techniques, Biomass gasification, Energy recovery from urban waste, Power generation from liquid waste, Biomass cogeneration, Energy plantation, Fuel properties, Biomass resource development in India.

### UNIT-V

**OCEAN ENERGY :** Principle of ocean thermal energy conversion, Wave energy conversion machines, Power plants based on ocean energy, Problems associated with ocean thermal energy conversion systems, Thermoelectric OTEC, Developments of OTEC.

**TIDAL POWER :** Tides and waves as sources of energy, Fundamentals of tidal power, Use of tidal energy, Limitations of tidal energy conversion systems.

## UNIT-VI

**GEOHERMAL ENERGY:** Structure of earth's interior, Geothermal sites, earthquakes & volcanoes, Geothermal resources, Hot springs, Steam ejection, Principle of working, Types of geothermal station with schematic representation, Site selection for geothermal power plants. Advanced concepts, Problems associated with geothermal conversion.

## UNIT-VII

**ELECTROCHEMICAL EFFECTS AND FUEL CELLS:** Principle of operation of an acidic fuel cell, Reusable cells, Ideal fuel cells, Other types of fuel cells, Comparison between acidic and alkaline hydrogen-oxygen fuel cells, Efficiency and EMF of fuel cells, Operating characteristics of fuel cells, Advantages of fuel cell power plants, Future potential of fuel cells

**HYDROGEN ENERGY:** Properties of hydrogen in respect of its use as source of renewable energy, Sources of hydrogen, Production of hydrogen, Storage and transportation, Problems with hydrogen as fuel, Development of hydrogen cartridge, Economics of hydrogen fuel and its use.

## UNIT-VIII

**DIRECT ENERGY CONVERSION :** Need for DEC, Carnot cycle, limitations, Principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule-Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, Hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects.

## TEXT BOOKS:

Rai G.D, "Non-Conventional energy Sources", Khanna Publishers, Fourth Edition, 2008.

## REFERENCE BOOKS:

Kothari D.P., "Renewable energy resources and emerging tech.", Prentice Hall of India Pvt. Ltd, 1<sup>st</sup> Edition, 1990.

# SOFTWARE PROJECT MANAGEMENT

(ELECTIVE-II)

(Common to CSE & IT)

Course Code: ACT1126

L	T	P	C
4	1	0	4

Pre-requisite: Software Engineering

## AIM:

To make the students understand how to manage software projects.

## OBJECTIVES:

- To understand the draw backs of traditional project management methods.
- To understand the principles of modern software project management.

## UNIT-I

**CONVENTIONAL SOFTWARE MANAGEMENT:** The waterfall model, conventional software Management performance. Evolution of Software Economics : Software Economics, pragmatic software cost estimation.

## UNIT-II

**IMPROVING SOFTWARE ECONOMICS :** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections. The old way and the new : The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

## UNIT-III

**LIFE CYCLE PHASES :** Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process : The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

## UNIT-IV

**MODEL BASED SOFTWARE ARCHITECTURES :** A Management perspective and technical perspective. Work Flows of the process : Software process workflows, Iteration workflows.

## UNIT-V

**CHECKPOINTS OF THE PROCESS :** major milestones, minor milestones, periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, iteration planning process, pragmatic planning.

## UNIT-VI

**PROJECT ORGANIZATIONS AND RESPONSIBILITIES:** Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation : Automation Building blocks, The Project Environment.

## UNIT-VII

**PROJECT CONTROL AND PROCESS INSTRUMENTATION:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates.

## UNIT-VIII

**FUTURE SOFTWARE PROJECT MANAGEMENT :** Modern Project Profiles, Next generation Software economics, modern process transitions. Case Study: The command Center Processing and Display system- Replacement (CCPDS-R)

### TEXT BOOK:

1. Walker Royce, “Software Project Management,” 1<sup>st</sup> Edition, Pearson Education, 2006.

### REFERENCE BOOKS:

1. Bob Hughes and Mike Cotterell, “Software Project Management,” 4<sup>th</sup> Edition, Tata McGraw Hill, 2008.
2. Joel Henry, “Software Project Management: A Real World Guide to Success,” 1<sup>st</sup> Edition, Pearson Education, 2008.



## ADVANCED COMPUTING CONCEPTS (ELECTIVE-II)

**Course Code: AIT1108**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>1</b>	<b>0</b>	<b>4</b>

### **AIM:**

To introduce grid computing, pervasive computing and quantum computing concepts.

### **OBJECTIVE:**

Students will be able to learn the concepts of Grid Computing, Pervasive Computing and Quantum Computing.

### **UNIT-I**

**GRID COMPUTING:** Data & Computational Grids, Grid Architectures and its relations to various Distributed Technologies

### **UNIT-II**

Autonomic Computing, Examples of the Grid Computing Efforts (IBM).

### **UNIT-III**

Cluster setup & its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging systems.

### **UNIT-IV**

Process scheduling, Load sharing and Balancing; Distributed shared memory, parallel I/O .

### **UNIT-V**

Example cluster System - Beowlf; Cluster Operating systems: COMPaS and NanOS

### **UNIT-VI**

Pervasive Computing concepts & Scenarios; Hardware & Software, Human - machine interface.

**UNIT-VII**

Device connectivity, Java for Pervasive devices; Application examples

**UNIT-VIII**

Classical Vs Quantum logic gates ,One ,two & three QUbit Quantum gates, Fredkin & Toffoli gates , Quantum circuits, Quantum algorithms.

**TEXT BOOKS:**

1. J. Joseph & C. Fellenstein, “Grid Computing”, 1<sup>st</sup> Edition, Pearson Education, 2010.
2. Jochen Burkhardt, Dr Horst Henn, Stefan Hepper, Klaus Rintdorff, Thomas Schack, “Pervasive Computing”, 1<sup>st</sup> Edition, Pearson Education, 2009.
3. Dan c. Marinescu, Gabriela M. Marinescu, “Approaching Quantum Computing”, 1<sup>st</sup> Edition, Pearson Education, 2005.

**REFERENCE BOOKS:**

1. Raj Kumar Buyya, “High performance cluster computing”, 1<sup>st</sup> Edition, Pearson Education, 1999.
2. Michael A. Nielsen, Isaac L. Chuang, “Quantum computing and Quantum Information”, 1<sup>st</sup> Edition, Cambridge University Press, 2000.
3. Daniel Minoli, “A Networking Approach to Grid Computing”, 1<sup>st</sup> Edition , Wiley, 2004.





# FORMAL LANGUAGES AND AUTOMATA THEORY

(ELECTIVE-II)

(Common to CSE & IT)

**Course Code: ACT1114**

L	T	P	C
4	1	0	4

Pre-requisite: None

## **AIM:**

To acquaint the student with an overview of the theoretical foundations of computer science from the perspective of formal languages

## **OBJECTIVES:**

- To explain deterministic and non-deterministic machines.
- To comprehend the hierarchy of problems arising in the computer sciences.

## **UNIT-I**

**FUNDAMENTALS** : Basic concepts, Formal languages, Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers.(proof's not required).

## **UNIT-II**

**FINITE AUTOMATA**: NFA with  $\hat{\Gamma}$  transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without  $\hat{\Gamma}$  transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output-Moore and Melay machines.

## **UNIT-III**

**REGULAR LANGUAGES**: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expression,

Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

#### **UNIT-IV**

**GRAMMAR FORMALISM :** Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, and sentential forms. Right most and leftmost derivation of strings.

#### **UNIT-V**

**CONTEXT FREE GRAMMARS:** Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

#### **UNIT-VI**

**PUSH DOWN AUTOMATA:** Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.

#### **UNIT-VII**

**TURING MACHINE :** Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing machines (proofs not required).

#### **UNIT-VIII**

**COMPUTABILITY THEORY :** Chomsky hierarchy of languages, linear bounded automata and context sensitive language, decidability of, problems, Universal Turing Machine, undesirability of posts Correspondence problem, Turing reducibility, graph theory introduction.

#### **TEXT BOOKS:**

1. Hopcroft H.E. and Ullman J. D, "Introduction to Automata Theory Languages and Computation", 3<sup>rd</sup> Edition, Pearson Education, 2002. (Units: 1 to 8 )

**REFERENCE BOOKS:**

1. Daniel I.A. Cohen, “Introduction to Computer Theory”, 2<sup>nd</sup> Edition, John Wiley Publication, 2000
2. Mishra and Chandrashekar, “Theory of Computer Science – Automata Languages and Computation”, 3<sup>rd</sup> Edition, PHI, 2007.
3. John C Martin, “Introduction to languages and the Theory of Computation”, 3<sup>rd</sup> Edition, TMH, 2007.
4. Sipser, “Introduction to Theory of Computation”, 2<sup>nd</sup> Edition, Thomson, 2007.
5. J.E.Hopcraft and Jeffery D.Ulman, “Introduction to Automata Theory”, Languages & Computation, 2<sup>nd</sup> Edition, Narosa publishing company, 2003.
6. Sunitha, “Formal Languages and Automata Theory”, 1<sup>st</sup> Edition, TMH, 2010.
7. Rajendra Kumar, “Theory of Automata, Languages & Computations”, 1<sup>st</sup> Edition, TMH, 2010.
8. <http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/afl/index.htm>



## DIGITAL FORENSICS

(ELECTIVE- II)

(Common to CSE & IT)

**Course Code: ACT1136**

L	T	P	C
4	1	0	4

### AIM :

To introduce the students to the latest information technology threats and their counter measures

### OBJECTIVE :

To make student aware of the forensic analysis techniques to protect e-mail, online transactions and secure information transmission over the network

### UNIT-I

**WINDOWS LIVE RESPONSE :** Analyzing Volatile Data, The System Date and Time, Current Network Connections, Open TCP or UDP Ports, Executables Opening TCP or UDP Ports, Cached NetBIOS Name Tables, Users Currently Logged On, The Internal Routing Table, Running Processes, Running Services, Scheduled Jobs, Open Files, Process Memory Dumps, Full System Memory Dumps, Analyzing Nonvolatile Data, System Version and Patch Level, File System Time and Date Stamps, Registry Data, The Auditing Policy, A History of Logins, System Event Logs, User Accounts, IIS Logs, Suspicious Files, Putting it all together.

**UNIX LIVE RESPONSE :** Analyzing Volatile Data, The System Date and Time, Current Network Connections, Open TCP or UDP Ports, Executables Opening TCP or UDP Ports, Running Processes, Open Files, The Internal Routing Table, Loaded Kernel Modules, Mounted File Systems, Analyzing Nonvolatile Data, System Version and Patch Level, File System Time and Date Stamps, File System MD5 Checksum Values, Users Currently Logged On, A History of Logins, Syslog Logs, User Accounts, User History Files, Suspicious Files, Putting it all together.

## UNIT-II

**COLLECTING NETWORK-BASED EVIDENCE :** Full Content Data, Session Data, Alert Data, Statistical Data, Putting NBE to Work, A Standard Intrusion Scenario, Using Full Content Data, Using Session Data, Using Alert Data, Using Statistical Data, Data Collection, Accessing the Wire, Collecting and Storing Traffic, Full Content Data Tools, Session Data Tools, Alert Data Tools, Statistical Data Tools, Putting it all together.

**ANALYZING NETWORK-BASED EVIDENCE FOR A WINDOWS INTRUSION :** Statistical Data: First Trace, Alert Data: First Trace, Session Data: First Trace, Full Content Data: First Trace, Statistical Data: Second Trace, Alert Data: Second Trace, Session Data: Second Trace, Full Content Data: Second Trace, Putting it all together.

**ANALYZING NETWORK-BASED EVIDENCE FOR A UNIX INTRUSION :** Statistical Data, Alert Data, Session Data, Full Content Data, Putting it all together.

## UNIT-III

**BEFORE YOU JUMP RIGHT IN...,** Preparing for a Forensic Duplication, Document, Document, Document!

**COMMERCIAL-BASED FORENSIC DUPLICATIONS :** The Read-Only IDE-to-Fire, wire Device, Acquiring a Forensic Duplication with EnCase, Acquiring a Forensic Duplication with FTK

**NONCOMMERCIAL-BASED FORENSIC DUPLICATIONS :** DD, Creating an Evidence File, Creating an Evidence Hard Drive. DD Rescue, DCFLDDNED-The Open Source Network Evidence Duplicator

## UNIT-IV

**COMMON FORENSIC ANALYSIS TECHNIQUES :** Recovering Deleted Files, Open Source Solutions, Commercial Solutions, Production of Time Stamps and Other Metadata for Files, Open Source Solutions, Commercial Solutions, Removing Known Files, Open Source Solutions, Commercial Solutions, File Signatures and Electronic Discovery, Open Source Solutions, Commercial Solutions, String Searching and File Fragments, Open Source Solutions, Commercial Solutions

**WEB BROWSING ACTIVITY RECONSTRUCTION :** Commercial Forensic Tools, Open Source Solutions, Pasco-An Open Source Web Browsing Investigation Tool, Galleta-An Open Source IE Cookie Investigation Tool, Putting It All Together

## UNIT-V

**E-MAIL ACTIVITY RECONSTRUCTION :** Commercial Forensic Tools, Open Source Solutions, Outlook Express

### **Microsoft Windows Registry Reconstruction**

Identifying Installed Programs, Identifying “Most Recently Used” Documents.

### **Forensic Tool Analysis: An Introduction to Using Linux for Analyzing Files of Unknown Origin,**

Case Background

A Hands-On Introduction to Forensic Tool Analysis: Hello World!

Static Analysis of Hello, Dynamic Analysis of Hello, Putting It All Together

## UNIT-VI

**FORENSIC TOOL ANALYSIS:** A Hands-On Analysis of the Linux File aio Static Analysis of aio,md5sum,ls -al,file,strings,Hexadecimal Viewer,nm,ldd,readelf,objdump,Dynamic Analysis of aio,System Call Trace (strace),GNU Debugger,Recovering the Uncompressed aio Binary,Recovery by Identifying the Packer That Was Used,Static Analysis of the Recovered Uncompressed Binary,Dynamic Analysis of the Recovered Uncompressed Binary,md5sum,Putting It All Together creating a complete forensic tool kit Building the Ultimate Response CD

Preparing the Windows Live Response Tools,Preparing the Unix Live Response Tools,Forensic Duplication Tools,DCFLDD,NED

## UNIT-VII

**FORENSIC DUPLICATION AND ANALYSIS OF PERSONAL DIGITAL ASSISTANTS :** Case Background,Forensic Acquisition, Utilizing EnCase,Initial Setup,EnCase,Forensic Acquisition Utilizing Paraben’s PDA Seizure,Forensic Acquisition Utilizing Palm Debugger,Forensic Analysis of the Palm IIIc,Forensic Analysis of the HP

iPAQ Pocket PC 2003, Forensic Analysis of the Palm m505, Putting it all together.

**FORENSIC DUPLICATION OF USB AND COMPACT FLASH MEMORY DEVICES :** Duplicating USB Devices, Duplicating Compact Flash Cards

Forensic Analysis of USB and Compact Flash Memory Devices

USB Memory Devices, Open Source Solutions, Commercial Solutions, Compact Flash Cards, Open Source Solutions, Commercial Solutions, Online-Based Forensics

### UNIT-VIII

**TRACING E-MAIL :** Hotmail, Yahoo!, Netscape, Other E-Mail Services, Anonymous Remailers

**DOMAIN NAME OWNERSHIP :** Importing the TLD Zone Files into Postgres, Translating FQDNs to IP Addresses, Searching for Domains, Searching for DNSs, An Introduction to Perl, Reading Input, Matching Text, Regular Expressions, Formatting Output, Processing Live IR Data Collected, The Date Problem with Microsoft Excel

### TEXT BOOK:

1. Keith J. Jones, Richard Bejtlich, Curtis Rose, "Real Digital Forensics: Computer Security and Incident Response", 1<sup>st</sup> Edition, Addison Wesley Pearson Education, 2008.

### REFERENCE BOOKS:

1. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", 1<sup>st</sup> Edition, Firewall Media, 2006.
2. Christopher L.T. Brown, "Computer Evidence Collection and Preservation", 2<sup>nd</sup> Edition, Firewall Media, 2009.



## SATELLITE COMMUNICATION

(ELECTIVE – II)

(Common to all branches)

Pre-requisites: None

**Course Code: AEC1132**

L	T	P	C
4	1	0	4

### AIM:

Students will learn Satellite Systems and Communications applications comprehensively and apply this knowledge for understanding the existing Modern Satellite Applications.

### OBJECTIVE:

The flow of the syllabus enables students to understand the subject from basics to advanced technologies on Satellite Communications and get prepared for Industry and will not be needing extensive training on these aspects.

### UNIT-I

**SATELLITE ORBITS** : Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility – eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

### UNIT-II

**SPACE SEGMENT** : Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. .

### UNIT-III

**EARTH SEGMENT** : Earth Station Technology— Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.



## UNIT-IV

**SATELLITE LINK DESIGN :** Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments- system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

## UNIT-V

**SATELLITE ACCESS :** Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption.

## UNIT-VI

**SATELLITE APPLICATIONS-COMMUNICATIONS :** INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Specialized services – E –mail, Video conferencing, Internet.

## UNIT-VII

**PRINCIPLES OF TV & BROADCASTING :** Gross structure, Image continuity, Scanning, flicker, interlaced scanning, number of scanning lines, Fine structure, Tonal Gradation. Video signal dimensions, Horizontal sync. details, Vertical sync. details, Scanning sequence details, Functions of vertical pulse train, Channel bandwidth, vestigial side band transmission, bandwidth allocations for colour transmission.

## UNIT-VIII

**SATELLITE APPLICATIONS-BROADCAST :** Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- World space services, Business TV(BTV), GRAMSAT.

## TEXT BOOKS:

1. Tri T. Ha, 'Digital Satellite Communication', II edition, McGraw-Hill, 1990.
2. R R Gulati , "Monochrome and colour television", New Age International,2007.

**REFERENCE BOOKS:**

1. M. Richharia, 'Satellite Communication Systems-Design Principles', Macmillan 2003
2. N.Agarwal, 'Design of Geosynchronous Space Craft, Prentice Hall, 1986.
3. Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, Artech House Boston London, 1997.
4. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, 'Satellite Communication Systems Engineering', Prentice Hall/Pearson, 2007.



## ARCHITECTURAL PLANNING OF BUILDINGS

(ELECTIVE- II)

(Common to all branches except Civil Engineering)

**Pre-requisites: None**

**Course Code: ACE 1152**

L	T	P	C
4	1	0	4

### AIM :

To understand the various planning principles and have basic knowledge on building drawing.

### OBJECTIVE :

Student shall have basic knowledge of different building bye-laws. The student shall have basic understanding on various planning principles of residential buildings.

### UNIT-I

**VAASTU :** Introduction – Principles of Vaastu – Vaastu grouping of rooms – preferences of vaastu aspects of rooms – General vaastu for common items like well (Bore), septic tank, water tank, gates etc.

### UNIT-II

**BUILDING BYELAWS AND REGULATIONS:** Introduction – Terminology – Objectives of building byelaws – Building byelaws as per Municipal norms - Floor area ratio (FAR) – Floor space Index (FSI) – Principles underlying building byelaws – classification of bye buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness.

### UNIT-III

**RESIDENTIAL BUILDINGS:** Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

**UNIT -IV**

**STAIR CASES :** Terms used in stair cases – classification of stairs – minimum requirements of stair case – stairs spanning horizontally and longitudinally.

**UNIT-V**

**PLANNING OF A RESIDENTIAL BUILDING :** Planning of two storied residential building – planning of a duplex building.

**UNIT-VI**

**BUILDING AUTOMATION SYSTEM - I :** Components of building automation system - Security, fire-fighting, communication etc.,

**UNIT-VII**

**BUILDING AUTOMATION SYSTEM - II :** Components of building automation system - HVAC, electrical lighting.

**UNIT-VIII**

**AIR CONDITIONING:** Components of the Building air condition system – tonnage of air condition requirements – requirements for better air conditioning.

**TEXT BOOKS:**

1. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,
2. Kumarswamy N and Kameswara Rao A, "Building Planning and Design", Oxford Publishers, 2001.
3. Gurucharan Singh, "Building Planning Scheduling and Design", Dhanpat Rai Publications, 1996.

**REFERENCE BOOKS:**

1. Building Byelaws by State and Central Governments and Municipal Corporations.



## MULTIMEDIA AND APPLICATION DEVELOPMENT LAB

Course Code : AIT1109

L	T	P	C
0	0	3	2

### AIM :

To make students capable of developing multimedia animations in Flash CS5..

### OBJECTIVE :

To introduce the basic concepts of tweening and multimedia effects of FlashCS5 and also to introduce Action Script 3.0 programming concepts to the Students.

### LIST OF EXPERIMENTS:

1. Draw a circle, fill it with color and divide it into four equal half's. (Use rulers and transformation tools).
2. Create any object on the stage; apply motion tween on it and vary the speeds of motion.
3. Create any two objects on the stage. Transform object1 into object2 using shape tween.
4. Simulate a solar system based on the concept of guided motion.
5. Import an image on to the stage. Add fading effect to the image.
6. Design a slideshow using a set of images.
7. Design play, stop and pause buttons to control an audio object.
8. Display a set of names one after the other with zooming effect. Add any audio in the background.
9. Design an animated banner. Banner can display scenery or advertise a product/organization.
10. Convert any video into a flash video. Embed this flash video in a web page.

11. Create a Movie clip to hold a simple animation. Duplicate the animation in to several copies.
12. Create a simple greeting card with audio effect. The greeting card should have play and stop buttons.
13. Using action script 3.0 write a program to create a rain fall effect. (hint. Create a Movie clip to capture the motion of a single rain drop and then duplicate it to have rain fall effect )
14. Using action script 3.0, design a login form.
15. Design an animated car and show that it is gradually progressing in some direction.

### REFERENCE BOOKS:

1. Flash CS5 Development Team, “Using ADOBE® FLASH® PROFESSIONAL CS5 & CS5.5”, 1<sup>st</sup> Edition 2011, Adobe.
2. Chris Grover, “Flash CS5: The Missing Manual”, 1st Edition, O’reilly, 29-05-2010
3. Joey, Lott, “Action Script Cookbook”, 1<sup>st</sup> Edition, SPD-Oreilly, 2003.



## NETWORK PROGRAMMING LAB

**Course Code: AIT1110**

L	T	P	C
0	0	3	2

### AIM:

To teach the students how to write programs that communicates with other programs across a computer network.

### OBJECTIVE:

The student shall be able to write their own network programs in UNIX, i.e., client and server programs, using TCP sockets, UDP sockets, and all types of IPC, Practically.

### LIST OF EXPERIMENTS:

1. Design TCP iterative Client and Echo server application to given input sentence
2. Design TCP iterative Client and server application to reverse the given input sentence
3. Design TCP client and server application to transfer file
4. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call “select”
5. Design a TCP concurrent server to echo given set of sentences using poll functions
6. Design UDP Client and server application to reverse the given input sentence
7. Design UDP Client server to transfer a file
8. Implement the following forms of IPC.
  - a) Pipes
  - b) FIFO
9. Implement file transfer using Message Queue form of IPC

10. Write a programme to create an integer variable using shared memory concept and increment the variable simultaneously by two processes. Use semaphores to avoid race conditions
11. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
12. Design a RPC application to add and subtract a given pair of integers

#### **TEXT BOOKS:**

1. W.Richard Stevens, “UNIX Network Programming”, Sockets API, Volume 1, 3<sup>rd</sup> Edition, PHI. 2004.
2. W.Richard Stevens, “UNIX Network Programming”, 1<sup>st</sup> Edition, PHI, 2005.

#### **REFERENCE BOOKS:**

1. Graham GLASS, King abls, “UNIX for Programmers and Users”, 3<sup>rd</sup> Edition, Pearson Education, 2008.
2. M. J. ROCHKIND, “Advanced UNIX Programming”, 3<sup>rd</sup> Edition, Pearson Education, 2008





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***COURSE STRUCTURE &  
SYLLABI FOR VIII SEMESTER***

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### VIII SEMESTER:

COURSE CODE	THEORY/LAB	L	T	P	C
AIT1111	Distributed Databases	4	0	0	4
	<b>Elective-III</b>	4	1	0	4
AIT1112	Multimedia Databases				
ACT1127	Network Management Systems				
AIT1113	Biometrics for Network Security				
ACT1137	Multi-Core Programming				
ACE1153	Green Buildings & Infrastructure				
	<b>Elective-IV</b>	4	1	0	4
ACT1133	Bio-informatics				
ACT1128	Image processing				
ACT1129	Pattern Recognition				
ACT1138	Information Storage Security and Management				
ACH1148	Optimization Techniques				
AIT11SM	Seminar			3	2
AIT11CV	Comprehensive Viva				4
AIT11PW	Project Work	0	0	9	12
	<b>Total</b>	<b>12</b>	<b>2</b>	<b>12</b>	<b>30</b>

## DISTRIBUTED DATABASES

**Course Code: AIT1111**

L	T	P	C
4	0	0	4

### AIM:

Distributed Database lets Collections of data (e.g. in a database) to be distributed across multiple physical locations

### OBJECTIVES:

- To provide the students an understanding of Distributed Database
- To improve database performance at end-user worksites
- Management of distributed data with different levels of transparency like fragmentation transparency, replication transparency etc.

### UNIT-I

Features of Distributed versus Centralized Databases, Principles of Distributed Databases, Levels Of Distribution Transparency, Reference Architecture for Distributed Databases , Types of Data Fragmentation, Integrity Constraints in Distributed Databases.

### UNIT-II

Translation of Global Queries to Fragment Queries, Equivalence Transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

### UNIT-III

Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, General Queries.

### UNIT-IV

The Management of Distributed Transactions, A Framework for Transaction Management , Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions.

**UNIT-V**

Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, and Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

**UNIT-VI**

Reliability, Basic Concepts, Nonblocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection

**UNIT-VII**

Architectural Issues, Alternative Client/Server Architectures, Cache Consistency Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution , Transaction Management, Transaction Management in Object DBMSs , Transactions as Objects.

**UNIT-VIII**

Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues. Transaction Management Transaction and Computation Model Multidatabase Concurrency Control, Multidatabase Recovery, Object Orientation And Interoperability Object Management Architecture CORBA and Database Interoperability Distributed Component Model COM/OLE and Database Interoperability, PUSH-Based Technologies

**TEXT BOOKS :**

1. Stefano Ceri, Giuseppe Pelagatti, “Distributed Database Principles & Systems”, 1<sup>st</sup> Edition, McGraw-Hill, 2008.

**REFERENCE BOOKS :**

1. M.Tamer Ozsu, Patrick Valduriez, “Principles of Distributed Database Systems”, 1<sup>st</sup> Edition , Pearson Education, 2005.



## MULTIMEDIA DATABASES

(ELECTIVE-III)

**Course Code: AIT1112**

L	T	P	C
4	1	0	4

Pre-requisite: Multimedia and Applications Development and Databases Management Systems

### AIM:

To give an idea about the design of databases using multimedia applications.

### OBJECTIVE:

Student may have the idea about Databases architecture, multimedia and application of multimedia to databases.

### UNIT-I

An introduction to Object-oriented Databases; Multidimensional Data Structures: k-d Trees,

Point Quad trees, The MX-Quad tree, R-Trees, comparison of Different Data Structures

### UNIT-II

**IMAGE DATABASES:** Raw Images, Compressed Image Representations, Image Processing: Segmentation,

Similarity-Based Retrieval, Alternative Image DB Paradigms, Representing Image DBs with Relations,

Representing Image DBs with R-Trees, Retrieving Images By Spatial Layout, Implementations

### UNIT-III

**TEXT/DOCUMENT DATABASES :** Precision and Recall, Stop Lists, Word Stems, and Frequency Tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques

## UNIT-IV

**VIDEO DATABASES :** Organizing Content of a Single Video, Querying Content of Video Libraries, Video Segmentation, video Standards

**AUDIO DATABASES :** A General Model of Audio Data, Capturing Audio Content through Discrete

Transformation, Indexing Audio Data

## UNIT-V

**MULTIMEDIA DATABASES :** Design and Architecture of a Multimedia Database, Organizing Multimedia Data based on The Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDSS with Enhanced Inverted Indices, Query Relaxation/Expansion

## UNIT-VI

**CREATING DISTRIBUTED MULTIMEDIA PRESENTATIONS :** Objects in Multimedia Presentations, Specifying Multimedia Documents with Temporal Constraints, Efficient Solution of Temporal Presentation Constraints, Spatial Constraints.

## UNIT-VII

**SPATIAL CONCEPTS AND DATA MODELS:** Models of spatial information, Design extending the ER model with spatial concepts, Extending the ER model pictograms, Object oriented data model with UML.

## UNIT-VIII

Spatial Query Languages: Extending the SQL for spatial data, Examples of queries that emphasis spatial data, Object relational schema examples queries.

## TEXT BOOKS :

1. V.S. Subrahmanian, “Principles of Multimedia Database Systems”, 1<sup>st</sup> Edition, Elsevier, 2010.
2. Shashi Shekhar, Sanjiv Chawla, “Spatial Databases”, 1<sup>st</sup> Edition, Pearson Education, 2010.

**REFERENCE BOOKS :**

1. Lynne Dunckley, “Multimedia Databases An object relational approach”, 2<sup>nd</sup> Edition, Pearson Education, 2009.
2. B. Prabhakaram, “Multimedia Database Management Systems”, 1<sup>st</sup> Edition, Kluwer Academic Publishers, 2009.



# NETWORK MANAGEMENT SYSTEMS

(ELECTIVE-III)

(Common to CSE & IT)

**Course Code: ACT1127**

L	T	P	C
4	1	0	4

Pre-requisite: Computer Networks

## AIM:

To help student understand network management systems and applications in real world.

## OBJECTIVE:

- To provide an understanding of SNMP and OSI network management standards and technologies.
- To familiarize the student with network management tools and systems used in industry.
- To analyze the challenges faced by Network managers.

## UNIT-I

### DATA COMMUNICATIONS AND NETWORK

**MANAGEMENT OVERVIEW** : Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

## UNIT-II

**SNMPV1 NETWORK MANAGEMENT** : Organization and Information and Information Models.

**MANAGED NETWORK:** Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model.



### UNIT-III

**SNMPV1 NETWORK MANAGEMENT :** Communication and Functional Models. The SNMP Communication Model, Functional model.

### UNIT-IV

**SNMP MANAGEMENT: SNMPv2 :** Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility With SNMPv1.

### UNIT-V

**SNMP MANAGEMENT: RMON:** What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, a Case Study of Internet Traffic Using RMON

### UNIT-VI

**TELECOMMUNICATIONS MANAGEMENT NETWORK:** Why TMN? , Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, implementation Issues.

### UNIT-VII

**NETWORK MANAGEMENT TOOLS AND SYSTEMS:** Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

### UNIT-VIII

**WEB-BASED MANAGEMENT :** NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network: , Future Directions.

**TEXT BOOK:**

1. Mani Subrahmanian, “Network Management Principles and Practice”, 2<sup>nd</sup> Edition, Pearson Education, 2010.

**REFERENCE BOOKS:**

1. Morris, “Network management”, 1<sup>st</sup> Edition, Pearson Education, 2008.
2. Mark Burges, “Principles of Network System Administration”, 1<sup>st</sup> Edition, Wiley DreamTech, 2008.



## BIOMETRICS FOR NETWORK SECURITY (ELECTIVE-III)

**Course Code : AIT1113**

L	T	P	C
4	1	0	4

Pre-requisite: None

### **AIM :**

To introduce the field of biometric security to the students.

### **OBJECTIVE :**

To make students understand the working various biometric technologies, their strengths and weaknesses

### **UNIT-I**

Introduction – Benefits of biometric security – Verification and identification – Basic working of biometric matching – Accuracy – False match rate – False non-match rate – Failure to enroll rate – Derived metrics – Layered biometric solutions.

### **UNIT-II**

Finger scan – Features – Components – Operation (Steps) – Competing finger Scan technologies – Strength and weakness. Types of algorithms used for interpretation.

### **UNIT-III**

Facial Scan - Features – Components – Operation (Steps) – Competing facial Scan technologies – Strength and weakness.

### **UNIT-IV**

Iris Scan - Features – Components – Operation (Steps) – Competing iris Scan technologies – Strength and weakness.

### **UNIT-V**

Voice Scan - Features – Components – Operation (Steps) – Competing voice Scan (facial) technologies – Strength and weakness.

## UNIT-VI

Other physiological biometrics – Hand scan – Retina scan – AFIS (Automatic Finger Print Identification Systems) – Behavioral Biometrics – Signature scan- keystroke scan.

## UNIT-VII

Biometrics Application – Biometric Solution Matrix – Bio privacy – Comparison of privacy factor in different biometrics technologies – Designing privacy sympathetic biometric systems. Biometric standards – (BioAPI , BAPI) – Biometric middleware

## UNIT-VIII

Biometrics for Network Security. Statistical measures of Biometrics. Biometric Transactions.

## TEXT BOOK :

1. Paul Reid, “Biometrics for Network Security”, 1<sup>st</sup> Edition, Pearson Education, 2003.

## REFERENCE BOOKS:

1. Samir Nanavati, Michael Thieme, Raj Nanavati, “Biometrics – Identity Verification in a Networked World”, 1<sup>st</sup> Edition, WILEY-Dream, 2002.
2. John D. Woodward, “Biometrics- The Ultimate Reference”, 1<sup>st</sup> Edition, Wiley DreamTech, 2003.



## MULTI-CORE PROGRAMMING

(ELECTIVE-III)  
(Common to CSE & IT)

**Course Code: ACT1137**

L	T	P	C
4	1	0	4

Pre-requisite: LINUX

### AIM :

To make students capable of using multicore processors efficiently with the help multicore programming tools.

### OBJECTIVE:

To introduce the basic concepts of multicore programming and various practical models of multicore programming.

### UNIT-I

#### INTRODUCTION TO MULTI-CORE ARCHITECTURE:

Motivation for Concurrency in Software, Parallel Computing Platforms (SIMD & MIMD systems, an overview of Single-Core, Multi-Processor, Multi-Core Architectures) , Parallel Computing in Microprocessors, Differentiating Multi-Core Architectures from Hyper-Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms, Understanding Performance, Amdahl's Law, Gustafson's Law

### UNIT-II

#### MULTI-CORE PROCESSORS: An Overview of Software

**Threading Defining Threads, System View of Threads:** Threading above the Operating System, Threads inside the OS , Threads inside the Hardware , Application Programming Models and Threading , Virtual Environment: Virtual Machines and Platforms, Runtime Virtualization, System Virtualization.

### UNIT-III

#### PARALLEL PROGRAMMING FUNDAMENTAL CONCEPTS :

Designing for threads, parallel programming patterns, Threading and

parallel programming constructs : Synchronization, Critical sections ,  
Deadlock, Synchronization Primitives, Messages

## UNIT-IV

### THREADING API's

Threading APIs for Microsoft Windows, Threading APIs for Microsoft .NETFramework: Creating Threads, Managing Threads, Thread Pools, Thread Synchronization, POSIX Threads: Creating Threads, Managing Threads, Thread Synchronization , Signaling , Compilation and Linking .

## UNIT-V

### OPENMP PROGRAMMING

OpenMP : Challenges in Threading a loop , Minimizing Threading overhead, Performance oriented Programming , Library Functions.

Solutions to parallel programming problems : Data races, deadlocks and Livelocks Non-blocking algorithms, Memory and cache related issues.

## UNIT-VI

**MPI PROGRAMMING** Message-Passing Model, Message-Passing Interface, MPI functions, Compiling and running MPI Programs, collective communication, data decomposition, Point-to-point communication – MPI Library.

## UNIT-VII

**MULTI-THREADED DEBUGGING TECHNIQUES** General Debug Techniques, Debugging Multi-threaded Applications in Windows : Threads Window , Tracepoints, Breakpoint Filters, Naming Threads , Multi-threaded Debugging Using GDB.

## UNIT-VIII

**MULTI-CORE PROCESSORS SOFTWARE DEVELOPMENT PRODUCTS:** An Overview of Software tools on Multi-Core Processors, Intel Software Development Products: overview , Thread Checker, Compilers: OpenMP, Software-based Speculative Precomputation, Compiler Optimization and Cache Optimization, Debugger , Intel Libraries, Intel Threading Building Blocks , VTune Performance Analyzer , Thread Profiler , MPI Programming : Intel Support for MPI

**TEXT BOOKS:**

1. Shameem Akhter and Jason Roberts, “Multi-core Programming- Increasing Performance through Software Multi-Threading”, 1<sup>st</sup> Edition, Intel Press, 2006.
2. Michael J Quinn, “Parallel programming in C with MPI and OpenMP”, 2<sup>nd</sup> Edition, Tata McGraw Hill, 2007.

**REFERENCE BOOKS:**

1. John L. Hennessey and David A. Patterson, “Computer architecture – A quantitative approach”, 4<sup>th</sup> Edition, Morgan Kaufmann/Elsevier Publishers, 2007.
2. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A hardware /software approach”, 1<sup>st</sup> Edition, Morgan Kaufmann/Elsevier Publishers, 1999.
3. Grama Ananth, Anshul Gupta, George Karypis and Vipin Kumar, “Introduction to Parallel Computing”, 2<sup>nd</sup> Edition, Addison-wesley, 2003.



## GREEN BUILDINGS AND INFRASTRUCTURE

(ELECTIVE III)

(Common to all branches except Civil Engineering )

Pre-requisites: None

**Course Code: ACE 1153**

L	T	P	C
4	1	0	4

### AIM :

To impart knowledge regarding environmental sustainability and environmentally responsible green buildings.

### OBJECTIVE :

The student must be able to develop skills to promote eco friendly characteristics in the area of buildings and identify crucial technologies, facilities and applications that help in developing green buildings.

### UNIT-I

**INTRODUCTION :** Introduction to Green Buildings.

### UNIT-II

**MACRO ENVIRONMENT:** Elements of climate, weather, Water cycle, Carbon cycle, Environmental quality, Deforestation, climatic change, Ozone depletion and implications.

### UNIT-III

**MICRO-ENVIRONMENT :** Natural environment Vis a vis built environment. Living environment characteristics and components of Urban Ecosystem solar radiation, heat flow, air-movement, Land use, drainage and sanitation.

### UNIT-IV

**CONCEPTS OF GREEN FIELD DEVELOPMENT :** Brown field development, environmental impact and ecological balance, FAR, layouts, sustainable Site development, vegetation, landscape elements, alternative



services and technologies, rain water harvesting, on site sewerage retention, treatment, recycle and reuse.

### **UNIT-V**

**BUILDING RESOURCES :** Passive energy system Design, Building envelope, orientation and components of building fabric and Shading, High rise buildings, modular building Construction, curtain walls, Sourcing and recycling of building materials, alternative Calcareous, metallic and non metallic, materials.

### **UNIT-VI**

**BUILDING INFRASTRUCTURE :** Active Energy Systems in buildings, Utilities and services, building automation. electro-mechanical systems, lifts and transportation, captive power plant and equipment, operation & maintenance.

### **UNIT-VII**

**INDOOR AIR QUALITY :** Fresh air requirements standards, Sick Building Syndrome and pollutants.

### **UNIT-VIII**

**BUILDING RATING SYSTEMS :** Building auditing, points system, components, and weight age, agencies and institutions, GBC, TERI etc, green buildings in the contexts of Indian sub continent.

### **TEXT BOOKS :**

1. Koenigsberger, O.H. “Manual of Tropical Housing and Building” Orient Longman Publishers, Chennai, 2003.
2. Odum, P. Eugene. “Ecology and Environments”, 2nd ed. Oxford and IBH Publishers, New Delhi, 2005.

### **REFERENCE BOOKS:**

1. Greening Building – Green Congress, US.(web).
2. HSMI. Sustainable Building Technology – HUDCO, HSMI (Human Settlement Management Institution, New Delhi.



## BIO-INFORMATICS

(ELECTIVE-IV)

(Common to CSE & IT)

**Course Code: ACT1133**

L	T	P	C
4	1	0	4

Pre-requisite: None

### AIM:

To teach students concepts of Bio-informatics and its applications in engineering field.

### OBJECTIVE:

To provide conceptual understandin of protein and Genone IS, alignmnet techniques and database searching, analysis.

### UNIT-I

**INTRODUCTION:** Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy.

### UNIT-II

**PROTEIN INFORMATION RESOURCES:** Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.

### UNIT-III

**GENOME INFORMATION RESOURCES:** DNA sequence databases, specialized genomic resources

### UNIT-IV

**DNA SEQUENCE ANALYSIS:** Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST

(Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases.

### UNIT-V

**PAIR WISE ALIGNMENT TECHNIQUES :** Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

### UNIT-VI

**MULTIPLE SEQUENCE ALIGNMENT :** Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching.

### UNIT-VII

**SECONDARY DATABASE SEARCHING :** Importance and need of secondary database searches, secondary database structure and building a sequence search protocol.

### UNIT-VIII

**ANALYSIS PACKAGES :** Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

### TEXT BOOKS:

1. T K Attwood & D J Parry-Smith Addison, “Introduction to Bioinformatics”, 1<sup>st</sup> Edition, Wesley Longman, 2008.

### REFERENCE BOOKS:

1. Arthur M.Lesk, “ Introduction to Bioinformatics”, 1<sup>st</sup> Edition, OXFORD publishers (Indian Edition), 2002.
2. Jean-Michel Claveriw, Cerdric Notredame, “Bioinformatics- A Beginner’s Guide”, 1<sup>st</sup> Edition, WILEY dreamtech India Pvt. Ltd, 2007.



## IMAGE PROCESSING

(ELECTIVE-IV)  
(Common to CSE & IT)

**Course Code: ACT1128**

L	T	P	C
4	1	0	4

Pre-requisite: Computer Graphics

### AIM:

To introduce the student to various image processing techniques.

### OBJECTIVES:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

### UNIT-I

**INTRODUCTION :** Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels.

### UNIT-II

**IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN :** Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods ( p.nos 76-141 of text book).

### UNIT-III

**IMAGE RESTORATION :** A model of the image degradation/restoration process, noise models, restoration in the presence of noise—only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

### UNIT-IV

**COLOR IMAGE PROCESSING :** Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation.

### UNIT-V

**IMAGE COMPRESSION :** Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards: JPEG compression standard, Fractal compression scheme, Wavelet compression scheme.

### UNIT-VI

**MORPHOLOGICAL IMAGE PROCESSING :** Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphological algorithms.

### UNIT-VII

**IMAGE SEGMENTATION :** Detection of discontinuous-First order and second order edge operators, Edge linking and boundary detection, Canny’s edge detection algorithm, Hough transform for detecting lines and curves, Edge linking, thresholding, region–based segmentation.

### UNIT-VIII

**OBJECT RECOGNITION :** Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching.

### TEXT BOOK:

1. Rafeal C.Gonzalez, Richard E.Woods, “Digital Image Processing”, 3rd Edition, Pearson Education/PHI,2010.

**REFERENCE BOOKS:**

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis, and Machine Vision”, 2<sup>nd</sup> Edition, ThomsonLearning, 2010.
2. Alasdair McAndrew, “Introduction to Digital Image Processing with Matlab”, 1<sup>st</sup> Edition, ThomsonCourseTechnology, 2010.
3. Adrian Low, “Computer Vision and Image Processing”, 2<sup>nd</sup> Edition, B. S. Publications, 2010.
4. Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, “Digital Image Processing using Matlab”, 1<sup>st</sup> Edition Pearson Education, 2010.
5. William K. Prat, Wily, “Digital Image Processing”, 3<sup>rd</sup> Edition
6. B. Chanda, D. Datta Majumder, “Digital Image Processing and Analysis”, 2<sup>nd</sup> Edition Prentice Hall of India, 2011.



## PATTERN RECOGNITION

(ELECTIVE-IV)

(Common to CSE & IT)

**Course Code: ACT1129**

L	T	P	C
4	1	0	4

Pre-requisite: None

### AIM:

To provide the basic skill in methods of design and analysis to identify patterns across engineering areas. Student will know about different aspects of machine learning using concepts of pattern recognition.

### OBJECTIVE:

To understand the methods and processes that shall be adopted to identify hidden patterns in the large volumes of data. This course covers the theory and methods for learning from data with an emphasis on pattern classification.

### UNIT-I

**INTRODUCTION :** Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation.

### UNIT-II

**BAYESIAN DECISION THEORY :** Introduction, continuous features – two categories classifications, minimum error-rate classification- zero-one loss function, classifiers, discriminant functions, and decision surfaces.

### UNIT-III

**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-IV****MAXIMUM LIKELIHOOD AND BAYESIAN PARAMETER ESTIMATION :**

Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case.

**UNIT-V****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-VI****COMPONENT ANALYSES :**

Principal component analysis, non-linear component analysis; Low dimensional representations and multi dimensional scaling.

**UNIT-VII****DISCRETE HIDDEN MARKOV MODELS :**

Introduction, Discrete–time markov process, extensions to hidden Markov models, three basic problems for HMMs.

**UNIT-VIII****CONTINUOUS HIDDEN MARKOV MODELS :**

Observation densities, training and testing with continuous HMMs, types of HMMs.

**TEXT BOOKS:**

1. Richard O. Duda, Peter E. Hart, David G. Strok, “ Pattern classifications”, 2<sup>nd</sup> Edition Wiley Student Edition, 2010.
2. Lawrence Rabiner, Biing, “Fundamentals of speech Recognition”, 1<sup>st</sup> Edition, Hwang Juang Pearson Education, 2009.

**REFERENCE BOOK:**

1. Earl Gose, Richard John baugh, “Pattern Recognition and Image Analysis”, 1<sup>st</sup> Edition, PHI, 2004.





## INFORMATION STORAGE SECURITY AND MANAGEMENT

(ELECTIVE-IV)  
(Common to CSE & IT)

**Course Code: ACT1138**

L	T	P	C
4	1	0	4

Pre-requisite: Information storage systems

### AIM:

Describes the advanced concepts involved in information storage and Management.

### OBJECTIVES:

- Describe about Information availability and Business continuity
- Describe the backup/recovery topologies
- Describe local replication and remote replication technologies and their operation
- Describe processes and technologies for identifying, analyzing, and mitigating security risks in storage infrastructure

### UNIT-I

**CONTENT-ADDRESSED STORAGE:** Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS, CAS Examples: Health Care Solution-Storing Patient Studies, Finance Solution-Storing Financial, Concepts in Practice: EMC Centera, EMC Centera Models ,EMC Centera Architecture ,Centera Tools, EMC Centera Universal Access

### UNIT-II

**STORAGE VIRTUALIZATION :** Forms of Virtualization: Memory Virtualization, Network Virtualization: Server Virtualization: Storage Virtualization, SNIA Storage Virtualization Taxonomy, Storage Virtualization Configurations, Storage Virtualization Challenges: Scalability, Functionality, Manageability, Support. Types of Storage Virtualization: Block-Level

Storage Virtualization, File-Level Virtualization. Concepts in Practice: EMC Invista, Rainfinity.

### UNIT-III

**INTRODUCTION TO BUSINESS CONTINUITY :** Information Availability: Causes of Information Unavailability, Measuring Information Availability, Consequences of Downtime. BC Terminology, BC Planning Lifecycle, Failure Analysis: Single Point of Failure. Fault Tolerance: Multipathing Software, Business Impact Analysis, BC Technology Solutions, Concept in Practice: EMC PowerPath, PowerPath Features, Dynamic Load Balancing, Automatic Path Failover.

### UNIT-IV

**BACKUP AND RECOVERY :** Backup Purpose: Disaster Recovery, Operational Backup: Archival. Backup Considerations , Backup Granularity , Recovery Considerations , Backup Methods, Backup Process , Backup and Restore Operations , Backup Topologies: Serverless Backup , Backup in NAS Environments, Backup Technologies : Backup to Tape, Physical Tape Library , Backup to Disk, Virtual Tape Library. Concepts in Practice: EMC NetWorker: NetWorker Backup Operation, NetWorker Recovery, EmailXtender, DiskXtender, Avamar, EMC Disk Library (EDL), Summary.

### UNIT-V

**LOCAL REPLICATION :** Source and Target, Uses of Local Replicas, Data Consistency: Consistency of a Replicated File System, Consistency of a Replicated Database. Local Replication Technologies: Host-Based Local Replication, Storage Array–Based Replication. Restore and Restart Considerations: Tracking Changes to Source and Target, Creating Multiple Replicas, Management Interface, Concepts in Practice: EMC TimeFinder and EMC SnapView, TimeFinder/Clone, TimeFinder/Mirror, EMC SnapView, EMC SnapSure, Summary

### UNIT-VI

**REMOTE REPLICATION :** Modes of Remote Replication, Remote Replication Technologies: Host-Based Remote Replication, Storage Array-Based Remote Replication, SAN-Based Remote Replication. Network Infrastructure: DWDM, SONET. Concepts in Practice: EMC SRDF,

EMC SAN Copy and EMC MirrorView : SRDF Family, Disaster Recovery with SRDF: SRDF Operations for Concurrent Access ,EMC SAN Copy, EMC MirrorView, Summary.

## **UNIT-VII**

**SECURING THE STORAGE** Storage Security, Risk : Assets, Threats ,Vulnerability. Storage Security Domains, Securing the Application Access Domain: Securing the Management Access Domain, Securing Backup, Recovery, and Archive (BURA) . Security Implementations in Storage Networking: SAN, NAS, IP SAN, Summary.

## **UNIT-VIII**

**MANAGING THE STORAGE INFRASTRUCTURE :** Monitoring the Storage Infrastructure: Parameters Monitored, Components Monitored, Monitoring Examples, Alerts. Storage Management Activities: Availability management, Capacity management, Performance management, Security Management, Reporting, Storage Management Examples. Storage Infrastructure Management Challenges, Developing an Ideal Solution: Storage Management Initiative, Enterprise Management Platforms. Concepts in Practice: EMC Control Center: Control Center Features and Functionality, Control Center Architecture, Summary.

## **TEXT BOOKS:**

1. G.Somasundaram, A.Shrivastava:EMC Corporation, “Information Storage and Management,” 1<sup>st</sup> Edition, Wiley publication, 2009.
2. Robert Spalding, “Storage Networks : The Complete Reference,” 1<sup>st</sup> Edition, Tata McGraw Hill/Osborne, 2003.

## **REFERENCE BOOKS:**

1. Marc Farley, “Building Storage Networks,” 2<sup>nd</sup> Edition, Tata McGraw Hill/Osborne, 2001.
2. Meeta Gupta, “Storage Area Network Fundamentals,” 1<sup>st</sup> Edition, Pearson Education, 2002.



## OPTIMIZATION TECHNIQUES

(ELECTIVE – IV)  
(Common to all branches)

**Pre-requisites:** Basic mathematical theory of vectors, matrices and functions.

**Course Code:** ACH1148

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### AIM & OBJECTIVES:

This course is concerned with formulating the optimization problems and solving them. Advanced topics on Evolutionary Optimization are also treated. MATLAB optimization Toolbox is used to solve large scale optimization problems.

### UNIT-I

**INTRODUCTION TO PROCESS OPTIMIZATION:** Formulation of various process optimization problems and their classification, constrained and unconstrained optimization. Classification of points in the 2D space.

Basic concepts of optimization: Convex Set, Convex functions, necessary and sufficient conditions for stationary points. Calculating Gradient of a function and Hessian matrix. Identifying minima and maxima points.

### UNIT-II

**LINEAR PROGRAMMING:** SIMPLEX algorithm, duality in Linear programming.

### UNIT-III

**TRANSPORTATION PROBLEM :** Solution of Balanced problems using East-West Rule.

### UNIT-IV

**UNCONSTRAINED OPTIMIZATION:** Optimality Criteria, Unidirectional search, Powell's Conjugate direction method, Gradient based method: Cauchy's steepest Descent method; Newton's method.

**UNIT-V**

**CONSTRAINED OPTIMIZATION:** Kuhn-Tucker conditions, Transformation methods: Penalty function method, method of multipliers.

**UNIT-VI**

**DISCRETE OPTIMIZATION:** Enumeration techniques and Branch and Bound method to solve discrete optimization problem.

**UNIT-VII**

**GENETIC ALGORITHMS :** Working principles, differences between GAs and traditional methods. Various operations like crossover and mutation.

**SIMULATED ANNEALING :** Metropolis Algorithm. (Qualitative treatment of GA and SA only).

**UNIT-VIII**

**MULTIOBJECTIVE OPTIMIZATION (MOO) :** Different methods to solve MOO like Utility function method and bounded function method. Solving 2D MOO problems graphically and identifying the Pareto set.

**TEXT BOOK:**

1. Kalyanmoy D, "Optimization for Engineering Design", Prentice Hall of India, 2005.
2. Rao S.S, "Engineering Optimization-Theory & Practices", New Age International Publishers, New Delhi, 1996.

**REFERENCES:**

1. Reklaitis, G.V., Ravindran, A., and Ragdell, "Engineering Optimization-Methods and Application", K.M., John Wiley, New York, 1983.

