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***COURSE STRUCTURE &  
SYLLABI FOR VII SEMESTER***

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## COMPUTER SCIENCE AND ENGINEERING

### 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
ACS1106	Computer Architecture	4	1	0	4
ACS1114	Principles of Data Warehousing and Data mining	4	1	0	4
	<b>Elective-I</b>	4	1	0	4
ACS1107	Natural Language Processing				
ACT1124	Unix Network Programming				
ACT1133	Bio-Informatics				
ACT1135	Information Storage Systems				
AEE1140	Electrical Safety Management				
AME1135	Non-Conventional Sources of Energy				
	<b>Elective-II</b>	4	1	0	4
ACT1125	Information Retrieval Systems				
ACS1108	Client-Server Computing				
ACT1126	Software Project Management				
ACT1136	Digital Forensics				
AEC1132	Satellite Communication				
ACE1152	Architectural Planning of Buildings				
ACS1109	<i>Embedded Systems lab</i>	0	0	3	2
ACS1110	<i>Data mining and Data Warehousing lab</i>	0	0	3	2
ACS11MP	* Industry Oriented Mini-project	-	-	-	2
	<b>Total</b>	<b>24</b>	<b>5</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 Books:**

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).

**ACTIONSCRIPT 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.



## COMPUTER ARCHITECTURE

**Course Code: ACS1106**

L	T	P	C
4	1	0	4

### AIM:

To teach the student advanced computer concepts and provide an understanding of various computer technologies.

### OBJECTIVE:

To provide a quantitative approach to the science of computer architecture, organisation and design.

### UNIT-I

Fundamentals of Computer design, Technology trends, cost, measuring and reporting performance, quantitative principles of computer design.

### UNIT-II

Instruction set principles and examples, classifying instruction set, memory addressing, type and size of operands, addressing modes for signal processing, operations in the instruction set, instructions for control flow, encoding an instruction set, the role of compiler

### UNIT-III

Instruction level parallelism (ILP), overcoming data hazards, reducing branch costs, high performance instruction delivery; hardware based speculation, limitation of ILP

### UNIT-IV

ILP software approach, compiler techniques, static branch protection, VLIW approach, H/W support for more ILP at compile time, H/W versus S/W Solutions

### UNIT-V

Memory hierarchy design; cache performance, reducing cache miss penalty and miss rate, virtual memory, protection and examples of VM.

## UNIT-VI

Multiprocessors and thread level parallelism, symmetric shared memory architectures, distributed shared memory, synchronization, multi threading.

## UNIT-VII

Storage systems- Types, Buses, RAID, errors and failures, bench marking a storage device, designing a I/O system.

## UNIT-VIII

Inter connection networks and clusters; interconnection network media, practical issues in inter connecting networks, examples, designing a cluster.

### TEXT BOOK:

1. John L. Hennessy & David A. Patterson, “Computer Architecture A quantitative approach,” Morgan Kaufmann, 5<sup>th</sup> Edition, An Imprint of Elsevier, 2011.

### REFERENCE BOOKS:

1. Kai Hwang and A. Briggs, “Computer Architecture and parallel Processing,” 1<sup>st</sup> Edition , International Edition McGraw Hill, 2004.
2. Dezso Sima, Terence Fountain, Peter Kacsuk, “Advanced Computer Architectures,” 1<sup>st</sup> Edition, Pearson, 2005.
3. David E. Culler, Jaswinder Pal Singh, “Parallel Computer Architecture A Hardware / Software Approach,” 2<sup>nd</sup> Edition, Princeton, 2005.



## PRINCIPLES OF DATA WAREHOUSING AND DATA MINING

Course code: ACS1114

L	T	P	C
4	1	0	4

### AIM:

To introduce the student to various data warehousing and data mining techniques

### OBJECTIVE:

To make the student capable of applying data mining and data warehousing techniques

### UNIT-I

**INTRODUCTION :** Data mining-On what kinds of Data, what kinds of patterns can be mined, which technologies are used, which kinds of applications are targeted, Major issues in Data Mining.

### UNIT-II

**DATA PREPROCESSING :** An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

### UNIT-III

**DATA WAREHOUSE AND OLAP TECHNOLOGY :** Data Warehouse: Basic concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse design and usage, Data Warehouse Implementation.

### UNIT-IV

**DATA GENERALIZATION AND DATA CUBE COMPUTATION:** Data generalization by Attribute-Oriented Induction, Data Cube Computation: Preliminary concepts, Data Cube Computation methods, Multidimensional Data Analysis in Cube space.

## UNIT-V

**MINING FREQUENT PATTERNS, ASSOCIATION AND CORRELATIONS :** Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods, Which patterns Are interesting? -Pattern Evaluation methods.

## UNIT-VI

**CLASSIFICATION: Basic concepts :** Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification.

## UNIT-VII

**CLASSIFICATION: Advanced concepts :** Support Vector Machines, Classification using frequent patterns.

## UNIT-VIII

**CLUSTER ANALYSIS: Basic Concepts:** Cluster analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Outlier and Outlier Analysis.

## TEXT BOOKS:

- 1 Jlawei Han & Micheline Kamber, “Data Mining – Concepts and Techniques”, 3<sup>rd</sup> Edition, Morgan Kaufmann Publishers, 2008.
- 2 Margaret H Dunham, “Data Mining Introductory and advanced topics”, 6<sup>th</sup> Edition, Pearson Education, 2009.

## REFERENCE BOOKS:

1. Arun K Pujari, “Data Mining Techniques”, 1<sup>st</sup> Edition, University Press, 2005.
2. Pang- Ning Tan, Michael Steinbach, Vipin Kumar, “Introduction to Data Mining”, 1<sup>st</sup> Edition, Pearson Education, 2009.
3. Sam Aanhory & Dennis Murray, “Data Warehousing in the Real World”, 1<sup>st</sup> Edition, Pearson Edn Asia, 2008.
4. Paulraj Ponnaiah, “Data Warehousing Fundamentals”, 1<sup>st</sup> Edition, Wiley student Edition, 2007.
5. Ralph Kimball, “The Data Warehouse Life Cycle Tool Kit”, 2<sup>nd</sup> Edition, Wiley student Edition, 2005.

# NATURAL LANGUAGE PROCESSING

(ELECTIVE-I)

**Course Code: ACS1107**

L	T	P	C
4	1	0	4

## AIM:

To lay out the mathematical and linguistic foundations for Natural Language Processing.

## OBJECTIVE:

To introduce statistical methods and models to process natural languages.

## UNIT-1

**INTRODUCTION :** Rationalist and Empiricist Approaches to Language, Scientific Content, Questions that linguistics should answer , Non-categorical phenomena in language , Language and cognition as probabilistic phenomena, The Ambiguity of Language: Why NLP Is Difficult, Dirty Hands, Lexical resources, Word counts, Zipf's laws, Collocations, Concordances.

## UNIT-II

**MATHEMATICAL FOUNDATIONS :** Elementary Probability Theory, Probability spaces, Conditional probability and independence, Bayes' theorem, Random variables, Expectation and variance, Notation, Joint and conditional distributions, Determining, Standard distributions, Bayesian statistics, Essential Information Theory, Entropy, Joint entropy and conditional entropy, Mutual information, The noisy channel model, Relative entropy or Kullback-Leibler divergence, The relation to language: Cross entropy , The entropy of English, Perplexity.

## UNIT-III

**LINGUISTIC ESSENTIALS :** Parts of Speech and Morphology, Nouns pronouns , Words that accompany nouns: Determiners and adjectives , Verbs, Other parts of speech, Phrase Structure , Phrase

structures, Dependency: Arguments and adjuncts, X' theory, Phrase structure ambiguity, Semantics and pragmatics.

#### **UNIT-IV**

**WORDS COLLOCATIONS :** Frequency, Mean and Variance, Hypothesis Testing, The test, Hypothesis testing of differences, Pearson's chi-square test, Likelihood ratios, Mutual Information, The Notion of Collocation.

#### **UNIT-V**

**STATISTICAL INFERENCE: N -GRAM MODELS OVER SPARSE DATA BINS:** Forming Equivalence Classes, Reliability vs. discrimination , n-gram models, Statistical Estimators, Maximum Likelihood Estimation, Laplace's law, Lidstone's law and the Jeffreys-Perks law , Held out estimation, Cross-validation (deleted estimation), Good-Turing estimation, Briefly noted, Combining Estimators , Simple linear interpolation, Katz's backing-off, General linear interpolation, Briefly noted Language models for Austen.

#### **UNIT-VI**

**WORD SENSE DISAMBIGUATION :** Methodological Preliminaries, Supervised and unsupervised learning, Pseudo words, Upper and lower bounds on performance, Supervised Disambiguation, Bayesian classification, An information-theoretic approach , Dictionary-Based Disambiguation, Disambiguation based on sense definitions, Thesaurus-based disambiguation, Disambiguation based on translations in a second-language corpus, One sense per discourse, one sense per collocation, Unsupervised Disambiguation, What Is a Word Sense?

#### **UNIT-VII**

**LEXICAL ACQUISITION :** Evaluation Measures, Verb Sub categorization, Attachment ambiguity, General remarks on PP attachment, Selection Preferences, Semantic, Vector space model, Probabilistic measures, The Role of Lexical Acquisition in Statistical NLP.

#### **UNIT-VIII**

**MARKOV MODELS :** Markov Models, Hidden Markov Models,

Why use, General form of an HMM, The Three Fundamental Questions for HMMs, Finding the probability of an observation, Finding the best state sequence, The third problem: Parameter estimation, Implementation, Properties, and Variants, Implementation, Variants, Multiple input observations, Initialization of parameter values .

**TEXT BOOK:**

1. Christopher D. Manning and Heinrich Schutze, “Statistical Language Processing”, 1<sup>st</sup> Edition, MIT Press, 2009.

**REFERENCE BOOKS:**

1. Dan Jurafsky and James H. Martin, “Speech and Language Processing”, 2<sup>nd</sup> Edition, Prentice Hall, 2008.
2. Manu Konchady, “Text Mining Application Programming”, 1<sup>st</sup> Edition, Delmar Cengage, 2006.



# UNIX NETWORK PROGRAMMING

(ELECTIVE-I)

(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 UDP, 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 UDPSOCKETS** : 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.



## BIO-INFORMATICS

(ELECTIVE-I)

(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 understanding of protein and Genome IS, alignment techniques and database searching, analysis.

### UNIT-I

**INTRODUCTION:** Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition and 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.



# 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:

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

## OBJECTIVES :

1. Describe storage technology solutions
2. Describe common storage management and roles
3. Understand the concept of information availability and its measurement

## UNIT-I

### INTRODUCTION TO INFORMATION STORAGE AND MANAGEMENT OF 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, 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**

<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 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	1	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.



# INFORMATION RETRIEVAL SYSTEMS

(ELECTIVE-II)

(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:**

1. 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. Chowdhury, “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.



## CLIENT-SERVER COMPUTING

(ELECTIVE-II)

**Course Code: ACS1108**

<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 give an exposure on various aspects of Client-Server Computing Applications.

### OBJECTIVE:

Students will be able to learn basic concepts of client-server computing. They will apply the techniques and features of a client-server development language to construct a moderately complex client-server application.

### UNIT-I

**INTRODUCTION TO CLIENT/SERVER COMPUTING:** Single System Image, Client Server Computing, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools.

### UNIT-II

**ADVANTAGES OF CLIENT SERVER COMPUTING :** The advantages of client server computing, Technology Revolution, Connectivity, User Productivity, ways to improve performance, how to reduce network traffic, vendor independence, faster delivery of systems.

### UNIT-III

**COMPONENTS OF CLIENT/SERVER APPLICATION-THE CLIENT, THE SERVER :** Role of the client, Client services, request for services, role of the server, Detailed server functionality, the network operating system, available platforms, the server operating system.

### UNIT-IV

**COMPONENTS OF CLIENT/SERVER APPLICATIONS-CONNECTIVITY :** Open Systems Interconnect , communication

interface technology, Interposes communication, wide area network technologies.

### **UNIT-V**

#### **CLIENT-SERVER SYSTEMS DEVELOPMENT-SOFTWARE:**

Factors for Application Software Development, improving technology , platform migration, common interface across platforms, client/server systems development methodology, project management, architecture definition, systems development environment.

### **UNIT-VI**

#### **CLIENT-SERVER SYSTEMS DEVELOPMENT- HARDWARE:**

Hardware/Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware, Data Storage, magnetic disk, mirrored disk , RAID-Disk array and others , network interface cards, Token ring, Ethernet, FDDI, CDDI, Power protection devices, uninterruptable power supply.

### **UNIT-VII**

#### **CLIENT SERVER SYSTEMS DEVELOPMENT-SERVICES**

**AND SUPPORT:** system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Remote Systems Management Security, LAN and Network Management issues.

Client/Server System Development: Training, Training advantages of GUI Application, System Administrator training, Database Administrator training, End-user training.

### **UNIT-VIII**

#### **THE FUTURE OF CLIENT SERVER COMPUTING:**

Enabling Technologies, expert systems, Geographic information systems, point-of-service, imaging, electronic document management, fulltext retrieval, transformational systems.

#### **TEXT BOOK:**

1. Patrick Smith & Steave Guengerich, “Client / Server Computing”, 2<sup>nd</sup> Edition, PHI, 2011.

**REFERENCE BOOKS:**

1. Dawna Travis Dewire, “Client/Server Computing”, 1<sup>st</sup> Edition, TMH, 2008.
2. Yadav, Subhash Chandra, Singh, Sanjay Kumar, “An Introduction to Client/Server Computing”, 1<sup>st</sup> Edition, New Age International Publication, 2009.



# 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.



## 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.



## EMBEDDED SYSTEMS LAB

**Course Code: ACS1109**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

### AIM:

To teach students applications of 32 bit Processors.

### OBJECTIVE :

This program exposes the emerging Technologies in the area which is expanding by leaps and bounds. It is imperative that our students get glimpse of the emerging development via hands on experience.

### LIST OF EXPERIMENTS

- 1) Basic programs using ARM Processors
  - a) I/O PORTS
  - b) ADC
  - c) timers
  - d) capture control and Pulse width modulation
  - e) Serial communication
  - d) ZIGBEE interfacing
  - e) RF Communication
- 2) Use of Captures Control in the following applications
  - a) Transit time of a moving object
  - b) Velocity of acceleration measurement of a linear object/and above rotary object
  - c) Pulse width Modulation in power Combine and regulator
  - d) PWM to generate any wave from , control phase and magnitude
  - e) Measurement of frequency
  - f) Ultrasonic transit time measurement
- 3) Graphics
  - a. Pixel programming and display control graphic Display
  - b. Touch Sensitive search to select a Programming module
  - c. Graphic representation of Wave forms generation in (1) above

- 4) **Synchronous Communication** using
  - a. 12 c bus
  - b. SPI bus
  - c. Enumeration in USB
  - d. Two wire Flash Program using of EEPROMS, Flash memories' and Programming
- 5) **In circuit-emulator** – Its examples application to
  - a) Debug a Program
  - b) Logic analysis of timing diagrams
- 6)
  - a) ADC Measurement
  - b) Data Acquisition and analysts
  - c) Measurement of timing wave forms for peak and valleysBluetooth Wireless Transmission



## DATA MINING AND DATA WAREHOUSING LAB

Course Code: ACS1110

L	T	P	C
0	0	3	2

### AIM:

To apply the learnt concepts of data mining and text mining practically

### OBJECTIVES :

- To introduce Weka software
- To make students implement data mining algorithms in Java
- To introduce text mining techniques to students
- To build data cube either by using open source tools or using SQL.
- To design, develop and implement data warehouse for simple applications.
- To understand and study data warehouse administration support concepts by considering any one commercial data warehouse.

### LIST OF EXPERIMENTS

1. Introduction to Weka : All the features of Weka software will be explored in this assignment. (2 weeks)
2. Implementation of Apriori algorithm (2 weeks)
3. Implementation of FP tree algorithm (2 weeks)
4. Implementation of Naïve Bayesian classification algorithm (1 week)
5. Implementation of K-means clustering algorithm (1 week)
6. Introduction to text mining : Text mining preprocessing tasks such as stop word removal, POS tagging, Introduction to Wordnet, Indexing, Classification of text using Naïve bayes etc. (3 weeks)

7. OLAP operators, building of data cube, simulation of data cube using powerful functions of SQL (1 week).
8. Data warehouse design and development-case study (1 week).
9. Data warehouse administration support-partitioning in SQL, parallel execution, materialized views, and demonstration using a data base (1 week).



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

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## VIII Semester

COURSE CODE	THEORY/LAB	L	T	P	C
ACS1111	Human Computer Interaction	4	0	0	4
	<b>Elective-III</b>	4	1	0	4
ACT1127	Network Management Systems				
ACS1112	Artificial Neural Networks				
ACT1128	Image Processing				
ACT1137	Multi-Core Programming				
ACE1153	Green Buildings & Infrastructure				
	<b>Elective-IV</b>	4	1	0	4
ACT1129	Pattern Recognition				
ACT1132	Mobile Communications				
ACS1113	Virtual Reality				
ACT1138	Information Storage Security and Management				
ACH1148	Optimization Techniques				
ACS11SM	Seminar	0	0	3	2
ACS11CV	Comprehensive Viva	0	0	0	4
ACS11PW	Project Work	0	0	9	12
	<b>Total</b>	<b>12</b>	<b>2</b>	<b>12</b>	<b>30</b>

## HUMAN COMPUTER INTERACTION

**Course Code: ACS1111**

L	T	P	C
4	0	0	4

### **AIM:**

**HCI** is the study of interaction between humans and computers specifically as it pertains to information security. Its aim, in plain terms, is to improve the usability of security features in end user applications.

### **OBJECTIVE:**

The student will learn how interaction with computers takes place at user interface, which comprises both hardware and software.

### **UNIT-I**

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

### **UNIT-II**

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, characteristics, web user – interface popularity, characteristics- principle of user interface.

### **UNIT-III**

Design process – Human interaction with computers, importance of human characteristics and human consideration; Human interaction speeds and understanding business functions.

### **UNIT-IV**

Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

**UNIT-V**

Windows – New and Navigation schemes selection of window, selection of devices based and screen based Controls.

**UNIT-VI**

Components – text and messages, Icons and increases – multimedia, colors, uses problems, choosing colors.

**UNIT-VII**

Software tools – Specification methods, interface – Building Tools.

**UNIT-VIII**

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

**TEXT BOOKS:**

1. Ben Shneidermann, “Designing the User Interface,” 3<sup>rd</sup> Edition, Pearson Education Asia, 2007.

**REFERENCE BOOKS:**

1. Alan Dix, Janet Finclay, “Human – Computer Interaction,” 3<sup>rd</sup> Edition, Pearson, 2003.
2. Rogers, Sharps, “Interaction Design, PRECE,” 1<sup>st</sup> Edition, Wiley Dreamtech, 2002.
3. Soren Lauesen, “User Interface Design”, 1<sup>st</sup> Edition, Pearson Education, 2005.
- 4.. Wilbert O Galitz, “The Essential Guide to User Interface Design,” 3<sup>rd</sup> Edition, Wiley DreamTech, 2007.



## NETWORK MANAGEMENT SYSTEMS

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

**Course Code: ACT1127**

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

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 COMMUNICATION 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 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.



# ARTIFICIAL NEURAL NETWORKS

(ELECTIVE-III)

**Course Code: ACS1112**

L	T	P	C
4	1	0	4

## AIM:

To give prerequisites in understanding the concepts of Neural Networks and applications.

## OBJECTIVE :

To introduce Neural Network models, synaptic dynamics, ANN for pattern recognition and applications.

## UNIT-1

**BASICS OF ARTIFICIAL NEURAL NETWORKS :** Characteristics of neural networks, Historical development of neural network, artificial neural networks: terminology, models of neurons, topology, basic learning laws.

## UNIT-II

**ACTIVATION AND SYNAPTIC DYNAMICS :** Activation Dynamics models, Synaptic Dynamics models, learning methods, stability and convergence, recall in neural networks.

## UNIT-III

**FUNCTIONAL UNITS OF ANN FOR PATTERN RECOGNITION TASKS :** Pattern Recognition Problems, basic functional units, Pattern Recognition tasks by the functional units.

## UNIT-IV

**FEED FORWARD NEURAL NETWORKS :** Analysis of pattern association networks, Analysis of pattern classification networks, Analysis of pattern mapping networks.

## UNIT-V

**FEEDBACK NEURAL NETWORKS :** Analysis of linear auto

associative FF Networks, Analysis of pattern storage networks, Stochastic Networks and Simulated Annealing, Boltzmann Machine.

### **UNIT-VI**

#### **COMPETITIVE LEARNING NEURAL NETWORKS :**

Components of competitive learning networks, analysis of feedback layer for different output functions, analysis of pattern clustering networks, analysis of feature mapping networks.

### **UNIT-VII**

#### **ARCHITECTURES FOR COMPLEX PATTERN RECOGNITION TASKS :**

Associative memory, pattern mapping, stability-plasticity dilemma: ART, Temporal patterns, Pattern Variability: Neocognitron.

### **UNIT-VIII**

**APPLICATIONS OF ANN :** Direct Applications, Application Area.

#### **TEXT BOOK:**

1. B. Yegnanarayana, “Artificial Neural Networks”, 1<sup>st</sup> Edition, Prentice Hall, 2009

#### **REFERENCE BOOKS:**

1. Satish Kumar, “Neural Networks – A Classroom Approach”, 2<sup>nd</sup> Edition, Tata McGraw-Hill, 2004.
1. C.M.Bishop, “Pattern Recognition and Machine Learning”, 1<sup>st</sup> Edition, Springer, 2006.



## IMAGE PROCESSING

(ELECTIVE-III)  
(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.



## 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.



## 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.



## MOBILE COMMUNICATIONS

(ELECTIVE-IV)  
(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.



## VIRTUAL REALITY

(ELECTIVE-IV)

**Course Code: ACS 1113**

L	T	P	C
4	1	0	4

### AIM:

Virtual Reality has branched out into numerous domains - from education to medicine to the alluring world of entertainment. The aim of this course is to train students in higher domain of virtual reality.

### OBJECTIVES:

1. To introduce the student to virtual reality in audio visual appliances, training, aircraft piloting, simulation of human movement and control etc.
2. To provide an understanding of visual affects, position sensing and three dimensional affects.

### UNIT-I

**INTRODUCTION :** The three I's of virtual reality, commercial VR technology and the five classic components of a VR system. (1.1, 1.3 and 1.5 of Text book 1)

### UNIT-II

**INPUT DEVICES :** (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces. (2.1, 2.2 and 2.3 of Text book 1).

### UNIT-III

**OUTPUT DEVICES :** Graphics displays, sound displays & haptic feedback. (3.1,3.2 & 3.3 of Text book 1)

### UNIT-IV

**MODELING :** Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model management. (5.1, 5.2 and 5.3, 5.4 and 5.5 of Text book 1).

## UNIT-V

Human Factors: Methodology and terminology, user performance studies, VR health and safety issues. (7.1, 7.2 and 7.3 of Text book 1).

## UNIT-VI

**APPLICATIONS:** Medical applications, military applications, robotics applications. (8.1, 8.3 and 9.2 of Text book 1).

## UNIT-VII

**VR PROGRAMMING-I :** Introducing Java 3D, loading and manipulating external models, using a lathe to make shapes. (Chapters 14, 16 and 17 of Text book 2)

## UNIT-VIII

**VR PROGRAMMING-II :** 3D Sprites, animated 3D sprites, particle systems. (Chapters 18, 19 and 21 of Text book 2)

## TEXT BOOKS:

1. Gregory C. Burdea & Philippe Coiffet, “Virtual Reality Technology”, 2<sup>nd</sup> Edition, John Wiley & Sons, Inc., 2003.
2. Andrew Davison, “Killer Game Programming in Java”, 1<sup>st</sup> Edition, O’Reilly-SPD, 2005.

## REFERENCES BOOKS:

1. William R.Sherman, Alan Craig, “Understanding Virtual Reality, interface, Application and Design,” 2<sup>nd</sup> Edition, Elsevier (Morgan Kaufmann), 2003.
2. Bill Fleming, “3D Modeling and surfacing,” 1<sup>st</sup> Edition, Elsevier (Morgan Kauffman), 2003.
3. David H.Eberly, “3D Game Engine Design,” 2<sup>nd</sup> Edition, Elsevier, 2006.
4. John Vince, “Virtual Reality Systems,” 1<sup>st</sup> Edition, Pearson Education, 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,

Undirectional 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 Ragsdell, "Engineering Optimization-Methods and Application", K.M., John Wiley, New York, 1983.

