

## **VISION**

*To evolve into a premier engineering institute in the country by continuously enhancing the range of our competencies, expanding the gamut of our activities and extending the frontiers of our operations.*

## **MISSION**

*Synergizing knowledge, technology and human resource, we impart the best quality education in Technology and Management. In the process, we make education more objective so that the efficiency for employability increases on a continued basis.*

# **Academic Regulations 2013 for M.Tech (Regular)**

**(With effect from batch admitted in the academic year 2013-2014)**

The M.Tech Degree of the Aditya Institute of Technology and Management (Autonomous), Tekkali shall be conferred on candidates who are admitted to the programme and fulfill all the requirements for the award of the Degree.

## **1. ELIGIBILITY FOR ADMISSIONS:**

Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the University from time to time. Admissions shall be made on the basis of merit rank obtained by the qualifying candidate in GATE / PG CET, subject to reservations prescribed by the Govt. of AP from time to time.

## **2. AWARD OF M. Tech DEGREE:**

- 2.1** A student shall be declared eligible for award of the M.Tech degree, if he/she pursues a course of study and completes it successfully in not less than two academic years and not more than four consecutive academic years and registered for **80** credits and he/she must secure total **80** credits.
- 2.2** A student, who fails to fulfill all the academic requirements for the award of the degree within four academic years from the year of his/her admission, shall forfeit his/her seat in M.Tech course.
- 2.3** The minimum clear instruction days for each semester are 95.

## **3. ATTENDANCE:**

- 3.1** A candidate shall be deemed to have eligibility to write End Semester examinations if he/she has put in a minimum of 75% of attendance in aggregate of all the subjects.
- 3.2** Condonation of shortage of attendance up to 10% (65% and above, and below 75%) may be given by the College academic committee.
- 3.3** Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representations by the candidate with supporting evidence.
- 3.4** Shortage of attendance below 65% shall in NO case be condoned.

- 3.5 A candidate shall not be promoted to the next semester unless he/she fulfills the attendance requirements of the present semester.
- 3.6 A stipulated fee shall be payable towards condonation of shortage of attendance.

**4. COURSE OF STUDY:**

The following specializations are offered at present for the M.Tech course of study.

1	Digital Electronics and Communication Systems
2	VLSI System Design
3	Power Electronics and Electric Drives
4	Computer Science and Engineering
5	Information Technology
6	Thermal Engineering

**5. EVALUATION:**

The performance of the candidate in each semester shall be evaluated subject-wise, with a Maximum of 100 marks for theory and 100 marks for Laboratory, on the basis of Internal Evaluation and End Semester Examination.

- 5.1 For the theory subjects 60 marks shall be awarded based on the performance in the End Semester Examination. Out of 40 internal marks **30** marks are assigned for subjective exam, 5 marks for subjective assignments and 5 marks for seminars. The internal evaluation for 30 marks shall be made based on the **average** of the marks secured in the two Mid Term-Examinations conducted, one in the middle of the Semester and the other immediately after the completion of instruction. Each midterm examination shall be conducted in a duration of 120 minutes and question paper shall contain **4** questions. The student should answer all **4** questions.
- 5.2 For practical subjects, 60 marks shall be awarded based on the performance in the End Semester Examinations. Out of 40 internal marks 20 marks are assigned based on day to day evaluation and 20 marks are assigned based on the internal test.

- 5.3 There shall be a technical seminar presentation during 3<sup>rd</sup> semester. For technical seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee. The Departmental Committee consists of Head of the Department, supervisor and two other senior faculty members of the department. For technical seminar there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% to be declared successful.
- 5.4 A candidate shall be deemed to have secured the academic requirement in a subject if he/she secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.
- 5.5 In case the candidate does not secure the minimum academic requirement in any Subject (as specified in 5.4) he has to reappear for the supplementary Examination in that subject.
- 5.6 The viva-voce examination shall be conducted at the end of the course work and after the candidate passing all subjects.
- 5.7 Laboratory examination for M.Tech courses must be conducted with two Examiners, one of them being Laboratory Class Teacher and second examiner shall be external examiner.

## **6. EVALUATION OF PROJECT/DISSERTATION WORK:**

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

- 6.1 A Project Review Committee (PRC) shall be constituted with Principal as chair person, Head of the department, one senior faculty member and project guide.
- 6.2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical).
- 6.3 After satisfying 6.2, a candidate has to submit, in consultation with his / her project supervisor, the title, objective and plan of action of his project work (Based on a

publication in a Peer Reviewed Journal) to the Project Review Committee for its approval before the second semester end examinations. After obtaining the approval of the Committee, the student can initiate the Project work after the second semester end examinations.

- 6.4** Every candidate shall work on projects approved by the PRC of the college.
- 6.5** If a candidate wishes to change his supervisor or topic of the project, he/she can do so with approval of the PRC. However, the Project Review Committee ( PRC) shall examine whether the change of topic/supervisor leads to a major change of his initial plans of project proposal. If so, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.
- 6.6** A candidate shall submit status report in two stages at least with a gap of 3 months between them.
- 6.7** The work on the project shall be initiated in the beginning of the second year/III semester and minimum duration of the project is two semesters. The candidate shall identify the problem, Literature survey, design/modeling part of the problem i.e. almost 35% of his dissertation/project work should complete in the III semester itself and it will be evaluated by PRC. If the candidate fails to get the satisfactory report, he has to re-register for the project/dissertation work.
- 6.8** A candidate shall be allowed to submit the project report only after fulfilling the attendance requirements of all the semesters with approval of PRC and not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal (through Head of the Department) and shall make an oral presentation before the PRC.
- 6.9** The Candidate may be permitted to submit the Project Report, if only after the work is Published/Accepted to be Published in a Journal / International conference of repute and relevance.
- 6.10** Three copies of the Project Thesis certified by the supervisor shall be submitted to the College/Institute.
- 6.11** The thesis shall be adjudicated by external examiner from outside the college.

**6.12** The viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner outside the college who adjudicated the Thesis.

**6.13** The student has to clear all the subjects of M.Tech course before submission of the project thesis/ dissertation

**The Board shall jointly report candidates work as :**

- A. Excellent
- B. Good
- C. Satisfactory
- D. Unsatisfactory

Head of the Department shall coordinate and make arrangements for the conduct of viva-voce examination. If the report of the viva-voce is unsatisfactory, the candidate has to retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, the candidate may be asked to submit a new project proposal to PRC starting with 6.5

## **7. METHOD OF AWARDING LETTER GRADES AND GRADE POINTS FOR A COURSE.**

A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.

Table: Grading System for M.Tech. Programme

Percentage of Marks	Grade Points	Letter Grade
90-100	10	S
80-89	9	A
70-79	8	B
60-69	7	C
50-59	6	D
40-49	5	E
< 40	0	F (Fail)

### **7.1 Calculation of Semester Grade Points Average (SGPA)\* for semester**

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as below:

$$SGPA = \frac{\Sigma(CR \times GP)}{\Sigma CR} \text{ (for all courses passed in semester)}$$

Where CR = Credits of a Course

GP = Grade points awarded for a course

\*SGPA is calculated for the candidates who passed all the courses in that semester.

### **7.1.1 Calculation of Cumulative Grade Points Average (CGPA) and Award of Division for Entire Programme.**

**The CGPA is calculated as below:**

$$CGPA = \frac{\Sigma(CR \times GP)}{\Sigma CR} \text{ (for entire programme)}$$

Where CR = Credits of a course

GP = Grade points awarded for a course

Table: Award of Divisions

CGPA	DIVISION
$\geq 8$	First Class with distinction
$\geq 7 - < 8$	First Class
$\geq 6 - < 7$	Second Class
$< 6$	Fail

After a student has satisfied the requirements prescribed for the completion of the programme and is eligible for receiving the award of M.Tech. Degree, he shall be placed in one of the above three divisions.

### **8. WITH-HOLDING OF RESULTS:**

If the candidate has not paid any dues to the college or if any case of indiscipline is pending against him / her, the result of the candidate will be withheld and he/she will not be allowed into the next higher semester. The issue of the degree is liable to be withheld in such cases.

### **9. TRANSITORY REGULATIONS:**

Candidate who have discontinued or have been detained for want of attendance or who have failed after having undergone the course are eligible for admission to the same or equivalent subjects as and when subjects are offered, subject to 5.5 and 2.0

**10. GENERAL:**

- 10.1** The academic regulations should be read as a whole for purpose of any Interpretation.
- 10.2** In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.
- 10.3** The Institute may change or amend the academic regulations and syllabus at any time and the changes and amendments made shall be applicable to all the students with effect from the date notified by the college.
- 10.4** Wherever the word he, him or his occur, it will also include she, her and hers.

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S. No	SUBJECT CODE	Subject	L	P	C	INT	EXT
1	13MIT1001	Advanced data structures	4	-	3	40	60
2	13MIT1002	Advanced Unix programming	4	-	3	40	60
3	13MIT1003	Data Base Management Systems	4	-	3	40	60
4	13MIT1004	Advanced Computer Network	4	-	3	40	60
5	13MIT1005	Code Optimization	4	-	3	40	60
6	13MIT1006	Object Oriented Software Engineering	4	-	3	40	60
7	13MIT1101	Advanced UNIX Programming Lab/ Advanced data structures Lab	-	3	2	40	60
<b>Total</b>			24	3	20	280	420
<b>M. Tech. (IT) – 2<sup>nd</sup> SEMESTER</b>							
S. No	SUBJECT CODE	Subject	L	P	C	INT	EXT
1	13MIT1007	Image Processing	4	-	3	40	60
2	13MIT1008	Parallel Computing Architecture	4	-	3	40	60
3	13MIT1009	Machine Learning	4	-	3	40	60
4	13MIT1010	Data Mining & Knowledge Discovery			3	40	60
5	13MIT1011 13MIT1012 13MIT1013 13MIT1014	<b>Elective-I</b> i) Network Management Systems ii) Distributed Operating Systems iii) Information Security iv) Soft Computing	4	-	3	40	60
6	13MIT1015 13MIT1016 13MIT1017 13MIT1018	<b>Elective-II</b> i) Ad-Hoc Sensor Networks ii) Bio- Informatics iii) Secured Database Applications Development iv) Multimedia and Application Development	4	-	3	40	60
7	13MIT1102	Image Processing Lab	-	3	2	40	60
8	13MIT1103	Parallel Computing Architecture Lab	-	3	2	40	60
<b>Total</b>			20	6	22	320	480
<b>M. Tech. (IT) – 3<sup>rd</sup> SEMESTER</b>							
			L / P	C	INT	EXT	
1	13MIT2201	Technical Seminar	-	2	100	-	
2	13MIT2202	Project Work Phase-1	-	18	-	-	
<b>Total</b>			<b>20</b>	<b>100</b>	<b>-</b>		
<b>M. Tech. (IT) – 4<sup>th</sup> SEMESTER</b>							
			L / P	C	INT	EXT	
1	13MIT2203	Project Work Phase-2	-	18	-	-	
<b>Total</b>			<b>18</b>	<b>-</b>	<b>-</b>		

L – Lecture hours/ Week; P – Practical hours/ Week; C – Credits; INT – Internal Marks;  
EXT – External Marks;

# ADVANCED DATA STRUCTURES

**Subject Code: 13MIT1001**

L	P	C	INT	EXT
4	0	3	40	60

## **COURSE OBJECTIVES:**

- Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure.
- Explain why competitive analysis is an appropriate measure for online algorithms.
- Explain the use of randomization in the design of an algorithm for a problem where a deterministic algorithm is unknown or much more difficult.
- Design and implement a dynamic programming solution to a problem.
- Be familiar with basic techniques of algorithm analysis.
- Be familiar with writing recursive methods.
- Master the implementation of linked data structures such as linked lists and binary trees.

## **COURSE OUTCOMES:**

At the end of the course student should be able to:

- Understand basic advanced data structures such as arrays, lists, trees, stacks, queues, binary search trees, and hash tables.
- Incorporate advanced data structures into the applications they write.
- Implement various searching and sorting algorithms.
- Understand and apply fundamental algorithmic problems including tree traversals, Graph traversals, and shortest paths.
- Visualize and interpret the domain of problem

## **UNIT I: ALGORITHM ANALYSIS**

Efficiency of algorithms, , Asymptotic Notations, Time complexity of an algorithm using O notation, Polynomial Vs Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.

## **UNIT II: STACKS, QUEUES & LISTS**

Stack: ADT - stack model - implementation of stacks - applications of stacks-infix, prefix and postfix expressions and their conversions, Queue: ADT - queue model – array implementation of queues, List: ADT - simple array implementation of lists - linked lists- doubly and circular linked lists - polynomial addition and multiplication, Overview of Garbage collection & Compaction.

## **UNIT III: SORTING**

Elementary sorts : selection, insertion, bubble sort, shell sort, radix sort, quick sort, merge sort, heap sort, bucket sorting, external sorting, worst case and average behavior, Lower bound for sorting using comparisons.

## **UNIT IV: TREE**

Basic Terminology, Binary tree and types; strictly, complete, skewed, binary expression tree, Representation of binary tree; static and dynamic, Traversals Algorithms; recursive and non-recursive, Threaded binary tree; representation and applications.

## **UNIT V: BINARY SEARCH TREE**

Basic operations on BST, AVL tree, basic operations in AVL tree, m-way tree, B-tree; basic operations, B+ tree, Applications of Tree, Heap sort, Max and Min Heap, Red block trees.

## **UNIT VI: SET**

Implementation – Basic Operations on Priority Queues.

### **GRAPHS:**

Directed Graphs, Shortest Path Problem, Undirected Graph, Spanning Trees.

### **GRAPH TRAVERSALS:**

Hash table representation, hash functions, collision resolution, separate chaining, open addressing, linear probing, quadratic probing, double hashing, rehashing.

**TEXT BOOKS:**

1. Mark Allen Weiss, "Data Structures & Algorithm Analysis in C++", Addison Wesley, 2004.
2. Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
3. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2nd edition, University Press

**REFERENCE BOOKS:**

1. E. Horowitz, S. Sahni and S. Rajesekar, "Computer Algorithms", Galgotia-1999.
2. Jean-Paul Tremblay and Paul. G. Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hill, 1991.
3. Classic Data Structures by D. Samanta, 2005, PHI
4. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C++, Pearson Education,2002.
5. Aho Hopcroft Ullman, —Data Structures and Algorithms, Pearson Education, 2002.
6. Horowitz Sahni, Rajasekaran, —Computer Algorithms, Galgotia, 2000.
7. Tanenbaum A.S, Langram Y, Augestien M.J.,Data Structures using C & C++, Prentice Hall of India, 2002
8. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
9. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.
10. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

## ADVANCED UNIX PROGRAMMING

**SUBJECT CODE: 13MIT1002**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- Review basic and kernel concepts covered in the core Operating Systems course prerequisite as they are realized in the unix/Linux platform
- Introduce the student to Unix/Linux system programming techniques
- Teach advanced C systems calls will implement and evaluate several small application programs utilizing low level Unix system calls
- Teach advanced C systems programming techniques in a Unix/Linux environment
- Discuss correct synchronization techniques for system programs

### **COURSE OUTCOMES**

Program outcomes are supported by the following learning outcomes achieved by students upon a successful completion of this course:

- Understand the role of the Unix/Linux kernel
- Understand the role of systems programming.
- Have hands-on knowledge of the basic principles of Unix system calls.
- Have hands-on knowledge of the basic principles of Unix file system.
- Have hands-on knowledge of the basic principles of Unix IO system.
- Design and implement system-level applications for open-source operating systems
- Discuss correct synchronization techniques for both application programs and system program

### **UNIT I: INTRODUCTION TO THE KERNEL**

Architecture of the UNIX operating system – Introduction to the system concepts – Kernel Data Structures; The Buffer Cache: Buffer Headers – Structure – Retrieval of a buffer – Reading and writing disk blocks – Advantages and Disadvantages.

## **UNIT-II: UNIX FILES**

Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets ), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir, rewinddir, seekdir, telldir)

## **UNIT-III: UNIX PROCESS AND SIGNALS**

What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, **system call interface for process management**-fork, vfork, exit, wait, waitpid, exec, system, **Signals**- Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

## **UNIT-IV: INTERPROCESS COMMUNICATION OVERVIEW**

Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, file and record locking, other unix locking techniques, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC(system-V)-message queues, semaphores and shared memory.

## **UNIT-V: MESSAGE QUEUES**

Unix system-V messages, unix kernel support for messages, unix APIs for messages, client/server example.

## **UNIT-VI: SEMAPHORES**

Unix system-V semaphores, unix kernel support for semaphores, unix APIs for semaphores, file locking with semaphores.

## **Shared Memory**

Unix system-V shared memory, unix kernel support for shared memory, unix APIs for shared memory, semaphore and shared memory example.

### **TEXT BOOKS:**

1. Maurice J. Bach, “The Design of the UNIX Operating System”, Prentice-Hall of India, 2004
2. Advanced Unix Programming, 2nd Edition, M.J.Rochkind, Pearson Education.
3. Unix Network Programming, W.R.Stevens Pearson/PHI.

### **REFERENCE BOOKS:**

1. Unix system programming using C++, T.Chan, PHI.
2. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
3. Unix System-V Network Programming, Stephen A.Rago, Pearson Education.
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education

## DATA BASE MANAGEMENT SYSTEMS

**SUBJECT CODE: 13MIT1003**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- To expose the student to the basic concepts involved in designing and building a database management system.
- Learn how to use the structured query language (SQL).
- To provide detailed knowledge of Transaction, concurrency and recovery strategies of DBMS.
- Understand the relational model and relational database management system.
- To know how normalization is important for DBMS and different normalization.
- To know how the indexing is important for DBMS and different types of indexing techniques.

### **COURSE OUTCOMES:**

- Students are expected to design a database based on given requirements.
- Students are expected to make projects with knowledge of subject provided to them.
- Students are expected to use standard query language and its various versions.
- Students are expected to apply normalization techniques on given database.
- Students are expected to know the concepts of indexing and implementation of those techniques.
- Students are expected to understand the concept of transaction management.

### **UNIT I**

#### **Introduction to Database:**

Advantages of DBMS, Type of Data Models, Classification of DBMS, Schema and instances, DBMS Architecture and Data Independence, Entity- Relationship Model, Attributes and Keys, Relationship Types, Types of Entity, Enhanced E-R Modeling, Specialization and Generalization, Construction & Conversion of E-R Diagram into Tables, Constraints of E-R Diagram, Merits & Demerits of E-R Diagram.

## **UNIT II**

### **Database Design:**

Logical Database design: various Database Design Strategies, Functional Dependencies, Types and Characteristics of FD, inference Rule, closure set of attributes & applications (equivalences & canonical form), Normalization for Relational Databases: Definition, Types of Normalization: First Normal form, Second Normal form, Third Normal form, Boyce-codd normal form, problem related with normal forms & solutions. Multi valued & Join Dependencies, 4th & 5th Normalization, Numerical based on Normal forms, Merits & Demerits of Normalization.

## **UNIT III**

### **Structured Query Language:**

Components of SQL: DDL, DML, DCL, View, Index, Cursors and Triggers, Query Processing: Query processing stages, Query interpretation, Query execution plan, Table scans, Classification Queries, Aggregate function, Use of Group By, Having, Order by Clause, sub queries characteristic & classification, Use of Any, All, Exist & Not Exist operator, join operator, types of join, Structure of a query optimizer.

## **UNIT IV**

### **Relational Algebra, Relational Calculus & Transaction Processing:**

Classification of Relational Algebra operator (Native, Extended and Set Operators), Relational data model concepts, constraints, Relational Calculus: Tuple Relational Calculus & Domain Relational Calculus. Transaction Processing: Types of failures, ACID property, Six different isolation problems, schedules and recoverability, serializability of schedules, Levels of transaction consistency, Deadlocks, Nested transaction, Transaction benchmarking.

## **UNIT V**

### **File Organization & Index Structures:**

File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree.

## **UNIT VI**

### **Concurrency Control:**

Different type of concurrency control techniques & their comparative analysis, Locking techniques, Time-stamp ordering, Multi-version techniques, Optimistic techniques, multiple granularity. Integrity, Security, Non-procedural and procedural integrity constraints, Integrity constraints specifications in SQL. Failure classification, Different type of Recovery techniques & their comparative analysis, deferred update, immediate update, Shadow paging, Check points, On-line backup during database updates,

## **TEXT BOOKS :**

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

## **REFERENCES BOOKS :**

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education

## **ADVANCED COMPUTER NETWORKS**

**SUBJECT CODE: 13MIT1004**

<b>L</b>	<b>P</b>	<b>C</b>	<b>INT</b>	<b>EXT</b>
<b>4</b>	<b>0</b>	<b>3</b>	<b>40</b>	<b>60</b>

### **COURSE OBJECTIVES:**

- To provide students with a theoretical and practical base in computer networks issues.
- Student will be able pursue his study in advanced networking courses.
- Prepare students for easy transfer from academia into practical life (i.e. summer training, Coop, etc.)

### **COURSE OUTCOMES:**

- Ability to apply knowledge of mathematics, probability, and statistics to model and analyze some networking protocols.
- Ability to design, implement, and analyze simple computer networks.
- Ability to identify, formulate, and solve network engineering problems.
- Knowledge of contemporary issues in computer networks.
- Ability to use techniques, skills, and modern networking tools necessary for engineering practice.

### **UNIT I:**

#### **COMPUTER NETWORKS AND THE INTERNET:**

What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM - Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

### **UNIT II:**

#### **ROUTING AND INTERNETWORKING:**

Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intra domain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer

**LOGICAL ADDRESSING:** IPv4 Addresses, IPv6 Addresses - Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6, Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intra domain Multicast Protocols, Inter domain Multicast Protocols, Node-Level Multicast algorithms

### **UNIT III:**

**TRANSPORT AND END-TO-END PROTOCOLS:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control

**APPLICATION LAYER:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

### **UNIT IV:**

**WIRELESS NETWORKS AND MOBILE IP:** Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs), Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale, Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch Sensor Networks, IPTV

### **UNIT V:**

**VPNS, TUNNELING AND OVERLAY NETWORKS:** Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control

Transmission Protocol, Mobile Ad-Hoc Networks: Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks, Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

## **UNIT VI:**

### **OPERATIONS ACCOUNTING MAINTENANCE AND PROVISIONING**

Introduction, overview of network building blocks, Network architecture with layers and protocols, Overview of data link concepts, IP addressing, forwarding, and routing, BGP and adaptive routing. Multi-Protocol Label Switching (MPLS), MPLS Architecture and related protocols, Traffic Engineering (TE) and TE with MPLS, Transport protocols and congestion control, Quality of Service (QoS) with MPLS technology, Network recovery and restoration with MPLS technology, Virtual Private Networks (L2, L3, and Hybrid).

## **TEXT BOOKS:**

- 1) Computer Networks: A Systems Approach, 4th edition, by Larry L. Peterson, Bruce S. Davie. Publisher: Elsevier/Morgan Kaufmann, ISBN: 13:978-0-12-370548-8; 10:0-12-370548-7
- 2) MPLS: Next Steps, by Bruce S. Davie, Adrian Farrel, Publisher: Morgan Kaufmann ISBN: 13:978-0-12-374400-5; 10: 0123744008

## **REFERENCE BOOKS:**

- 1) Metro Ethernet, by Sam Halabi, Publisher: Cisco Press, ISBN: 158705096X
- 2) Emerging Optical Network Technologies, by Krishna M. Sivalingham, Suresh Subramaniam, Publisher: Springer, ISBN: 0-387-22582-X

## CODE OPTIMIZATION

**SUBJECT CODE: 13MIT1005**

<b>L</b>	<b>P</b>	<b>C</b>	<b>INT</b>	<b>EXT</b>
<b>4</b>	<b>0</b>	<b>3</b>	<b>40</b>	<b>60</b>

### **COURSE OBJECTIVES:**

- Describe the steps and algorithms used by language translators.
- Recognize the underlying formal models such as finite state automata, push-down automata and their connection to language definition through regular expressions and grammars.
- Discuss the effectiveness of optimization.
- Explain the impact of a separate compilation facility and the existence of program libraries on the compilation process.

### **COURSE OUTCOMES:**

At the end of the course student should be able to:

- Understand how the design of a compiler requires most of the knowledge acquired during their study
- Develop a firm and enlightened grasp of concepts learned earlier in their study like higher level programming, assemblers, automata theory, and formal languages, languages, languages specifications, data structure and algorithms, operating systems
- Apply the ideas, the techniques, and the knowledge acquired for the purpose of other software design
- Working skills in theory and application of finite state machines, recursive descent, production rules, parsing, and language semantics.
- Know about the powerful compiler generation tools, which are useful to the other non-compiler applications

### **UNIT I: INTRODUCTION**

Review of compiler structure, advanced issues in Elementary topics, The Importance of code Optimization, Structure of Optimizing Compilers, Placement of Optimizations in Aggressive Optimizing Compilers.

### **UNIT II: COMPILER INTERNAL REPRESENTATIONS AND RUNTIME**

## **SUPPORT**

Intermediate Representations: Issues in Designing an Intermediate Language, High level Intermediate Languages, Medium Level Intermediate Languages, Low Level Intermediate Languages, Multi-Level Intermediate Languages

Our Intermediate Languages: MIR,HIR and LIR, Representing MIR,HIR and LIR in ICAN,ICAN Naming of Data Structures and Routines that Manipulate Intermediate Code, Other Intermediate-Language Forms, Run time Support: Data Representations and Instructions, Register Usage, The Local Stack Frame, Run time stack, parameter passing disciplines, procedure prologues, Epilogues, calls, and returns, code sharing and position independent code, symbolic and polymorphic language support.

### **UNIT III: CONTROL FLOW ANALYSIS & DATA FLOW ANALYSIS.**

#### **Control Flow Analysis:**

Approaches to control flow analysis, depth first search, pre-order traversal, post-order traversal and breath first search, dominators, loops and strongly connected components, reducibility, interval analysis and control trees, structural analysis.

#### **Data Flow Analysis:**

Reaching definitions, basic concepts: Lattices, Flow functions and fixed points, Taxonomy of data flow problems and solution methods, iterative data flow analysis, lattices of flow functions, control tree based data flow analysis, structural analysis, interval analysis, other approaches, DU-chains, UD-chains and webs, Static single assignment (SSA) form, dealing with arrays, structures and pointers, Automating construction of data flow analyzers.

### **UNIT-IV: DEPENDENCY ANALYSIS AND OPTIMIZATIONS.**

Dependency and dependency Graphs: Dependency relations, basic block dependencies, DAGs, Dependencies in loops, Dependency Testing, Program dependency graphs.

Introduction to optimization: Flow sensitivity and May vs Must information, importance of individual optimizations, order and reputation of optimizations.

**Early Optimizations:** Constant expression evaluation, Scalar replacement of aggregates, Algebraic simplifications and re-association, value numbering, Copy propagation, Sparse conditional constant propagation.

## **UNIT-V: REGISTER ALLOCATION & CONTROL FLOW AND LOW LEVEL**

### **OPTIMIZATIONS.**

Register allocation and assignment, local methods, graph coloring, priority based graph coloring, other approaches to register allocation.

Unreachable code elimination, strengthening, if simplifications, loop simplifications, loop inversions, un switching, branch optimization, dead code elimination, branch prediction.

## **UNIT-VI: PROCEDURAL/INTER-PROCEDURAL ANALYSIS AND**

### **OPTIMIZATIONS.**

Tail call optimizations and tail call recursion elimination, Procedure integration, Inline Expansion, leaf routine optimization and shrink wrapping Inter procedural control flow analysis: The call graph, inter procedural data flow analysis, Inter procedural cost and propagation, Inter procedural alias analysis, Inter procedural optimizations, Inter procedural register allocation.

### **TEXT BOOK:**

1. Advanced Compiler design and Implementation, Muchnick, Elsevier,IndiaPvt limited, 2008.

### **REFERENCE BOOKS:**

1. Engineering a complier, Keith D Cooper, Linda Torczon, Elsevier
2. Compiler design in C, Allen Holub, PHI, 1990
3. Compilers principles, techniques and tools, Aho, Sethi, Ullman, Pearson, 2006
4. Crafting a compiler with C, Charles N.Fischer, Richard J Leblanc, Benjamim, Cummings, Addision-Wesley.

# OBJECT ORIENTED SOFTWARE ENGINEERING

**SUBJECT CODE: 13MIT1006**

L	P	C	INT	EXT
4	0	3	40	60

## **COURSE OBJECTIVES:**

- Describe and explain concepts and principles of object oriented software development
- Describe and explain fundamental theories, techniques and methods in software engineering
- Master basic object oriented modelling principles
- Describe and explain basic concepts and constructs in the Java programming language
- Implement programs in the Java programming language

## **COURSE OUTCOMES:**

- An understanding of the object oriented methodology and how it is applicable in the design and implementation of software and the management of the software project. He is able to use UML, an object oriented design tool, in the realization of a given software engineering project.

## **UNIT I: INTRODUCTION TO SOFTWARE ENGINEERING**

Scope of Software Engineering, Software Life-Cycle Models, Object-Oriented Life-Cycle Models, Comparison of Life-Cycle Models, Software Process, Unified Process, Process metric and CMM levels.

### **Planning and Estimation:**

Estimation of Duration and Cost, Product metrics, Estimation- LOC, FP, COCOMO models. Software Project Management Plan Framework, One case study.

## **UNIT II: TOOLS FOR STEP WISED REFINEMENT**

Cost - Benefit analysis, Software metrics and CASE tools, Taxonomy and Scope of CASE tools. Testing, with focus on Utility, Reliability, Robustness, Performance, Correctness.

### **UNIT III: MODULES TO OBJECTS**

Cohesion and Coupling, Data Encapsulation and Information hiding aspects of Objects. Inheritance, polymorphism and Dynamic Binding aspects. Cohesion and coupling of objects, Reusability, Portability and Interoperability aspects

### **UNIT IV: THE PHASES OF THE SOFTWARE LIFE CYCLE**

Requirement Elicitation Techniques, Rapid Prototyping method, Specification Document, Other Semiformal Techniques – Finite State Machines, Petri Nets and E-Language.

#### **Analysis Phase:**

Use-Case Modelling, Class Modelling, Dynamic Modelling, Testing during OO Analysis, One case study.

### **UNIT V: DESIGN PHASE**

Data oriented design, Object Oriented design, and Formal techniques for detailed design, Challenges in design phase, one case study.

### **UNIT VI: IIM PHASES**

Testing during the Implementation, Integration and maintenance phases. Mapping Design (Models) to Code –Testing - Usability – Deployment – Configuration Management – Maintenance, OOSE aspects in IIM(Implementation, Integration and maintenance) phases.

#### **TEXT BOOKS:**

1. Object oriented and Classical Software Engineering, 7/e, Stephen R. Schach, TMH
2. Roger Pressman, “Software Engineering”, sixth edition, Tata McGraw Hill
3. Bernd Bruegge, “Object oriented software engineering”, Second Edition, Pearson Education

## REFERENCE BOOKS:

1. Component-based software engineering: 7th international symposium, CBSE 2004, Ivica Crnkovic, Springer.
2. Timothy C. Lethbridge, Robert Laganieri “Object-Oriented Software Engineering – A practical software development using UML and Java”, Tata McGraw-Hill, New Delhi
3. Craig Larman, Applying UML and Patterns 3rd ed, Pearson Education, 2005.
4. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.
5. Ivar Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, 1999. Alistair Cockburn, Agile Software Development 2nd ed, Pearson Ed

## **ADVANCED UNIX PROGRAMMING /ADVANCED DATA STRUCTURES LAB**

**SUBJECT CODE: 13MIT1101**

<b>L</b>	<b>P</b>	<b>C</b>	<b>INT</b>	<b>EXT</b>
<b>0</b>	<b>3</b>	<b>2</b>	<b>40</b>	<b>60</b>

### **ADVANCED UNIX PROGRAMMING LAB**

#### **COURSE OBJECTIVES:**

- To make the student learn a system programming language Using Unix environment
- To teach the student to write programs in C solve the file and directories problems
- To teach the student to write programs in C solve the process handling problems
- To teach the student to write programs in C solve the inter process communication problems
- To teach the student to write programs in C solve the signals handling problems
- To teach the student to write programs in C solve the shared memory handling problems

#### **COURSE OUTCOMES:**

On completion of this course lab, the student will have:

- developed Unix system programming using Unix environment
- developed Unix system programming using Unix environment for process handling, and process communication
- developed Unix system programming using Unix environment for file and directories handling

1. Write a C program that counts the number of blanks in a text file

- a. Using standard I/O                      b. Using system calls

2. Implement in C the following UNIX commands using system calls.

- a) cat              b) ls              c) mv

3. Write a c program that creates a directory, puts a file into it, and then removes it.

4. Write a c program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.

5. Write a C program that illustrates how to execute two commands concurrently with a Command pipe.
6. Write a c program that illustrates suspending and resuming processes using signals.
- 7 .Write a C program that illustrates inter process communication using shared memory system calls.

#### **SUGGESTED TEXT BOOKS FOR LAB:**

1. **Advanced Unix Programming**, N.B.Venkateswarulu, BS Publications.
2. **Advanced Unix Programming**, 2nd Edition, M.J.Rochkind, Pearson Education.
3. **Advance Unix Programming** Richard Stevens, Second Edition Pearson Education

#### **ADVANCED DATA STRUCTURES LAB**

#### **COURSE OBJECTIVES:**

- This course demonstrate an in-depth understanding of the sorting techniques, Stack ADT , queue ADT , linked lists, graphs, and their applications ,binary search tree, and balanced binary search tree.

#### **COURSE OUTCOMES:**

- Student will learn implementation of stack adt, queue adt.
- Student will learn implementation of different sorting algorithms.
- Student will learn implementation of tree traversal algorithms.
- Student will learn implementation of binary search tree.
- Student will learn implementation of graph algorithms and applications.
- Student will learn implementation of balanced binary search trees.

1) Implement the Stack ADT and Queue ADT using arrays and linked list.

2) Implement the Quick sort and Merge sort algorithms.

3) Implement the following Binary tree traversal algorithms.

- a) In-order                      b) Post-order                      c) Pre-order

4) Implement the following Binary search tree operations.

- a) Searching                      b) Insertion                      c) Deletion

5) Implement the following AVL tree operations.

- a) Insertion                      b) Deletion
- 6) Implement the Heap sort algorithm.
- 7) Implement the priority Queue operations.

**SUGGESTED TEXT BOOKS FOR LAB:**

1. N.B.Venkateswarlu- C and Data Structures A Snap Shot Oriented Treatise Using Live Engineering Examples, S.Chand & Co, New Delhi
2. Jean-Paul Tremblay and Paul. G. Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hill, 1991.
3. Classic Data Structures by D. Samanta, 2005, PHI

# IMAGE PROCESSING

**SUBJECT CODE: 13MIT1107**

L	P	C	INT	EXT
4	0	3	40	60

## COURSE OBJECTIVES

- Cover the basic theory and algorithms that are widely used in digital image processing
- Expose students to current technologies and issues that are specific to image processing systems
- Develop hands-on experience in using computers to process images
- Develop critical thinking about shortcomings of the state of the art in image processing

## COURSE OUTCOMES

- Know and understand the basics and fundamentals of digital signal and image processing, such as digitization, sampling, quantization, and 2D-transforms.)
- Operate on images using the processing techniques of smoothing, sharpening, enhancing, reconstructing geometrical alterations, filtering, restoration, segmentation, features extraction, compression, encoding and color /multichannel.
- Manipulate images using the computer: reading, writing, printing, and operating on them.
- Apply and relate the basic imaging techniques to practical cases, such as, multimedia, videoconferencing, pattern and object recognition, etc.
- Aware of the ethical and legal issues related to image processing, such as, copyright, security, privacy, pornography, electronic distribution, etc

## UNIT I: DIGITAL IMAGE FUNDAMENTALS

Digital image representation –fundamental steps involved in digital image processing – components of image processing system – image sensing and acquisition –image sampling and quantization – basic relationships between pixels –examples of fields that use digital image processing. Image Transforms: introduction to Fourier transform

– Discrete Fourier Transform – Fast Fourier Transform – Cosine, Sine, Hadamard, Haar, Slant and KLT transforms.

## **UNIT II: IMAGE ENHANCEMENT**

Basic gray level transformations – histogram processing – enhancement using arithmetic/logic operations – basics of spatial and frequency domain filtering – smoothing spatial and frequency domain filters - sharpening spatial and frequency domain filters. Color Image Processing: fundamentals – color models – pseudo color image processing – color transformations – color image smoothing and sharpening – color segmentation – noise in color images.

## **UNIT III: IMAGE RESTORATION**

Model of the image degradation/restoration process – noise models – restoration in the presence of noise only-spatial filtering – periodic noise reduction by frequency domain filtering – linear, position-invariant degradations – estimating the degradation function – inverse, wiener, constrained least square and geometric mean filtering

## **UNIT IV: GEOMETRIC TRANSFORMATIONS**

Geometric transformations, Wavelets and Multi-resolution processing: background – Multi-resolution expansions – wavelet transforms in 1D and 2Ds – fast wavelet transform – wavelet packets.

## **UNIT V: IMAGE COMPRESSION**

Fundamentals – image compression models – elements of information theory – error-free compression – lossy compression – image compression standards. Morphological Image Processing: preliminaries – dilation and erosion – opening and closing – hit-or-miss transform – some basic morphological algorithms.

## **UNIT VI: IMAGE SEGMENTATION**

Detection of discontinuities – edge linking and boundary detection –thresh holding – region based segmentation. Representation and Description: representation –boundary descriptors – regional descriptors – relational descriptors.

**TEXT BOOKS:**

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, 2nd edition, Pearson Education Pvt. Ltd, 2002.
2. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall of India, 2001.

**REFERENCE BOOK:**

1. Gonzalez, Woods, and Eddins, Digital Image Processing Using MATLAB, 2nd Edition, Prentice Hall, 2009.

## PARALLEL COMPUTING ARCHITECTURE

**SUBJECT CODE: 13MIT1008**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- Students will gain fundamental knowledge and understanding of principles and practice in parallel computer architecture and computing, emphasizing both hardware and software challenges and the interactions between them, as well as exposure to research challenges in this field, through class lectures and discussions, reading assignments, homework, and a major research project.
- To develop structural intuition of how the hardware and the software work, starting from simple systems to complex shared resource architectures;
- To provide guidelines about how to write and document a software package;
- To familiarize the audience with the main parallel programming techniques and the common software packages/libraries.

### **COURSE OUTCOMES:**

- Describe the major components of a computer system and state their function and purpose
- Describe the microstructure of a processor
- Describe how conventional machine instructions operate in conjunction with the components of a computer.
- Demonstrate the ability to program a microprocessor in assembly language.
- Classify and describe the operation of parallel computer architectures

### **UNIT I: MOTIVATION FOR PARALLELISM**

Parallel Computing, Speed Up, Moore's Law, Grand Challenge Problems, Trends;

#### **Parallel and Distributed Computers:**

Flynn's Taxonomy, Distributed Memory Multicomputers, Shared Memory Multiprocessors, Networks of Workstations, Cluster and Grid Computing;

### **Message Passing Computing:**

Process Creation, Message Passing Routines, Point-to-Point, Collective Communication;

## **UNIT II: MPI AND PVM**

MPI Model of Computation, Basic Concepts, Message Passing Routines, Point-to-Point, Collective Communication, Comparison of MPI and PVM;

### **Performance Measures:**

Granularity, Speed Up, Efficiency, Cost, Amdahl's Law, Gustafson's Law, Isoefficiency.

### **Analysis of Parallel Programs:**

Parallel Computation Models, PRAM, Modeling Communication, Cluster Cost Model;

## **UNIT III: PARALLEL PROGRAMMING TECHNIQUE INTRODUCTION**

### **Embarassingly Parallel Computations:**

Low Level Image Processing, Mandelbrot Set, Monte Carlo Methods;

### **Simple Data Partitioning:**

Sum of Numbers, Bucket Sort, Numerical Integration, N-Body Problem;

## **UNIT IV: DIVIDE-AND-CONQUER:**

Sum of Numbers, Merge Sort, Adaptive Quadrature, Barnes-Hut Algorithm;

**Pipelined Computations:** Type 1, 2 and 3 Pipelines, Sum of Sequence, Insertion Sort, Prime Number Generation, Back Substitution;

## **UNIT V: SCHEDULING AND LOAD BALANCING**

List Scheduling, Static Load Balancing, Dynamic Load Balancing, Moore's Algorithm;

## **UNIT VI: SYNCHRONOUS COMPUTATIONS**

Data Parallel Programming, Global and Local Synchronization, Solving Linear Equations, Cellular Automata;

## **Shared Memory Programming:**

Threads, Compiler Directives, OpenMP;

## **TEXT BOOKS:**

### **Main Course Text**

1. Barry Wilkinson and Michael Allen. Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers (2nd Edition), Prentice Hall PTR (2005), ISBN 0-13-140563-2 (Home Page for Text Book).

### **Additional Course Text**

- 1 Michael J. Quinn. Parallel Programming in C with MPI and OpenMP, McGraw Hill (2003), ISBN 0-07-282256-2 (Home Page for Text Book).

## **REFERENCE BOOKS:**

- 1 Grama, A. Gupta, G. Karypis and V. Kumar. Introduction to Parallel Computing (2nd edition), Addison Wesley (2002), ISBN 0-201-64865-2.
- 2 H. El-Rewini and T.G. Lewis. Distributed and Parallel Computing, Manning (1997), ISBN 0-13-795592-8.
- 3 Foster. Designing and Building Parallel Programs, Addison Wesley (1995), ISBN 0-201-57594-9.
- 4 Kai Hwang and Zhiwei Xu. Scalable Parallel Computing, McGraw Hill (1998), ISBN 0-07-031798-4

# MACHINE LEARNING

**SUBJECT CODE: 13MIT1009**

L	P	C	INT	EXT
4	0	3	40	60

## **COURSE OBJECTIVES:**

- This course would aim to focus on the concepts and techniques that contribute to the rapidly changing field of machine learning--including probability and statistics, artificial intelligence, and neural networks--unifying them all in a logical and coherent manner.

## **COURSE OUTCOMES:**

- The completion of the course would enable the students to be able to program computers to use example data or past experience to solve a given problem, and apply the techniques learnt in applications like systems that analyze past sales data to predict customer behaviour, recognize faces or spoken speech, optimize robot behaviour so that a task can be completed using minimum resources, and extract knowledge from bioinformatics data.

## **UNIT I: INTRODUCTION**

Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering, Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

## **UNIT II: DECISION TREE LEARNING**

Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

## **Artificial Neural Networks:**

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition  
Advanced topics in artificial neural networks

## **Evaluation Hypotheses:**

Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

## **UNIT III: BAYESIAN LEARNING**

Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

## **UNIT IV: COMPUTATIONAL LEARNING THEORY**

Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning - Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case- Based Reasoning, Remarks on Lazy and Eager Learning

## **Genetic Algorithms:**

Motivation, Genetic Algorithms, An Illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

## **UNIT V: LEARNING SETS OF RULES**

Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as

Inverted Deduction, Inverting Resolution Analytical Learning: Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge

## **UNIT VI: COMBINING INDUCTIVE AND ANALYTICAL LEARNING**

Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators, Reinforcement Learning : Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

### **TEXT BOOK:**

- 1 Machine Learning ,Tom M. Mitchell, MGH

### **REFERENCE BOOKS:**

- 1.Machine Learning, An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)
2. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2

## DATA MINING & KNOWLEDGE DISCOVERY

**SUBJECT CODE: 13MIT1010**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- Studies algorithms and computational paradigms that allow computers to extract knowledge from data warehouse.
- Perform prediction and forecasting, and generally improve their performance through interaction with data.
- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.
- To gain experience of doing independent study and research.

### **COURSE OUTCOMES:**

Upon the successful completion of this course students will be able to:

- Apply database analysis and design techniques to the concept of Data Warehousing.
- Construct a data model for a case sample Data Warehouse project.
- List and describe the core components of a Data Mart.
- Summarize the rational and key benefits of using Data Marts.
- Construct a data model representing a Data Mart strategy.
- Explain the concept of Data Mining.
- List and describe the core components of a Data Mining initiative.
- Summarize the tools and approaches used in support of Data Mining in the process of knowledge discovery. Analyze sample data and identify correlations.

### **UNIT-I: INTRODUCTION TO DATA MINING**

Basic Data Mining Tasks, Data Mining Functionalities, Interestingness of a pattern Classification of Data Mining Systems Data Mining Issues, Data Mining Metrics, Data Mining from a Database Perspective. Data Mining Techniques: A Statistical Perspective on Data Mining. Similarity Measures

## **UNIT-II :DATA WAREHOUSE AND OLAP TECHNOLOGY FOR DATA MINING**

Data Warehousing : Def – Multidimensional Data Model – Data Cube – Dimension Modelling– OLAP Operations – Warehouse Schema – Data Warehouse Architecture – Data Mart – Meta Data – Types of Meta Data – Data Warehouse Backend Process – Development Life Cycle. Data Pre-Processing and Characterization: Data Cleaning – Data Integration and Transformation, Data Reduction

## **UNIT-III:CONCEPT DESCRIPTION: CHARACTERIZATION AND COMPARISON**

What is Concept Description, Data Generalization and summarization-based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between different Classes, Mining Descriptive Statistical Measures in large Databases.

## **UNIT-IV: MINING ASSOCIATION RULE IN LARGE DATABASES**

Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional DBs, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational DBs and DWs, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

## **UNIT-V CLASSIFICATION**

Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Classifier Accuracy.

## **UNIT VI: CLUSTERING**

Cluster Analysis: What is Cluster Analysis, A Categorization of Major Clustering Methods, Hierarchical Algorithms, Partitional Algorithms and Density based Clustering methods.

**TEXT BOOKS:**

1. Data Mining Concepts and Techniques Jiawei Han and Micheline Kamber Morgan Kaufman Publication

**REFERENCE BOOKS:**

1. Data Mining Introductory and Advanced Topics, Margaret H Dunhan, Pearson Education.
2. Data Mining, Ian H. Witten Eibe Frank, Morgan Kaufman Publications.
3. Data Mining by Tan, Steinbach, Vipin Kumar, Pearson Education.

## NETWORK MANAGEMENT SYSTEMS (ELECTIVE – I)

**SUBJECT CODE: 13MIT1011**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- The objectives of this course include gaining solid knowledge and some hands-on experience of the data communication network management technology. After taking this course a student is expected to be able to explain and evaluate the architectures and functions, as well as important concepts, methods and protocols used in datacom network management systems. Paper critique and hands-on small projects will be used to further the understanding of this important data communication technology.

### **COURSE OUTCOMES:**

Upon successful completion of this course you will be able to:

- Describe the need for and issues associated with dealing with scale, complexity, reliability, extensibility, efficiency and sustainability of network management systems
- Analyze a specific network management problem and apply concepts and issues learnt to design one or more aspects of a network management solution usually required in network stations. The need of FCAPS will easily digested.

## **UNIT-I: DATA COMMUNICATIONS AND NETWORK MANAGEMENT**

### **OVERVIEW**

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

## **UNIT-II: SNMPV1 NETWORK MANAGEMENT**

Organization and Information and Info Models

## **Managed network:**

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

## **SNMPv1 Network Management :**

Communication and Functional Models. The SNMP Communication Model, Functional model.

## **UNIT-III: 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

## **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-IV: 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-V: NETWORK MANAGEMENT TOOLS AND SYSTEMS**

Network Mgt Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network mgt Systems, System Management, Enterprise Management Solutions.

## **UNIT-VI: WEB-BASED MANAGEMENT**

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

**TEXT BOOK:**

1. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

**REFERENCE BOOKS:**

1. Network management, Morris, Pearson Education.
2. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
3. Distributed Network Management, Paul, John Wiley.

## DISTRIBUTED OPERATING SYSTEMS (ELECTIVE – I)

**SUBJECT CODE: 13MIT1012**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- Present the principles underlying the functioning of distributed systems;
- Create an awareness of the major technical challenges in distributed systems design and implementation;
- Expose students to modern and classic technology used in distributed systems and their software;
- Expose students to past and current research issues in the field of distributed systems;
- Provide experience in the implementation of typical algorithms used in distributed systems.

### **COURSE OUTCOMES:**

After completing this course you will be able to:

- Explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are;
- List the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions;
- Recognise how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems;
- Design a distributed system that fulfills requirements with regards to key distributed systems properties (such as scalability, transparency, etc.), be able to recognise when this is not possible, and explain why;

### **UNIT-I**

**Introduction to Distributed Systems:** Introduction to Distributed Systems, Distributed systems: Goals Hardware Concepts Software – design

## **UNIT-II**

**Communication distributed systems:** Communication distributed systems, Layered Protocol: ATM Networks client server model - remote procedure call – group communication

## **UNIT-III**

### **Synchronization:**

Synchronization, Clock synchronization - mutual exclusion - election atomic transactions - dead locks.

## **UNIT-IV**

### **Process and Processors:**

Process and Processors, Threads - System models processor allocation - scheduling fault tolerance - real time distributed systems.

## **UNIT-V**

### **Distributed file systems:**

Distributed file systems, File system design and implementation - trends in distributed file systems.

### **Shared Memory:**

Introduction - bus based multi processors ring based multiprocessors switched multiprocessors - NUMA comparison of shared memory systems –

## **UNIT-VI**

**Consistency models:** Consistency models - page based distributed shared memory - shared variable distributed Shared memory - object based distributed shared memory.

Case studies: MACH and CHORUS

## **TEXT BOOK:**

1. Andrew S.Tanenbaum: Distributed Operating System, Prentice Hall International Inc. 1995.

## INFORMATION SECURITY (ELECTIVE – I)

**SUBJECT CODE: 13MIT1013**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

This course will introduce cryptography theories, algorithms, and systems. It will also consider necessary approaches and techniques to build protection mechanisms in order to secure computer networks.

### **COURSE OUTCOMES:**

On successful completion of this course, students will be able to:

- Understand theory of fundamental cryptography, encryption and decryption algorithms,
- Learn to program and apply the encryption algorithms,
- Build cryptosystems by applying encryption algorithms,
- Apply the cryptosystems so far learned to building of information and network security mechanisms,
- Grasp algorithms and techniques for identity authentication message authentication develop identity management,
- Build secure authentication systems by use of message authentication techniques.

### **UNIT I:**

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

### **UNIT II:**

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

### **UNIT III:**

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

**UNIT IV:**

Email privacy: Pretty Good Privacy (PGP) and S/MIME. IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**UNIT V:**

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).  
Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3.

**UNIT VI:**

Intruders, Viruses and related threats. Intrusion Detection Systems. Firewall Design principles, Trusted Systems.

**TEXT BOOKS:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W. Manzuik and Ryan Permech, Wiley Dreamtech

**REFERENCE BOOKS:**

1. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Cengage Learning.

## **SOFT COMPUTING (ELECTIVE – I)**

**SUBJECT CODE: 13MIT1014**

<b>L</b>	<b>P</b>	<b>C</b>	<b>INT</b>	<b>EXT</b>
<b>4</b>	<b>0</b>	<b>3</b>	<b>40</b>	<b>60</b>

### **COURSE OBJECTIVES:**

- The course would aim to make the student understand the basic idea of problem solving through the principles of soft computing, which would be seen as a well-balanced integration of fuzzy logic, evolutionary computing, and neural information processing.

### **COURSE OUTCOMES:**

- On completion of the course, a student is expected to be able to apply the methods learnt in different application areas such as optimization, data analysis and data mining, fault diagnosis, control as well as traffic and transportation systems.

### **UNIT-I: NEURAL NETWORKS-1(INTRODUCTION & ARCHITECTURE)**

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

### **UNIT-II: NEURAL NETWORKS-II (BACK PROPOGATION NETWORKS)**

Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propogation algorithm, factors affecting backpropagation training, applications.

### **UNIT-III FUZZY LOGIC-I (INTRODUCTION)**

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

#### **UNIT-IV FUZZY LOGIC –II (FUZZY MEMBERSHIP, RULES)**

Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfication & Defuzzification, Fuzzy Controller, Industrial applications.

#### **UNIT-V GENETIC ALGORITHM (GA)**

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

#### **UNIT –VI UNSUPERVISED LEARNING**

Competitive Learning Networks, Kohonen self-organising networks, Hebbian Learning, The Hopfield Network

#### **TEXT BOOKS:**

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications” Prentice Hall of India.
2. N.P. Padhy, “Artificial Intelligence and Intelligent Systems” Oxford University Press.

#### **REFERENCE BOOKS:**

1. Simon Haykin, “Neural Networks” Prentice Hall of India
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.
3. Kumar Satish, “Neural Networks” Tata Mc Graw Hill

## AD-HOC AND SENSOR NETWORKS (ELECTIVE –II)

**SUBJECT CODE: 13MIT1015**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- Knowledge of mobile ad hoc networks, design and implementation issues, and available solutions.
- Knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
- Knowledge of clustering mechanisms and the different schemes that have been employed, e.g., hierarchical, flat, and leaderless.
- Knowledge of sensor networks and their characteristics. This includes design of MAC layer protocols, understanding of power management, query processing, and sensor databases.
- A broad overview of the state of wireless and mobile ad hoc networking
- A thorough understanding of the current and emerging applications
- An overview of the physical, networking and architectural issues of mobile ad hoc networks
- Been introduced to the key technologies that will enable the next generation of ad hoc networks and the proliferation of ubiquitous computing
- Been familiarized with sensor networks and the unique set of design challenges that they introduce.

### **COURSE OUTCOMES:**

- Are able to understand and explain the concept of ad-hoc and sensor networks, their applications and typical node and network architectures.
- Are able to understand and explain protocol design issues (especially energy-efficiency) and protocol designs for wireless sensor networks
- Are able to set up and evaluate measurements of protocol performance in wireless sensor networks

- Understand the principles of sensor networks and mobile ad hoc networks, and their impact on protocol design
- Develop MAC and routing protocols for sensor and mobile networks
- Develop efficient protocols for sensor and mobile networks
- Understand and develop information dissemination protocols for sensor and mobile networks

## **UNIT I: INTRODUCTION**

Introduction to Ad Hoc Networks: Characteristics of MANETs, Applications of MANETs and challenges of MANETs - Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

## **UNIT II: DATA TRANSMISSION**

Broadcast storm problem, Broadcasting, Multicasting and Geo-casting

### **TCP over Ad Hoc:**

TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

## **UNIT III: BASICS OF WIRELESS, SENSORS AND APPLICATIONS**

Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

## **UNIT IV: DATA RETRIEVAL IN SENSOR NETWORKS**

Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots

## **UNIT V: SECURITY**

Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

## **UNIT VI: SENSOR NETWORK PLATFORMS AND TOOLS**

1. Sensor Network Hardware, Berkeley notes, Sensor Network Programming Challenges, Node-Level Software Platforms, Node-Level Simulators, ns-2.

### **TEXT BOOKS:**

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

### **REFERNCE BOOKS:**

1. AD Hoc Wireless networks , Architectures and protocols, Murthy, Manoj, Pearson
2. Ad-hoc Networks: Fundamental Properties and Network Topologies, Hekmat, Ramin, Springer
3. AD HOC NETWORKS: Technologies and Protocols, Prasant Mohapatra, Srikanth Krishnamurthy, Springer
4. C. Siva Ram Murthy and B.S.Manoj, “Ad hoc Wireless Networks – Architectures and Protocols’, Pearson Education, 2004

## BIO- INFORMATICS (ELECTIVE – II)

**SUBJECT CODE: 13MIT1016**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- The objective of the program in Bioinformatics is to prepare students for careers in academia and industry, and in particular to deepen their knowledge in both the biosciences and computational sciences to apply this knowledge to manage and analyze data in the life sciences and to train them in research.

In this course, we aim to cover the following:

- The concepts of computer science that relate to problems in biological sciences.
- Commercial and academic perspectives on bioinformatics.
- The impact of bioinformatics on the methodologies used in biological science.
- The influence biological science has on computing science.

### **COURSE OUTCOMES:**

- Extract information from different types of bioinformatics data (gene, protein, disease, etc.), including their biological characteristics and relationships.
- Employ different data representation models and formats used for bioinformatics data representation, including markup languages such as SBML and CellML, and ontologies such as GO ontology.
- Apply the different approaches used for data integration and data management, including data warehouse and wrapper approaches.
- Master computational techniques and diversified bioinformatics tools for processing data, including statistical, machine learning and data mining techniques.
- Analyze processed data with the support of analytical and visualization tools

### **UNIT I: HISTORY OF BIOINFORMATICS**

History of Bioinformatics-role of Bioinformatics in biological sciences- scope of bioinformatics -introduction to internet-WWW, network basics, LAN & WAN

standards-network topologies and protocols- ftp, http - division of Bioinformatics-  
Bioinformatics and internet-challenges in Bioinformatics.

## **UNIT-II: INTRODUCTION TO HOMOLOGY**

Introduction to Homology (with special mention to Charles Darwin, Sir Richard Owen, Willie Henning, Alfred Russel Wallace).

### **Special Topics In Bioinformatics:**

DNA mapping and sequencing, Map alignment

## **UNIT III: DATABASES IN BIOINFORMATICS**

Databases in Bioinformatics- Genbank, NCBI, EMBL, DDBJ, UniGene, SGD, EMI Genomes, -protein databases-PIR, SWISSPROT, TrEMBL, Prosite, PRINTS - structural databases-PDB, SCOP, CATH, PDB\_SELECT, PDBSUM, DSSP, FSSP, DALI, PRODOM, protein families & pattern databases

## **UNIT-IV: SECONDARY DATABASES:**

Introduction to Secondary Databases Organization and management of databases  
Swissprot, PIR,KEGG

## **UNIT V: BIO CHEMICAL DATA BASES**

Introduction to BioChemical databases-organization and Management of databases.  
KEGG, EXGESCY, BRENDA, WIT.

## **UNIT VI: FILE FORMATS**

File formats-raw/plain format-NCBI, Genbank flat file format-ASN.1, GCG, FASTA, EMBL, NBRF, PIR, swissprot sequence formats, PDB format, etc. - introduction to structure prediction methods.

## **TEXT BOOKS:**

1. Bioinformatics Basics. Applications in Biological Science and Medicine by Hooman H. Rashidi and Lukas K.Buehler CAC Press 2000.

2. Algorithms on Strings Trees and Sequences Dan Gusfield. Cambridge University Press 1997.

**REFERENCE BOOKS:**

1. Bioinformatics: A Machine Learning Approach P. Baldi. S. Brunak, MIT Press 1988.

2. Bioinformatics. David Mount, 2000. CSH Publications

3. Attwood T.K and Parry-Smith, "Introduction to Bioinformatics", Addison Wesley Longman, 1999.

## SECURED DATABASE APPLICATIONS DEVELOPMENT (ELECTIVE – II)

**SUBJECT CODE: 13MIT1017**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- Make to know the Information systems & its Architecture and various security methods.
- Make to know Operating System security environment and Authentication methods.
- How to design & implement password policies and granting, revoking user privileges.
- Creating Virtual private databases using Views and application context.
- Know about Various Database Auditing models.
- Auditing Databases and creating DLL triggers.

### **COURSE OUTCOMES:**

At the end of course students are able to know:

- What is Information Systems and security methods.
- Various authentication methods and password policies.
- Designing and implementing password policies
- Various operations of user privileges.
- How to create VPDs using Views and Application context.
- About various database auditing models.
- What are different types of audits, auditing databases and creating DLL triggers.

### **UNIT I :**

#### **Security Architecture:**

Introduction, security, information systems, database management systems, information security, information security architecture, database security, asset types and their value, security methods

#### **Operating system security fundamentals:**

Introduction, operating systems overview, security environment, components, authentication methods, user administration, password policies, vulnerabilities of operating systems, -mail security

## **UNIT II :**

### **Administration of users:**

Introduction, user authentication, operating system authentication, creating/ removing/ modifying users, default/remote users, database links, linked servers, remote servers

### **Profiles, password policies, privileges and roles:**

Introduction, defining and using profiles, designing and implementating password policies, granting and revoking user privileges, creating, assigning and revoking user roles.

## **UNIT III :**

### **Database application security models:**

Introduction, types of users, security models, application types, application security models and data encryption.

### **Virtual private databases (VPD):**

Introduction, overview, implementing a VPD using views and application context. Implementing oracle VPD, viewing VPD policies and application context using: data dictionary, policy manager, implementing row and column level security with SQL server.

## **UNIT IV :**

### **Database auditing models, application data auditing:**

#### **Database auditing models:**

Introduction, auditing overview, environment, process, objectives, classification and types, benefits and side effects of auditing.

#### **Application data auditing:**

Introduction, DML auction auditing architecture. Triggers, fine grained auditing, DML statement audit trail and auditing application errors with oracle.

**UNIT V :****Auditing database activities, security and auditing project cases****Auditing database activities:**

Introduction, usage of database activities, creating DLL triggers, auditing database activities with oracle.

**UNIT VI:****Security and auditing project cases:**

Introduction, case study for developing on online databse, taking care of payroll, tracking database changes and developing a securing authentication repository

**TEXT BOOK:**

1. Database security and auditing, Hassan Afyouni, cengage learning 2007

**REFERENCE BOOKS:**

1. database security, S. Castano, M. Fugini, G. Martella, P. Samarati, Addison-wesley, 1994.
2. implementing database security and auditing, RonBen Natan : Elsevier, Indian reprint, 2006.
3. principles of Distributed database Systems, prentice Hall, 2/e, M.TamerOzsu, Patrick valdureiz, 2009.

## MULTI MEDIA AND APPLICATION DEVELOPMENT (ELECTIVE – II)

**SUBJECT CODE: 13MIT1018**

L	P	C	INT	EXT
4	0	3	40	60

### **COURSE OBJECTIVES:**

- To understand the goals of various issues like Hypermedia, www, HTTP,XML,HTML etc
- To Identify the Availability various multimedia software tools in the industry
- To Identify the Availability various multimedia file formats
- To identify various methods of graphic/image representations
- To List out the various image color models and video color models
- To List out the types of the video signal
- Demonstrate how a audio is digitized and transmitted
- List out the oops concepts implemented in Action script
- To identify various data types supports by action script
- To Distinguish between static type checking and dynamic type checking

### **COURSE OUTCOMES:**

- To Distinguish between static type checking and dynamic type checking
- To understand how the class is authored in flash
- To implement various oops concepts like inheritance, polymorphism, packages and interfaces
- To develop a application using mx components
- To understand need for compression
- To distinguish between lossy and lossless compression
- To identify the various compression techniques
- To distinguish the various mpeg version and their features
- Identify and understand the various audio compression techniques
- Understand the importance of quality in multimedia data transmission

## **UNIT I :**

### **Fundamental concepts in Text and Image:**

#### **Introduction:**

What is multimedia? Defining the scope of multimedia

#### **Text and Image:**

Introduction, compression, File formats. Types of images, colour models, Basic steps for image processing, principle and working of scanner and digital camera

#### **Multimedia presentation and authoring:**

Overview, multimedia authoring metaphor, multimedia production, presentation and automatic authoring, Design paradigms and user interface, Macro media flash, Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

## **UNIT II:**

### **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 I:**

Action Script Features, Object-Oriented Action Script, Data types and Type Checking, Classes, Authoring an Action Script Class.

#### **Action Script II :**

Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions

## **UNIT III:**

### **Application Development:**

An OOP Application Frame work, Using Components with Action Script Movie Clip Subclasses.

### **Multimedia Data Compression:**

Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic.

Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

#### **UNIT IV:**

##### **Basic Video Compression Techniques:**

Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

#### **UNIT V**

##### **Multimedia Networks:**

Multimedia networks: TCP/IP model, QOS, Internet telephony, Voice over IP, Set top Boxes, Broad casting networks Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand (MOD)

#### **UNIT-VI**

##### **Compression and coding:**

What is compression? Need for compression, Types of compression- basic compression techniques-run length, Huffman's coding, JPEG, zip coding. Overview of Image and Video compression techniques

##### **TEXT BOOKS:**

1. Principles of Multimedia by Ranjan Parekh. Tata McGraw-Hill
2. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education.
3. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY
4. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, PHI/PEA.
5. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.
6. Digital Multimedia, Nigel chapman & jenny chapman, Wiley-Dreamtech.

7. Macromedia Flash MX Professional 2004 Unleashed, PEA.

**REFERENCE BOOKS:**

1. Multimedia Systems Design by Prabhat K. Andleigh and Kiran Thakrar-PHI publication
2. Multimedia systems by John F. Koegal Buford-Pearson Education.
3. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
4. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
5. Multimedia and communications Technology, Steve Heath, Elsevier (Focal Press).
6. Multimedia & Communications Technology, Steve Heath, Elsevier (Focal Press).
7. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
8. Multimedia Basics, Weixel Thomson.

## IMAGE PROCESSING LAB

**SUBJECT CODE: 13MIT1102**

L	P	C	INT	EXT
0	3	2	40	60

### **COURSE OBJECTIVES:**

- Provide the student with the fundamentals of digital image processing.
- Give the students a taste of the applications of the theories taught in the subject.  
This will be achieved through the project and some selected lab sessions.
- Introduce the students to some advanced topics in digital image processing should time permit.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

### **COURSE OUTCOMES:**

Upon successfully completing the course, the student should:

- Have an appreciation of the fundamentals of Digital image processing including the topics of filtering, transforms and morphology, and image analysis and compression.
- Be able to implement basic image processing algorithms in MATLAB.
- Have the skill base necessary to further explore advanced topics of Digital Image Processing.
- Be in a position to make a positive professional contribution in the field of Digital Image Processing.

### **Exercise 1:**

Introduction on images and Getting information on images in MATLAB  
Read about meshgrid, figure, impixelinfo, imshow, imfinfo, imread, imwrite, imhist, plot, subplot, impixelinfo

### **Exercise 2:**

Color models : Various colors models and conversion between different formats

- gray2ind, ind2gray, ind2rgb, mat2gray, rgb2gray, rgb2ind.

**Exercise 3:**

**Intensity** adjustment using some of MATLAB functions imhist, histeq, imadjust  
Contrast stretching  
Histogram equalization  
Histogram stretching

**Exercise 4:**

Image Restoration restore a blurred image using inverse filter and wiener filter

**Exercise 5:** Spatial Transformations. Convolution and correlation. Main Matlab functions:

imfilter, conv2, filter2.

**Exercise 6:** Frequency Transformations. Fourier transform. Main Matlab functions:

fft2, ifft2, fftshift.

**Exercise 7:** Thresholding and Image segmentation

- Thresholding
- Connected Components Labeling

**Exercise 8:** Morphological operations

- Morphology-based Operations- warping, open, close, coloring, lighting etc
- Read about imdilate, imerode, imclose, imopen, bwmorph.

**Exercise 9:** Filtering of noise: Noise identification and filtering techniques to remove it.

Main Matlab functions: innoise, medfilt2, ordfilt2, wiener2.

**Exercise 10 :** Edge detection

- Segmentation using Edge Detection. Detection of boundaries between two regions using different gradient approximations. Main Matlab function: edge.
- Segmentation using Thresholding. Divide the image in regions depending on the graylevel. Main Matlab function: im2bw.

## PARALLEL COMPUTING ARCHITECTURE LAB

**SUBJECT CODE: 13MIT1103**

L	P	C	INT	EXT
0	3	2	40	60

### **COURSE OBJECTIVES:**

- Making the students learn What is parallel programming.
- Making the students understand the OPENMP language for parallel programming
- Making the students to know how to create threads and running them in parallel.
- Making the students to know how to implement POSIX thread using OPENMP.
- Making them to know how to control the multiple threads.
- Making the students to know implementation of Critical section in parallel running threads.

### **COURSE OUTCOMES:**

- Students able to know what is parallel programming and languages.
  - Students gain knowledge on OPENMP language.
  - Students gain knowledge on how to create threads and running them in parallel.
  - Students able to know how to implement POSIX thread using OPENMP.
  - Students able to know how to control the multiple threads.
  - Students able to know implementation of Critical section in parallel running threads.
1. Write a C program which prints out "Hello, world!" using the Open MP parallel programming environment.
  2. Write C programs which illustrate the use of the POSIX thread library to carry out parallel program execution.
  3. Write a C program which demonstrates how to "multitask", that is, to execute several unrelated and distinct tasks simultaneously, using OpenMP for parallel execution.
  4. Write a C program which implement "critical section", using Open MP for serial execution.

5. Write a C program to implement "reduction", using Open MP.
6. Write a C program which counts the number of primes between 1 and N, using Open MP for parallel execution.
7. Write a C program which uses Open MP to parallelize a simple example of Dijkstra's minimum distance algorithm for graphs.
8. Write a C program to control the number of threads using Open MP for parallel execution.
9. Write a C program to check the running threads using Open MP for parallel execution.
10. Write a C program which demonstrates the computation of a Fast Fourier Transform in parallel, using Open MP.
11. Write a C program which computes a dense matrix product  $C=A*B$ , using OpenMP for parallel execution.
12. Write a C program which illustrates how a parallel program using Open MP can generate multiple distinct streams of random numbers.