Master of Science

in

Information Technology

(M.SC IT)

Curriculum and Syllabus

(Based on Choice Based Credit System)

Effective from the Academic year

2019 - 2020

Department of Information Technology

School of Computing Sciences

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO1:   Possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively
to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and team work, decision making based on open-mindedness, objectivity and rational analysis in order to achieve
common goals.

PEO2:   Critically analyze complex problems and apply independent judgment for fusing information to conduct Research in a wider theoretical, practical and policy context in Computer Science.

PEO3:   Understand the relevance of the research to the society by the ethical and economic connotations of research outcomes and an understanding of responsibility to contribute to the community for sustainable development of society.

PEO4 :   Apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyze and

interpret data, demonstrate higher order skill and contribute individually or in groups to the development of

technological knowledge in Computer Science.

PROGRAM OUTCOME (PO)

PO1:   **Domain knowledge:** Apply the knowledge of various domains like Data mining, embedded systems, Mobile computing, distributed computing, Image processing, Pattern recognition, Virtualization techniques and Cloud Computing to find the solution of complex problems.

PO2:   **Problem analysis:** Identify, analyze and synthesis the problem with quantitative and qualitative analysis

PO3:   **Design/development of solutions**: Develop practical knowledge and apply thorough grounding and practical experience to provide solutions for complex problems and design system that meet the specified needs of IT industry, society and business.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1:   Be an expert as System/Network Administrator with comprehensive knowledge in Network design & analysis, Network security and Software defined networks

PSO2:   Be a proficient Software Engineer by obtaining exhaustive knowledge in Software Requirement Analysis, Design, Coding, Testing and Documentation.

Vels Institute of Science Technology & Advanced Studies

School of Computing Sciences
Department of Information Technology

Board of Studies

Chairman : **Dr.P.Swaminathan**, Dean,

School of Computing Sciences,

Vels Instituute of Science,Technology and Advanced Studies,

Chennai.

Internal Board Member : 1. **Dr.P.Mayilvahanan**, Professor,

Department of Computer Applications,

School of Computing Sciences,

Vels Instituute of Science,Technology and Advanced Studies,

Chennai.

2. **Dr.S.Prasanna**, HOD,

Department of Computer Applications,

School of Computing Sciences,

Vels Instituute of Science,Technology and Advanced Studies,

Chennai.

3. **Dr.Kamalakannan**, HOD,

Department of Information Technology,

School of Computing Sciences,

Vels Instituute of Science,Technology and Advanced Studies,

Chennai..

4. **Dr.K.Kalaiselvi**, HOD,

Department of Computer Science,

School of Computing Sciences,

Vels Instituute of Science,Technology and Advanced Studies,

Chennai.

External Member   : **Dr.K.R.Ananthapadmanaban**, Professor & HOD,

Department of Computer Science,

SRM Arts and Science College, Chennai.

Industry Member   : **Dr.P.Magesh Kumar**,

Calibsoft Technologies Pvt Ltd., Chennai.

Special Invitees   : **Dr.Jothi Venkateswaran**, HOD,

Department of Computer Science,

Presidency College, Chennai.

Alumni Member   : **Mr.R.Balamurugan**, SCOPUS Ltd, Chennai.

**DEGREE OF MASTER OF INFORMATION
TECHNOLOGY**

1. DURATION OF THE PROGRAMME

1.1. Two years (Four semesters)

1.2. Each academic year consist of two semesters. The odd semester starts from July to November and the even semester is from January to May.

1.3. Each semester comprises of 90 working days.

2. ELIGIBILITY FOR ADMISSION

2.1. Candidates for admission to the first year of the Degree of Master of Information Technology shall be required to pass any UG degree Examinations (Academic Stream) accepted as equivalent thereof by the Syndicate of the Vels Institute of Science, Technology & Advanced Studies.

3. CREDIT REQUIRMENTS AND ELIGIBILITY FOR AWARD OF DEGREE

3.1. A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years and passed the examinations of all the four semesters prescribed earning a minimum of 90 credits as per the distribution given in for Part I, II, III and also fulfilled such other conditions as have been prescribed thereof.

4. COURSE OF STUDY, CREDITS AND SCHEME OF EXAMINATION

4.1. The Course Components and Credit Distribution shall consist Part I, II &

   III: (Minimum number of Credits to be obtained)

Credit Assignment Each course is assigned certain number of credits based on the following: Contact period per week CREDITS

1 Lecture Period   -   1 Credit

1 Tutorial Period   -   1 Credit

2 Practical Periods   -   1 Credit

(Laboratory / Seminar / Project Work / etc.)

5. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

5.1. **Eligibility:** Students shall be eligible to a subsequent semester only if they earn sufficient attendance as prescribed there by the Board of Management from time to time.

5.2. **Attendance:** All Students must earn 60% and above of attendance for appearing for the University Examination. (Theory/Practical)

5.3. **Condonation of shortage of attendance:** If a Student fails to earn the minimum attendance (Percentage stipulated), the HODs shall condone the shortage of attendance up to a maximum limit of 10% (i.e. between 65% and above and less than 60%) after collecting the prescribed fee towards the condonation of shortage of attendance should be remitted to the University.

5.4. **Non-eligibility for condonation of shortage of attendance:** Students who have secured less than 65 % but more than 50 % of attendance are NOT ELIGIBLE for condonation of shortage of attendance and such Students will not be permitted to appear for the regular examination, but will be allowed to proceed to the next year/next semester of the program

5.5. **Detained students for want of attendance:** Students who have earned less than 50% of attendance shall be permitted to proceed to the next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion of final semester of the course, by paying the fee for the break of study as prescribed by the University from time to time.

5.6. **Condonation of shortage of attendance for married women students:** In respect of married women students undergoing UG programs, the minimum attendance for condonation (Theory/Practical) shall be relaxed and prescribed as 55% instead of 65% if they conceive during their academic career. Medical certificate from the Doctor together with the attendance details shall be forwarded to the university to consider the condonation of attendance mentioning the category.

5.7. **Zero Percent (0%) Attendance:** The Students, who have earned 0% of attendance, have to repeat the program (by rejoining) without proceeding to succeeding semester and they have to obtain prior permission from the University immediately to rejoin the program.

6. EXAMINATION AND EVALUATION

6.1. Register for all subjects: Students shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

6.2. Marks for Internal and End Semester Examinations for PART I, II, III

6.2.1. There shall be no passing minimum for Internal.

6.2.2. For external examination, passing minimum shall be 50% [Fifty Percentage] of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-Voce.

6.2.3. In the aggregate [External/Internal] the passing minimum shall be of 50%.

6.2.4. He / She shall be declared to have passed the whole examination, if he / she passes in all the papers and practical wherever prescribed as per the scheme of the examinations by earning 90 CREDITS in Part I, II, III.

7. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMS TO QUALIFY FOR A DEGREE

7.1. A Student who for whatever reasons is not able to complete the programs within the normal period (N) or the Minimum duration prescribed for the programme, may be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree. (Time Span = N + 2 years for the completion of programme)

8. REVISION OF REGULATIONS, CURRICULUM AND SYLLABI

The University may from time to time revise, amend or change the Regulations, Curriculum, Syllabus and Scheme of examinations through the Academic Council with the approval of the Board of Management.

M.Sc. (INFORMATION TECHNOLOGY)

CURRICULUM

SEMESTER I   **Total No. of Credits: 90**

CATEGORY	CODE	COURSE	HOURS PER WEEK			CREDIT
			LECTURE	**TUTORIAL**	**PRACTICAL**	
CORE	19MIT001	PROGRAMMING USING C++	4	0	0	4
CORE	19MIT002	DATA STRUCTURES	4	0	0	4
CORE	19MIT003	DATA STRUCTURE USING C++ LAB	0	0	4	2
CORE	19MIT004	OPEN SOURCE TECHNOLOGIES	4	0	0	4
CORE	19MIT005	OPEN SOURCE TECHNOLOGIES LAB	0	0	4	2
DSE	-	DSE -I	3	0	0	3
DSE	-	DSE – II	3	0	0	3
GE	-	GE –I	2	0	0	2
Total			20	0	8	24

SEMESTER II

CATEGORY	CODE	COURSE	HOURS PER WEEK			CREDIT
			LECTURE	**TUTORIAL**	**PRACTICAL**	
CORE	19MIT006	DATABASE MANAGEMENT SYSTEM	4	0	0	4
CORE	19MIT007	PROGRAMMING IN JAVA	4	0	0	4
CORE	19MIT008	PROGRAMMING IN JAVA LAB	0	0	4	2
CORE	19MIT009	DBMS LAB	0	0	4	2
CORE	19MIT010	COMPUTER NETWORKS	4	0	0	4
DSE	-	DSE –III	3	0	0	3
DSE	-	DSE –IV	3	0	0	3
GE	-	GE –II	4	0	0	4
Total			22	0	8	26

SEMESTER III

CATEGORY	CODE	COURSE	HOURS PER WEEK			CREDIT
			LECTURE	TUTORIAL	PRACTICAL	
CORE	19MIT010	OPERATING SYSTEM	5	0	0	5
CORE	19MIT011	R-PROGRAMMING	4	0	0	4
CORE	19MIT012	LINUX PROGRAMMING LAB	0	0	4	2
CORE	19MIT013	R-PROGRAMMING LAB	0	0	4	2
CORE	19MIT014	MINI PROJECT	0	0	4	2
DSE	-	DSE –V	3	0	0	3
DSE	-	DSE-VI	3	0	0	3
SEC	-	INTENSHIP	0	0	0	2
GE	-	GE- III	2	0	0	2
Total			17	0	11	25

SEMESTER IV

10

CATEGORY	CODE	COURSE	HOURS PER WEEK			CREDIT
			LECTURE	TUTORIAL	PRACTICAL	
CORE	19MIT019	PROJECT VIVA & VOCE	0	0	30	15
Total			0	0	30	15

DISCIPLINE SPECIFIC ELECTIVES (DSE)

19MITD101   SOFTWARE ENGINEERING

19MITD102   DATAMINING & DATA WAREHOUSING

19MITD201   DESIGN AND ANALYSIS OF ALGORITHMS

19MITD202   ARTIFICIAL INTELLIGENCE

19MITD203   COMPILER DESIGN

19MITD301   CLOUD COMPUTING

19MITD302   MOBILE COMPUTING

19MITD303   NATURAL LANGUAGE PROCESSING

GENERIC ELECTIVES

19MITGE101   SIMULATION AND SYSTEM MODELING

19MITGE102   INFORMATION SECURITY AND CYBER LAWS

19MITGE103   EMBEDDED SYSTEM

19MITGE104   ERP SYSTEMS

19MITGE105   PATTERN RECOGNITION

CORE SYLLABUS

19MIT101   PROGRAMMING USING C++   4   0   0   4

COURSE OBJECTIVE

- This course introduces the basic concepts of programming in C++.
- To improve problem solving skills using OOPS concept.
- To make a good programmer, to write code, make the code work, and fix the number of bugs.

UNIT I   INTRODUCTION   15

Introduction to OOP – features of OOP - Advantages of OOP – Structures – Unions – Classes – Private member function - Public member function- Friend Function - Inline Function – Static Variables – Static Function- Scope Resolution Operator – Passing objects to functions – function Retuning objects.

UNIT II   ARRAYS & POINTERS   15

Arrays – Pointers – this pointer - References – Dynamic memory Allocation – Polymorphism- functions Overloading – Ambiguity in function overloading- Default argument – Pointer to Functions – Pointers to Array- Array of Pointers- Constructors – Default constructor- Parameterized Constructor- Copy Constructor- Dynamic Constructor- Constructor Overloading – Destructors.

UNIT III   OVERLOADING & POLYMORPHISM   15

Operator Overloading – Member Operator Function – Friend Operator Function – Overloading some special operator like [], (), and comma operator – Inheritance – Types of Inheritance – Protected members – Runtime Polymorphism - Virtual base Class – Virtual functions – Pure Virtual functions.

UNIT IV   EXCEPTION HANDLING   15

Class templates and generic classes – Functions templates and generic functions – Overloading a function templates – Exception Handling – Derived class Exception – over handling generic function – Exception handling Function – terminate(), unexpected(), Uncaught – exception().

UNIT V   STREAMS   15

Streams – Formations I/O with ios class functions and manipulators – creating own manipulators – overloading << and >> - file I/O – Name Spaces – Conversion functions – Standard Template Library (STL)

Total Hours: 75

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1:   Identify and list the basic concepts and advantages of Object Oriented Programming
CO2:   Analyze and develop the program using the concepts of functions Solve problems using linear programming.
CO3:   Explain the Class, Constructors , Destructors and Overloading concepts
CO4:   Analyze the role and understand the importance of   building reusable code and I/O operations
CO5:   Examine and handle the error using exception handling

Text Books:

1. BalaGuruSamy.E, "Programming with C++", TMH, India, 2006**.**

2. Herbert Schildt, "C++ - The complete reference", Third Edition – Tata McGraw Hill –, 4th Edition, 2002.

Reference Books:

1. Yashwant Kanetkar- "Let us C++" – 2nd Edition- McGraw Hill – 2000.

2. Maria Litvin and Gary Litvin " C++ for you++", Vikas Publ, 2002.

3. John R Hubbard: "Programming with C++", TMH Publ. II Edition, 2004.

15MIT102　　　　　　　DATA STRUCTURE　　　　　　4　　0　　0　　4

COURSE OBJECTIVE

- This subject deals with the methods of data structures.
- On successful completion of this subject the students should have :
  - o　Writing programming ability on data structures
  - o　Dealing with Stacks, Queues, List,
  - o　Algorithms etc.,

UNIT I　INTRODUCTION　　　　　　　　　　　　　　　　　15

Definition of a Data Structure – Primitive and Composite data types,Asymptotic notations – Arrays – operations on arrays – ordered list.

UNIT II　STACK　　　　　　　　　　　　　　　　　　　　15

Stacks –Application of stack – Infix to postfix conversion, Recursion, queues – operation on Queue , Queue application ,circular queues.

UNIT III　LINKED LIST　　　　　　　　　　　　　　　　15

Singly linked list –Operation, Application –representation of a polynomial, polynomial addition, doubly linked list-Operation.

UNIT IV　TREES AND GRAPHS　　　　　　　　　　　　15

Trees and Graphs: Binary Trees –Operation, tree traversals – Graph Implementation –Definition, Types of graph, Traversal– Shortest Path Problems, Dijikstra's algorithm.

UNIT V　ALGORITHM　　　　　　　　　　　　　　　　15

Algorithm-Definition-examples-Complexity-Divide and Conquer- Binary search -Maximum and Minimum-Merge sort.

Total Hours: 75

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Distinguish between different data types , different data storage methods and discover appropriate data types for a particular application
CO2: List the Relationship between the data structures stack and queue.
CO3: Identify the Importance of various types of linked lists
CO4: Determine the applications and operations of tree and graph
CO5: Apply various algorithm development techniques and build their own algorithms

Text Books:

1. E. Horowitz, S. Sahni and Mehta – "Fundamentals of Data Structures in C++" - 2ndEdition, Universities Press – 2008.

2. Horowitz, S.Shani, and S.Rajasekaran, "computer algorithms", golgotia pub. Ltd., 2000.

Reference Books:

1. E Balagurusamy: Programming in ANSI C, Tata McGraw-Hill, 1998.

2. Ellis Horowitz & Sartaj Sahni: Fundamentals of Data Structure, Galgotia Book Source, 2000.

3. Data structure using C – Aaron M Tanenbaum, Yedidyeh langsam, Moshe J Augenstein, PHI Pub

19MIT103   **OPEN SOURCE TECHNOLOGIES**   **4   0   0   4**

OBJECTIVE: To provide knowledge about Open Source Technologies and to help in understanding the programming aspects of Personal Home Page PHP & Python

UNIT I INTRODUCTION   **15**

Introduction to Open Sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources - Open Source Operating Systems: LINUX: Introduction – General Overview – Kernel Mode and User Mode- Development with Linux.

UNIT II   PHP   **15**

Introduction – Basic features of PHP – Evolution of PHP — Introducing Variables – Holding Data – Constants – Introducing Operators. Control Structures – Using Conditional Statements – Using Loops in PHP .

UNIT III PHP –FUNCTIONS AND ARRAYS   **15**

Introduction to Functions – Using Functions. Introducing Arrays – Create Arrays – Looping through Arrays – Manipulating Arrays – Sorting Arrays

UNIT 1V WORKING WITH DATA   **15**

Testing and Debugging – Debugging PHP script – Debugging and handling errors in PHP5 –Retrieving data using PHP – SQL statement for retrieving Data – Inserting records using PHP – Updating and Deleting Records in tables.

UNIT V PYTHON   **15**
Basic syntax, variable type, operators, Decision making, Loops, Strings, Lists, Function, Modules, Files I/O,Exceptions**.   Total Hours : 75**

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1:   Analyse different open source technologies

CO2: Determine dynamic and interactive web pages by embedding Java Script code in HTML.
CO3: Explain the basic concepts and syntax in PHP
CO4: List the various controls and components in PHP
CO5: Create database in Ms sql server

TEXTBOOK:

1. Remy card , Eric Dumas & Frank Mevel,―The Linux Kernel Book‖,Wiley Publications,2003. (Unit I) ..

2. Rasmus Lerdorf & Levin Tatroe, ― Programming PHP ‖, O'Reilly, 2002(Unit II ,III & IV)

3. Wesley J.chun , ― Core Phython Programming ‖, Prentice Hall, 2001(Unit IV)

REFERENCES:

1. Steven Holzner, ―PHP: The Complete Reference‖, 2 nd Edition, Tata MCGraw Hill, Indian Reprint 2009..

19MITP101   DATA STRUCTURES USING C++ LAB   0   0   4   2

COURSE OBJECTIVE

- To Know the Fundamentals of Data Structure
- To Undestand how to implement Data Structre using C++.
- This course gives practical training in C++

1. Array operations.
2. Stack using array
3. Stack using pointers
4. Queue using array.
5. Queue using pointers.
6. Singly linked list operations.
7. Program to implement C++ concepts.
8. Program to implement function overloading.
9. Program to implement inheritance.
10. Program to implement operator overloading.

Total Hours: 45

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1:   Analyze and develop programs through quantitative and qualitative techniques.
CO2:   Discover solution for the industry, society and business problems
CO3:   Understand and compare the concepts of Class, Constructors , Destructors and function Overloading
CO4:   Analyze the role and understand the importance of   Operator Overloading
CO5:   Examine and handle the error using exception handling

19MITP102   **OPEN SOURCE TECHNOLOGIES LAB**   **0   0   4   2**

OBJECTIVE: To provide practical experience in software development using open source tools like Phython, PHP and MySql**.**

EXERCISES

1. Program to Demonstrate String Functions using PHP.

2. Program to Demonstrate Session using PHP.

3. Program to Create a File and write the Data into it using PHP.

4. Application for Email Registration and Login using PHP and MySQL.

5. Program to check the given number is Prime or not using Python.

6. Program to perform the String Operation using Python.

7. Program to perform Functions in Lists using Python.

8. Program to copy content of one file to another file Using Exception Handling using Python.

Total Hours: 45

COURSE OUTCOME:

At the end of this course the students will be able to,
- CO1:   Analyze and apply the role of languages like HTML, DHTML
- CO2:   Create web pages using HTML, DHTML and Cascading Styles sheets
- CO3:   Explain dynamic web pages using PHP
- CO4:   Create applications using PHP
- CO5:   Analyze and build web applications using PHP with Ms-sql server

19MIT201   **DATABASE MANAGEMENT SYSTEM**   **4**   **0**   **0**   **4**

COURSE OBJECTIVE

- This course introduces the concepts of database systems design
- This course provides hands on experience in database design and implementation
- Describes about the fundamental data and database concepts
- To compare and contrast the relational database model with other database models

UNIT I   INTRODUCTION   12

Database concepts / basic concepts / E-R model/constraints / keys ER diagram / reduction or ER schema / UML/ design of an ER database schema / relational model / views / Tuple Relational Calculus/relational database.

UNIT II   SQL STRUCTURE   14

SQL / Basic structure / set quotation / join relation / DDL / DML / DCL/ TCL commands/ Keys and constraints /embedded SQL/ Normal Forms 1NF,2NF,3NF,4NF & BCNF normal forms / decomposition. Integrity & security / triggers.

UNIT III   OBJECT RELATIONAL DATA MODEL   12

Object relational data model / nested relations / complex types / reference / types / querying with complex / types / functions & procedures / file Storage and file structure / file organization, data dictionary storage

UNIT IV   INDEXING AND HASHING-BASIC   12

Indexing and Hashing-Basic concepts-static hashing-Dynamic/Multiple Key Access/query processing / selection operation / sorting / join operation transaction / concepts / state / atomicity and amiability / Serialisability / transaction definition in SQL / concurrency control / deadlock handling

UNIT V   ARCHITECTURE   10

     Database system architecture / centralized & client server architecture / server system architecture - Distributed Database-Homogeneous and Heterogeneous Database

Total Hours: 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Analyze and to Apply query processing techniques to automate the real time problems of databases
CO2: Identify and evaluate the redundancy problem in database tables using normalization
CO3: Ability to interpret the Oracle Database Objects using Procedures, Functions, Packages
CO4: Analyze the concepts of transactions, their processing so they will familiar with broad range of database management issues including data integrity, security and recovery
CO5: Familiar with relational DB theory and will able to evaluate relational algebra expressions for query

Text Book:

1. A. Silberschatz, H.F. Korth, "Database System Concepts", 5th Edition, Tata McGraw Hill, New Delhi, 2005.

Reference Books:

1. Ramon a.Mato-Toledo, Pauline K.Cushman – "Database Management Systems" - Schaums'Outline series, TMH, New Delhi Special Indian Edition 2007

2. R.Pannerselvam – "Database Management Systems" - PHI Learning Pvt Ltd, New Delhi - Second Edition,2011.

3. - Sharad Maheswari, Ruchin Jain – "Database Management Systems" - Firewall Media, New Delhi - Second Edition Reprint 2010

19MIT202   **PROGRAMMING IN JAVA**   **4   0   0   4**

COURSE OBJECTIVE

- This course is to develop programming skills in Java.
- It will focus on more sophisticated features such as design of classes, interfaces, packages and APIs.
- To design and implementation of both graphical applets and standalone applications.

UNIT I   INTRODUCTION   16

Introduction to Java – Features of Java – Object Oriented Concepts – Lexical issues – Data Types – Variables – Arrays – Operators – Control Statements. Classes – Objects – Constructors – Overloading methods – Access control – Static and fixed methods – inner class – string Class – Inheritance – Overriding methods – using super – Abstract class- Dynamic Method Dispatch- using Final.

UNIT II   PACKAGES   16

Packages – Access Protection – Importing packages – Interfaces – extending an Interface- Exception Handling – Try catch, Nested Try, Multicatch Statements, Throw, Throws and finally – Exception Classes – user defined exception- Thread – states of a Thread- Thread methods-creation using Thread class- creation using Runnable Interface – Synchronization – Thread Priorities- Multithreading. - Inter thread communication- Deadlock .

UNIT III   STREAMS   14

I/O Streams – File Streams – Applets – String Class– Methods in String class-String Buffer class– Methods in String Buffer class – Java Util Package – Java Lang Package- Wrapper classes- Collection classes

UNIT IV   NETWORK   14

Network basics – sockets – IP Address- Proxy servers-ports- InetAddress- Factory methods-Socket classes-Datagrams-TCP/IP sockets-URL – URL Connection – Working with windows ,colors and Fonts-Event Handling- AWT Controls – Layout Manager-Menus.

UNIT V   SERVLETS   15

Servlets – Environment and role – Architectural role for servlets – Servlet classes- GenericServlet- HttpServlet-doGet(),doHead(),dopost()-HTML support – Installing servlets – servlets API – servlet life cycle - HTML to servlet communication.

Total Hours: 75

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1:   Analyze and develop the Java Programs implementing object Oriented programming concepts.
CO2:   Examine and handle the error using exception handling
CO3:   Analyze and implement the concepts   of File streams, Applets,Strings.
CO4:   Explain the basic concepts of Networking and evaluate binary tree traversal.
CO5:   Understand the importance of Servlets and evaluate its applications

Text Book:

1.   P. Naughton and H. Schildt – "Java2 (The Complete Reference)" 5th Edition, 2002

Reference Books:

1. Cay S. Horstmann, Gray Cornell – "Core Java 2 Volume 1 Fundamentals" – Addison Wesley,2004.

2. D.R. Callaway, "inside Servlets", Addison Wesley,2004.

3. Karl Moss, Java Servlets, TMH edition Web Using Java 2 PHI, 2000.

19MIT203   **COMPUTER NETWORKS**   **4**   **0**   **0**   **4**

OBJECTIVE: To help students understand the basics of data communications and networking, and the protocols used in the Internet in particular by using the protocol layering of the Internet and TCP/IP protocol suite**.**

UNIT I PHYSICAL LAYER   **15**

Introduction – Network Models – OSI Model – Layers in the OSI Model – Digital Transmission – Analog Transmission – Transmission Media – Guided Media – Unguided Media.

UNIT II DATALINK LAYER   **15**

Switching – Circuit-Switched Networks – Datagram Networks –Virtual-Circuit Networks – Error Detection and Correction – Data Link Control – Multiple Access – Wired LANs – Wireless LANs – Connecting LANs, Backbone Networks – Virtual LANs**.**

UNIT III NETWORK LAYER   **15**

Logical Addressing – IPv4 Addresses – IPv6 Addresses – Internet Protocol – IPv4 – IPv6 – Network Layer - Delivery - Forwarding – Unicast Routing Protocols – Unicast Routing Protocols**.**

UNIT IV TRANSPORT LAYER   **15**

Process –to–Process Delivery – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control and Quality of Service (QoS) – Congestion Control – Techniques to Improve QoS – Integrated Services – Differentiated Services.

UNIT V APPLICATION LAYER   **15**

Domain Name System (DNS) – Name Space – DNS – Distribution of Name Space – DNS in the Internet – Resolution – DNS Messages – Types of Records – Remote Logging – Electronic Mail – File Transfer – World Wide Web (WWW) – Hyper Text Transfer Protocol (HTTP) – Security – Cryptography – Network Security

                                                    Total Hours : 75

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Know the fundamental concepts of data communications and networking
CO2: Analyze the various layers of OSI Reference model
CO3: Explain the functionalities of Physical Layer, Data Link Layer, Network Layer
CO4: Explain the various protocols of Transport Layer
CO5: Understand the importance of domain name system, remote logging and network security

TEXT BOOK:

1. Behrouz A. Forouzan, ―Data Communication and Networking‖, Tata McGraw Hill, 5 th Edition, 2010.

REFERENCES:

1. Andrew S.Tanenbaum, ―Computer Networks‖, Prentice Hall, 4 th Edition 2003.

2. Larry L. Peterson & Bruce S. Davie, ―Computer Networks: A Systems Approach‖, 4 th Edition, Morgan Kaufmann Publishers, 2007

| 19MITP201 | **DBMS LAB** | 0 | 0 | 4 | 2 |

COURSE OBJECTIVE

- This course gives training in design and implementation of data bases for the selected problems.
- To familiarise the participant with the nuances of database environmentstowards an information
- oriented data-processing oriented framework
- To give a good formal foundation on the relational model of data

1. Table creation using constraints and perform insert, update ,delete ,select commands.
2. Exercise using drop,truncate,commit,rollback
3. Exercise to implement sub queries.
4. Joins
5. Aggregate functions
6. String, math and date functions.
7. Examples for triggers.
8. Indexing.
9. Simple PL/SQL programs.
10. Cursor examples.
11. Database backup and restore.

Total Hours: 45

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Analyze and design different views of tables for different users and to apply embedded and nested queries

CO2: Ability to interpret and develop the skills of writing applications using SQL

CO3: Understand and evaluate SQL and PL/SQL queries

CO4: Modify the database and determine different constraints by implementing techniques like PL/SQL, cursors and triggers

CO5: Analyze and Implement different SQL queries which will automate the real life problem related to data storage.

19MITP202	PROGRAMMING IN JAVA LAB	0	0	4	2

COURSE OBJECTIVE

- This course gives practical training in java programming
- It will focus on more sophisticated features such as design of classes, interfaces, packages and APIs.
- Provide the foundation of good programming skills by discussing keys issues to the design of object-oriented software.

APPLICATIONS   30

1. Finding area and perimeter of a circle. Use buffered reader class.
2. Sub string removal from a string. Use string buffer class.
3. Determining the order of numbers generate randomly using random class.
4. Implementing of point class for image manipulation.
5. Usage of calendar class and manipulation
6. String manipulation using char array.
7. Database creation for storing e-mail addresses and manipulation.
8. Usage of vectors classes.
9. Implementing threads based application & exception handling.
10. Application using synchronization such as thread based, class based and synchronized statements.

APPLETS   15

1. Working with frames and various controls.
2. Working with dialogs and menus.
3. Working with panels and layout.
4. Incorporating graphics.
5. Working with colors and fonts.

Total Hours: 45

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Analyze and justify the importance of Applets by developing real world applications.
CO2: Analyze and to develop programs implementing exception Handling.
CO3: Explain and evaluate the basic concepts of Multithreading
CO4: Analyze and implement the concepts   of Vector class, File Streams,Strings.
CO5: Understand the importance of Servlets and develop the real time applications

19MIT301   **OPERATING SYSTEM**   **5**   **0**   **0**   **5**

COURSE OBJECTIVE

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.

UNIT I OPERATING SYSTEMS OVERVIEW   15

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization- Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT   15

Processes-Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; Threads- Overview, Multicore Programming, Multithreading Models; Windows 7 – Thread and SMP Management. Process Synchronization – Critical Section Problem, Mutex Locks, Semophores, Monitors; CPU Scheduling and Deadlocks.

UNIT III STORAGE MANAGEMENT   15

Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32 and 64 bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples**.**

UNIT IV I/O SYSTEMS   15

Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory Structure, Allocation Methods, Free Space Management, I/O Systems**.**

UNIT V CASE STUDY 15

Linux System- Basic Concepts; System Administration

Total Hours: 75

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Understand the fundamental concepts and functions of operating systems
CO2: Explain the concepts of Processes, Threads and Scheduling algorithms
CO3: Analyze the basic principles of concurrency and Deadlocks
CO4: Learn various memory management schemes
CO5: Understand the importance of I/O management and File systems

REFERENCES:

1. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.

2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.

3. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw HillEducation", 1996.

4. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata

    McGraw-Hill Education, 2007. 5. http://nptel.ac.in/.

19MIT302   **R PROGRAMMING**   **4 0 0 4**

OBJECTIVES

- To understand the basic concepts of R , Controls statements , functions and arrays

- To analyze various data structures and their functions

- To gain the knowledge of R Functions, Packages and Files

UNIT – I   15

Introduction to R: Overview of R programming, Evolution of R, Applications of R program

UNIT – II   15

Basic Concepts of R: Reserved Words, Variables & Constants Operators, Operator Precedence, Data Types , Input and Output.

UNIT – III   15

Data structures in R: Vectors, Matrix, List in R programming Data Frame, Factor . Control flow: If...else, If else() Function, Programming for loop While Loop, Break & next, Repeat Loop

UNIT – IV   15

Functions: R Functions, Function Return Value, Environment & Scope, R Recursive Function, R Infix Operator, R Switch Function. Strings: String construction rules, String Manipulation functions

UNIT – V   15

R packages: Study of different packages in R - R Data Reshaping: Joining Columns and Rows in a Data Frame Merging Data Frames, Melting and Casting - Working with files: Read and writing into different types of files

Total Hours:75

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Understand the fundamental concepts and applications of R Language
CO2: Explain the basic concepts of data types, input/output statements
CO3: Analyze the basic principles of Controls statements , functions and arrays
CO4: Learn various data structures and their functions
CO5: Understand the importance of R Functions, Packages and Files

Text Books

1. The Art of R Programming-a tour of statistical software design by Norman Matloff

2. R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics (O'Reilly Cookbooks) by Paul Teetor

3. R in Action Book by Rob Kabacoff, John Mount , Jim Porzak

4.. Learning R: A Step-by-Step Function Guide to Data Analysis by Richard Cotton

OBJECTIVE: Implement the network concepts in LINUX Environment.

EXERCISES

1. Write a Shell program to do the following operations using File and Directory Permission by supplying File name as argument:

i. Display File and Directory Permissions.

ii. Modify File and Directory Permissions.

iii. Set new File Permissions.

iv. Identify the Owner and Group for any File or Directory.

2. Write a UNIX shell program that prints the Owner, File Type, Access Permissions, and Access times of Files supplied as parameters. If a file is a directory, the program should read the directory and print the information for all Files in the Directory.

3. Program using basic Network Commands.

4. Program using system calls: create, open, read, write, close, stat, fstat, lseek.

5. Program to implement Inter Process Communication using Pipes.

COURSE OUTCOME:

At the end of this course the students will be able to,
CO1: Run various UNIX commands on a standard UNIX/LINUX Operating system
CO2: Explain the basic concepts of shell programming on UNIX OS
CO3: Understand and handle UNIX system calls
CO4: Learn and apply various Network Commands and file handling
CO5: Implement Inter Process Communication using Pipes

19MITP302   **R PROGRAMMING LAB**   **0   0   4   2**

OBJECTIVE: Handling the data using R tool.

EXERCISES

1. Assignments on Basic Concepts of R

2. Assignments on Data structures in R

3. Assignments on Control flow

4. Assignments on Functions

5. Assignments on R packages, R Data Reshaping

6. Assignments on Working with files, R object and Class

7. Assignments on Data visualization in R and Data Management

8. Assignments on Statistical modelling and Databases in R

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1:   Get a solid foundation in R programming concepts
CO2:   Collect, analyze and interpret quantitative data
CO3:   Create and edit visualizations with R
CO4:   Access online resources for R and import new function packages into the R workspace
CO5:   Import, review, manipulate and summarize data-sets in R

DISCIPLINE SPECIFIC ELECTIVES (DSE) SYLLABUS

19DMIT11   **SOFTWARE ENGINEERING**   3   0   0   3

COURSE OBJECTIVE:

- Be employed in industry, government, or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility.

- Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment.

- Progress through advanced degree or certificate programs in computing, science, engineering, business, and other professionally related fields.

UNIT I   INTRODUCTION   15

Introduction to Software Engineering: Definitions – Size Factors- Quality and Productivity Factors – Managerial Issues- Planning a software Project: Defining the Problem – Developing a Solution – Strategy – Planning the Development Process – Planning an Organization Structure – Other Planning Activities.

UNIT II   SOFTWARE COST ESTIMATION   15

Software cost factors – Software Cost Estimation Techniques – Staffing – Level Estimation Estimating Software Maintenance Costs – The Software Requirements Specification – Formal Specification Techniques – Languages and Processors for Requirements Specification.

UNIT III   SOFTWARE DESIGN: 15

Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real-Time and Distributed System Design – Test Plans – Milestones, Walkthroughs, and Inspections.

UNIT IV   IMPLEMENTATION ISSUES: 15

Structured Coding Techniques – Coding Style – Standards and Guidelines – Documentation guidelines – Type checking – Scooping Rules – Concurrency Mechanism.

UNIT V   QUALITY ASSURANCE   15

Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and

Debugging – System Testing – Formal Verification: Enhancing Maintainability during Development – Managerial aspects of Software Maintenance – Source Code Metrics – Other Maintenance Tools and Techniques.

Total No of Hours : 75

COURSE OUTCOME:

At the end of this course the students will be able to,
CO1: Identify, formulate and solve complex engineering problems by applying principles of software
        Engineering
CO2: Describe key activities in software development and the role of modelling
CO3: Explain key concepts in software development such as risk and quality
CO4: Describe the basics of an object-oriented approach to software development
CO5: To function effectively on a team whose members together provide leadership, create a collaborative and
        Inclusive environment, establish goals, plan tasks, and meet objectives

TEXT BOOK

1. R. S. Pressman, 2005, Software Engineering a Practitioner's approach, 6th Edition, Tata McGraw-Hill, New Delhi.

REFERENCE BOOKS

1. Sommerville, 2001, Software Engineering, 6th Edition, Addison Wesley, Boston.
2. Rajib Mal, 2005, -Fundamental of Software engineering, 2 ND Edition, PHI, New Delhi.
3. N. E. Fenton, S. L. Pfleenger, 2004, Software Metrics, Thomson Asia, Singapore.

19DMIT12   DATA MINING & DATA WAREHOUSING   3   0   0   3

COURSE OBJECTIVE:

- Learn about data mining functionalities, applications and issues.

- Demonstrate the data mining classification and clustering analysis.

- To understand the data ware housing components and benefits.

UNIT 1   INTRODUCTION   12

Data mining – Functionalities – Knowledge Discovery Process- Applications of Data mining– Issues in Data mining -Classification of Data mining- Tasks Primitives- Data Preprocessing- Cleaning, Reduction, Transformation .

UNIT 2   CLASSIFICATION AND PREDICTION   12

Classification: Introduction to Classification-Issues Regarding Classification and Prediction-Classification by Decision Tree Induction- Rule based Classification-Support Vector machine-Other Classification methods-Prediction: Introduction- Regression Analysis.

UNIT 3   CLUSTERING ANALYSIS, ASSOCIATION MINING, TEXT MINING   12

Introduction- Applications of Cluster Analysis- Requirements of Clustering in Data Mining- Categorization of Major Clustering Methods- Partitioning Methods-Hierarchical Methods-
Association Rule mining-Text mining-Web Mining.

UNIT 4   DATA WAREHOUSING   12

Data warehousing Components- Benefits of data warehousing-Operational and informational Data-Data Warehouse Characteristics- Data warehouse Architecture and its components- Benefits of data warehousing-Mapping the data warehouse architecture to Multiprocessor architecture.

UNIT 5   ON-LINE ANALYTICAL PROCESSING (OLAP) and Data Mining Tools   12

OLAP-Introduction-Need for OLAP- Categories of OLAP Tools- OLAP Tools and the Internet- List of tools for Data Mining.

COURSE OUTCOME:

CO1: Understand the basic functionalities & issues of data mining

CO2: Can able to understand steps involved in data mining.

CO3: Analyze different classification & clustering techniques.

CO4: Understand the basic components & benefits of Data Warehousing.

CO5: Understand the concept of OLAP tools

Text Books

Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.

Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining & OLAP‖, Tata McGraw – Hill Edition, 35th Reprint 2016

19DMIT21   DESIGN AND ANALYSIS OF ALGORITHMS   3   0   0   3

COURSE OBJECTIVE

- To provide a solid foundation in algorithm design and analysis.
- To help the student learn the outcomes, include Basic knowledge of graph and matching algorithms.
- To analyze asymptotic runtime complexity of algorithms including formulating recurrence relations.
- To understand basic knowledge of computational complexity, approximation and randomized algorithms.

UNIT I   INTRODUCTION   12

Algorithms, Analyzing algorithms, Complexity of algorithms, Growth of functions, Performance measurements, Sorting and order Statistics - Shell sort, Quick sort, Merge sort, Heap sort, Comparison of sorting algorithms, Sorting in linear time.

UNIT II   ADVANCED DATA STRUCTURES   12

Red-Black trees, B – trees, Binomial Heaps, Fibonacci Heaps. Divide and Conquer with examples such as Sorting, Matrix Multiplication, Convex hull and Searching.

UNIT III   GREEDY METHODS   12

Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Minimum Spanning trees – Prim's and Kruskal's algorithms, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.

UNIT IV   DYNAMIC PROGRAMMING   12

Dynamic programming with examples such as Kanpsack, All pair shortest paths – Warshal's and Floyd's algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.

UNIT V   SELECTED TOPICS   12

Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

Total Hours: 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Compare and Contrast various algorithm development techniques and design their own

Algorithms

CO2: Identify the importance of Divide and conquer technique

CO3: Utilize the idea of greedy method to solve the greedy algorithms

CO4: Compare greedy technique and backtracking techniques

CO5: Explain Fast Fourier Transform and Theory of NP-completeness

Text Book:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India, 2002.

Reference Books:

1. RCT Lee, SS Tseng, RC Chang and YT Tsai, "Introduction to the Design and Analysis of Algorithms", Mc Graw Hill, 2005.

2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", 2006.

3. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.

19DMIT22   **CLOUD COMPUTING TECHNOLOGIES**   3   0   0   3

COURSE OBJECTIVE

- To understand the concept of cloud and utility computing
- To understand the various issues in cloud computing
- To familiarize themselves with the lead players in cloud
- To appreciate the emergence of cloud as the next generation computing   paradigm
- To be able to set up a private cloud

UNIT I   INTRODUCTION   12

Evolution of Cloud Computing –System Models for Distributed and Cloud Computing–NIST Cloud Computing Reference Architecture -IaaS–On-demand Provisioning -Elasticity inCloud –E.g.of IaaS Providers -PaaS –E.g.of PaaS Providers –SaaS –E.g. of SaaS Providers–Public , Private and Hybrid Clouds.

UNIT II   VIRTUALIZATION   12

Basics of Virtualization -Types of Virtualization -Implementation Levels of Virtualization -Virtualization Structures -Tools and Mechanisms -Virtualization ofCPU, Memory, I/O Devices -Desktop Virtualization – Server Virtualization.

UNIT III   CLOUD INFRASTRUCTURE   12

Architectural Design of Compute and Storage Clouds –Layered Cloud Architecture Development –Design Challenges -Inter Cloud Resource Management–Resource Provisioning and Platform Deployment –Global Exchange of Cloud Resources.

UNIT IV   PROGRAMMING MODEL   14

Parallel and Distributed Programming Paradigms –Map Reduce, Twister and Iterative MapReduce – Hadoop Library from Apache –Mapping Applications Programming Support -Google App Engine, Amazon AWS -Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack.

UNIT V   SECURITY IN THE CLOUD   10

Security Overview –Cloud Security Challenges –Software-as-a-Service Security –

Security Governance –Risk Management –Security Monitoring –Security Architecture Design –Data Security –Application Security –Virtual Machine Security.

Total hours 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Explain the core concepts of the cloud computing paradigm.
CO2: Get clear knowledge of various cloud models and their services, characteristics, advantages and Challenges.
CO3: Analyze various cloud programming models and apply them to solve problems on the cloud.
CO4: Interpret the security issues in cloud.
CO5: Build cloud architecture.

Text Book:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributedand Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

Reference Books:

1. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press,2010.

2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach",TMH, 2009.

3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud"O'Reilly, 2009.

4. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

| 19DMIT31 | COMPILER DESIGN | 3 | 0 | 0 | 3 |

COURSE OBJECTIVE:

- This course introduces the basic concepts and applications of complier design.
- To understand, design and implement a parser.
- To understand, design code generation schemes.

UNIT 1   INTRODUCTION TO COMPLIERS   15

Compliers and Translator– Need of Translator – The structure of a Complier – Lexical analysis – Syntax analysis – Intermediate code generation – optimization – code generation – Complier – writing tools. Finite automata and lexical Analysis: The role of the lexical analysis – A simple approach to the design of lexical analyzersRegular expressions to finite automata – Minimizing the number of state s of a DFA.

UNIT 2   SYNTACTIC SPECIFICATION OF PROGRAMMING LANGUAGES14

Context free grammars – derivations and parse trees – capabilities of context free grammars-. Basic parsing techniques: Parsers – shift – reduce parsing – operator – precedence parsing – top down parsing – predictive parsers – automatic construction of efficient parsers: LR parsers – the canonical collection of LR (o) items constructing SLR parsing tables – constructing canonical LR parsing tables.

UNIT 3   SYNTAX – DIRECTED TRANSLATION   16

Syntax – directed translation schemes – Implementation of syntax – directed translators – intermediate code – postfix notation – parse trees and syntax trees – 3 address code – quadruples and triples – translation of assignment statements – Boolean expressions – statements that alter the flow of control. Symbol tables: the contents of a symbol table – data structures for symbol table – representing scope information.

TOTAL HOURS   75

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1:   Understand the major phases of compilation and to have thorough knowledge of Lexical and syntax analysis
CO2:   Get clear knowledge of Context free grammars, derivations and parse trees and basic parsing techniques
CO3:   Construct the intermediate code representations and generation
CO4:   Convert source code for a novel language into machine code for a novel computer
CO5:   Apply for various optimization techniques for dataflow analysis

TEXT BOOK

1.   Alfred V.Aho, Jeffrey D.Ullman "Principles of Complier Design" by , Narosa Pub House.2007.

REFERENCE BOOK

1.   Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.

2.   C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.

3.   J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill, 2003.

19DMIT32   **MOBILE COMPUTING**   **4   0   0   4**

COURSE OBJECTIVE

- To learn the basics of Wireless voice and data communications technologies.
- To build working knowledge on various telephone and satellite networks.
- To study the working principles of wireless LAN and its standards.
- To build knowledge on various Mobile Computing algorithms.
- To build skills in working with Wireless application Protocols to develop mobile content applications.

UNIT I   INTRODUCTION   12

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

UNIT II   WIRELESS NETWORKING   12

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

UNIT III   DATA MANAGEMENT ISSUES   12

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT IV   MOBILE AGENTS COMPUTING   12

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

UNIT V   AD HOC NETWORKS   12

Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Total hours 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Understand fundamentals of wireless communications.
CO2: Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless
       Networks.
CO3: Demonstrate basic skills for cellular networks design.
CO4: Explain the concepts of Mobile Agents computing, security and fault tolerance
CO5: Get thorough knowledge of Ad Hoc Networks, Routing Protocols

Text Book:

   1. J. Schiller, "Mobile Communications", Addison Wesley, 2002

Reference Books:

   1. Mehrotra ," GSM System Engineering".,2003

   2. M. V. D. Heijden, M. Taylor, "Understanding WAP", Artech House, 2004.

   3. Charles Perkins, "Mobile IP", Addison Wesley, 2002.

   4. Charles Perkins, Ad hoc Networks, Addison Wesley,2003.

ARTIFICIAL INTELLIGENCE   3   0   0   3

COURSE OBJECTIVE:

- To familiarize students with Artificial Intelligence techniques for building well-engineered and efficient intelligent systems.
- Pattern-directed inference systems and different types of truth maintenance systems will be discussed in length from both theoretical and applied point of view.
- Some cutting edge applications of these systems will also be discussed. Introduction to Artificial Intelligence Programming using LISP will be provided to help students with the programming part of the course.

UNIT I   INTRODUCTION   12

Artificial Intelligence Definition – Importance of Artificial Intelligence – Knowledge based Systems – Knowledge Representation – State space search – Production systems – Artificial Intelligence Programming Language – PROLOG – Heuristic search - Depth First Breadth first – Hill climbing – 4th algorithms – Game Playing.

UNIT II   KNOWLEDGE REPRESENTATION   12

Prepositional Logic – Clause form – Predicate logic – Resolution – Inference Rules – Unification – Semantic networks – frames – conceptual dependency – Scripts – Representing Knowledge using rules.

UNIT III   SYMBOLIC REASONING AND UNCERTAINTY   12

Non monotonic Reasoning – Truth maintenance systems – closed world assumption –   modal and temporal Logics – Bayes Theorem - certainty factors – Bayesian networks – Dempster – Shafer Theory –   Fuzzy logic.

Total No Of Hours: 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Demonstrate foundations and history of artificial intelligence (AI).

CO2: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models

CO3: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CO4: Demonstrate profciency developing applications in an 'AI language', expert system

CO5: Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications

TEXT BOOKS

1. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, Delhi, 2001.

2. Elaine Rich and Kevin Knight, "Artificial Intelligence" Tata McGraw Hill Pub. Co., Delhi, 2001.

REFERENCE BOOK

1. George F Luger, "Artificial Intelligence, structures and strategies for complex problem solving", Pearson Education Delhi, 2001

NATURAL LANGUAGE PROCESSING   4   0   0   4

Course Objective

The Course provides the models, methods, and algorithms of statistical Natural Language Processing (NLP) for common NLP tasks, such as speech recognition, machine translation, spam filtering, text classification and spell checking.

UNIT I   OVERVIEW AND LANGUAGE MODELING   12

Overview - Origins and challenges of NLP-Language and Grammar-Processing Indian Languages - NLP Applications-Information Retrieval - Language Modeling: Various Grammar - based Language Models - Statistical Language Model.

UNIT II   WORD LEVEL AND SYNTACTIC ANALYSIS   12

Word Level Analysis - Regular Expressions - Finite-State Automata - Morphological Parsing - Spelling Error Detection and correction - Words and Word classes - Part-of Speech Tagging. Syntactic Analysis – Context - free Grammar - Constituency - Parsing - Probabilistic Parsing.

UNIT III   SEMANTIC ANALYSIS AND DISCOURSE PROCESSING   12

Semantic Analysis - Meaning Representation - Lexical Semantics – Ambiguity - Word Sense Disambiguation - Discourse Processing – cohesion - Reference Resolution - Discourse Coherence and Structure.

UNIT IV NATURAL LANGUAGE GENERATION   12

Natural Language Generation - Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation - Problems in Machine Translation - Characteristics of Indian Languages - Machine Translation Approaches - Translation involving Indian Languages.

UNIT V   INFORMATION RETRIEVAL AND LEXICAL RESOURCES   12

Information Retrieval - Design features of Information Retrieval Systems – Classical - Non-classical - Alternative Models of Information Retrieval – valuation Lexical Resources: World Net - Frame Net - Stemmers - POS Tagger - Research Corpora.

Total: 60 Hours

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Understand approaches to syntax and semantics in NLP.
CO2: Explain discourse, generation, dialogue and summarization within NLP.
CO3: Understand current methods for statistical approaches to machine translation.
CO4: Get clear idea of machine learning techniques used in NLP
CO5: Build models using Hidden Markov models and probabilistic context-free grammars, Clustering and unsupervised methods, log-linear and discriminative models, and the EM Algorithm.

Text Books:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

Reference Books:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2nd Edition, Prentice Hall, 2008.

James Allen, "Natural Language Understanding", 2nd edition, Benjamin /Cummings publishing company

GENERIC ELECTIVE SYLLABUS

19MITGE101   **EMBEDDED SYSTEMS**   **2   0   0   2**

COURSE OBJECTIVE

Objective of this course is to impart training to students to understand programming in Embedded System for IT industry from basic to advance & to provide education & training in design, implementation & testing of Embedded System.

UNIT I   INTRODUCTION   10

Introduction to embedded systems: Classification, Characteristics and requirements, Applications

UNIT II   TIMING AND CLOCKS   14

Timing and clocks in embedded systems, Task Modeling and management, Real time operating system issues.

UNIT III SIGNALS   14

Signals, frequency spectrum and sampling, digitization(ADC, DAC), Signal Conditioning and Processing,

Modeling and Characterization of Embedded Computation System.

Total hours 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Describe the differences between the general computing system and the embedded system,
      Recognize the classification of embedded systems.
CO2: Understand the architecture of the ATOM processor and its assembly Level programming.
CO3: Become aware of interrupts, hyper threading and software optimization.
CO4: Design real time embedded systems using the concepts of RTOS.
CO5: Analyze various Fault-Tolerance methods.

Text Book:

1. H.Kopetz, "Real-Time Systems", Kluwer , 2002

Reference Books:

1. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer, 2004

2. Shibu K.V., "Introduction to Embedded Systems", TMH, 2006

3. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2nd ed., 2008,TMH.

19MITGE201   SIMULATION AND MODELING   2   0   0   2

COURSE OBJECTIVE

- Work comfortably at the command line of their computer
- Use computers to investigate simple scientific problems using both data and simulation.
- Solve simple scientific equations.
- Describe how data are acquired, processed, analyzed, and visualized in a variety of scientific domains

UNIT I   SYSTEM DEFINITION   12

System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

UNIT II   SYSTEM SIMULATION   12

System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

UNIT III   SIMULATION OF CONTINUOUS SYSTEMS   12

Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot, Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.

Total hours 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Define basic concepts in modeling and simulation and classify various simulation models.

CO2: Understand the system concept and apply functional modeling method to model the activities of a static system.

CO3: Understand the behavior of a dynamic system and create an analogous model for a dynamic system.
CO4: Generate and test random number variates and apply them to develop simulation models.
CO5: Simulate the operation of a dynamic system and make improvement according to the simulation results.

Text Book:

1. Geoftrey Gordon, " System Simulation", PHI,2000

Reference Books:

1. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, "Discrete Event System Simulation", Pearson Education, 2004

2. V P Singh, "System Modeling and simulation", New Age International, 2004

3. Averill M. Law, W. David Kelton, "System Modeling and simulation and Analysis", TMH, 2006.

19MITGE202   INFORMATION SECURITY AND CYBER LAWS   2   0   0   2

COURSE OBJECTIVE

Cyber forensics is a huge field that is constantly evolving and this course aims to achieve the following:

- Teach students the basics of information security and computer communication.
- Familiarize students with Cyber laws and Security policies and Cryptography.
- Learn some of the conventions and experience the ways of improving from existing experiences.

UNIT I   HISTORY OF INFORMATION SYSTEMS   12

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Concepts in Internet and World Wide Web: Brief review of Internet Protocols-TCP/IP, IPV4, IPV6. Functions of various networking components-routers, bridges, switches, hub, gateway and Modulation Techniques.

UNIT II   BASIC PRINCIPLES OF INFORMATION SECURITY   12

Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles. 11 Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards.

UNIT III   PHYSICAL SECURITY   12

Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal

Challenges Framework for Information Security, ISO 27001, SEE-CMM, Security Metrics, Information Security Vs Privacy

Total hours 60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Analyze and evaluate the cyber security needs of an organization.
CO2: Explain and analyze software vulnerabilities and security solutions to reduce the risk of exploitation
CO3: Design operational and strategic cyber security strategies and policies.
CO4: Design and develop a security architecture for an organization.
CO5: Implement cyber security solutions, information assurance, and cyber/computer forensics software/tools

Text Book :

1. Godbole," Information Systems Security", Willey,2000

Reference Books:

1. Merkov, Breithaupt," Information Security", Pearson Education,2002

2. Yadav, "Foundations of Information Technology", New Age, Delhi,2003

3. Schou, Shoemaker, " Information Assurance for the Enterprise", Tata McGraw Hil,2004

4. Sood,"Cyber Laws Simplified", Mc Graw Hill,2000

| 19MITGE301 | ERP SYSTEMS | 2 | 0 | 0 | 2 |

COURSE OBJECTIVE

- To know the basics of ERP
- To understand the key implementation issues of ERP
- To know the business modules of ERP
- To be aware of some popular products in the area of ERP
- To appreciate the current and future trends in ERP

UNIT I   ERP Introduction   12

ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, The Structure of ERP.

UNIT II   Business Process Reengineering   12

Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing(OLAP), Product Life Cycle Management(PLM),LAP, Supply chain Management.

UNIT III   ERP Marketplace and Marketplace Dynamics   12

ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, The Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications.

Total hours   60

COURSE OUTCOME:

At the end of this course the students will be able to,

CO1: Describe basic concepts of ERP systems for manufacturing or service companies.
CO2: Analyze the strategic options for ERP identification and adoption.
CO3: Develop skills necessary for building and managing relationships with customers, and stakeholders.
CO4: Design the ERP implementation strategies.
CO5: Create reengineered business processes for successful ERP implementation.

Text Book:

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008

Reference Books:

1. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.

2. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2006.

3. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India, 2006.

4. Summer, ERP, Pearson Education, 2008.

| 19MITGE302 | **PATTERN RECOGNITION** | **2** | **0** | **0** | **2** |

COURSE OBJECTIVE

The objective of this course is to gain an understanding of the methods used in pattern recognition and machine learning:

- Density estimation methods
- Linear models for regression and classification
- Neural networks and kernel methods
- Support Vector Machines (SVMs) and Relevance Vector Machines (RVMs)
- Graphical models and clustering
- Mixture models and expectation maximization (EM)
- Principal component analysis (PCA)

UNIT I   INTRODUCTION   12

Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

UNIT II   STATISTICAL PATTEN RECOGNITION   12

Statistical Patten Recognition: Bayesian Decision Theory, Classifiers, Normal density and discriminate functions,

UNIT III   PARAMETER ESTIMATION METHODS   12

Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

Total hours   60

Text Book:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2nd Edition, John Wiley, 2006.

Reference Books:

1. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
2. S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4th Edition, Academic Press, 2009.
3. R. O. Duda, P. E. Hart, D. G. Stork, Pattern Classification, 2nd edition, John Wiley & Sons, Inc., 2000.
4. S. Theodoridis, K. Koutroumbas, Pattern Recognition, 3rd edition, Academic Press, 2006.