School of Computer Science, Engineering & Applications

Bhrathidasan University

Tiruchirappalli - 620 023

Master of Technology in Computer Science

(6 year Integrated Course Structure under CBCS)

(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

BHARATHIDASN UNIVERSITY
SCHOOL OF COMPUTER SCIENCE, ENGINEERING & APPLICATIONS
MASTER OF TECHNOLOGY IN COMPUTER SCIENCE
(6 YEAR INTEGRATED COURSE)
CHOICE BASED CREDIT SYSTEM
REGULATIONS
(w.e.f. 2022 - 2023)

1. **Aim of the Course** The course strives to inculcate job-oriented and value based quality education in Information Technology and Commercial Application Development. At the end of the course, the students will be well-versed, particularly in core subjects with quality in inter-personal and professional skills.

2. **Eligibility for Admission** A Candidates who has passed 12^{TH} standard with (Maths, physics and Chemistry).

3. **Duration of the Course** The Course duration shall be for six years consisting of twelve semesters. In order to be eligible for the award of the degree the candidate shall successfully complete the course in a maximum period of eight years from the date of enrolment for the first semester of the course.

4. **Choice Based Credit System** The University follows the 'Choice Based Credit System (CBCS)' for all its programmes. Each credit is worth 12 hours of student study time, comprising all learning activities. Thus a four-credit course involves 48 study hours. This helps the student to understand the academic effort and to successfully complete a course.

5. Structure of the Course and Evaluation Pattern

Internal Marks:**25** External Marks: **75**

The duration of University examination for both theory and practical subjects shall be 3 hours. The maximum marks for each theory and practical course is 100. Continues Internal Assessment (CIA) will be 25. The university theory examination will be conducted for 75 marks, which will be add with continues internal assessment to make 100 marks for the course. For the conduct of University examinations in theory, the question paper for the theory examination will be set by the external examiner and for practical examination, the question paper will be set by both internal and external examiners appointed by the Department.

6. Procedures for Awarding Marks for Internal Assessment

THEORY COURSES

For regularity and discipline - 5 Marks

For two assignment (Equal weightage) - 5 Marks

For two tests to be conducted (Equal weightage) - 5Marks

Model examination - 10 Marks

Total - 25 Marks

PRACTICAL COURSES

For regularity and discipline - 5 Marks

Completion of all Experiments prescribed for the course - 5 Marks

Observation Note - 10 Marks

For model Examination at the end of the Semester - 20 Marks

Total – 40 Marks

In the case of CIA, a candidate who secures not less than 40% of total marks prescribed for any course shall be declared to have passed for that course, failing which the candidate has toredo the academic activities prescribed for the continuous internal assessment (CIA)..

7. Pattern of Question Paper (Theory)

Time 3 hours Max Marks 75

Section - A: (10 X 2 = 20 Marks)

All questions are to be answered. Two questions from each Unit

Section - B: (5X 5 = 25 Marks)

Five Questions are to be answered, Two questions from each unit in the either or pattern

Section - C : (3 x 10 = 30 Marks)

Three Questions are to be answered out of five questions – one question from each Unit

Programme Outcomes

S.No	Programme Outcome
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Development of Solutions: Design and evaluate solutions for complex computing problems with appropriate consideration.
PO4	Modern Tool Usage: Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities
PO5	Investigations of complex Computing problems: Use research-based knowledge and research methods for analysis and
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Communication Efficacy: Communicate effectively with the computing community, and with society

Program Specific Outcome

S.No	Programme Specific Outcome
PSO1	Apply the knowledge of computer engineering to find solutions for real-life application
PSO2	Ability to analyze, design, develop and maintain the software application with latest technologies
PSO3	Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.
PSO4	Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises
PSO5	Develop techniques to enhance ability for lifelong learning.
PSO6	Develop class environment congenial and competitive for generation of ideas, innovation and sharing.
PSO7	To make graduates understand cross cultural, societal, professional, legal and ethical issues prevailing in industry
PSO8	Ability to research, analyze and investigate complex computing problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive atvalid conclusions.

Master of Technology in Computer Science (6 year Integrated Course Structure and Syllabus under CBCS)

(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

Course Number	Course Code	Course Name	L	P	C	Int.	Ext.	Total
Semester III								
22MTCS031	CC-I	Data Structures	5	0	4	25	75	100
22MTCS032	CC-II	Digital Systems	5	0	4	25	75	100
22MTCS033	CC-III	Probability and Statistics	5	0	4	25	75	100
22MTCS034	CC-IV	Java Programming	5	0	4	25	75	100
22MTCS035	CC-V	Computer Networks	4	0	3	25	75	100
22MTCS036P	CC-VI	Lab I - Data Structure	0	3	2	40	60	100
22MTCS037P	CC-VII	Lab II - Java Programming	0	3	2	40	60	100
22VAC01	VAC-I	Hardware and Network Essential	0	0	0	25	75	100
		Total	24	6	23	800		
Semester IV								
22MTCS041	CC-VIII	Computer Organization and Architecture	4	0	3	25	75	100
22MTCS042	CC-IX	Design and Analysis of Algorithms	5	0	4	25	75	100
22MTCS043	CC-X	Mathematical Foundations of Computer Science	5	0	3	25	75	100
22MTCS044	CC-XI	Operating System	4	0	4	25	75	100
22MTCS045	CC-XII	Object Oriented Analysis and Design	4	0	3	25	75	100
22MTCS046	EEC	Soft Skills**	2	0	2	-	-	100
22MTCS047P	CC-XIII	Lab-III Operating System	0	3	2	40	60	100
22MTCS048P	CC-XIV	Lab-IV Object Oriented Analysis and Design	0	3	2	40	60	100
		Total	24	6	23	800		

Course Number	Course Code	Course Name	L	P	C	Int.	Ext.	Total
Semester V								
22MTCS051	CC-XV	Microprocessor and MicroController	4	0	4	25	75	100
22MTCS052	CC-XVI	Operation Research	4	0	4	25	75	100
22MTCS053	CC-XVII	Python Programming	4	0	4	25	75	100
22MTCS054	CC-XVIII	Database Management System	4	0	4	25	75	100
22MTCS055	EC-I	Elective-I (G)	4	0	3	25	75	100
22MTCS056	EC-II	Elective-II (G)	4	0	3	25	75	100
22MTCS057P	CC-XIX	Lab-V Python Programming	0	3	2	40	60	100
22MTCS058P	CC-XX	Lab-VI Database Management System	0	3	2	40	60	100
22VAC02	VAC-II	Augmented Reality and Virtual Reality	0	0	0	25	75	100
		Total	24	6	26	900		
Semester VI								
22MTCS061	CC-XXI	Computer Graphics	4	0	4	25	75	100
22MTCS062	CC-XXII	Software Engineering	4	0	4	25	75	100
22MTCS063	CC-XXIII	Network Security	4	0	4	25	75	100
22MTCS064	CC-XXIV	Web Technology	4	0	3	25	75	100
22MTCS065	EC-III	Elective-III (G)	4	0	3	25	75	100
22MTCS066	EC-IV	Elective-IV (G)	4	0	3	25	75	100
22MTCS067P	CC-XXV	Lab VII - Network Security	0	3	2	40	60	100
22MTCS068P	CC-XXVI	Lab VIII - Web Technology	0	3	2	40	60	100
		Total	24	6	25	800		

Course Number	Course Code	Course Name	L	P	C	Int.	Ext.	Total
Semester VII								
22MTCS071	CC-XXVII	AGILE Technologies	4	0	4	25	75	100
22MTCS072	CC-XXVIII	Open Source Technologies	4	0	3	25	75	100
22MTCS073	CC-XXIX	Mobile Application Development	4	0	3	25	75	100
22MTCS074	CC-XXX	Compiler Design	4	0	4	25	75	100
22MTCS075	EC-V	Elective-V (G)	4	0	3	25	75	100
22MTCS076	EC-VI	Elective-VI (G)	4	0	3	25	75	100
22MTCS077P	CC-XXXI	Lab-IX Open Source Technologies	0	3	2	40	60	100
22MTCS078P	CC-XXXII	Lab-X Mobile Application Development	0	3	2	40	60	100
22VAC03	VAC-III	Ethical Hacking	0	0	0	25	75	100
		Total	24	6	24	900		
Semester VIII								
22MTCS081	CC-XXXIII	Project	6	20	6	40	60	100
22MTCS082	CC-XXXIV	Professional Ethics	4	0	3	25	75	100
22MTCS083	EC-VII	Elective-VII (S)	4	0	3	25	75	100
Total			14	20	12	300		
Grand Total (III to VIII semester)			133					

Credits from 1st semester to 8th semester: 51+133=184

Course Number	Course Code	Course Name	L	P	C	Int.	Ext.	Total
Semester IX								
22MTCS091	CC-XXXV	Advanced Data Structure and Algorithms	5	0	4	25	75	100
22MTCS092	CC-XXXVI	Wireless Sensor Networks	5	0	4	25	75	100
22MTCS093	CC-XXXVII	VLSI Technology	5	0	4	25	75	100
22MTCS094	CC-XXXVIII	Internet of Things	5	0	4	25	75	100
22MTCS095	CC-XXXIX	Artificial Intelligence	4	0	5	25	75	100
22MTCS096	CC-XL	Research Study ***	3	0	2	40	60	100
22MTCS097P	CC-XLI	Lab-XI Advanced Data Structure and Algorithms	0	3	2	40	60	100
22VAC04	VAC-IV	Robotics	0	0	0	25	75	100
		Total	27	3	25	800		
Semester X								
22MTCS101	CC-XLII	Parallel Distributed Systems	4	0	4	25	75	100
22MTCS102	CC-XLIII	Big Data Analytics	5	0	4	25	75	100
22MTCS103	CC-XLIV	Digital Forensics & Cyber Security	5	0	4	25	75	100
22MTCS104	CC-XLV	Machine Learning Techniques	5	0	3	25	75	100
22MTCS105	EC-VIII	Elective-VIII (S)	5	0	4	25	75	100
22MTCS106P	CC-XLVI	Lab-XII Big Data Analytics	0	3	2	40	60	100
22MTCS107P	CC-XLVII	Lab-XIII Machine Learning	0	3	2	40	60	100
		Total	24	6	23	700		

Course Number	Course Code	Course Name	L	P	C	Int.	Ext.	Total
Semester XI								
22MTCS111	CC-XLVIII	Cloud Computing	5	0	4	25	75	100
22MTCS112	CC-XLIX	System Modeling and Simulation	5	0	4	25	75	100
22MTCS113	CC-L	Block Chain Technology	5	0	3	25	75	100
22MTCS114	EC-IX	Elective-IX (S)	5	0	4	25	75	100
22MTCS115	EC–X	Elective-X (S)	5	0	4	25	75	100
22MTCS116	CC-LI	Project Phase –I	0	5	3	40	60	100
22VAC05	VAC-V	Full Stack Developments	0	0	0	25	75	100
		Total	25	5	22	700		
Semester XII								
22MTCS121	CC-LII	Project Phase –II	10	20	12	40	60	100
		Total	10	20	12	100		
Grand Total (IX to XII semester)			**82**					

Credits from 1st sem to 8th sem: 51+133=184

Credits from 9th sem to 12th sem =82

Total Credits: 184+80=266

Credit Summary

Semester	Credit Secured
I to II Semester	51
III to VIII Semester	133
IX to XII Semester	82
Total	266

Soft Skill: EEC (Employability Enhancement Course)

** This course is offered with 2 credits an hour/week basis. This course has demonstrations/ GD and other communication skills. However the evaluation pattern for this course will be based on oral examination. Maximum marks will be 100 (external only).

Research Study:

*** This course is offered with 3 credits an hour/week basis. This course has written assignment on specific topic selected from a journal under the guidance of a supervisor.

40 marks - Internal evaluation

60 marks - External evaluation.

List of Elective Courses:

Elective General(G)

Elective (**General-G**)
1. Network Management and Protocols
2. Angular JS
3. e-Learning
4. Adhoc Network
5. Embedded Systems
6. Real Time Operating System
7. Grid Computing
8. Information Storage and Management
9. Advance Database Management Systems
10. Management Information System
11. Business Intelligence
12. Digital Signal Processing
13. Managerial Economics
14. Multimedia Technology
15. Data warehousing and Data Mining
16. Organizational Behavior

List of Elective Courses:

Elective Specialization(S) :

Elective(Specialization-S)
Intelligent Systems
1. System Administration and Management
2. Evolutionary Computing
3. Computer Vision
4. Natural Language Processing
5. Bio Informatics
6. Human Computer Interaction
7. Robotics
8. High Performance Computing

List of Value Added Courses

S.No	Course Number	Course Code	Course Name
1	22VAC01	VAC-I	Hardware and Network Essential
2	22VAC02	VAC-II	Augmented Reality and Virtual Reality
3	22VAC03	VAC-III	Ethical Hacking
4	22VAC04	VAC-IV	Robotics
5	22VAC05	VAC-V	Full Stack Developments

Credit Distributions

Course Nature	Total Credits
Core – Theory	135
Core – Practical	26
Project	21
Elective	33
Employability Enhancement Course (EEC)	2
Total	217

III SEMESTER

Course Code: 22MTCS031 **CC-I**

Credits: 4 **L-P-C: 5-0-4**

DATA STRUCTURES

OBJECTIVES:

- Understand the concept of data storage and its representation.
- Introduce various techniques for representing of the data in the real world.
- Understand basic data structures such as arrays, linked lists, stacks and queues.
- Discuss the hash function and concepts of collision and its resolution methods
- Develop knowledge of data structures for storage and retrieval of ordered or unordered data.
- Develop the ability to implement algorithms for the creation, insertion, deletion, searching and sorting of each data structure.

Unit I - Basic Operations

Introduction to Data Structures - Arithmetic operations and Expressions-Strings and string operations-Relations and relational operators-Logical operations and Expressions-Information and its storage representation-Primitive data structures

Unit II - Various Storage Representations

Linear data structures and their sequential storage representation-storage structures for arrays-stacks-applications of stacks-polish expressions and their compilation-queues-linear data structures and their linked storage representation-linked linear lists-applications of lined linear lists.

Unit III – Trees and Graphs

Nonlinear data structures-trees-storage representation and manipulation of binary trees-conversion of general trees to binary trees-applications of trees-multilinked structures-graphs and their representations-spanning trees-applications of graphs-dynamic storage management.

Unit IV- Sorting Methods

Sorting and searching: Sorting-selection sort-bubble sort-merge sort-tree sorts-partition-exchange sort-radix sort-address-calculation sort-searching-binary searching-search trees-hash table methods.

Unit V – File Structures

File structures-sequential files-external sorting-indexed sequential files-class record retrieval system-direct files-external searching-other methods of file organization-multiple-key access.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Books:

An introduction to Data structures with Applications, Jean-Paul Tremblay & Paul G. Sorenson 2nd Edition 2006.

Reference books:

1. Seymour Lipschitz, " Data Structures", Tata McGraw Hill Publications.
2. Ellis Horowitz and S. Sahni, " Fundamentals of Data Structures", Galgotia Pub.

OUTCOMES:

The students will be able to,

- Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data
- Able to analyze and compare algorithms for efficiency using Big-O notation.
- Implement projects using the implementation of the various data structures
- Improve the logical ability and programming skill
- Solve problem involving graphs, trees and heaps

Course Code: 22MTCS032 **CC-II**

Credits: 4 **L-P-C: 5-0-4**

DIGITAL SYSTEMS

OBJECTIVES:

- Study of logic gates and realization of OR,AND,NOT AND XOR Functions using universal gates
- Introducing and discussing about sequential circuits like flip-flops, counters and shift registers
- Learn about the 8-bit DAC and 8 -bit ADC
- Understand the functionality of digital logic and various number systems
- To understand the knowledge of Sequential Circuit Design and Programmable Logic.

Unit I – Number System

Digital Systems- Binary Numbers- Number base conversions- Octal and Hexa decimal Numbers – complements – Signed binary numbers – Binary codes – Binary Storage and Registers- Binarylogic.

Unit II – Boolean Algebra

Basic Definitions-Axiomatic definition of Boolean Algebra- Basic theorems and properties of Boolean algebra-Boolean functions canonical and standard forms- other logic operations- Digital logic gates- integrated circuits.

Unit III – Logic Gates

The map method- Four-variable map-Five-Variable map- product of sums simplification Don't-care conditions- NAND and NOR implementation other Two-level implementations-Exclusive – Or function-Hardware Description language (HDL).

Unit IV – Combinatorial Circuit Design

Combinational Circuits, Analysis procedure Design procedure, Binary Adder- Subtractor- Decimal Adder- Binary multiplier- magnitude comparator- Decoders- Encoders- Multiplexers- HDL for combinational circuits.

Unit V – Sequential Circuit Design and Programmable Logic

Sequential circuits- latches- Flip-Flops Analysis of clocked sequential circuits- HDL for sequential circuits – State Reduction and Assignment – Design Procedure-Registers – shift Registers – Ripple counters synchronous counters – other counters-HDL for Registers and counters.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Book:

1. M.Morris Mano, "Digital Logic and Computer Design", Third Edition , Pearson Education/PHI.

Reference books:

1. Roth, "Fundamentals of Logic Design", 5th Edition,Thomson.
2. Zvi. Kohavi, "Switching and Finite Automata Theory", Tata McGraw Hill.
3. C.V.S. Rao, " Switching and Logic Design", Pearson Education
4. Donald D.Givone, "Digital Principles and Design", Tata McGraw Hill, Edition.

OUTCOMES:

The students will be able to,

- Design and implement combinational circuits like half adder/full adder, half subtractor /full subtractor, code converters, comparators, MUX/DEMUX
- Ability to rapidly design combinational and sequential circuit design
- Analyze and synthesize digital modules and circuits for a wide application range
- Define the basic concepts of Boolean Algebra
- Analyze the Sequential Circuit Design and Programmable Logic

Course Code: 22MTCS033 **CC-III**

Credits: 4 **L-P-C: 5-0-4**

PROBABILITY AND STATISTICS

OBJECTIVES:

- Identify Objectives of Statistical Analysis.
- Apply Methods of Data collection & Analysis.
- To understand the Correlation and Regression Analysis
- To get the knowledge of probability distribution and statistics.
- To understand the testing hypothesis.

Unit I – Introduction to Statistical Methods

Statistics & managerial decisions - statistical data - operation research technique.

Unit II - Data Collection and Analysis

Collection and presentation of data in terms of tables- graphs- raw data-frequency distributions-histogram-Cumulative frequency curve-Measures of central tendency and location-Partition value-Comparison of various measures of central tendencies - Measures of dispersion- skewness &Kurtosis - comparison of various measures of dispersion-Moments as measures of Statistical propertie- measures of skewness & kurtosis based on moments.

Unit III - Probability Distribution & Statistics

Introduction of Probability- sample, space & events- Basic rules of probability - permutation & combinations- conditional probability- Baye's theorem, - distributions: Binomial, Poisson, Exponential and Normal distribution with their properties and application- Random variables - discrete and continuous probability distribution functions- probability density functions- mean medium, moment and moment generating functions of Binomial- Poisson- geometric & hyper geometric- Concept of joint probability distribution.

Unit – IV Correlation and Regression Analysis

Curve fitting - correlation and regression analysis- Autocorrelation- Multiple regression-statistical Inference & estimation applied to Industrial problems.

Unit – V Statistical Tests and Testing of Hypothesis

Elementary theory and practice of sampling - standard error or means and variance - tests of significance - T test - F test - Z test and chi-square test along with their applications - Goodness of fit - testing of hypotheses and decision making, analysis of variance (ANOVA).

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Books:

1. Quantitative Techniques for Managerial Decision by Srivastava, New Age
2. Statistics for Management by Lewis, Pearson
3. Quantitative Techniques in Management by Vohra, TMH
4. Applied Statistics & Probability for Engineers by Sharma, Willey
5. Introduction to Probability & Statistical Application by P.A. Meyer

OUTCOMES:

The students will be able to,

- Use the statistical methods.
- Use probability as a tool for Statistical Analysis.
- Use the probability distribution and its theorms.
- Use Correlation And Regression Analysis.
- Apply Statistical Tests.

Course Code: 22MTCS034 **CC-IV**

Credits: 4 **L-P-C: 5-0-4**

JAVA PROGRAMMING

OBJECTIVES:

- Acquire knowledge of object-oriented paradigm in the Java programming language
- Design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and iterative structures, and functions.
- Describe and use the mechanics of parameter passing.
- Learns to design, implement, test, debug, and document in object-oriented programming language.
- Discuss and use primitive data types and built-in data structures.

UNIT I - OBJECT ORIENTED CONCEPTS

Java Basics History of Java, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects - concepts of classes, objects, constructors, and methods.

UNIT II - INHERITENCE AND POLYMORPISM

Access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling. Inheritance –Inheritance basics, using super, creating a multilevel hierarchy, dynamic method dispatch, using final with inheritance, Polymorphism- method overriding, abstract classes.

UNIT III - PACKAGES AND INTERFACES

Defining, Creating and Accessing a Package, Understanding CLASSPATH, Access protection, importing packages. Interface – difference between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT IV - EXCEPTION HANDLING AND MULTI-THREADING

Concepts of exception handling, Exception types, uncaught exceptions, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Multithreading – Java thread model, thread priorities, synchronization, creating threads, creating multiple threads, inter-thread communication.

UNIT V- EVENT HANDLING

Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. Applets - Concepts of Applets, Applet

architecture, Applet skeleton, Applet initialization and termination, simple applet display methods, simple banner applet, creating applets, passing parameters to applets.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. "Java; The complete reference", Herbert Schildt, 7th Editon, TMH, 2007.

Reference books:

1. "The Java Programming Language", Ken Arnold, James Gosling and David Holmes, Pearson Education, Seventh Indian Reprint, 2005

2. "Programming with JAVA", C. Muthu, Thomson, 2004

OUTCOMES:

The students will be able to,

- Be able to understand better the object-oriented approach in programming.
- Apply the techniques of structured (functional) decomposition to break a program into smaller pieces.
- Write clear and comprehensive program documentation.
- Learns to develop software in the Java programming language,
- Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements
- Learns the use of Java in a variety of technologies and on different platforms
- Analyze and design a computer program to solve real world problems based on object-oriented principles

Course Code: 22MTCS035 **CC-V**

Credits: 3 **L-P-C: 4-0-3**

COMPUTER NETWORKS

OBJECTIVES:

- To appreciate the top-down and bottom-up view of computer network architecture,
- To know the functionality of each layer in computer networks,
- To get introduced to various protocols at every layer,
- To learn concepts related to network addressing and
- To learn the use of hardware in data communication.

Unit-I:

Introduction: Data Communication – Networks – Network Types - Internet History – Standards and Administration – Network Models : Protocol Layering - TCP/IP Protocol Suite – The OSI Model

Unit-II:

Bandwidth Utilization: Multiplexing and Spectrum Spreading : Multiplexing - Spread Spectrum - Transmission Media: Guided Media - Unguided Media: Wireless – Switching : Introduction - Circuit-Switched Networks - Packet Switching

Unit-III:

Error Detection And Correction : Introduction - Block Coding - Cyclic Codes - Data Link Control (DLC) : DLC Services - Data-Link Layer Protocols – HDLC - Point-To-Point Protocol (PPP)

Unit-IV:

Introduction to Network Layer: Network-Layer Services - Network-Layer Performance – IPV4 Addresses - Network-Layer Protocols: Internet Protocol (IP) - Mobile IP - Unicast Routing: Introduction - Routing Algorithms - Unicast Routing Protocols - Multicast Routing: Introduction - Multicasting Basics - Next Generation IP - IPV6 Addressing

Unit-V:

Introduction to Transport Layer: Introduction - Transport-Layer Protocols - Introduction To Application Layer: Introduction - Standard Client-Server Protocols: World Wide Web And Http – FTP – Electronic Mail – Telnet – Secure Shell (SSH) – Domain Name System (DNS)

Unit VI:

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned

Text Book

1. Behrouz A. Forouzan, "Data Communications and Networking", McGraw-Hill Publication, New York, 5th Edition, 2017.

Reference Books

1. Andrew S Tanenbaum, "Computer Networks", Prentice Hall of India, New Delhi, 6th Edition,2021
2. William Stallings "Data and computer communications", Prentice Hall of India, 7th Edition,2017

OUTCOMES:

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

- To differentiate between the functional view of TCP and UDP**,**
- To evaluate the protocols in network layer from QoS perspective,
- To outline the protocols and topologies in data link layer and
- To dentify the use of various transmission media.
- To expertise into transport layer configuration.

Course Code: 22MTCS036P **CC-VI**

Credits: 2 **L-P-C: 0-3-2**

LAB I - DATA STRUCTURES

OBJECTIVES:

- Understand the concept of data storage and its representation.
- Introduce various techniques for representing of the data in the real world.
- Understand basic data structures such as arrays, linked lists, stacks and queues.
- Discuss the hash function and concepts of collision and its resolution methods
- Develop knowledge of data structures for storage and retrieval of ordered or unordered data.
- Develop the ability to implement algorithms for the creation, insertion, deletion, searching and sorting of each data structure.

List of Programs

1. Implementation of Singly, Doubly and Circular linked list .
2. Implementation of Multistack in a Single Array.
3. Implementation of Circular Queue.
4. Implementation of Binary Search Trees.
5. Implementation of Hash table.
6. Implementation of Heaps.
7. Implementation of AVL Rotations.
8. Implementation of Breadth First Search Techniques.
9. Implementation of Depth First Search Techniques
10. Implementation of Prim's Algorithm.
11. Implementation of Dijkstra's Algorithm.
12. Implementation of Kruskal's Algorithm
13. Implementation of Searching Techniques
14. Implementation of Sorting Techniques

OUTCOMES:

The students will be able to,

- Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data
- Able to analyze and compare algorithms for efficiency using Big-O notation.
- Implement projects using the implementation of the various data structures
- Improve the logical ability and programming skill
- Solve problem involving graphs, trees and heaps

Course Code: 22MTCS037P **CC-VII**

Credits: 2 **L-P-C: 0-3-2**

LAB II - JAVA PROGRAMMING

OBJECTIVES:

The course aims to,

- Demonstrate the fundamental programming constructs and concepts.
- Explaining the process of object instantiation using variables and methods.
- Discuss about the Boolean operations, comparison, arithmetic and object (instance of) operators in their programs.
- Distinguishing between inheritance of implementation (extends) and inheritance of design (implements).
- Explaining the properties of a variable such as its name, value, scope, persistence, and size.
- Identify and use the overloaded methods and constructors.
- Explaining the restrictions imposed when using inheritance.
- Distinguishing between Overriding and overloading parent class functions within a child class.

List of Programs

1. Implement a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence

2. a. Develop a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer

b. Design a Java program to multiply two given matrices.

c. Develop a Java Program Using StringTokenizer class of java.util.

3. a. Design java program to apply the concept of inheritance

b. Implement a Java program to use all the methods in String class and StringBuffer class

4. Develop Java program using Vector class and Stack class

5. a. Develop an Applet program to display simple message

b. Use text field and label to develop an Applet program

6. Develop program using all the types of Exception

7. a. Implement the concept of Mutithreading and b. Inter-thread communication using a Java program

8. Develop a program to use package and interface concept.

9. Develop a Java program to incorporate the abstract class.

10. Design a Java program that implements a simple client/server application.

11. Develop a java program to read and write the file.

12. Design a java program that allows the user to draw lines, rectangles and ovals.

Outcomes:

The students will be able to,

- Use and create packages and interfaces in a Java program
- Create Applets, Implement exception handling in Java
- Implement Multithreading, Input/Output Streams
- Using appropriate data types for programming assignments.
- Distinguishing between expressions and statements.
- Parsing a string and using other string manipulation techniques using arrays.
- Developing a recursive algorithm for solving a problem.
- Creating programs using inner classes and describing their effects on generated class files
- Explaining the benefits of inheritance.
- Creating a class which extends a parent class and a class which implements an interface.
- Creating a class which extends an abstract class Using visibility modifiers (public, private, protected) to implement appropriate abstraction and encapsulation.

IV SEMESTER

Course Code: 22MTCS041 **CC-VIII**

Credits: 3 **L-P-C: 4-0-3**

COMPUTER ORGANIZATION AND ARCHITECTURE

OBJECTIVES:

- To understand the basic hardware and software issues of computer organization
- To provide an overview on the design principles of digital computing systems
- To understand the representation of data at machine level
- To understand how computations are performed at machine level
- To work in RAID configuration for disk storage systems.

Unit – I

Introduction, Technologies for building Processors and Memory, Performance, The Power Wall, Operations of the Computer Hardware, Operands Signed and Unsigned numbers, Representing Instructions, Logical Operations, Instructions for Making Decisions

Unit – II

MIPS Addressing for 32-Bit Immediates and Addresses, Parallelism and Instructions: Synchronization, Translating and Starting a Program, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Subword Parallelissm, Streaming SIMD Extensions and Advanced Vector Extensions in x86.

Unit – III

Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, overview of Pipelining, Pipelined Datapath, Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, The ARM Cortex – A8 and Intel Core i7 Pipelines, Instruction –Level Parallelism and Matrix Multiply Hardware Design language

Unit – IV

Memory Technologies, Basics of Caches, Measuring and Improving Cache Performance, dependable memory hierarchy, Virtual Machines, Virtual Memory, Using FSM to Control a Simple Cache, Parallelism and Memory Hierarchy: Redundant Arrays of Inexpensive Disks, Advanced Material: Implementing Cache Controllers

Unit – V

Disk Storage and Dependability, RAID levels, performance of storage systems, Introduction to multithreading clusters, message passing multiprocessors.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. David A. Patterson and John L. Hennessey, "Computer organization and design, The Hardware/Software interface", Morgan Kauffman / Elsevier, Fifth edition, 2014

Reference Books :

2. V. Carl Hamacher, Zvonko G. Varanesic, and Safat G. Zaky, "Computer Organization", 6 th edition, McGraw-Hill Inc, 2012.
3. William Stallings, "Computer Organization and Architecture", 8 th Edition, Pearson Education, 2010

OUTCOMES:

- Ability to analyze the abstraction of various components of a computer
- Ability to analyze the hardware and software issues and the interfacing
- Ability to work out the tradeoffs involved in designing a modern computer system
- Ability to understand the virtual machine and memory technologies.
- Ability to work RAID configuration for disk storage systems.

Course Code: 22MTCS042 **CC-IX**

Credits: 4 **L-P-C: 5-0-4**

DESIGN AND ANALYSIS OF ALGORITHMS

OBJECTIVES:

- Learn good principles of algorithm design
- Describe the methodologies of how to analyze an algorithm
- Explain the space and time complexity of problems
- Learn how to analyze algorithms and estimate their worst-case and average-case behavior
- Discuss various algorithm design techniques for developing algorithms.

UNIT I: BASIC CONCEPTS OF ALGORITHMS

Introduction - Notion of Algorithm - Fundamentals of Algorithmic Solving - Important Problem types - Fundamentals of the Analysis Framework - Asymptotic Notations and Basic Efficiency Classes.

UNIT II: MATHEMATICAL ASPECTS & ANALYSIS OF ALGORITHMS

Mathematical Analysis of Non-recursive Algorithm - Mathematical Analysis of Recursive Algorithm - Example: Fibonacci Numbers - Empirical Analysis of Algorithms - Algorithm Visualization.

UNIT III: ANALYSIS OF SORTING & SEARCHING ALGORITHMS

Brute Force - Selection Sort and Bubble Sort - Sequential Search and Brute - force string matching - Divide and conquer - Merge sort - Quick Sort - Decrease and Conquer - Insertion Sort - Depth first Search and Breadth First Search.

UNIT IV: ALGORITHMIC TECHNIQUES

Dynamic Programming - Warshall's and Floyd's Algorithm - Optimal Binary Search trees - Greedy Techniques - Prim's Algorithm - Kruskal's Algorithm - Dijkstra's Algorithm - Huffman trees.

UNIT V: ALGORITHM DESIGN METHODS

Backtracking - n-Queen’s Problem - Hamiltonian Circuit problem - Subset-Sum problem - Branch and bound - Assignment problem - Knapsack problem - Traveling salesman problem.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. "Introduction to the Design and Analysis of Algorithm", Anany Levitin, Pearson Education Asia, 2003.

Reference Books :

1. "Introduction to Algorithms", T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, PHI Pvt. Ltd., 2001

2. "Computer Algorithms: Introduction to Design and Analysis", Sara Baase and Allen Van Gelder, Pearson Education Asia, 2003.

3. "The Design and Analysis of Computer Algorithms", A.V.Aho, J.E. Hopcroft and J.D.Ullman, Pearson Education Asia, 2003.

OUTCOMES:

The students will be able to,

- Define the basic concepts of algorithms and analyze the performance of algorithms
- Discuss various searching, sorting and graph traversal algorithms.
- Understand NP completeness and identify different NP
- Design a better algorithm to solve the problems
- Identify and Formulate the time complexity analysis for an Algorithm
- Solve a problem using an algorithm and evaluate its correctness

Course Code: 22MTCS043 **CC-X**

Credits: 3 **L-P-C: 5-0-3**

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

OBJECTIVES:

- Formulate simple definitions, examples and proofs in discrete mathematics
- Understand the concepts of formal languages, automata and grammars, and the relation between them Describe concrete examples of computationally or inherently infeasible problems from different fields
- Describe precisely what it means for a problem to be in the classes P,NP, and PSPACE, and what it means to be complete for a class
- Explain the theoretical limits on computational solutions and inherently complex problems
- Understand the syntax and semantics of propositional logic.

Unit I – Logic

Statements – Connectives – Truth tables – Normal forms – Predicate calculus – Inference Theory for Statement calculus and predicate calculus.

Unit II - Elementary Combinatorics

Mathematical Induction – Pigeonhole principle – Principle of inclusion and exclusion.

Unit III – Recursive Functions

Recurrence relation- Solution of recurrence relation using characteristic polynomial and using generating function – Recursive functions – Primitive recursive functions, Computable and non computable functions.

Unit IV – Algebraic Structures

Groups – Definition and examples only – Cyclic groups – Permutation group (Sn and Dn) – Subgroups – Homomorphism and Isomorphism – Cosets – Lagrange's Theorem – Normal subgroups – Cayley's representation theorem.

Unit V - Lattices

Partial order relations, poset – Lattices, Hasse diagram – Boolean algebra.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Books:

1. Tremblay J. P. and Manohar R., "Discrete Mathematical Structures with applications to Computer Science", McGraw Hill International Edition, 1987.(reprint 2005)

2. Kenneth H. Rosen, Discrete Mathematics and its Applications, 4th Edition, Tata McGraw Hill, 2002. (Unit II – Chapter 3: Sections 3.1, 3.2, Chapter 4: Section 4.2).

3. Venkataraman M.K. etal., "Discrete Mathematics", National Publishing Co., 2000, (Unit III Ch. 5.1 – 5.7)

4. Prof. V. Sundaresan, K.S. Ganapathy Subramanian and K. Ganesan, "Discrete Mathematics", New Revised Edition, 2001. (Unit IV – Chapter 4: Section 4.3)

5. Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia publications (P) Ltd., 1992. (Unit – V Chapter:13.1, 13.2,13.3)

Reference books:

1. C. L. Liu, Elements of Discrete Mathematics, 2nd Edition, McGraw Hill Publications, 1985
2. Gersting. J. L. Mathematical Structures for Computer Science, 3rd Edition, W. H. Freeman and Co., 1993.
3. Lidl and Pitz, Applied abstract Algebra, Springer – Verlag, New York, 1984.

OUTCOMES:

The students will be able to,

- Lay the foundations in discrete mathematics commonly required in many areas of computer science
- Reinforce the concept of mathematical proof, including constructive proof by giving an algorithm
- Classify problems into appropriate complexity classes, including P, NP and PSPACE, and use this information effectively.
- Able to apply definitions and theorems in basic discrete mathematics

Course Code: 22MTCS044 **CC-XI**

Credits: 4 **L-P-C: 4-0-4**

OPERATING SYSTEM

OBJECTIVES:

- Demonstrate the operating system design and its impact on application design
- Describe how computing resources (such as CPU and memory) are managed by the operating system, describe the basic principles used in the design of modern operating systems
- Understand the process concept and concurrency as the heart of modern operating systems.
- Describe the various CPU scheduling algorithms and remove deadlocks.
- Explain various memory management techniques and concept of thrashing
- Introduce and explain the various features of distributed operating system
- Learn how the file, mass storage, and I/O are handled in a modern computer system

UNIT I- INTRODUCTION

Main frame Systems, Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time systems – Hand held Systems, Operating Systems Structures: System Components – Operating System Services - System calls – System Programs – System Design and Implementation - CPU scheduling: Basic Concepts – Scheduling Algorithms**.**

UNIT II - PROCESS MANAGEMENT

Process Concepts - Process Scheduling - Operation on Process - Co-Operating process - Inter Process Communication - Threads: Multithreading Models – Process Synchronization: The Critical Section Problem – Synchronization Hardware - Semaphores – classical problem of Synchronization – Monitors - Deadlock: Deadlock Characterization - Methods for handling Deadlocks - Deadlock Prevention – Deadlock Avoidance - Deadlock Detection – Recovery from Deadlock.

UNIT III - MEMORY MANAGEMENT

Background – Swapping - Contiguous Memory Allocation - Paging - Segmentation – Segmentation with paging - Virtual Memory: Demand paging - Page Replacement - Thrashing.

UNIT IV - FILE SYSTEMS

File Concepts - Access methods - Directory Structure - File Protection - File System Implementation: File System Structure and Implementation – Directory Implementation – Allocation methods Free Space Management – Recovery - Disk Structure – Disk Scheduling.

UNIT V - DISTRIBUTED OPERATING SYSTEM

Design issues in distributed operating system-Distributed file systems - Naming and Transparency-Remote File Access- Stateful versus Stateless service – Distributed Coordination-Event Ordering-Mutual Exclusion- Atomicity- Concurrency Control- Deadlock Handling-Election Algorithms-Case Study-Linux**.**

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. "Operating System Concepts", Silberschatz, Galvin, Gagne Sixth Edition, 2003.

Reference Books :

1. Andrew S. Tanenbaum , "Modern Operating Systems", PHI , 2nd Edition 2001

2. Achut S. Godbole and Kahate Atul , "Operating Systems & Systems

Programming ", Tata Mcgraw Hill, 2003.

Outcomes:

The students will be able to,

- Understand the basics of operating systems like kernel, shell, types and views of operating systems
- Indentify the performance issues associated with I/O devices
- Evaluate and report appropriate design choices when solving real-world problems
- Use disk management and disk scheduling algorithms for better utilization of external memory.
- Recognize file system interface, protection and security mechanisms. Explore the effectiveness of particular algorithms depending on varying situations.
- Explore the effectiveness of particular memory management algorithms depending on varying situations.

Course Code: 22MTCS045 **CC-XII**

Credits: 3 **L-P-C: 4-0-3**

OBJECT ORIENTED ANALYSIS AND DESIGN

OBJECTIVES:

- Demonstrate a thorough understanding of scope within an object-oriented system
- Learns to build object-oriented programs with inheritance from UML Class diagrams
- Develop the mastery of essential programming structures (variables, functions, conditionals, loops, lists)
- Design and build object-oriented programs that use abstract date types

UNIT I - OBJECT ORIENTED BASICS

An Overview of Object Oriented Systems Development – Object Basics – Object Oriented Systems Development Life Cycle.

UNIT II - OBJECT ORIENTED METHODOLOGIES

Rumbaugh Methodology – Booch Methodology – Jacobson Methodology – Patterns – Frameworks – Unified Approach – Unified Modeling Language – Use case – class diagram – Interactive Diagram – Package Diagram – Collaboration Diagram – State Diagram – Activity Diagram.

UNIT III - OBJECT ORIENTED ANALYSIS

Identifying use cases – Object Analysis – Classification – Identifying Object relationships – Attributes and Methods.

UNIT IV - OBJECT ORIENTED DESIGN

Design axioms – Designing Classes – Access Layer – Object Storage – Object Interoperability.

UNIT V - SOFTWARE QUALITY AND USABILITY

Designing Interface Objects – Software Quality Assurance – System Usability – Measuring User Satisfaction

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. "Object Oriented Systems Development", Ali Bahrami, Tata McGraw-Hill, 2006

2. "UML Distilled", Martin Fowler Second Edition, PHI/Pearson Education, 2002.

Reference books:

1. "Introduction to Object Oriented Analysis and Design", Stephen R. Schach, Tata McGraw-Hill, 2003.

2. "The Unified Modeling Language Reference Manual", James Rumbaugh, Ivar Jacobson, Grady Booch Addison Wesley, 1999.

3. "UML Toolkit", Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, OMG Press Wiley Publishing Inc., 2004

OUTCOMES:

The students will be able to,

- Able to build object-oriented database systems
- Develop solutions for a range of problems using objects and classes.
- Design and build object-oriented programs in Python that include multiple classes related through both inheritance hierarchies.
- Develops the aggregate relationships and that demonstrate an understanding of the principles of information hiding and encapsulation
- Design and build object-oriented programs that use abstract date types

Course Code: 22MTCS046 **EEC**

Credits: 2 **L-P-C: 2-0-2**

SOFT SKILLS

OBJECTIVES

- The conformity of the Institute' purpose and educational goal with academic professional development programs.
- The purpose and goal of the Institute is set in accordance with the "The Institute Educational Program of National Defense Medical College".
- As a military college shouldering the duty of military education, the purpose of the Institute is set as ""To cultivate outstanding talents of biomedical research" and "To upgrade academic standards and the quality of medical care", whereas the educational objective is: "To foster outstanding research talents and reserve professional teachers in the fields of Microbiology and Immunology."

UNIT1:

Behavioral Skills

UNIT2:
Business Communication

UNIT3:
Spoken English

UNIT4:
Text Writing

UNIT5:
Group Dynamics

TextBook:

1. G. Ravindran, S.P. Benjamin Elango and L. Arockiam, " Success Through Soft Skills", ICT, 2007.

OUTCOMES

- **Resilience** – learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict
- **Teamwork** – learning to connect and work with others to achieve a set task
- **Leadership** – assessing the requirements of a task, identifying the strengths within the team, utilizing the diverse skills of the group to achieve the set objective, awareness of risk/safety
- **Communication** – demonstrating clear briefing and listening skills, not being afraid to ask for help and support when necessary
- **Emotional maturity and emotional health** – learning to handle emotions including tolerance and behavioral responses, building positive friendships and bonding with peers and classmates, learning to show understanding and to demonstrate respect for the opinions, personal space and beliefs of others
- **Confidence and enthusiasm for learning** – developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals
- **Citizenship** – raising awareness of one's place and role within a community through volunteering and conservation opportunities
- **Responsibility** – for one's self, learning self-reliance and independence
- **Employability skills** – time and resource management, conflict resolution, teaching and mentoring others

Course Code: 22MTCS047P **CC-XIII**

Credits: 2 **L-P-C: 0-3-2**

LAB III - OPERATING SYSTEM

OBJECTIVES:

- Describe the fundamentals of the UNIX system
- Understand the fundamentals of proper UNIX command syntax and issue properly formed UNIX commands
- Demonstrate the proper use of meta characters and redirection in UNIX commands
- Customize environment settings using a text editor
- Describe the concept of a shell script
- Discuss the concepts, and demonstrate the commands and files used to create and manage user accounts
- Demonstrate the use of hard and symbolic links.

Simple Unix-C Programs:

1. Display "Unix Programming Lab." N times using LIBRARY FUNCTION CALLS and user Defined function dsply(int). N is an integer given through keyboard uponprompting.
2. Display "Unix Programming Lab." N times using SYSTEM CALLS and user defined function dsply(char *). N is an integer given through keyboard upon prompting.
3. Write "Unix Programming Lab." N times in a file: outfile.txt in current directory using LIBRARY FUNCTION CALLS and user defined function writefile(int). N is an integer given through a file infile.txt.
4. Write "Unix Programming Lab." N times in a file: outfile.txt in current directory usingSYSTEM CALLS and user defined function writefile(char *). N is an integer given through a file infile.txt.

PROGRAMS using system calls that provides some error checking:

1. Display all of the available system error messages in a numbered two-columns-per-line format.
2. Write your own error messaging function that is called when a file manipulation failure occurs. The function should provide a more descriptive, user-friendly interface than perror. It might be helpful to examine the header file<sys/errno.h>and the manual pageentry for Intro in section 2(i.e., man –s2 Intro) prior to start.
3. Display process group ID information.
4. Displaying system limits like Max size of argv, Max #Child Processes, etc using sysconf

PROGRAMS using Processes:

1. Chain of processes 2. Fan of Processes

3. Write a program that determines by trial and error the numbers of files a process can have simultaneously open. Be sure to remove (investigate the unlink system call) any files that you generate.

4. Predict what will happen when a process forks a child process and the child process issues a chdir system call – will the current directory for the parent be changes as well? Write a program that substantiates your answer.

PROGRAMS using COMMAND LINE ARGUMENTS:

1. PROGRAMS for Simple Shell and Complex Shell with cd command, editor command, etc.)

2. PROGRAMS for Primitive Communications: Lock Files, Signal and Signal management Calls.

3. PROGRAMS using Pipes: Unnamed Pipes, Named Pipes.

4. PROGRAMS using Message Queues: Creating a Message Queue, A Client-Server Message Queue.

5. PROGRAMS using Semaphores: Creating and Accessing Semaphore Sets, Semaphore operations.

6. PROGRAMS using Shared Memory: Creating Shared Memory Segment, using a File as Shared memory.

7. PROGRAMS using RPCs: Executing Remote Commands in a C program.

OUTCOMES:

The students will be able to,

- Develop mastery of commands used to manage files and directories
- Demonstrate the proper use of meta characters and redirection in UNIX commands
- Create and execute a basic shell script
- Discuss the fundamentals of system start and shutdown
- Execute UNIX commands to backup and restore files
- Create shell scripts that use conditional statements and loop structures
- Control access to files and directories using file and directory permissions

Course Code: 22MTCS048P **CC-XIV**

Credits: 2 **L-P-C: 0-3-2**

LAB IV - OBJECT ORIENTED ANALYSIS DESIGN

OBJECTIVES:

- Documenting user requirements using the UML notation
- Description of the various components of UML
- The use of Use Cases Models helps us to visualize a system
- To implement the models gives us a template guides us in constructing a system.
- To implement the models document the decisions we have made.

List of Programs

1. ATM system
2. Course registration system
3. Expert system
4. Online ticket reservation system
5. Payroll system
6. Quiz system
7. Real time scheduler
8. Stock maintenance system
9. Student marks analyzing system glossary

OUTCOMES:

- Models permit us to specify the structure or behavior of a system.
- Models gives us a template guides us in constructing a system.
- Models document the decisions we have made.
- Documenting user requirements using the UML notation
- Description of the various components of UML

V SEMESTER

Course Code: 22MTCS051 **CC-XV**

Credits: 4 **L-P-C: 4-0-4**

MICROPROCESSOR AND MICROCONTROLLER

OBJECTIVES:

- To understand the functional blocks of a microprocessor, to learn 8085 / 8086 programming and
- To build a microprocessor based system for a given application.
- To write programs for 8085 / 8086,
- To work with 8086 software aspects.
- To write programs involving interrupt handling and explain the architecture and concepts behind 8051 and its operations

UNIT I 8085 MICROPROCESSOR

8085 Microprocessor: The 8085 MPU – Architecture – Instruction formats – Addressing modes – Instruction set – Programming with 8085 – 8085 based microcomputer system.

UNIT II 8086 SOFTWARE ASPECTS

8086 Software Aspects: Intel 8086 Microprocessor – Architecture – Assembly Language Programming – Linking and relocation – Stacks – Procedures – Macros - Interrupts and Interrupt Routines – Byte & String Manipulation. 8086 System Design: Basic configurations – System bus timing – Multiprocessor configurations – Coprocessor, Closely coupled and loosely coupled configurations.

UNIT III I/O INTERFACES

I/O Interfaces: Serial Communication Interface – Parallel communication interface – Programmable Timer – Keyboard and Display controller – DMA controller – Interrupt controller.

UNIT IV ADVANCED PROCESSORS

Advanced Processors: Intel’s 80X86 family of processors – Salient features of 80286, 80386.

UNIT V 80486 PENTIUM PRO

Basic 486 Architecture: 486 memory system and memory management - Features of Pentium memory and I/O systems - Pentium memory management - Introduction to Pentium Pro features.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. "Microprocessor Architecture, Programming and Applications with the 8085", Ramesh S. Gaonkar, , 4th Edition, Penram International Publishing (India) Pvt. Ltd., 1999.

2. "Microprocessors and Interfacing", Douglas V. Hall, , Tata Mcgraw Hill, 1999.

3. "The Intel Microprocessors – 8086/8088, 80186, 286, 386, 486, Pentium and PentiumPro Processor", Barry B. Brey, Prentice Hall of India Pvt. Ltd., 1998.

Reference books:

1. "Microcomputer Systems: The 8086/8088 Family Architecture, Programming & Design", Yu-chengliu and Glenn a.Gibson, 2nd Edition, Prentice Hall of India pvt. Ltd., 2001.

OUTCOMES:

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

- To write programs for 8085 / 8086,
- To work with 8086 software aspects.
- To write programs involving interrupt handling and explain the architecture and concepts behind 8051 and its operations
- Distinguish and analyze the properties of Microprocessors & Microcontrollers.
- CO5: analyze the data transfer information through serial & parallel ports.

Course Code: 22MTCS052 **CC-XVI**

Credits: 4 **L-P-C: 4-0-4**

OPERATION RESEARCH

OBJECTIVES:

- To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.
- Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained.
- Optimize the allocation of resources to Demand points in the best possible way using various techniques and minimize the cost or time of completion of number of jobs by number of persons.
- Model competitive real-world phenomena using concepts from game theory. Analyse pure and mixed strategy games
- Formulate Network models for service and manufacturing systems, and apply operations research techniques and algorithms to solve these Network problems

UNIT I FUNDAMENTAL OF OPERATIONAL RESEARCH

Definition of OR- Types of OR Models - Applications of OR – Linear Programming Problem: Mathematical Formulation - Graphical Solution of LP Models - Simplex Method - Artificial Variable Techniques - Dual Simplex Method - Special cases in Simplex Method - Duality Principle - Economic Interpretation of the Dual Problem

UNIT II TRANSPORTATION MODEL

Definition and Applications of the Transportation Model: Mathematical Formulation - Solution of the Transportation Problem: North - West Corner Rule Vogel's Approximation Method - Least Cost Method - Determination of Optimal Solution - Degeneracy in TP - Unbalanced TP Assignment Problem: Mathematical Formulation - Assignment Method - Unbalanced Assignment Problem - The Traveling Salesman Problem

UNIT III NETWORK SCHEDULING

Network Scheduling by PERT/CPM: Basic components - Rules of Network Construction - Critical Path Calculation - Determination of Floats – Probability Considerations in Project Scheduling - Cost Considerations in Project Scheduling

UNIT IV GAME THEORY

Two-Person Zero-Sum Games : Maximin-Minimax Principle – Dominance Property - Graphic Solution of 2 X n and m X 2 games. Decision Analysis: Basic definitions - Decision Making under Uncertainty - Decision Making under Risk Decision Tree Analysis. Markov Analysis – Simulation

UNIT V QUEUING THEORY

Inventory Control: Costs associated with Inventories - EOQ Models – ABC Analysis. Queuing Theory: Queuing System - Classification of Queuing Models Transient and Steady States - M/M/1 & M/M/N Models

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. “Operations Research An Introduction” ,Hamdy A Taha Macmillan Publishing Company, April 2006, 8th Edition ISBN: 9780131889231

2. “Operations Research', KantiSwarup, P.K. Gupta and Man Mohan, Sultan Chand and Sons, Ninth Edition, 2008.

OUTCOMES:

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

- Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems.
- Solve the problems mentioned in point 4 using linear programming approach using software.

- Understand different queuing situations and find the optimal solutions using models for different situations.
- Simulate different real life probabilistic situations using Monte Carlo simulation technique.
- Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes

Course Code: 22MTCS053 **CC-XVII**

Credits: 4 **L-P-C: 4-0-4**

PYTHON PROGRAMMING

Objectives:

- To acquire programming skills in core Python.
- To study data structures in Python.
- To get familiar in modules and packages.
- To develop the skill of designing web applications in Python.
- To develop the ability to write database applications in Python.

UNIT I:

Introduction To Python Programming: Python interpreter and interactive mode; values and types variables, expressions, statements, Order of operations, comments, debugging; modules and functions: function Calls, adding new functions, Definitions and Uses, flow of execution, parameters and arguments, Fruitful functions. Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, range, break, continue, pass; recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays.

UNIT II:

Lists, Tuples, Dictionaries: Lists: Traversing a List, list operations, list slices, list methods, Map, Filter and Reduce, list loop, mutability, aliasing, cloning lists, list parameters; Dictionaries: operations and methods; advanced list processing - list comprehension; Tuples: tuple assignment, tuple as return value

UNIT III:

Files, Modules, Packages: Files and Input/output; text files, reading and writing files, format operator; command line arguments, Errors and Exception; detecting and handling exception, raising exception and Assertions, Modules; importing modules, Features, Packages: PANDAS and NUMPY

UNIT IV

Network And Web Programming: Network programming; Socket communication, socket server module, Internet client programming, Transferring files, Electronic mail and related modules, Web Programming: Creating simple web client, Process client data and building CGI applications

UNIT V:

Database And Gui Programming : Introduction to tkinter, Top Level Windows, Dialogs, Message and Entry, Event Handling, Menus, List boxes and Scrollbars, Text, SQL Database interfaces with sqlite: Basic operations and table load scripts

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‖, 2nd edition, Updated for Python 3, Shroff/OReilly Publishers,2016
2. WesleyJ. Chun,–CorePython Programming|2ndEdition, Pearson Education, 2007

References:

1. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd.,2011.
2. Mark Lutz ,Learning Python, O Reily, 4th Edition,2009,
3. Magnus Lie Hetland, –Beginning Python: From Novice To Professional‖, Second Edition, 2005
4. Mark Summerfield –Programmingin Python 3|, Pearson Education, 2010

E-Resources:

- http://www.network-theory.co.uk/docs/pytut
- http://docs.python.org/tutorial/
- http://index-of.es/Python/Core.Python.Programming.2nd.Edition.Wesley.Chun.2006.pdf

Outcomes:

After completing the course students able to,

- Understand the basics of python programming.
- Explain the use of the built-in data structures list, sets, tuples and dictionary.
- Make use of modules and create python modules
- Build real world applications using network and web programming in python
- Create data base applications and GUI based applications in python

Course Code: 22MTCS054 **CC-XVIII**

Credits: 4 **L-P-C: 4-0-4**

DATABASE MANAGEMENT SYSTEM

OBJECTIVES:

- To expose the students to the fundamentals of Database Management System.
- To make the students understand the rational model.
- To make the students to understand the storages structures.

UNIT I: INTRODUCTION

File systems versus Database systems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model – Enhanced E-R Modeling.

UNIT II: STORAGE STRUCTURES

Secondary storage Devices – RAID Technology – File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Indexes on Multiple Keys.

UNIT III: RELATIONAL MODEL

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views – Constraints – Relational Calculus – Tuple Relational Calculus – Domain Relational Calculus – overview of commercial RDBMSs – Database Design – Functional Dependencies – Normal Forms – 1NF – 2NF-3NFBCNF – 4NF-5NF – Database Tuning.

UNIT IV: QUERY AND TRANSACTION PROCESSING

Algorithms for Executing Query Operations – using Hermistics in Query operations – Cost Estimation – Semantic Query Optimization – Transaction Processing – Properties of Transactions - Serializability – Transaction support in SQL.

UNIT V: CONCURRENCY, RECOVERY AND SECURITY

Locking Techniques – Time Stamp ordering – Validation Techniques – Granularity of Data Items – Recovery concepts – Shadow paging – Log Based Recovery – Database Security Issues – Access control – Statistical Database Security.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. “Database System Concepts”, Abraham Silberschatz, Henry F. Korth and S. Sudarshan, McGraw-Hill, - Fourth Edition, 2002.

Reference Books:

1. “Fundamental Database Systems”, Ramez Elmasri and Shamkant B. Navathe, Pearson Education, Third Edition, 2003.
2. “Database Management System”, Raghu Ramakrishnan, Tata McGraw- Hill Publishing Company, 2003.
3. “Database System Implementation”, Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom, Pearson Education, 2000.
4. “Database System, Design, Implementation and Management”, Peter Rob and Corlos Coronel, Thompson Learning Course Technology, Fifth edition, 2003

OUTCOMES:

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

- Design Database for applications.
- Use the rational model, ER diagrams
- Apply the concurrency control and recovery mechanisms for practical problems
- Design the query processor and transaction processor.
- Apply security concepts to databases

Course Code: 22MTCS057P **CC-XIX**

Credits: 2 **L-P-C: 0-3-2**

LAB V - PYTHON PROGRAMMING

Objectives:

- To acquire programming skills in core Python.
- To understand the data structures in Python.
- To develop the skill on files and modules.
- To develop the skill of designing Graphical user Interfaces in Python.
- To develop the ability to write database applications in Python.

List of Exercises

1. Exercise programs on basic control structures &loops.
2. Exercise programs on Python Script.
3. Exercise programs on Lists.
4. Exercise programs on Strings.
5. Exercise programs on functions.
6. Exercise programs on recursion & parameter passing techniques.
7. Exercise programs on searching & sorting Techniques.
8. Exercise programs on Files
9. Exercise Program on Modules
10. Exercise Program on Exception handling
11. Exercise programs on Networking
12. Exercise programs on GUI, Graphics
13. Exercise Programs on Data base Connection

Outcomes:

At the end of the course, student will be able to

- Understand the basics of python programming.
- Explain the use of the built-in data structures list, sets, tuples and dictionary.
- Make use of functions, strings and its applications.
- Demonstrate the use of modules, packages and its applications
- Build the real world applications using data base, GUI and Netwoking

Course Code: 22MTCS058P **CC-XX**

Credits: 2 **L-P-C: 0-3-2**

LAB VI - DATABASE MANAGEMENT SYSTEM

OBJECTIVES:

- Understand data definitions and data manipulation commands, Learn about the use of nested and joint queries,
- Understand functions and procedures and procedural extensions of data bases.
- Use typical data definitions and
- manipulation commands,
- Design applications to test Nested and Joint Queries,

Recommended Systems/Software Requirements:

- Intel based desktop PC
- Mysql /Oracle latest version Recommended

1) Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.

   Example:- Select the roll number and name of the student who secured fourth rank in the class.

3) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4) Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
5) i)Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

   ii)Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6) Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.
8) Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9) Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10) Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
11) Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
12) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEADOF Triggers

OUTCOMES:

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

- Use typical data definitions and
- manipulation commands,
- Design applications to test Nested and Joint Queries,
- Implement simple applications that uses Views and critically analyze the use of Tables, Views, functions and Procedures for a realistic database application.

VI SEMESTER

Course Code: 22MTCS061 **CC-XXI**

Credits: 4 **L-P-C: 4-0-4**

COMPUTER GRAPHICS

OBJECTIVES:

The student should be made to

- Gain knowledge about graphics hardware devices and software used.
- Understand the two dimensional graphics, three dimensional graphics and their transformations
- It provides the necessary theoretical background and demonstrates the application of computer science to graphics.
- The course further allows students to develop programming skills in computer graphics through programming assignments.
- The course covers fundamental topics such as graphics representations and transformations.

UNIT I: FUNDAMENTALS

Overview of Graphics System – Bresenham technique – Line Drawing and Circle Drawing Algorithms – DDA – Line Clipping – Text Clipping

UNIT II: 2D TRANSFORMATIONS

Two dimensional transformations – Scaling and Rotations – Interactive Input methods – Polygons – Splines – Bezier Curves – Window view port mapping transformation

UNIT III: 3D TRANSFORMATIONS

3D Concepts – Projections – Parallel Projection – Perspective Projection – Visible Surface Detection Methods – Visualization and polygon rendering – Color models – XYZ – RGB – YIQ – CMY – HSV Models – Animation – Key Frame systems – General animation functions – Morphing

UNIT IV: OVERVIEW OF MULTIMEDIA

Multimedia hardware & software – Components of multimedia – Text – Image – Graphics – Audio – Video – Animation – Authoring

UNIT V: MULTIMEDIA SYSTEMS AND APPLICATIONS

Multimedia communication systems – Database systems – Synchronization Issues – Presentation requirements – Applications – Video conferencing – Virtual reality – Interactive video – Video on demand

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. Hearn D and Baker M.P, "Computer graphics, C Version", Second Edition Pearson Education, 2004.

2. Ralf Steinmetz and Klara Steinmetz, "Multimedia Computing: Communications and Applications", Pearson Education, 2004.

Reference Books:

1. Siamon J. Gibbs and Dionysios C. Tsichritzis, "Multimedia programming", Addison Wesley, 1995.

2. John Villamil, Casanova and LeonyFernanadez, Eliar, "Multimedia Graphics", Prentice Hall of India, 1998.

3. Newman and Sproul, "Interactive Computer Graphics ", Tata McgrawHill , 2002

OUTCOMES:

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

- Design two dimensional graphics.
- Apply two dimensional transformations.
- Design three dimensional graphics.
- Apply clipping techniques to graphics.
- Design animation sequences

Course Code: 22MTCS062 **CC-XXII**

Credits: 4 **L-P-C: 4-0-4**

SOFTWARE ENGINEERING

OBJECTIVES:

- To provide an overview of software engineering,
- To learn detailed concepts related to software engineering life cycle,
- To understand the concepts of verification and validation and appreciate the necessity of assessing software quality and measurements.
- An ability to work in one or more significant application domains
- Work as an individual and as part of a multidisciplinary team to develop and deliver quality software

UNIT I SOFTWARE PROCESS

Introduction –S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) – system engineering – computer based system – verification – validation – life cycle process – development process –system engineering hierarchy.

UNIT II SOFTWARE REQUIREMENTS

Functional and non-functional – user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping – S/W document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

UNIT III DESIGN CONCEPTS AND PRINCIPLES

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design – transform and transaction mapping – user interface design – user interface design principles. Real time systems – Real time software design – system design – real time executives – data acquisition system – monitoring and control system. SCM – Need for SCM–Version control – Introduction to SCM process – Software configuration items.

UNIT IV TESTING

Taxonomy of software testing – levels – test activities – types of s/w test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large. S/W testing strategies – strategic approach and issues – unit testing – integration testing – validation testing – system testing and debugging.

UNIT V SOFTWARE PROJECT MANAGEMENT

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking – Software changes – program evolution dynamics – software maintenance – Architectural evolution. Taxonomy of CASE tools.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. "Software engineering- A practitioner's Approach" , Roger S.Pressman, McGraw-Hill

International Edition, 5th edition, 2001.
2. "Software engineering", Ian Sommerville, Pearson education Asia, 6th edition, 2000.

3. "Software Engineering Concepts ", Richard E. Fairley, McGraw-Hill edition, 2002.

Reference books:

1. "Software Engineering – An Engineering Approach", James F Peters and Witold

Pedryez, John Wiley and Sons, New Delhi, 2000.

OUTCOMES:

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

- To differentiate the perspective of various software process models, to elicit the requirements for real-time problems,
- To compile a SRS pertaining to industry standards, to develop a user-interface design for the given system,
- To outline various software metrics and their context in measuring software Programs and estimate the software cost.
- An ability to work in one or more significant application domains

- Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle

Course Code: 22MTCS063 **CC-XIII**

Credits: 4 **L-P-C: 4-0-4**

NETWORK SECURITY

OBJECTIVES:

- To understand the Classical Encryption Techniques.
- To understand various block cipher and stream cipher.
- To describe the principles of public key cryptosystems, hash functions and digital signatures.
- To analyze and design classical encryption techniques and block ciphers.
- To understand and analyze data encryption standard.

UNIT I: ENCRYPTION TECHNIQUE OVERVIEW

Overview – Symmetric Ciphers: Classical Encryption Techniques

UNIT II: SYMMETRIC KEY CRYPTOGRAPHY

Symmetric Ciphers: Block ciphers and Data Encryption Standards. Public-key encryption and Hash Functions: Public-Key Cryptography and RSA

UNIT III: SECURITY PRACTICES

Network Security Practices: Authentication applications – Electronic Mail Security

UNIT IV: IP AND WEB SECURITY

Network Security Practices: IP Security – Web security

UNIT V: SYSTEM SECURITY

System Security: Intruders – Malicious Software – Firewalls

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. William Stallings, “Cryptography and Network Security – Principles and Practices”, Prentice-

Hall, Third edition, 2005

Reference books:

1. Johannes A, Buchanan, "Introduction to cryptography", Springer-Verlag
2. Atulkahate, "Cryptography and Network Security". TMH

OUTCOMES:

Upon Completion of the course, the students should be able to

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications
- Analyze and design classical encryption techniques and block ciphers.
- Understand and analyze data encryption standard.
- Understand and analyze public-key cryptography, RSA and other public-key cryptosystems such as Diffie-Hellman Key Exchange, ElGamal Cryptosystem, etc.
- Understand key management and distribution schemes and design
- User Authentication

Course Code: 22MTCS064 **CC-XXIV**

Credits: 3 **L-P-C: 4-0-3**

WEB TECHNOLOGY

OBJECTIVES:

- To build web applications using ASP and client side script technologies use with Microsoft's IIS,
- To build XML applications with DTD and style sheets that span multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers.
- To analyze a web page and identify its elements and attributes.
- To create web pages using XHTML and Cascading Style Sheets.
- To build dynamic web pages using JavaScript (Client side programming).
- To create XML documents and Schemas.

Unit I BASIC WEB TECHNOLOGY PROTOCOL

History of the Internet and World Wide Web – HTML 4 protocols – HTTP, SMTP, POP3, MIME, IMAP. Introduction to JAVA Scripts – Object Based Scripting for the web. Structures – Functions – Arrays – Objects.

Unit II DYNAMIC WEB TECHNOLOGY

Introduction – Object refers, Collectors all and Children. Dynamic style, Dynamic position, frames, navigator, Event Model – On check – On load – Onenor – Mouse rel – Form process – Event Bubblers – Filters – Transport with the Filter – Creating Images – Adding shadows – Creating Gradients – Creating Motion with Blur – Data Binding – Simple Data Binding – Moving with a record set – Sorting table data – Binding of an Image and table.

Unit III SPEECH RECOGNITION

Audio and video speech synthesis and recognition - Electronic Commerce – Eusiness Model – E-Marketing – Online Payments and Security – Web Servers – HTTP request types – System Architecture – Client Side Scripting and Server side Scripting – Accessing Web servers – IIS – Apache web server.

Unit IV SQL AND ASP

Database, Relational Database model – Overview, SQL – ASP – Working of ASP – Objects – File System Objects – Session tracking and cookies – ADO – Access a Database from ASP – Server side Active-X Components – Web Resources – XML – Structure in Data – Name spaces – DTD – Vocabularies – DOM methods.

Unit V SERVLET

Introduction – Servlet Overview Architecture – Handling HTTP Request – Get and post request – redirecting request – multi-tier applications – JSP – Overview – Objects – scripting – Standard Actions – Directives.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. Deitel & Deitel, Goldberg, "Internet and world wide web – How to Program",

Pearson Education Asia, 2001.

Reference books:

1. Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and JAVA", Prentice Hall of India – QUE, 1999.
2. Aferganatel, "Web Programming: Desktop Management", PHI, 2004.
3. Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.

OUTCOMES:

At the end of the course, students should be able to:

- Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
- Have a Good grounding of **Web** Application Terminologies, **Internet** Tools, E – Commerce and other **web** services.
- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.
- Build interactive web applications using JSP

Course Code: 22MTCS067P **CC-XXV**

Credits: 2 **L-P-C: 0-3-2**

LAB VII - NETWORK SECURITY

OBJECTIVES:

- To understand the DES, RSA and AES Encryption algorithms for problem solving.
- To understand the Stream cipher and block cipher.
- To understand the security issues and its problem solving techniques.
- Able to solve the security problems by using Blowfish, Vigener Cipher algorithm.
- To understand the Digital Signature using SHA-1 and substitution cipher methods.

PROGRAM 1: Write a program to perform Ceasar Cipher.

PROGRAM 2: Write a program to perform Data Encryption Standard

PROGRAM 3: Write a program to perform Advanced Encryption Standard.

PROGRAM 4: Write a program to explain the RSA Encryption Algorithm.

PROGRAM 5: Write a program to perform the Blowfish algorithm.

PROGRAM 6: Write a program to perform the Vigenere Cipher.

PROGRAM 7: Write a program to perform the Digital Signature using SHA-1.

PROGRAM 8: Write a program to perform the Substitution Cipher.

OUTCOMES:

At the end of the course, students should be able to:

- Able to solve the problems by Block cipher and stream cipher algorithms.
- Able to solve the problems using DES, RSA and AES Encryption algorithms.
- Able to solve the security problems by using Blowfish, Vigener Cipher algorithm.
- To understand the Digital Signature using SHA-1 and substitution cipher methods.

Course Code: 22MTCS068P **CC-XXVI**

Credits: 2 **L-P-C: 0-3-2**

LAB VIII - WEB TECHNOLOGY

OBJECTIVES:

- The objective of this lab is to develop an ability to design and implement static and dynamic website
- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas. • Build interactive web applications using AJAX.

PROGRAM 1. Create a HTML table with rows & columns and split them using Rowspan and Colspan.

PROGRAM 2. Create a web page in the format of front page of a news paper using Text links. Align the text with colors.

PROGRAM 3. Write an XML document to display your bio-data. Write an XSL style sheet and attach that to the XML document. Validate the document using DTD or XSD.

PROGRAM 4. Write an ASP program to prepare Employee pay bill using Java Script.

PROGRAM 5. Write an ASP program to prepare student performance evaluation document using Java Script.

OUTCOMES:

At the end of the course, students should be able to:

- Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
- Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.
- Get introduced in the area of Online Game programming.

VII SEMESTER

Course Code: 22MTCS071 **CC-XXVII**

Credits: 4 **L-P-C: 4-0-4**

AGILE TECHNOLOGIES

OBJECTIVES:

- To understand how an iterative, incremental development process leads to faster delivery of more useful software
- To understand the essence of agile development methods
- To understand the principles and practices of extreme programming
- To understand the roles of prototyping in the software process
- To understand the concept of Mastering Agility

Unit I - Why Agile?

Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility, **How to Be Agile?:**Agile Methods, Don't Make Your Own Method, The Road to Mastery, Find a Mentor

Unit II - Understanding XP

The XP Lifecycle, The XP Team, XP Concepts, **Adopting XP:** Is XP Right for Us?, Go!, Assess Your Agility

Unit III - Practicing XP

Thinking: Pair Programming, Energized Work, Informative Workspace, Root-Cause Analysis, Retrospectives, **Collaborating:** Trust, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting, **Releasing:**"DoneDone", No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation **Planning:** Vision, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, Estimating **Developing:** Incremental requirements, Customer Tests, Test-Driven Development, Refactoring, Simple Design ,Incremental Design and Architecture, Spike Solutions, Performance Optimization, Exploratory Testing

Unit IV - Mastering Agility

Values and Principles: Commonalities, About Values, Principles, and Practices, Further Reading, **Improve the Process:** Understand Your Project, Tune and Adapt, Break the Rules,

Rely on People : Build Effective Relationships, Let the Right People Do the Right Things, Build the Process for the People, **Eliminate Waste :**Work in Small, Reversible Steps, Fail Fast, Maximize Work Not Done, Pursue Throughput

Unit V -Deliver Value

Exploit Your Agility, Only Releasable Code Has Value, Deliver Business Results, Deliver frequently, **Seek Technical Excellence :**Software Doesn't Exist, Design Is for Understanding, Design Trade-offs, Quality with a Name, Great Design, Universal Design Principles, Principles in Practice, Pursue Mastery

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. **The Art of Agile Development** (Pragmatic guide to agile software development), James shore, Chromatic, O'Reilly Media, Shroff Publishers & Distributors, 2007

Reference Books :

1. Agile Software Development, Principles, Patterns, and Practices, Robert C. Martin, Prentice Hall; 1st edition, 2002
2., "Agile and Iterative Development A Manger's Guide", Craig Larman Pearson Education, First Edition, India, 2004.
.

Outcomes:

Students should be able to,

- Understand The XP Lifecycle, XP Concepts, Adopting XP
- Work on Pair Programming, Root-Cause Analysis, Retrospectives, Planning, Incremental Requirements, Customer Tests
- Implement Concepts to Eliminate Waste
- Components of management models in agile project management;
- Apply agile methods for the success of all kind of project.

Course Code: 22MTCS072 **CC-XXVIII**

Credits: 3 **L-P-C: 4-0-3**

OPEN SOURCE TECHNOLOGIES

OBJECTIVES:

- To introduce open technologies and open hardware and develop applications using PHP.
- To expose students to free open source software environment and introduce them to use open source packages.
- To implement various applications using build systems
- To understand the difference between open-source software and commercial software.
- To understand the policies, licensing procedures and ethics of FOSS.

Unit I: Introduction to Open Source

Introduction: Open Source – Open Source vs. Commercial Software – What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions

Unit II: Overview of Linux

Introduction: Linux Essential Commands – File system Concept – Standard Files – The Linux Security Model – Vi Editor – Partitions creation – Shell Introduction – String Processing – Investigating and Managing Processes – Network Clients – Installing Application

Unit III: Exploring Apache

Introduction – Apache Explained – Starting, Stopping, and Restarting Apache – Modifying the Default Configuration – Securing Apache – Set User and Group – Consider Allowing Access to Local Documentation – Don't Allow public_html Web sites – Apache control with .ht access

Unit IV: Manipulating MY SQL Database

Introduction to MY SQL – The Show Databases and Table – The USE command – Create Database and Tables – Describe Table – Select, Insert, Update, and Delete statement – Some Administrative detail – Table Joins – Loading and Dumping a Database.

Unit V: Working with PHP

PHP Introduction- General Syntactic Characteristics – PHP Scripting – Commenting your code – Primitives, Operations and Expressions – PHP Variables – Operations and Expressions Control Statement – Array – Functions – Basic Form Processing – File and Folder Access – Cookies –

Sessions – Database Access with PHP – MySQL – MySQL Functions – Inserting Records – Selecting Records – Deleting Records – Update Records.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. James Lee and Brent Ware, "Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP".

OUTCOMES:

At the end of the course, the student will be able to:

- Explain the internal structure of Linux,
- Write desktop and web applications using PHP,
- Design for extendibility and code reuse
- Develop applications for open source hardware.

Course Code: 22MTCS073 **CC-XXIX**

Credits: 3 **L-P-C: 4-0-3**

MOBILE APPLICATION DEVELOPMENT

Objective:

- To understand the basic concepts in Mobile Computing and about Android Operating System.
- To understand the fundamentals of Android programming using the Android SDK.
- To understand the fundamental concepts in Android programming –
- To study the activities and intents, designing user interface using views, data persistence, content providers, messaging and networking, location-based services, and developing android services.
- To demonstrate their skills of using Android software development tools

Unit I Overview of Mobile Communications

Mobile Communications - An Overview: Mobile Computing - Mobile Computing Architecture - Mobile Devices - Mobile System Networks - Data Dissemination - Mobility Management - Security

Unit II Mobile Devices

Mobile Devices and Systems: Mobile Phones - Digital Music Players - Handheld Pocket Computers - Handheld Devices with Operating Systems - Smart Systems - Limitations of Mobile Devices - Automotive Systems

Unit III Overview of Android

Android Overview - The Stack - Main Building Blocks - Android User Interface

Unit IV Customization

Preferences, the File system, the Options Menu, and Intents - The Database - Lists and Adapters - Broadcast Receivers.

Unit V Content Providers

Content Providers - System Services - The Android Interface Definition Language - The Native Development Kit (NDK).

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. Mobile Computing, Rajkamal, Second Edition, Oxford Higher Education, 2014.
2. Learning Android, Marko Gargenta, O'Reilly Media, Inc,2011

Reference books:

1. Mobile Computing: Technology, Applications and Service Creation, Ashoke K Talukder et al, McGraw Hill Education, 2012
2. Android Application Development, Pradeep Kothari, Black Book 2014

Outcomes:

A student passing this module should be able to:

- Understand and apply the key technological principles and methods for delivering and maintaining mobile applications,
- Evaluate and contrast requirements for mobile platforms to establish appropriate strategies for development and deployment
- Develop and apply current standard-compliant scripting/programming techniques for the successful deployment of mobile applications targeting a variety of platforms.

Course Code: 22MTCS074 **CC-XXX**

Credits: 4 **L-P-C: 4-0-4**

COMPILER DESIGN

OBJECTIVES:

The student should be made

- To Learn the design principles of a Compiler,
- To Learn the various parsing techniques and different levels of translation and
- To learn how to optimize and effectively generate machine codes
- To understand relations between computer architecture and how its understanding is useful in design of a compiler.
- To construct efficient algorithms for compilers.

UNIT I - COMPILERS: GRAMMARS & AUTOMATA

Languages – Grammars – Types of grammars – Context free grammar - regular expression - Recognizing of patterns - finite automation (deterministic & non deterministic) Conversion of NDFA to DFA - Conversion of regular expression of NDFA – Thompson's construction- minimization of NDFA –Derivation - parse tree – ambiguity

UNIT II- LEXICAL ANALYSIS

Lexical analysis- handles - token specification - design of lexical analysis (LEX) - Automatic generation of lexical analyzer - input buffering - A language for specifying lexical analyzers - implementation of lexical analyzer

UNIT III - SYNTAX ANALYSIS – PARSING

Definition - role of parsers - top down parsing - bottom-up parsing - Left recursion - left factoring - Handle pruning , Shift reduce parsing - operator precedence parsing – FIRST- FOLLOW- LEADING- TRAILING- Predictive parsing - recursive descent parsing. LR parsing – LR (0) items - SLR parsing – Canonical LR - LALR parsing - generation of LALR - Ambiguous grammars - error recovery

UNIT IV - SYNTAX DIRECTED TRANSLATION

Intermediate Languages - prefix - postfix - Quadruple - triple - indirect triples – syntax tree- Evaluation of expression - three-address code- Synthesized attributes – Inherited attributes –

Conversion of Assignment statements- Boolean expressions –Backpatching - Declaration - CASE statements.

UNIT V -CODE OPTIMIZATION

Local optimization- Loop Optimization techniques – DAG – Dominators- Flow graphs – Storage allocations- Peephole optimization – Issues in Code Generation.

UNIT VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. AlfredAho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Pearson Education Asia, 2003.

Reference books:

1 .HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001.

2. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning, 2003

3. Alfred V Aho , Jeffery D Ullman , Ravi Sethi, " Compilers , Principles techniques and tools ", Pearson Education 2011

4. Raghavan V., "Principles of Compiler Design", Tata McGraw Hill Education Pvt. Ltd., 2010.

5. David Galles, "Modern Compiler Design", Pearson Education, Reprint 2012.

6. Dasaradh Ramaiah. K., "Introduction to Automata and Compiler Design", PHI, 2011

OUTCOMES:

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

- Design and implement a prototype compiler
- Apply the various optimization techniques
- Use the different compiler construction tools
- Understand fundamentals of compiler and identify the relationships among different phases of the compiler.
- Understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics.

Course Code: 22MTCS077P **CC-XXXI**

Credits: 2 **L-P-C: 0-3-2**

LAB IX - OPEN SOURCE TECHNOLOGIES

OBJECTIVES:

- To extend the students' knowledge of algorithms and data structures and
- To learn a variety of useful algorithms and techniques
- Explain the internal structure of Linux,
- Write desktop and web applications using PHP,
- Design for extendibility and code reuse
- Develop applications for open source hardware

Programs:

1. Implement the server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.

2. Create a PHP program that adds products that are selected from a web page to a shopping cart.

3. Design a PHP program to access the data stored in a mysql table.

4. PHP program interface to create a database and to insert a table into it.

5. Develop a PHP program using classes to create a table.

6. Implement the PHP program to upload a file to the server.

7. Design PHP program to create a directory, and to read contents from the directory.

8. Develop a shell program to find the details of an user session.

9. Shell program to change the extension of a given file.

10. Create a mysql table and execute queries to read, add, remove andmodify a record from that table.

OUTCOMES:

- Discuss the insights of internet programming and implement complete application over the web,
- Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet

- Use web application development software tools PHP and HTML and identify the environments currently available on the market to design web sites.
- Design for extendibility and code reuse
- Develop applications for open source hardware

Course Code: 22MTCS078P **CC-XXXII**

Credits: 2 **L-P-C: 0-3-2**

LAB X - MOBILE APPLICATION DEVELOPMENT

OBJECTIVES:

The student should be made to:

- To Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles,
- To understand how to work with various mobile application development frameworks, learn the basic and important design concepts and
- To issues of development of mobile applications and understand the capabilities and limitations of mobile devices.
- To able to write simple GUI applications, use built-in
- To widgets and components, work with the database to store data locally, and much more.

Write Android Programs for the following:

1. Different Layout design including nested layout for a single bio-data.
2. Arithmetic Operation for two numbers
3. Business Calculator
4. Animation: Bouncing of a ball
5. Intent
6. Database SQLite: Student Bio-data
7. Fragments - Tablet Programming
8. Media Player

OUTCOMES:

A student passing this module should be able to:

Understand and apply the key technological principles and methods for delivering and maintaining mobile applications, Evaluate and contrast requirements for mobile platforms to establish appropriate strategies for development and deployment, Develop and apply current standard-compliant scripting/programming techniques for the successful deployment of mobile applications targeting a variety of platforms.

VIII SEMESTER

Course Code: 22MTCS082 **CC-XXXIV**

Credits: 3 **L-P-C: 4-0-3**

PROFESSIONAL ETHICS

Objective:

- To create awareness on professional ethics and Human Values
- To create awareness on Engineering Ethics providing basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues
- To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards

UNIT I: HUMAN VALUES

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II: ENGINEERING ETHICS

Senses of ‑Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas– Moral Autonomy – Kohlberg's theory – Gilligan"s theory – Consensus and Controversy –Models of professional roles – Theories about right action – Self-interest – Customs and Religion - Uses of Ethical Theories.

UNIT III: ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV: SAFETY, RESPONSIBILITIES AND RIGHTS

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V: GLOBAL ISSUES

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers - Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

UNIT VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Mike W. Martin andRoland Schinzinger, –Ethics in Engineering‖, Tata McGraw Hill, New Delhi,2013.
2. R. Subramanian, –ProfessionalEthics‖,Oxford UniversityPress,NewDelhi, 2013.
3. Govindarajan M, Natarajan S, Senthil Kumar V. S, –Engineering Ethics‖, Prentice Hall of India, New Delhi,2004.

Reference Books:

1. Daniel Albuquerque, –Business Ethics‖,Oxford University Press, NewDelhi, 2013.
2. Edmund G.Seebauer and Robert L. Barry, –Fundamentals of Ethics‖, OxfordUniversity Press, New Delhi, 2012.
3. Laura P. Hartman and Joe Desjardins, –Business Ethics: Decision Making for Personal Integrity and Social Responsibility‖ McGraw Hill education, India Pvt. Ltd.,New Delhi2013.
4. World Community Service Centre, "Value Education", Vethathiri publications, Erode,2011.

E-References:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

Outcomes:

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society
- Can analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual Property Rights
- Inculcate knowledge and exposure on Safety and Risk, Risk Benefit
- Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.

IX SEMESTER

Course Code: 22MTCS091 **CC-XXXV**

Credits: 4 **L-P-C: 5-0-4**

ADVANCED DATA STRUCTURE AND ALGORITHMS

Objectives:

- To extend the student's knowledge in algorithms and data structures
- To learn a variety of useful algorithms and techniques

Unit I: Design and Analysis of Algorithms

Hash Tables – Binary Search Trees - Balanced binary search trees - B/B+ trees - Basic operations on B-trees- AVL trees - red black trees – Rotations – Insertion – Deletion - priority queues

Unit II: Advanced Design and Analysis Techniques

Dynamic Programming – Assembly-line scheduling – Matrix-chain Multiplication – Greedy Algorithm – Huffman codes –Task Scheduling problem – Amortized analysis – Aggregated analysis – The accounting method – The potential method

Unit III: Advanced Data Structures

Binomial Heaps – operations on Binomial heaps – Fibonacci Heaps – Structure of Fibonacci heaps – Mergeable-heap operations – Bounding the maximum degree – Data structures for disjoint Sets – Linked-list representation of disjoint sets - Disjoint-set forests

Unit IV: Graph Algorithms

Elementary Graph Algorithms – Breadth-first search – Depth-first search – Topological – Minimum spanning trees – The algorithm of Kruskal and Prim – Single-Source Shortest Paths – Bellman-Ford algorithm - Dijkstra's algorithm – All-pairs shortest paths – The Floyd-Warshall algorithm –Maximum Flow- the Ford-Fulkerson method.

Unit V: Mutual Exclusion and Pattern Matching Algorithm

Sorting Networks – the Zero-one Principle - Bitonic sorting network – sorting network – Matrix operations – Strassen's algorithm for matrix multiplication – Polynomials and FFT – The DFT and FFT – Efficient implementation – String matching – The Rabin-Karp algorithm – The Knuth-Morris-Pratt algorithm.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. Cormen T. H., Leiserson C. E., Rivest R. L., Introduction to Algorithms, Prentice Hallof India – 2003.

2.Brassad G. & Bratley P., Fundamentals of Algorithmics, Prentice Hall of India

Reference books

1. Basse S., Computer Algorithms - Introduction to Design and Analysis, AddisonWesley

2.Lynch N. A., Distributed Algorithms, Harcourt Asia (Morgan Kaufman)

Outcomes:

Upon completion of this course, the student should be able to

- Design and implement optimized algorithms in specific applications.
- Have a basic ability to analyze algorithms and to determine algorithm correctness and time efficiency
- Master a variety of advanced data structures and their implementations and different Algorithms design techniques in computational geometry and in parallel algorithms
- Apply Hashing, Disjoint sets and String Matching techniques for solving problems effectively.
- Analyze the given scenario and choose appropriate Data Structure for solving problems

Course Code: 22MTCS092 **CC-XXXVI**

Credits: 4 **L-P-C: 5-0-4**

WIRELESS SENSOR NETWORKS

Objective

- To understand the fundamentals of wireless sensor networks and its application to critical real time scenarios.
- To study the various protocols at various layers and its differences with traditional protocols.
- To understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.

Unit I

Introduction: Fundamentals of wireless communication technology, the electromagnetic spectrum – Spectrum allocation, Radio propagation mechanisms, Characteristics of the wireless channels-Path loss, Fading, Interference, Doppler Shift, Transmission Rate Constraints, Modulation Techniques – Analog Modulation, Digital Modulation, Multiple Access Techniques, Wireless LANs, PANs, WANs, and MANs, Wireless Internet.

Unit II

Introduction to adhoc/sensor networks: Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.

Unit III

MAC Protocols : Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.

Unit IV

Routing Protocols: Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power-aware routing protocols. QoS and Energy Management: Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS Model

Unit V

Security in Ad Hoc Wireless Network: Security Attacks, Key Distribution and Management , Intrusion Detection , Software based Anti-tamper techniques, Water marking techniques, Defense against routing attacks, Secure Ad hoc routing protocols, Broadcast authentication WSN protocols, TESLA, Biba , Sensor Network Security Protocols, SPINS

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Book

1. C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks ", Pearson Education - 2008.
2. Holger Karl, Andreas Willing, ―Protocols and Architectures for Wireless Sensor Networks‖, John Wiley & Sons, Inc., 2005.

Reference Book

1. Feng Zhao and Leonides Guibas, "Wireless sensor networks ", Elsevier publication - 2004.
2. Jochen Schiller, "Mobile Communications", Pearson Education, 2nd Edition, 2003.
3. William Stallings, "Wireless Communications and Networks ", Pearson Education – 2004
4. Xiang-Yang Li , "Wireless Ad Hoc and Sensor Networks: Theory and Applications‖, 1227 th edition, Cambridge university Press,2008.

Outcome

- Technical knowhow in building a WSN network.
- Analysis of various critical parameters in deploying a WSN
- Identify different issues in wireless ad hoc and sensor networks.
- Understand and explain mobile data-centric networking principles.
- Be familiar with WSN standards

Course Code: 22MTCS093 **CC-XXXVII**

Credits: 4 **L-P-C: 5-0-4**

VLSI TECHNOLOGY

Objective:

- To bring both Circuits and System views on design together.
- It offers a profound understanding of the design of complex digital VLSI circuits, computer aided simulation and synthesis tool for hardware design
- To learn the concept of various VLSI technologies.
- To understand the logic design principles.

Unit I

VLSI Technology: A System Perspective, Introduction- Contemporary VLSI Systems -Emerging VLSI Systems- Alternative Technologies.

Unit II

CMOS/BiCMOS Technology - Introduction - CMOS Technology - BiCMOS Technology- Future Technology. **Bipolar Technology** - Introduction - Bipolar Process Design - Conventional Bipolar Technology - High-Performance Bipolar Technology- Advanced Bipolar Technology.

Unit III

Silicon on Insulator Technology - Introduction - Fabrication of SOI Wafers-Generic Advantages of SOI- SOI Devices -Fully Depleted SOI Transistors - Partially Depleted SOI Transistors- Short-Channel Effects- SOI Challenges. **SiGe Technology**- Introduction-SiGe Strained Layer Epitaxy- The SiGe Heterojunction Bipolar Transistor (HBT)- The SiGe Heterojunction Field Effect Transistor (HFET) .

Unit IV

Passive Components- Magnetic Components- Air Core Inductors- Resistors- Capacitors. **Power IC Technologies**- Introduction- Intelligent Power ICs- High-Voltage Technology- High-Voltage Metal Interconnection- High-Voltage SOI Technology- High-Voltage Output Devices.

Unit V

Noise in VLSI Technologies-Introduction- Microscopic Noise- Device Noise- Chip Noise- Future Trends. Logic Design Principles and Examples- Introduction- Static Logic Design- Transient Analysis and Design for Very-High-Speed Logic- Logic Design Examples- Design of MESFET and HEMT Logic Circuits- HBT Logic Design Examples.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Book:

- Wai-kai-Chief, VLSI Technology, CRC Press, 2000, New York.
- Wai-kai-chen, The VLSI Handbook, CRC Press, 17-Jul-2019 - Technology & Engineering - 1788 pages

Reference:

- S.K. Gandhi , Fundamentals of Modern VLSI Devices Reference Book, John Wiley Inc., New York, 1994(2nd Edition)
- S.M.Sze, VLSI TECHNOLOGY, McGraw Hill, 2nd Edition. 2008.

Outcomes:

- Getting knowledge of various VLSI technologies.
- Analysis the different components of circuits.
- Understand the logic design with examples.
- Apply principles to Identify and Analyze the various steps for the fabrication of various components
- Assess the various reliability issues in VLSI technology

Course Code: 22MTCS094 **CC-XXXVIII**

Credits: 4 **L-P-C: 5-0-4**

INTERNET OF THINGS

Objective :

- To provide a Complete Knowledge about the Internet of Things
- Explain the definition and usage of the term "The Internet of Things" in different contexts.
- Understand where the IoT concept fits within the broader ICT industry and possible future trends.
- Appreciate the role of big data, cloud computing and data analytics in a typical IoT system.
- Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.

UNIT I – Introduction

Introduction - Putting the Internet of Things forward to the Next Level - Internet of Things Strategic Research and Innovation Agenda : Internet of Things Vision - Internet of Things Strategic Research and Innovation Directions - IoT Smart X Applications.

UNIT II- Communication Network for IoT

Internet of Things and Related Future Internet Technologies - Network and Communications - Processes - Data Management - Security, Privacy and Trust - Device Level Energy Issues - IoT Related Standardization - IoT Protocols Convergence.

UNIT III- Integration of Applications

Scalable Integration Framework for Hetrogeneous Smart Objects, Applications and Services : IPV6 Potential - IoT6 - IPV6 vsIoT - Adapting IPV6 to IoT Requirements - IoT6 Architecture - DigCovery - IoT6 Integration with the Cloud and EPICS - Enabling Hetrogeneous Integration - IoT6 Smart Office Use Case - Scalability Perceptive.

UNIT IV- Federated Cloud for IoT

Insignts on Federated Cloud Service Management and the IoT : Federated Cloud Service Management - Federated Management Service Lifr Cycle - Self Management Life Cycle - Self Organising Cloud Architecture - Horizontal Platform.

UNIT V- Application of IoT Internet of Things Applications :OpenIoT - iCORE - Compose.

UNIT VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

Internet of Things - From Research Innovation to Market Deployment by OvidiuVermesan and Peter Friess, River Publishers, 2014.

Reference Book:

Designing the Internet of Things by Adrian McEwen and Hakim Cassimally, John Wiley and Sons, Ltd, 2014.

Outcomes:

- Design a simple IoT system comprising sensors, edge devices, wireless network connections and
- data analytics capabilities.
- Use the knowledge and skills acquired during the course to build and test a complete, working
- IoT system involving prototyping, programming and data analysis.

Course Code: 22MTCS095 **CC-XXXIX**

Credits: 5 **L-T-P-C: 4-0-5**

ARTIFICIAL INTELLIGENCE

Objectives:

- Formulate and solve problems in the framework of constraint satisfaction problems.
- Formulate and solve planning problems.
- Use probabilistic modelling techniques to solve problems with noise, incomplete information, and uncertainty.
- Summarize the essential components of gradient-based optimization in supervised learning problems
- Explain the impact of step sizes in gradient-based optimization
- Be able to apply the training and running of trained neural networks in tensor flow
- Be able to investigate the impact of essential parameters such as step size, batch size and training iterations when training a neural network
- Discuss the usage of different neural network structures such as fully connected, convolution and pooling layers

Unit-I INTRODUCTION

Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

UNIT-II INTRODUCTION TO SEARCH

Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

UNIT-III KNOWLEDGE REPRESENTATION & REASONING

Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

UNIT-IV MACHINE LEARNING

Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

UNIT-V PATTERN RECOGNITION

Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbour (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

UNIT VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education

Reference BookS:

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill
2. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
3. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

Outcomes:

- Recognize the difference between batch and stochastic/mini-batch gradient descent and apply improved weight update methods such as momentum term, RMSProp and Adam.
- Be able to recall state of the art neural network components such as batch normalization layers and residual connections
- Be able to recall the basic ideas behind neural networks used for machine translation and sequence to sequence learning.
- Be able to construct input samples that are able to fool neural networks

Course Code: 22MTCS096 **CC-XL**

Credits: 2 **L-P-C: 3-0-2**

RESEARCH STUDY

Course Code: 22MTCS097P **CC-XLI**

Credits: 2 **L-P-C: 0-3-2**

LAB XI - ADVANCED DATA STRUCTURE AND ALGORITHMS

Objectives:

- To learn to design and implement searching algorithms.
- To learn to implement concurrent data structures.

Programs:

1. Problem: Evaluation of expressions operations on multiple stacks & queues
2. Implementation of linked lists: inserting, deleting, and inverting a linked list, and implementation of stacks
3. Queues using linked lists
4. Polynomial addition, Polynomial multiplication
5. Sparse Matrices: Multiplication, addition.
6. Recursive and Non recursive traversal of Trees
7. Threaded binary tree traversal. AVL tree implementation
8. Application of Trees. Application of sorting and searching algorithms
9. Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

Outcomes:

Upon completion of the course, the students will be able to

- Design and apply iterative and recursive algorithms.
- Design and implement algorithms using the AVL tree techniques.
- Design and implement optimisation algorithms for specific applications.
- Design and implement randomized algorithms.

X SEMESTER

Course Code: 22MTCS101 **CC-XLII**

Credits: 4 **L-P-C: 4-0-4**

PARALLEL DISTRIBUTED SYSTEMS

Objectives:

- To Introduce the Concepts of Parallel Distributed Systems.
- To be familiar with the types of Parallel Processing.
- To understand the concept of Distributed Computing.
- To understand the Clock Synchronization and Message Passing methods.
- To understand the parallel programming models and its techniques.

UNIT – I

Basic Concepts: Introduction to parallel processing, parallel processing terminology, decomposition, complexity, throughout, speedup, measures, data dependence, resource dependence, Bernstein's conditions levels of parallelism in programs. Program flow-control flow, data flow, Distributed systems – Introduction, advantages, and tightly-coupled loosely-coupled systems. Hardware and software requirements, design issues.

UNIT- II

Parallel Processing – Structure & Organization: Taxonomy of parallel processes: granularity, basic architectures, multiprocessors, vector processors, pipeline:-both linear as well as non-liner pipeline, optimal design, Arithmetic pipeline, Instruction pipeline, Pipeline hazards and their solution ,reservation table, scheduling.

UNIT- III

Distributed Computing-introduction, definition , its history; Distributed Computing system definition and its evolution, reasons for its popularity, Strength and weaknesses of distributed computing, Different forms of Computing: Minicomputer model, workstation model, workstation server model, Processor pool Model; Cluster:- definitions, reasons for its popularity cluster computer system architecture, Windows cluster, Solaris cluster, Linux cluster; Using cluster, distributed Computing System models: Distributed operating system, Introduction to DCE, architecture of Distributed Applications

UNIT- IV

Clock: Types of Clock, Synchronization of clocks, types of Clock synchronization algorithms, lamport time stamps, Message passing:- introduction, desirable features of a good message passing system, Issues in IPC by Message passing, synchronization, Buffering, Multi-datagram messages, Encoding and decoding of message data, Process addressing, Failure handling, IPC, Distributed Election, types of election algorithms.

UNIT – V

Parallel & Distributed Programming: Parallel Programming environments, models, synchronous asynchronous programming, modulla-2, occamm, FORTRAN, DAP FORTRAN, C-linda, Actus, data flow programming, VAL etc,. MPI, Open MP

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Book:

1. Michael J. Quinn, "Parallel Computing – Theory and Practice, 2nd Edition, McGraw Hill, 1994
2. Kai Hwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", McGraw Hill Inc, 1993.
3. Wilkinson, "Parallel Programming using networked computer" , Pearson Education India, 20006
4. S. G. Akl, "The Design and Analysis of parallel algorithms", Englewood Cliffs, NJ, 1989

Reference Books:

1. R. H. Perrott, "Parallel Programming", Addison Wesley, 1987.
2. T. G. Lewie and H. Ele-Revini, "Introduction to Parallel computing", PHI, NJ, 1992.
3. S. Lakshmivardhan and S.K. Dhall, "Analysis and design of parallel algorithm – arithmetic and matrix problems", McGraw Hill, 1990
4. J. M. Crichlow, "An introduction to distributed and parallel computing", PHI, 1988
5. Pradeep K. Sinha," Distributed Systems

Outcomes:

- To develop and apply knowledge of parallel and distributed computing techniques and methodologies.
- To gain experience in the design, development, and performance analysis of parallel and distributed applications.
- To gain experience in the application of fundamental Computer Science methods and algorithms in the development of parallel applications.
- To gain experience in the design, testing, and performance analysis of a software system, and to be able to communicate that design to others.

Course Code: 22MTCS102 **CC-XLIII**

Credits: 4 **L-P-C: 5-0-4**

BIG DATA ANALYTICS

Objective

- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques.
- To understand the big data security.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

Unit – I BIG DATA

Characteristics, Importance, Use cases: Fraud detection patterns - Risks, Case study: Big Data and the energy sector -IBM for Big Data. Mapreduce-MapReduce (MR) basics, MR algorithm design, Graph algorithms, Limitations of MR, Future of MR, Case study:Word alignment for statistical machine translation.

Unit – II HADOOP

Hadoop distributed file system, Hadoop I/O, Developing a MapReduce application.

Unit – III PIG AND HBASE

Pig Latin, User defined functions, Data processing operators, HBasics, Installation, Clients, Examples, HBaseVs RDBMS, Zookeeper: Examples - Service - Building applications with Zookeeper.

Unit – IV MONGODB

Overview, Data model, Working with data, GridFS, Database administration, Optimization, Replication, Sharding.

Unit – V R LANGUAGE

Overview, Programming structures: Control statements - Operators - Functions - Environment and scope issues -Recursion - Replacement functions, R data structures: Vectors - Matrices and arrays - Lists - Data frames - Classes, Input/output,

String manipulations

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books: :

1. Paul Zikopoulos et al, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill Professional, USA, 2011.

Reference Book :

1. Jimmy Lin and Chris Dyer, "Data Intensive Text Processing using MapReduce", Morgan and Claypool Publishers, USA, 2010.

2. Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press, USA, 2011.

3. Tom White, "Hadoop: The Definitive Guide", O`Reilly Publishers, USA, 2012.

4. EelcoPlugge, Tim Hawkins and Peter Membrey, "The Definitive Guide to MongoDB: The NoSQL Database for Cloud and
Desktop Computing", Apress, USA, 2010.

Outcomes:

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

- Work with big data platform and its analysis techniques
- Analyze the big data for useful business applications.
- Design efficient algorithms for mining the data from large volumes.
- Explore the technologies associated with big data analytics such as NoSQL, Hadoop and Map Reduce.

Course Code: 22MTCS103 **CC-XLIV**

Credits: 4 **L-P-C: 5-0-4**

DIGITAL FORENSICS & CYBER SECURITY

Objective:

- To understand the basic digital forensics and techniques for conducting the forensic examination on different digital devices.
- To understand how to examine digital evidences such as the data acquisition, identification analysis.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity in the Cyber Security.
- To understand how to deploy security techniques to secure data in transit across data networks.
- To design security applications in the field of Information technology, Cyber Space.

Unit –I

Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues. Understanding Computing Investigations – Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations.

Unit-II

Data acquisition- understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools. Processing crimes and incident scenes, securing a computer incident or crime, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case.

UNIT – III

Cyber Security and the CIO: CIO: Personality - CIO: Education - CIO: Experience - CIO: Responsibilities- CIO: Information Security - CIO: The Changing Role - Building a Secure Organization: Business Continuity Planning - System Access Control - System Development and Maintenance - Physical and Environmental Security - Compliance - Personnel Security - Security Organization - Computer and Network Management - Asset Classification and Control - Security Policy.

UNIT – IV

Cyberspace Intrusions: IDPS Configuration - IDPS Capabilities - IDPS Management- IDPS Classification - IDPS Comparison - Cyberspace Defense: File Protection Applications - PC Performance Applications - Protection Tools.

UNIT – V

Cyberspace and the Law: International Laws - Cyber-Related Laws – Cybercrime - Cyber Warfare and Homeland Security: Cyber Warfare - Homeland Security - Cyber Security Preparedness - Distributed Defense.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

George K. Kostopoulos, "Cyber Space andCyber Security", CRC Press, 2013

Reference Book :

James Graham, Richard Howard, Ryan Olson, "Cyber SecurityEssentials", Auerbach Publications,2011.

Outcomes:

- Know how to apply forensic analysis tools to recover important evidence for identifying computer crime.
- To be well-trained as next-generation computer crime investigators.
- Implement basic security algorithms required by any computing system.
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective countermeasures.

Course Code: 22MTCS104 **CC-XLV**

Credits: 3 **L-P-C: 5-0-3**

MACHINE LEARNING TECHNIQUES

Objectives:

- To Know the Concepts in Machine Learning
- To Understand the Basic Activities of Machine Learning
- To Know the Functionality of Modelling and Evaluation in Machine Learning
- To Get Introduced to Feature Engineering in Machine Learning
- To Learn the Different Types of Learning in Machine Learning

UNIT I

Introduction to Machine Learning : Introduction - Human Learning - Types of Human Learning - Learning under expert guidance - Learning guided by knowledge gained from experts - Learning by self - Machine Learning - Machines learning - Well-posed learning problem - Types of Machine Learning - Supervised learning - Unsupervised learning - Reinforcement learning - Comparison – supervised, unsupervised, and reinforcement learning - Problems Not To Be Solved Using Machine Learning - Applications of Machine Learning - Banking and finance, Insurance, Healthcare, State-of-The-Art Languages/Tools In Machine Learning, Python, R, Matlab, SAS, Other languages/tools, Issues in Machine Learning

UNIT II

Preparing to Model : Introduction - Machine Learning Activities - Basic Types of Data in Machine Learning - Exploring Structure of Data - Exploring numerical data - Plotting and exploring numerical data - Exploring categorical data - Exploring relationship between variables - Data Quality and Remediation - Data quality - Data remediation - Data Pre-Processing - Dimensionality reduction - Feature subset selection

UNIT III

Modelling and Evaluation : Introduction - Selecting a Model - Predictive models - Descriptive models - Training a Model (for Supervised Learning) - Holdout method - K-fold Cross-

validation method - Bootstrap sampling - Lazy vs. Eager learner - Model Representation and Interpretability - Underfitting - Overfitting - Bias – variance trade-off - Evaluating Performance of a Model - Supervised learning – classification - Supervised learning – regression - Unsupervised learning – clustering - Improving Performance of a Model

UNIT IV

Basics of Feature Engineering : Introduction - Feature - Feature Engineering - Feature Transformation - Feature construction - Feature extraction - Feature Subset Selection - Issues in high-dimensional data - Key drivers of feature selection – feature relevance and redundancy - Measures of feature relevance and redundancy - Overall feature selection process - Feature selection approaches

UNIT V

Other Types of Learning : Introduction - Representation Learning - Supervised neural networks and multilayer perceptron - Independent component analysis (Unsupervised) - Autoencoders - Various forms of clustering - Active Learning - Heuristics for active learning - Active learning query strategies - Instance-Based Learning (Memory-based Learning) - Radial basis function - Pros and cons of instance-based learning method - Association Rule Learning Algorithm - Apriori algorithm - Eclat algorithm - Ensemble Learning Algorithm - Bootstrap aggregation (Bagging) - Boosting - Gradient boosting machines (GBM) - Regularization Algorithm

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Book(s)

Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson Education Press, 2018

Reference Books

Machine Learning, Anuradha Srinivasaraghavan, Vincy Elizabeth Joseph, Wiley Publications, 2019

EBOOK LINK : https://jp.b-ok.as/book/15096921/7f7e13

Outcomes:

At the End of the Course, the Student Should be able to:

- Know the Basic Concepts in Machine Learning
- Study the Different Activities of Machine Learning
- Know about Modelling and Evaluation in Machine Learning
- Understand about Feature Engineering in Machine Learning
- Understand the Different Types of Learning in Machine Learning

Course Code: 22MTCS106P **CC-XLVI**

Credits: 2 **L-P-C: 0-3-2**

LAB XII - BIG DATA ANALYTICS

1. Data Import and Export
2. Decision Trees
3. Regression
4. Prediction
5. Clustering
6. Outlier Detection
7. Association Rule
8. Text Mining

Course Code: 22MTCS107P **CC-XLVII**

Credits: 2 **L-P-C: 0-3-2**

LAB XIII – MACHINE LEARNING

Objectives:

- To Practice Scikit-Learn Python Library.
- To apply pre-processing methods.
- To reduce dimensions of data.
- To design a ML model for the given business problem.
- To perform training, testing and evaluation of the designed ML model Access internet and database data.

Exercises:

Develop applications that will demonstrate the following Machine Learning models for the given business use case.

- Pre-processing methods
- Dimensionality reduction and feature selection using PCA, Kernel PCA and SVD as well as Entropy, Information Gain and Gini Index.
- Supervised Machine Learning Models
    - Logistic Regression
    - Support Vector Machine
    - Decision Trees
    - K-Nearest Neighbour
    - Neural Network
- Unsupervised Machine Learning Models
    - KMeans and KMeans++
    - Agglomerative Clustering
    - DBSCAN
- Evaluation of ML Models
    - K-Fold Cross Validation
    - Grid Search
- Performance Evaluation
    - Accuracy
    - MSE and SSE
    - Confusion Matrix
    - Precision, Recall and F-Score

Outcomes

On successful completion of this course, students would be able to

- Practice Scikit-Learn Python Library.
- Apply pre-processing methods.
- Reduce dimensions of data.
- Design a ML model for the given business problem.
- Perform training, testing and evaluation of the designed ML model Access internet and database data.

XI SEMESTER

Course Code: 22MTCS111 **CC-XLVIII**

Credits: 4 **L-P-C: 5-0-4**

CLOUD COMPUTING

Objective

- To introduce the broad perceptive of cloud architecture and model.
- To be familiar with the lead players in cloud.
- To understand the concept of Virtualization.
- To understand the CRM in cloud computing.
- To know the use of cloud computing in day-to-day life.

UNIT I: Computing Paradigms

High-performance computing, parallel computing, distributed computing, cluster computing, grid computing, cloud computing, bio-computing, mobile computing quantum computing, optical computing. Nano-computing.

UNIT II: Cloud Computing Fundamentals

Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT III: Cloud Computing Architecture and Management

Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud application, Migrating, Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT IV: Cloud Service Models

Infrastructure as a Service, Characteristics of IaaS, Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers. Other Cloud Service Models

UNIT V: Cloud Service Providers

EMC, EMC IT, Captiva Cloud Toolkit, Google Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,Service, Microsoft Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft Aneka Platform

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Book:

1. Essentials of Cloud Computing :K.Chandrasekhran , CRC press, 2014

Reference Book:

1. Cloud Computing: Principles and Paradigms by RajkumarBuyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing , Kai Hwang, GeofferyC.Fox, Jack J.Dongarra, Elsevier, 2012.

3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, SubraKumaraswamy, ShahedLatif, O'Reilly, SPD, rp2011.

Outcomes:

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

- Compare the strengths and limitations of cloud computing.
- Identify the architecture, infrastructure and delivery models of cloud computing.
- Understanding the project management in the cloud environment.
- Understanding the cloud services.

Course Code: 22MTCS112 **CC-XLIX**

Credits: 4 **L-P-C: 5-0-4**

SYSTEM MODELING AND SIMULATION

Objectives

- Learn principle of computer modeling
- Be exposed to random number generation and distributions
- Be familiar with design and evaluation of simulation experiments
- Learn to represent simulation languages

UNIT – I: INTRODUCTION TO SIMULATION

Principle of Computer Modeling and Simulation – Monete Carlo Simulation – Nature of Computer Modeling and Simulation – Limitation of Simulation – Areas of Application Systems and System Environment, Components of a system, general systems theory, Concept of simulation, Simulation as a decision making tool, types of simulation.

UNIT – II: RANDOM NUMBER GENERATION AND RANDOM VARIABLE GENERATION

Pseudo Random Numbers - Techniques for Generating Random Numbers - Tests for Random Numbers - Inverse transform technique - exponential distribution – uniform distribution - Weibull distribution. Empirical continuous distribution – generating approximate normal variates - Erlang distribution.

UNIT – III: DISTRIBUTIONS

Empirical Discrete Distribution – Discrete Uniform Distribution – Poisson Distribution – Geometric Distribution – Acceptance – Rejection Technique for Poison Distribution – Gamma Distribution.

UNIT – IV: VERIFICATION AND VALIDATION

Design and evaluation of simulation experiments – Variance reduction technique – Antithetic Variables – Verification and Validation of Simulation models.Discrete Event Simulation –

Concepts in Discrete – Event Simulation, Manual Simulation using event Scheduling, Single Channel Queue, two server queue, Simulation of Inventory Problem.

UNIT – V

SIMULATIONS LANGUAGES

Simulation Languages - GPSS – SIMSCRIPT – SIMULA. CASE STUDIES Development of simulation models using simulation language studied for systems like queuing systems, Production systems, Inventory systems, maintenance and replacement systems and Investment analysis.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Book(s)

- "Discrete Event System Simulation" Jerry Banks and John S.Carson,Barry L. Nelson, David M.Nicol - 3rd Edition, Prentice Hall, India, 2002.
- **"System Simulation with Digital Computer"** NarsinghDeo, Prentice Hall, India, 2001.

Reference Books

- "Applied Simulation Modeling", Andrew Seila, Vlatko Ceric, PanduTadikamalla, 1st Edition, 2009, Cengage Learning pvt. Ltd. New Delhi.
- "Simulation, Modeling and Arena", Manuel D. Rossetti, First Edition, 2009, Wiley India Pvt. Ltd. New Delhi.
- "Theory of Modeling and Simulation", Bernard P. Zeigler, Herbert Praehofer, Tag Gon Kim, 2nd Edition, 2000, Academic Press/ Elsevier India Pvt. Ltd, New Delhi.

Outcome

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

- Discuss principle of computer modeling and simulation
- Apply random number generation techniques.
- Use simulation languages

Course Code: 22MTCS113 **CC-L**

Credits: 3 **L-P-C: 5-0-3**

BLOCK CHAIN TECHNOLOGIES

Objectives:

- To Introduce the Concepts of Block chain Technologies.
- To be familiar with the types of Block chain.
- To understand the concept of Private and Public Block chain
- To understand the Security in Block chain Technology.
- To know the Applications of Block chain Technology.

UNIT I: FUNDAMENTALS OF BLOCK CHAIN :
Introduction - Origin of Blockchain - Blockchain Solution - Components of Blockchain - Components of Blockchain - Block in Blockchain - The Technology and the Future

UNIT II: BLOCKCHAIN TYPES AND CONSENSUS MECHANISM :

Introduction-Decentralization and Distribution - Types of Blockchain - Consensus Protocol - CRYPTOCURRENCY - BITCOIN, ALTCOIN and TOKEN : Introduction - Bitcoin and Cryptocurrency Basics - Types of Cryptocurrency - Cryptocurrency Usage

UNIT III: PUBLIC BLOCKCHAIN SYSTEM :

Introduction - Public Blockchain - Popular Public Blockchains - The Bitcoin Clockchain - Etherum Blockchain

UNIT IV: PRIVATE BLOCKCHAIN SYSTEM :

Introduction - Key Characteristics of Private Blockchain - Why We Need Private Blockchain - Private Blockchain Examples - Private Blockchain and Open Source - E-Commerce Site Examples - Varous Commands in E-Commerce Blockchain - Smart Contract in Private Environment - State Machine - Different Algorithms of Permissioned Blockchain - Byzantine Fault - Multichain

UNIT V: SECURITY IN BLOCKCHAIN : Introduction - Security Aspects in Bitcoin - Security and Privacy Challenges of Blockchain in General - Performance and Scalability - Identity Management and Authentication - Regularity Compliance and Assurance - Safeguarding Blockchain Smart Contract - Security Aspects in Hyperledger Fabric -

APPLICATIONS OF BLOCKCHAIN : Blockchain in Banking and Finance - Blockchain in Healthcare.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Book:

1.Blockchain Technology, Chandramouli Subramaniam, Asha A George, Abhilash K A, Meera Karthikeyan, University Press, 2020

Reference Books:

1. Blockchain Basics: A Non-Technical Introduction, Daniel Drescher, Apress, 2017

2. BlockChain From Concept to Execution, Debajani Mohanty, BPB,2018

E-Resourses

1. https://www.pdfdrive.com/blockchain-books.html2.https://www.blockchain.com/

Outcomes:

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

- Understand the Basic Idea of Blockchain Technology.
- Identify the Differences Between Public and Private Blockchain Technologies.
- Know about Cryptocurrency - Bitcoin, Altcoin andToken
- Understanding the Security Challenges
- Know about Applications in Blockchain Technology.

ELECTIVE (GENERAL-G)

Network Management & Protocols

Objectives:

- To provide students with an overview of the concepts and fundamentals of data communication and computer networks.
- To familiarize with the basic taxonomy and terminology of computer networking area.
- To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite.
- Use appropriate network tools to build network topologies
- Install and configure an open source tool NS2 Test simple protocols in a laboratory scenario.

UNIT I- Network & Internetworking

Introduction & Overview - Review of Underlying Network Technologies - Internetworking Concept & Architectural Model - Classfull Internet Addresses.

UNIT II- Mapping & Protocols

Mapping Internet Addresses to Physical Addresses(ARP) - Internet Protocol: Connectionless Datagram Deliver (IPv4) - Internet Protocol: Forwarding IP Datagrams.

UNIT III- Internet protocols & UDP

Internet Protocol: Error and Control Messages (ICMP) - Classless and Subnet Address Extensions (CIDR) - Protocol Layering - User Datagram Protocol (UDP).

UNIT IV- Transmission Control Protocols & Routing Protocols

Reliable Stream Transport Service (TCP) - Routing Architecture: Cores, Peers and Algorithms - Routing Between Peers (BGP) - Routing Within an Autonomous System (RIP, OSPF).

UNIT V- IP Switching and Label Switching

Internet Multicasting - IP Switching and MPLS - Mobile IP - Private Networking Interconnection (NAT, VPN) - Client-Server Model of Interaction - The Socket Interface.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Book:

"**Internetworking with TCP/IP - Principles, Protocols & Architecture**" - Douglas E. Comer - Fifth Edition - PHI - 2006 - ISBN: **81-203-2998-8**

Reference Books

1. "TCP/IP Jump Start - Internet Protocol Basics" - Andrew G. Blank - Third Edition - SYBEX Inc. - 2004 - ISBN: 0-7821-4101-3.

2. “TCP/IP Unleashed” - Karanjit S. Siyan& Tim Parker - Third Edition - Sams Publishing - 2002 - ISBN: 0-672-32351-6

Outcomes:

After completion of this course learner will be able to:

- Conceptualize all the OSI Layers
- Use appropriate network tools to build network topologies
- Install and configure an open source tool NS2 Test simple protocols in a laboratory scenario.
- To provide students with an overview of the concepts and fundamentals of data communication and computer networks.
- To familiarize with the basic taxonomy and terminology of computer networking area.

ANGULAR JS

Overview:

- Reduce the amount of code you write to build rich user interface applications.
- Increase the reliability and maintainability of UI by using data binding.
- Retrieve data from back-end server, manipulate it and display it with ease.
- Modularise your code with the custom services and directives.
- Providing two way binding of data.
- Create Single Page Applications (SPA).

UNIT I

Introduction to HTML - HTML Basics, Elements, Attributes, Styles, Forms, Form Elements, Input Element Types, Input Attributes, File Paths, Script tag. **Introduction to CSS -** CSS Introduction, Syntax, Selectors, Styling, Pseudo class, Pseudo Elements, CSS Tables, CSS Box Models, CSS Opacity, CSS Navigation Bar, Dropdowns

UNIT II

Angular JS Basics - What is Angular JS? , Why Angular JS? , Why MVC matters, MVC-The Angular JS way, Features of Angular JS, Model-View-Controller, My First Angular JS app. **Angular Expressions -** All about Angular Expressions, How to use expressions, Angular vs JavaScript

UNIT III

Filters - Built-In Filters, Using Angular JS Filters, Creating Custom Filters. **Directives -** Introduction to Directives, Directive Lifecycle, Binding controls to data, Matching directives, Using Angular JS built-in directives, creating a custom directive. **Controllers -** Role of a Controller, Controllers & Modules, Attaching Properties and functions to scope, Nested Controllers, Using Filters in Controllers, Controllers in External Files.

UNIT IV

Angular JS Modules - Introduction to Angular JS Modules, Bootstrapping Angular JS. **Angular JS Forms -** Working with Angular Forms, Model Binding, Forms Events, Updating Models with a Twist, Form Controller, Validating Angular Forms, $error object. **Scope -** What is scope, Scope Lifecycle, Scope Inheritance, Scope & Controllers, Root scope, Scope Broadcasting, Two-way data binding, Scope Inheritance, Scope & Directives, $apply and $watch, Scope Events

UNIT V

Creating Web Server - Creating Web Server, Sending Requests, and Handling http requests. **File System-** read File, Writing a File, Opening a file, deleting a file, writing a file asynchronously, Other IO Operations. **Angular JS Animation -** Animate Module, CSS Transforms, CSS Transitions, Applying Animations, **Database Connectivity -** Connecting String, Configuring, Updating Records, Working with Select Command, Deleting Records. **Project Development -** Project Development using Node JS

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. ANGULARJS: Easy AngularJS For Beginners, Your Step-By-Step Guide to AngularJS Web Application Development (AngularJS Series)
2. ANGULARJS: In 8 Hours, For Beginners, Learn Coding Fast! (2nd Edition) by Ray Yao
3. AngularJS Web Application Development Cookbook by Matt Frisbie

Reference Books:

1. AngularJS: Up and Running: Enhanced Productivity with Structured Web Apps by Shyam Seshadri and Brad Green
2. Pro AngularJS by Adam Freeman

Outcomes:

- Build native mobile apps for Android, iOS and using Angular 1.x
- Understand the fundamentals of Angular Forms and its architecture
- Present data in beautiful, interactive lists
- Build forms and setting pages
- Implement Single page application(SPA)

E- LEARNING

Objectives:

- Build relevant, pedagogically sound educational materials and programs for the Internet using the latest developments in online educational theories and technology.
- Integrate a variety of multimedia technology tools to develop engaging, effective eLearning.
- Apply the components of effective eLearning instructional design, development, implementation, and evaluation to creating projects and
- The programs that meet your immediate classroom or business needs and goals.

UNIT I- Interactivity and Navigation in eLearning

E-Learning Definition, Scope, trends, attributes and opportunities – Advantages and disadvantages of e-learning, Evolution – Barriers to E-learning.

UNIT II- Learning Architecture

e-Learning and e-Knowledge Architecture - Current Realities and their Impact on Learning - Evolving Job Roles and the e-Learning Architecture - Characteristics of e-Learning and e-Knowledge Architecture - Developing e-Learning and e-Knowledge Solutions - Learning, Then and Now.

UNIT III- Learning Models

e-Learning: Models - e-Learning Myths - What is e-Learning – Content - Anywhere, Anytime Content - Dynamic Content – Services – Technology – Content Management.

UNIT IV- Learning organizational & Application

Strategy and Applications - An Overview of Learning Organisation - Important Factors for a Learning Organisation - The Learning Process in an Organisation - Broad Stages of the Learning Process and Organisational learning and the Connect with e-Learning Learning Systems - Scenarios for Business Application - Case Study.

UNIT V- Trend in eLearning

Introduction - Trends in Learning - Trends in e-Learning Content - A Day in the Life of a Knowledge Worker - Impact on Knowledge Management.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Book:

"E-Learning: An Expression of the Knowledge Economy" – by Chadha, Gaurav, Kumail, S.M. Nafy, Tata McGraw Hill, 2002

References Books:

1. "E - Learning Concepts and Techniques" – Ebook, 2006

2."E – LearningA Guide book of Principles, Procedures and Practices" – Ebook by Som Naidu, 2003.

Outcomes:

- Identify and classify different technologies, tools, and applications.
- Compare, contrast, and evaluate different technologies, tools, and applications.
- Choose appropriate technologies, tools, and
- Applications to most effectively support instruction and
- Achieve learning outcomes.

AD-HOC NETWORK

Objectives:

- The goal is to introduce students to the network protocol designs in wireless Ad-Hoc networks.
- A systematic exposition of network protocols and their cross-layer interactions.
- A broad perspective on the active research areas in wireless multi-hop networks.
- current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks and
- the challenges in designing MAC,
- routing and transport protocols for wireless ad-hoc/sensor networks and
- Comprehend the various sensor network Platforms, tools and applications.

Unit I- Network Communication

Introduction - Wireless LANS and PANS - Wireless WANS AND MANS - Wireless Internet - Ad Hoc Wireless Networks.

Unit II- Wireless Networks

MAC Protocols for Ad Hoc Wireless Networks - Routing Protocols for Ad Hoc Wireless Networks.

Unit III- Ad Ho Wireless networks

Multicast routing in Ad Hoc Wireless Networks - Transport Layer and Security Protocols for Ad Hoc Wireless Networks

Unit IV- Energy Management in Ad Hoc Wireless Networks

Quality of Service in Ad Hoc Wireless Energy Management in Ad Hoc Wireless Networks

Unit V- Wireless Sensor Networks

Wireless Sensor Networks - Hybrid Wireless Networks - Recent Advances in Wireless Networks.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

"**Ad Hoc Wireless Networks: Architectures and Protocols**" - C. Siva Ram Murthy & B.S. Manoj - Prentice Hall - 2005 - ISBN: 9780131470231.

References Book:

"**Ad Hoc Networking**" - Charles E. Perkins - Addison-Wesley Professional - 2008 - ISBN: 9780321579072

Outcomes:

- Upon completion of the course the student will be able
- to describe the unique issues in ad-hoc/sensor networks,
- current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks and
- the challenges in designing MAC,
- routing and transport protocols for wireless ad-hoc/sensor networks and
- Comprehend the various sensor network Platforms, tools and applications.

EMBEDDED SYSTEM

Objectives:

- To introduce students to the modern embedded systems
- To show how to understand and program such systems using a concrete platform built around.
- Know what an embedded system is understand the general process of embedded system development.
- Comprehend important embedded system terminology.
- Experience common aspects of embedded system development.

Unit I- Embedded System

Introduction to Embedded Systems - 8051 And Advanced Processor Architectures, Memory organization, and Real World Interfacing.

Unit II- Device and Communication

Devices and Communication Buses For Devices Network - Device Drivers And Interrupts Servicing Mechanism

Unit III- Embedded programming concepts

Programming Concepts and Embedded Programming in C, C++ and Java - Program Modeling Concepts in Single and Multiprocessor Systems Software-Development Process.

Unit IV- Real time operating system

Real Time Operating Systems- I: Inter Process Communication and Synchronization of Processes, Task and Threads - Real Time Operating Systems.

Unit V- Embedded Design & Case study

Design Examples And Case Studies Of Program Modeling And Programming With RTOS - 1 - Design Examples And Case Studies Of Program Modeling And Programming With RTOS – 1

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

"**Embedded Systems Architecture, Programming and Design**" - Raj Kamal TMH - Second Edition - 2008 ISBN-13: 978-0-07-066764-8.

References Book:

"**The 8051 Microcontroller and Embedded Systems**" - Muhammad Ali Mazidi, Janice Mazidi&RolinMckinlay - Prentice Hall - 2006 - ISBN: 9780131194021.

Outcomes:

The following summarize intended outcomes of this course,

- Know what an embedded system is understand the general process of embedded system development.
- Comprehend important embedded system terminology.
- Experience common aspects of embedded system development.
- Understanding of what an embedded system R&D project is, and the activities it involves.

REAL TIME OPERATING SYSTEM

Objectives:

- Real-time scheduling and analysis, Formal specification and verification of timing constraints and properties
- Design methods for real-time systems
- Development and implementation of new techniques to advance the state-of-the-art real-time systems research.
- An ability to understand advanced concepts in theory of computer science
- An ability to understand advanced concepts in applications of computer science

Unit I- Overview of RTOS

What is RTOS and Why Do We Need It? - Mutual Exclusion, Thread Synchronization & Scheduling: Mutex implementation in SROS - Interrupts handling in RTOS - Interrupt Handler in SROS - Creation of thread in RTOS & SROS - RTOS & SROS Initialization and starting - Semaphore – Mailbox

Unit II- Real-time scheduling: uniprocessor scheduling

Timer Support: Need for Timer Support - Timer Support Implementaion in RTOS & SROS - Priority Inversions: Bounded & Unbounded Priority Inversion

Unit III- Deadlocks

Deadlocks: Simple Examples - Resource Allocation Graph - Necessary Conditions for Deadlocks - Dealing with Deadlocks

Unit IV- Real Time Databases

Schedulability of a real-time Application: Basic Rate Monotonic Analysis - Extended Rate Monotonic Analysis.

Unit V- Fault Tolerance Techniques

Other Components of RTOS: I/O Sub System - Network Stack - File System.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

"Simple Real-time Operating System: A Kernel Inside View for a Beginner" - ChowdaryVenkateswaraPenumuchu - Trafford Publishing (www.trafford.com) - 2007.

Outcomes:

- An ability to understand advanced concepts in theory of computer science
- An ability to understand advanced concepts in applications of computer science
- An ability to apply knowledge of advanced computer science to formulate the analyze problems in computing and solve them.
- Design methods for real-time systems
- Development and implementation of new techniques to advance the state-of-the-art real-time systems research.

GRID COMPUTING

Objectives:

By the end of this course, participants should:

- understand the need for and evolution of Grids in the context of processor- and data-intensive applications
- be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery
- be able to design and implement Grid computing applications using Globus or similar toolkits
- be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.

Unit I- Introduction of Grid Computing
Grid Computing & Key Issues – Applications – Other Approaches – Grid Computing Standards – Pragmatic Course of Investigation.

Unit II- Grid Benefits & Status of Technology
Motivations – History of Computing, Communications and Grid Computing – Grid Computing Prime Time – Suppliers and Vendors – Economic Value – Challenges.

Unit III- System Architectures
Components of Grid Computing Systems and Architectures: Basic Constituent Elements-A Functional View – A Physical View – Service View.

Unit IV- Grid Computing Standards
OGSI: Standardization – Architectural Constructs – Practical View – OGSA/OGSI Service Elements and Layered Model – More Detailed View.

Unit V- Standards Supporting Grid Computing-OGSA
Functionality Requirements – OGSA Service Taxonomy – Service Relationships – OGSA Services – Security Considerations.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:
"**A Networking Approach to Grid Computing**" - Daniel Minoli - Wiley Publication – 2004

References Book:
"**Grid Computing – A Practical Guide to Technology and Applications**" - Ahmar Abbas - Charles River Media Publication - 2004.

Outcome:
- At the end of the course student will have knowledge of Grid Computing,

- Web Services, and Service-oriented architecture,
- Architecture for grid computing,
- Cluster Computing, process scheduling and load balancing.

INFORMATION STORAGE AND MANAGEMENT

Objectives:

- To understand the basic components of Storage System Environment.
- To understand the Storage Area Network Characteristics and Components.
- To examine emerging technologies including IP-SAN.
- To describe the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities.
- To understand the local and remote replication technologies.

Unit I

Introduction to Information Storage Technology: Review data creation and the amount of data being created and understand the value of data to a business - Challenges in Data Storage and Management - Data Storage Infrastructure. Storage Systems Environment: Components of a Storage System Environment - Disk drive components, Disk Drive Performance - Logical Components.

Unit II

Data protection: Concept of RAID and its Components - Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Comparison of Levels. Intelligent Storage Systems: Components - Intelligent Storage Array- High-level architecture and working of an intelligent storage system.

Unit III

Introduction to Networked Storage: Evolution of networked storage, Architecture, Overview of FC-SAN, NAS, and IP-SAN. Network-Attached Storage (NAS): Benefits of NAS, Components, Implementations, File Sharing, I/O operations, Performance and Availability. Content Addressed Storage (CAS): Features and Benefits of a CAS - CAS
Architecture - Storage and Retrieval - Examples. Storage Virtualization: Forms – Taxonomy – Configuration – Challenges - Types of Storage Virtualizations.

Unit IV

Information Availability & Monitoring & Managing Datacenter: Information Availability- Business continuity -Failure Analysis- Business impact Analysis- Differentiate between business continuity (BC) and disaster recovery (DR). Disaster Recovery: Backup- Methods- And Technologies- Replication technologies: Local replicas- Technologies- Restore and Restart- Multiple Replicas, Remote Replication, DR in practice.

Unit V

Storage Security and Management: Security Framework, Storage security domains, List and analyzes the common threats in each domain, Security Implementations. Managing The Storage

Infrastructure: Monitoring the Storage Infrastructure, Storage Management Activities, Challenges and solutions.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

TEXT BOOK:

1. EMC Corporation, Information Storage and Management, Wiley, India.

REFERENCES:

1. Robert Spalding, ―Storage Networks: The Complete Reference ―, Tata McGraw Hill, Osborne, 2003.
2. Marc Farley, ―Building Storage Networks‖, Tata McGraw Hill, Osborne, 2001.
3. Meeta Gupta, Storage Area Networks Fundamentals, Pearson Education Limited, 2002.

Outcomes:

1. Search, retrieve and synthesize information from a variety of systems and sources.
2. Evaluate systems and technologies in terms of quality, functionality, cost-effectiveness and
3. Aadherence to professional standards.
4. Integrate emerging technologies into professional practice.
5. Apply theory and principles to diverse information contexts.

Objectives:

- Upon successful completion of this module, students will be able to demonstrate their competence in their ability.
- Critically assess new developments in database technology.
- Interpret and explain the impact of emerging database standards.
- Evaluate the contribution of database theory to practical implementations of database management systems.

Unit I- Conceptual Modeling

Introduction and Conceptual Modeling: Databases and Database Users - Database System Concepts and Architecture - Data Modeling Using the Entity-Relationship (ER) Model.

Unit II- Models

The Enhanced Entity-Relationship (EER) Model - Relational Model: Concepts, Constraints, Languages, Design, and Programming - The Relational Data Model and Relational Database Constraints

Unit III- Relational Database

The Relational Algebra and Relational Calculus - Relational Database Design by ER and EER-to-Relational Mapping - SQL-99: Schema Definition, Constraints, Queries, and Views

Unit IV- SQL

Introduction to SQL Programming Techniques - Database Design Theory and Methodology: Functional Dependencies and Normalization for Relational Databases - Relational Database Design Algorithms and Further Dependencies

Unit V- Database design Methodology

Practical Database Design Methodology and Use of UML Diagrams - Data Storage, Indexing, Query Processing, and Physical Design: Disk Storage, Basic File Structures, and Hashing - Indexing Structures for Files - Algorithms for Query Processing and Optimization

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

"Fundamentals of Database Systems" - RamezElmasri and Shamkant B. Navathe, Addison-Wesley Copyright - Fifth Edition - 2007.

References Book:

"First Course in Database Systems" - Jeffrey D. Ullman & Jennifer Widom - Third Edition (2008) - Prentice Hall

Outcomes:

- Master the basic concepts and appreciate the applications of database systems. Master the basics of SQL and construct queries using SQL.
- Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.
- Be familiar with the relational database theory, and be able to write relational algebra expressions for queries.
- Mater sound design principles for logical design of databases, including the E-R method and normalization approach.

MANAGEMENT INFORMATION SYSTEM

Objectives:

- Explain to students why information systems are so important today for business and management.
- Evaluate the role of the major types of information systems in a business environment and their relationship to each other.
- Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business.
- Identify the major management challenges to building and using information systems and learn how to find appropriate solutions to those challenges.

Unit I- Foundation Concepts
Foundations of Information Systems in Business - Competing With Information Technology

Unit II- Information Technologies
Computer Hardware - Computer Software - Data Resource Management - Telecommunications and Networks

.**Unit III- Business Applications**
Electronic Business Systems - Enterprise Business Systems - Electronic Commerce Systems - Decision Support Systems

Unit IV- Development Processes
Developing Business/IT Strategies - Developing Business/IT Solutions

Unit V- Management Challenges
Security and Ethical Challenges - Enterprise and Global Management of Information Technology

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:
"Management Information System" - O'Brien, James &Marakas, George - Tata McGrawHill Publications - Seventh Edition - 2007 - ISBN: 978-0-07-062003-2
References Book:
"Management Information Systems" - Hagg& Cummings - Tata McGrawHill Publications - Sixth Edition - 2008 - ISBN: 978-0-07-066836-2

Outcomes:
- Upon completion of this course, students will be able to understand the basic concepts and technologies used in the field of management information systems.
- Have the knowledge of the different types of management information systems.
- Understand the processes of developing and implementing information systems.
- Be aware of the ethical, social, and security issues of information systems.

BUSINESS INTELLIGENCE

Objectives:
- The objective of this course is for the students
- To achieve a profound understanding of Business Intelligence (BI) systems in terms of its tools,

- To current practices and impacts.
- The students should acquire knowledge on
- how to design BI solutions for different BI targets and users.

Unit I- Business Intelligence
Introduction to Business Intelligence and Business Decisions – Data Ware house and its role in BI – Creating a Corporate Data Warehouse – Data Warehousing Architecture – OLAP Vs OLTP – ETL process – Tools for Data Warehousing – Data Mining – KDD Process.

Unit II- Application of Datamining Business
Applications of Data Mining in Business – Data Mining Techniques for CRM – Text Mining in BI – Web Mining – Mining e-commerce data – Enterprise Information Management – Executive Information Systems.

.**Unit III-** Business intelligent application
Business Intelligence – Function, Process, Services and Tools – Application in Different Domains – Operational BI – Customizing BI – Managing BI Projects Vs Traditional Information System Projects – Best Practices in BI Strategy.

Unit IV- Knowledge Management
Definition – Data Vs. Information Vs. Knowledge – The Ten Key Principles of KM – Knowledge Management Architecture – Knowledge Management Vs. Knowledge Processing – KM Approaches – KM Tools – KM Infrastructure – KM Models – KM Strategies.

Unit V- Web based business intelligent
Web Analytics and Business Intelligence – eCRM – Case Study: Web Trends – Boeing – EverBank – China Eastern.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:
" Business Intelligence in the Digital Economy – Opportunities, Limitations and Risks" - M. Raisinghani - Idea Group Publications - 2004.
References Books:
1. " **Introduction to Data Mining and Its Applications**" - Sumathy&Sivanandam - Springer Verlag - 2006.
2. "**Knowledge Management and Business Innovation**" Yogesh Malhotra - Idea Group - 2001.

Outcomes:
- Learning outcomes on completion of the course, students shall have achieved the following: Knowledge and understanding and Competence and Skills.

- To achieve a profound understanding of Business Intelligence (BI) systems in terms of its tools,
- To current practices and impacts.
- The students should acquire knowledge on
- how to design BI solutions for different BI targets and users.
-

DIGITAL SIGNAL PROCESSING

Objective

- To introduce signals, systems, time and frequency domain concepts and the associated mathematical tools that are fundamental to all DSP techniques.
- To provide a thorough understanding and working knowledge of design, implementation, analysis and

- To comparison of digital filters for processing of discrete time signals.
- To study various sampling techniques and
- To different types of filters and will also understand Basic principles of Estimation Theory.

Unit I- SIGNALS SYSTEMS

Basic Elements of Digital Signal Processing – Concept of Frequency in Continuous Time and Discrete Time Signals – Sampling Theorem – Discrete Time Signals. Discrete Time Systems – Analysis of Linear Time Invariant Systems – Z Transform – Convolution and Correlation.

Unit II- DFT

Introduction to DFT – Efficient Computation of DFT Properties of DFT – FFT Algorithms – Radix-2 And Radix-4 FFT Algorithms – Decimation in Time – Decimation in Frequency Algorithms – Use of FFT Algorithms in Linear Filtering and Correlation.

Unit III- IIR FILTER DESIGN

Structure of IIR – System Design of Discrete Time IIR Filter From Continuous Time Filter – IIR Filter Design by Impulse Invariance – Bilinear Transformation – Approximation Derivatives.

Unit IV- FIR FILTER DESIGN

Symmetric and Antisymmetric FIR Filters – Linear Phase Filter – Windowing Technique – Rectangular – Kaiser Windows – Frequency Sampling Techniques – Structure for FIR Systems.

Unit V- FINITE WORD LENGTH EFFECTS

Quantization Noise – Derivation for Quantization Noise Power – Fixed Point And Binary Floating Point Number Representation – Comparison – Over Flow Error – Truncation Error.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

"Digital Signal Processing Principles, Algorithms and Application" - John G Proakis, and Dimtris G Manolakis - Fourth Edition - Pearson Education, 2007 - ISBN: 9780131873742 .

References Books:

1. "Digital Signal Processing – A Computer Base Approach" SanjitK.Mitra - Third Edition - Tata Mcgraw Hill - 2007 - ISBN: 978-0-07-066756-3 .
2. "Discrete Time Signal Processing" - Alan V. Oppenheim, Ronald W. Schafer, and John R. Back - 1 st Edition, Pearson Education - 2000 (Third Edition is expected to be released by 2010 ISBN: 9780131988422).

Outcome

- To impart the knowledge about continuous and discrete time signals.
- To create an understanding of Fourier Transform, Cosine Transform, Haar Transform.
- To examine the process of Quantization and the effects of finite Register Length.
- To outline the concepts of decimation, interpolation, power spectrum estimation.
- To determine and implement the appropriate type of design method for FIR filter.
- To know different types of IIR filter structures and their implementations.
- To implement DFTs using Fast Fourier Transforms.

MANAGERIAL ECONOMICS

Objective

- To introduce the economic concepts
- To familiarize with the students the importance of economic approaches in managerial decision making
- To understand the applications of economic theories in business decisions

Unit – I

General Foundations of Managerial Economics - Economic Approach - Circular Flow of Activity - Nature of the Firm - Objectives of Firms - Demand Analysis and Estimation - Individual, Market and Firm demand - Determinants of demand - Elasticity measures and Business Decision Making- Demand Forecasting.

Unit-II

Law of Variable Proportions - Theory of the Firm – Production Functions in the Short and Long Run - Cost Functions – Determinants of Costs – Cost Forecasting - Short Run and Long Run Costs –Type of Costs - Analysis of Risk and Uncertainty.

Unit-III

Product Markets -Determination Under Different Markets – Market Structure – Perfect Competition – Monopoly – Monopolistic Competition – Duopoly - Oligopoly - Pricing and Employment of Inputs Under Different Market Structures – Price Discrimination - Degrees of Price Discrimination.

Unit-IV

Introduction to National Income – National Income Concepts – Models of National Income Determination - Economic Indicators - Technology and Employment - Issues and Challenges – Business Cycles – Phases – Management of Cyclical Fluctuations - Fiscal and Monetary Policies.

Unit – V

Macro Economic Environment - Economic Transition in India – A quick Review - Liberalization, Privatization and Globalization – Business and Government - Public-Private Participation (PPP) - Industrial Finance - Foreign Direct Investment(FDIs).

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

1. YogeshMaheswari, **Managerial Economics,** Phi Learning, Newdelhi, 2005 Gupta G.S.,
2. **Managerial Economics,** Tata Mcgraw-Hill, New Delhi Moyer &Harris,
3. **Anagerial Economics,** Cengage Learning, Newdelhi, 2005 Geetika,Ghosh&Choudhury, ,
4. **Managerial Economics,** Tata Mcgrawhill, Newdelhi, 2011

Outcomes:

- Apply the knowledge of the mechanics of supply and demand to explain working of markets
- Describe how changes in demand and supply affect markets
- Understand the choices made by a rational consumer
- Explain relationships between production and costs
- Define key characteristics and consequences of different forms of markets

MULTIMEDIA TECHNOLOGY

OBJECTIVES:

- To enrich student learning in multimedia systems.
- To train the students to acquire knowledge in multimedia related technologies.
- To acquire knowledge about multimedia techniques to enhance quality of service.
- To acquire knowledge on multimedia architecture.

- To learn about the multimedia elements in a comprehensive way

UNIT I INTRODUCTION TO MULTIMEDIA ELEMENTS

Multimedia – Medium – Properties of a Multimedia System – Traditional Data Stream Characteristics – Data Stream Characteristics of Continuous Media – Basic Sound Concepts – Speech – Images and Graphics – Computer Image Processing – Video and Animation – Computer Based Animation.

UNIT II MULTIMEDIA COMPRESSION

Storage Space – Coding Requirements – Hybrid Coding – JPEG: Image Preparation, Lossy Mode, Lossless Mode, Hierarchical Mode – H.261 – MPEG: Video Encoding, Audio Encoding, Data Stream, MPEG 3, MPEG 7, MPEG 21 – DVI – Audio Encoding.

UNIT III MULTIMEDIA ARCHITECTURES

User Interfaces – OS multimedia support – Multimedia Extensions – Hardware Support – Distributed multimedia applications – Real time protocols – Play back Architectures – Synchronization – Document and document architecture – Hypermedia concepts – Hypermedia design – Digital copyrights – Digital Library – Multimedia Archives.

UNIT IV MULTIMEDIA OPERATING SYSTEM AND DATABASES

Real Time – Resource Management – Process Management – File systems – Interprocess communication and synchronization – Memory management – Device Management – Characteristics of MDBMS – Data Analysis – Data structures – Operations on data – Integration in a database model.

UNIT V MULTIMEDIA COMMUNICATION &APPLICATIONS

Tele Services – Implementation of Conversational Services, Messaging Services, Retrieval Services, Tele Action Services, Tele Operation Services – Media Consumption – Media Entertainment – Virtual Reality – Interactive Audio – Interactive Video – Games.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

TEXTBOOKS:

1. Ralf Steinmetz, Klara Nahrstedt, "Multimedia computing, communications, and applications", Pearson India, 2009.
2. Ranjan Parekh, "Principles of Multimedia", Second Edition, McGraw Hill Education, 2017.
3. Ralf Steinmetz, Klara Nahrstedt, "Multimedia Systems", Springer IE, 2004.

REFERENCES:

1. Tay Vaughan, "Multimedia: Making it Work", McGraw – Hill Education, Ninth Edition, 2014.
2. Mark S Drew, Zee Nian Li, "Fundamentals of multimedia", Prentice Hall, 2006.
3. Jerry D. Gibson, Toby Berger, Tom Lookabaugh, Dave Lindergh, Richard L. "Baker Digital Compression for Multimedia: Principles and Standards", Elsevier, 2006.

OUTCOMES:

On completion of the course, the students will be able to:

1. Handle the multimedia elements effectively.
2. Encode and decode the multimedia elements.
3. Understand the underlying multimedia computing architectures used for media development.
4. Develop effective strategies to deliver Quality-of-Experience in multimedia applications.
5. Design and implement algorithms and techniques related to multimedia objects.
6. Design and develop multimedia applications in various domains.

DATA WAREHOUSING AND DATA MINING

Objectives:

- To introduce the concepts, techniques, design and applications of data warehousing and data mining.
- To data warehousing and/or data mining will also be introduced.

- To enable students to understand and implement classical algorithms in data mining and data warehousing.
- To analyze the data, identify the problems, and
- To choose the relevant algorithms to apply.

UNIT I- Data mining & Application

Introduction: Data mining - motivation - importance-DM Functionalities - Basic Data Mining Tasks - DM Vs KDD - DM Metrics - DM Applications - Social implications.

UNIT II- Data warehousing

Data Warehousing: Difference between Operational Database and Data warehouse - Multidimensional Data Model: From tables to data Cubes - Schemas - Measures - DW Architecture: Steps for design and construction of DW, 3-tier DW Architecture-DW Implementation: Efficient computation of DATA Cubes, Efficient Processing of OLAP queries, Metadata repository.

UNIT III- Data Preprocessing

Data Preprocessing: Data Mining Primitives, Languages: Data cleaning, Data Integration and Transformation, Data Reduction. Discretization and concept Hierarchy Generation. Task-relevant data, Background Knowledge, Presentation and Visualization of Discovered Patterns. Data Mining Query Language-other languages for data mining.

UNIT IV- Data mining algorithms & Classification and Predication

Data Mining Algorithms: Association Rule Mining: MBA Analysis, The Apriori Algorithm, Improving the efficiency of Apriori. Mining Multidimensional Association rules from RDBMS and DXV. Classification and Predication: Decision Tree, Bayesian Classification back propagation, Cluster Analysis: Partitioning Methods, Hierarchical Method, Grid-based methods, Outlier Analysis.

UNIT V- Web data mining

Web, Temporal And Spatial Data Mining: Web content Mining, Web Structure Mining, Web usage mining. Spatial Mining: Spatial DM primitives, Generalization and Specialization, Spatial rules, spatial classification and clustering algorithms. Temporal Mining: Modeling Temporal Events, Times series, Pattern Detection, Sequences.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary Book:

1. "**Data Mining: Concepts and Techniques**" - Jiawei Han, Micheline Kamber Contributor MichelineKamber Edition: 2, illustrated, revised Published by Morgan Kaufmann, 2006 ISBN 1558609016

Reference books:

1. "**Data Warehousing, Data Mining & OLAP**" - Berson& Alex - Tata McGraw Hill Publishing - 2004 - ISBN: 0070587418.

2. "Introduction to Data Mining" - Pang-Hing Tan, Vipin Kumar & Michael Steinbach - Pearson Education - 2007 - ISBN: 9788131714720.

Outcome:

- The end of this course the student should be able to:
- Understand the functionality of the various data mining and data warehousing components
- Appreciate the strengths and limitations of various data mining & data warehousing models
- Compare the various approaches to data warehousing and data mining implementations
- Describe and utilize a range of techniques for designing data warehousing and data mining systems for real-world applications.

ORGANIZATION BEHAVIOR

Objectives:

- To discuss the development of the field of organizational behavior
- To analyze and compare different models used to explain individual behavior related to motivation and rewards
- To identify the processes used in developing communication and resolving conflicts
- To explain group dynamics and demonstrate skills required for working in groups (team building)

- To identify the various leadership styles and the role of leaders in a decision making process.

Unit I: Introduction

Introduction to Organizational Behavior - Related Disciplines - Theoretical Framework - Organizational Approaches - Modern Organizational Scenario: Impact of Globalization and e- business

Unit II: Personality & Attitudes

Individual Behavior - Perception - Process - Changes - Personality and Attitudes - Job Satisfaction

Unit III: Motivation

Motivation: Needs, Content And Process: Motivation: Content Theories - Process Theories - Contemporary Theories - Motivation Applied - Job Design And Goal Setting. Leadership - Background - Process- Styles - Activities – Skills

Unit IV: Behaviour of groups

Group Dynamics - The Nature of Informal Organizations - Formal Groups - Interactive Conflict: Interpersonal Conflict - Intergroup Behavior and Conflict - Negotiation Skills: Going Beyond Conflict Management - Traditional Negotiation Approaches - Contemporary Negotiation Skills.

Unit V: Communication

Communication - Role and Background - Interpersonal Communication - Informal Communication- The Decision Making Process- Participative Decision Making Techniques - Organization Design - Culture - Organization Change and Development.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Fred Luthans, "Organizational Behavior", 12th edition, McGraw Hill, 2011.

References:

1. Stephen P. Robbins, TimothyA. Judge,–Organizational Behavior‖, 14th Edition, Pearson Education,2012.
2. RobertKreitner,Angelo Kinicki,–OrganizationalBehavior‖,8thEdition,McGrawHill, 2007.

3. John W. Newstorm and Keith Davis, "Organizational Behavior", TMG, Tenth Edition, 2002

E-Resources:

1. https://bdpad.files.wordpress.com/2015/05/fred-luthans-organizational-behavior-_-an-evidence-based-approach-twelfth-edition-mcgraw-hill_irwin-2010.pdf

Outcomes:

- The statement of educational aims and objectives has several benefits.
- To help teachers design the course - the content, the methods, and the assessment.
- To communicate the educational intent of the course to students and to colleagues.
- To help identify the resources needed to undertake the teaching.
- To provide a basis for evaluating the course, and a basis for quality assurance.

ELECTIVE (Specialization – S)

SYSTEM ADMINISTRATION AND MANAGEMENT

Objective:

- Understand the role and responsibilities of a Unix system administrator
- Install and configure the Linux operating system
- Manage the resources and security of a computer running Linux at a basic level
- Make effective use of Unix utilities, and scripting languages
- Configure and mange simple TCP/IP network services on a Linux system

Unit I

Understanding System Administration – Network Operating System – Network File System – Admin User – Administration Tools – Commands – Configuration Files – Log Files – Backup and Restore Files.

Unit II

User Management – Issues – Registration – Account Policy – Login environment – Setting up and Supporting Users – Disk Quotas.

Unit III

Network Administration – Topologies – Network Devices – Understanding TCP/IP – Administering TCP/IP – Network Configuration – Static and Dynamic.

Unit IV

Introduction to File Server – Setting Up a File Server – Network File Systems – SAMBA – Web Server.

Unit V

Understanding Directory Services – Active Directory – Network Security – Importance of Port Number – Tracking Services – Monitoring your System – Network Security Tools.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. Red Hat Linux – System Administration
2. Introducing Microsoft Windows Server 2003 – Jerry Homeycutt – PHI
3. Mark Burgess – Principles of Network and System Administration – Second Edition – John Wiley & Sons

Reference Books:

1. Tom Adelstein, Bill Lubanovic, Linux System Administration: Solve Real-life Linux Problems Quickly, O'Reilly Media.
2. Æleen Frisch, Essential System Administration, Third Edition, O'Reilly Media.

3. Terry Collings, Kurt Wall, Red Hat Linux Networking and System Administration, 3rd Edition, Wiley Publication

Outcomes:

- After completing this course, students will be able carry the duties of a Unix system administer.
- Students will learn to do file processing, process management, IO management, queues management, networking, storage backup, account management, proper system start-up and shutting down, as well as other tasks.
- Install and configure the Linux operating system
- Manage the resources and security of a computer running Linux at a basic level
- Make effective use of Unix utilities, and scripting languages
- Configure and mange simple TCP/IP network services on a Linux system

EVOLUTIONARY COMPUTING

Objectives:

- Introduce the main concepts, techniques and applications in the field of evolutionary computation.
- Give students some practical experience on when evolutionary computation techniques are useful, how to use them in practice and how to implement them with different programming languages.
- Understand the implementation issues of evolutionary algorithms.
- Determine the appropriate parameter settings to make different evolutionary algorithms work well.
- Design new evolutionary operators, representations and fitness functions for specific practical and scientific applications.

Unit I

Introduction to Evolutionary Computation - Biological and artificial evolution-Evolutionary computation and AI-Different historical branches of EC, e.g., GAs, EP, ES, GP, etc.-A simple evolutionary algorithm. Search Operators, **Selection Schemes** - Fitness proportional selection and fitness scaling - Ranking, including linear, power, and exponential and other ranking methods - Tournament selection - Selection pressure and its impact on evolutionary search.

Unit II

Search Operators and Representations - Mixing different search operators - An anomaly of self-adaptive mutations - The importance of representation, e.g., binary vs. Gray coding - Adaptive representations. Evolutionary Combinatorial Optimisation - Evolutionary algorithms for TSPs - Evolutionary algorithms for lecture room assignment - Hybrid evolutionary and local search algorithms.

Unit III

Co-evolution - Cooperative co-evolution - Competitive co-evolution. Niching and Speciation - Fitness sharing (explicit and implicit) - Crowding and mating restriction. Constraint Handling - Common techniques, e.g., penalty methods, repair methods, etc. – Analysis - Some examples.

Unit IV

Genetic Programming - Trees as individuals - Major steps of genetic programming - functional and terminal sets, initialisation, crossover, mutation, and fitness evaluation - Search operators on trees - Automatically defined functions - Issues in genetic programming -bloat, scalability

Unit V

Multi objective Evolutionary Optimisation - Pareto optimality – Multi objective evolutionary algorithms. Learning Classifier Systems - Basic ideas and motivations - Main components and the main cycle - Credit assignment and two approaches. Theoretical Analysis of Evolutionary Algorithms - Schema theorems - Convergence of EAs - Computational time complexity of EAs - No free lunch theorem

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Books:

1. T. Baeck, D.B. Fogel and Z. Michakewicz (eds), Handbook on Evolutionary Computation, IOP Press, 1997.
2. Z. Michalewicz, Genetic algorithms + data structures = evolutionary programs, SpringerVerlag, 1994.

3. X. Yao (ed), Evolutionary Compution: Theory and Applications, World Scientific Publ. Co., Singapore, 1999

Reference Books:

1. D.E. Goldberg, Genetic algorithms in search, optimization and machine learning, Addison Wesley, 1989.
2. W Banzhaf, P Nordin, R E Keller & Frank D Francone, Genetic Programming: An Introduction, Morgan Kaufmann, 1999

Outcomes:

- Understand the relations between the most important evolutionary algorithms presented in the course, new algorithms to be found in the literature now or in the future, and other search and optimisation techniques.
- Understand the implementation issues of evolutionary algorithms.
- Determine the appropriate parameter settings to make different evolutionary algorithms work well.
- Design new evolutionary operators, representations and fitness functions for specific practical and scientific applications.

COMPUTER VISION

Objectives:

- To understand the fundamental concepts related to image processing and feature extraction etc.
- To study the concepts of edge detection techniques.
- To get familiar about image segmentation concept.
- To understand motion analysis and object tracking
- To apply the concepts to solve computer vision problems of different fields.

UNIT I:

Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective,

etc; Fourier Transform, Convolution and Filtering, Image Enhancement-Histogram Processing.

UNIT II:

Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH

UNIT III:

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, Texture Segmentation; Object Detection

UNIT IV:

Motion analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio -Temporal Analysis, Dynamic Stereo; Motion parameter estimation

UNIT V:

Object tracking; Mean Shift tacking, Object Categorization, Content Based Image Retrieval, Action Recognition

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Textbooks:

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited2011.
2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003.

References:

1. D.L.Baggioetal.,-MasteringOpenCVwithPracticalComputerVisionProjects ,Packt Publishing,2012.
2. E. R. Davies, -Computer & Machine Vision, Fourth Edition, AcademicPress,2012.

E-Resources:

1. http://szeliski.org/Book/drafts/SzeliskiBook_20100903_draft.pdf

Outcomes:

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

- Apply fundamental algorithms in Image Processing
- Implement edge tracking techniques
- Implement object motion and object tracking related techniques
- Perform shape analysis
- Develop applications using computer vision techniques

NATURAL LANGUAGE PROCESSING

OBJECTIVES

- The course introduced the basics of statistical natural language processing (NLP) including both linguistics concepts such as
- morphology and syntax and machine learning techniques relevant for NLP
- Relevant linguistic concepts, relevant ML techniques, in particular structured prediction,
- What makes NLP challenging (and exciting),
- How to write programs that process language, how to rigorously formulate NLP tasks as learning and inference tasks, and address the computational challenges involved

UNIT I STUDY OF NLP

Introduction - Rationalist and Empiricist Approaches to Language - Scientific Content - The Ambiguity of Language: Why NLP Is Difficult - Mathematical Foundations - Elementary Probability Theory - Essential Information Theory - Linguistics Essentials - Parts of Speech and Morphology - Phrase Structure - Semantics and Pragmatics.

UNIT II COLLOCATION

Collocations - Frequency - Mean and Variance - Hypothesis Testing - Mutual Information - The Notion of Collocation - Statistical Inference: n-gram Models over Sparse Data - Bins: Forming Equivalence Classes - Statistical Estimators - Combining Estimators- Lexical Acquisition - Evaluation Measures.

UNIT III MARKOV AND HIDDEN MARKOV MODELS

Markov Models - Markov Models - Hidden Markov Models - The Three Fundamental Questions for HMMs - HMMs: Implementation, Properties, and Variants - Part-of-Speech Tagging - The Information Sources in Tagging - Markov Model Taggers - Hidden Markov Model Taggers.

UNIT IV STATISTICAL ALIGNMENT AND TRANSLATION

Statistical Alignment and Machine Translation - Text Alignment - Word Alignment - Statistical Machine Translation - Clustering - Hierarchical Clustering - Non-Hierarchical Clustering.

UNIT V INFORMATION RETRIEVAL

Topics in Information Retrieval - Some Background on Information Retrieval - The Vector Space Models - Term Distribution Models - Latent Semantic Indexing - Discourse Segmentation - Text Categorization - Decision Trees.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

"Foundations of Statistical Natural Language Processing" - Christopher D. Manning and HinrichSchütze - MIT Press - 1999.

References Book:

Speech and Language Processing, DanielJurafsky, James Martin, Pearson Education, 2008.

OUTCOMES

Students successfully completing the module should understand:

- Relevant linguistic concepts, relevant ML techniques, in particular structured prediction,
- What makes NLP challenging (and exciting),
- How to write programs that process language, how to rigorously formulate NLP tasks as learning and inference tasks, and address the computational challenges involved.
- The course introduced the basics of statistical natural language processing (NLP) including both linguistics concepts such as
- morphology and syntax and machine learning techniques relevant for NLP

BIO-INFORMATICS

OBJECTIVES

- To impart knowledge on basic techniques of Bioinformatics
- To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
- Sequencing Alignment and Dynamic Programming, Sequence Databases and Evolutionary Trees and Phylogeny
- Explain about the methods to characterise and manage the different types of Biological data.

UNIT I FUNDAMENTALS OF BIOINFORMATICS

Molecular Biology, Gene Structure and Information Content, Molecular Biology Tools, Genomic Information Content, Data Searches and Pairwise Alignments, Gaps, Scoring Matrices, Needleman and Wunsch Algorithm, Global and Local Alignments, Database Searches.

UNIT II SUBSTITUTION

Patterns of Substitution Within Genes, Estimating Substitution Numbers, Molecular Clocks, Molecular Phylogenetics, Phylogenetic Trees, Distance Matrix Methods.

UNIT III CHARACTER-BASED METHODS

Character-Based Methods of Phylogenetic, Parsimony, Ancestral Sequences, Searches, Consensus Trees, Tree Confidence, Genomics, Prokaryotic Gene Structure, Gene Density, Eukariotic Genomes, Gene Expression.

UNIT IV STRUCTURE PREDICTION

Protein and Rna Structure Prediction, Polypeptic Composition, Secondary and Tertiary Structure, Algorithms For Modeling Protein Folding, Structure Prediction

UNIT V PROTEIN CLASSIFICATION

Proteomics, Protein Classification, Experimental Techniques, Ligand Screening, Post-Translational Modification Prediction.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

"Fundamental Concepts of Bioinformatics" - D. E. Krane and M. L. Raymer - Pearson Education - 2003.

References Book:

1."Introduction to Bioinformatics" - T. K. Attwood and D. J. Parry-Smith - Pearson Education - 2007.

2. “Biostatistical Analysis” - J. H. Zar - Fourth Edition - Pearson Education - 1999 (Fifth Edition about to be released in 2010).

OUTCOMES

At the end of the course, the students would have learnt about:

- To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
- Sequencing Alignment and Dynamic Programming, Sequence Databases and Evolutionary Trees and Phylogeny
- Explain about the methods to characterise and manage the different types of Biological data.
- Classify different types of Biological Databases.

HUMAN COMPUTER INTERACTION

OBJECTIVES

The student should be made to

- Learn the foundations of Human Computer Interaction and mobile HCI.

- Be familiar with the design technologies for individuals and persons with disabilities and user interface.
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UNIT I: BASICS OF INTERACTIONS

The interaction: Introduction – Models of interaction – Frameworks and HCI – Ergonomics – Interaction Styles – Elements of WIMP interface – Interactivity – The Context of the interaction - Paradigm: Introduction – Paradigms for interaction.

UNIT II: DESIGN AND PROCESS OF INTERACTION

Interaction Design basics: Introduction – what is design? – User focus – Scenarios – Navigation design – Screen design and layout – Interaction and prototyping - HCI in the software process: Introduction – The software lifecycle – Usability engineering – Interactive design and prototyping – Design rationale.

UNIT III: DESIGN AND IMPLEMENTATION OF HCI RULES

Design rules: Introduction – Principles to support usability – Standards – Guidelines – Golden rules and heuristics – HCI patterns – Implementation Support: Introduction – Elements of windowing systems – Programming the application – Using toolkits – User interface management systems.

UNIT IV: EVALUATION TECHNIQUES

Evaluation techniques: What is evaluation – Goals of evaluation – Evaluation through expert analysis – Evaluation through user participation – Choosing an evaluation method - Universal Design: Introduction – Universal design principles – Multi-modal interaction – Designing for diversity.

UNIT v: USER SUPPORT SYSTEM

User Support: Instruction – Requirements of user support – Approaches to user support – Adaptive help system – Designing user support systems.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary book:

1. "Human-computer Interaction" - Alan Dix - Pearson Education – 2004

OUTCOMES

Upon completion of the course, the student should be able to

- Design effective dialog for HCI.
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
- Develop meaningful user interface

ROBOTICS

OBJECTIVES

To understand robot locomotion and mobile robot kinematics

- To understand perception in robotics

- To understand robot planning and navigation

UNIT I: FUNDAMENTALS OF ROBOTICS

Fundamentals of robot Technology: Robot anatomy. Work volume. Drive systems. Control - Systems and dynamic performance - Accuracy and repeatability - Sensors in robotics – Robot reference frames and coordinates and robot kinematics.

UNIT II: ROBOT KINEMATICS REPRESENTATION

Robot kinematics: Matrix representation - Homogeneous transformations - Forward and inverse kinematics - Robot dynamics - Differential motions of a frame - Jacobian static force analysis.

UNIT III: ROBOT SETTING AND CONFIURATION

Configuration of a robot controller: End effectors - Mechanical and other types of grippers - Tools as end effectors - Robot and effector interface - Gripper selection and design - Introduction to robot languages.

UNIT IV: ROBOT LAYOUT AND CONTROLS

Applications for manufacturing - Flexible automation - Robot cell layouts – Machine interference - Other considerations in work cell design - Work cell control – Interlocks – Robot cycle time analysis.

UNIT V: MACHINE PROCESSING

Simulation of robotic work cells - Typical applications of robots in material transfer, machine loading/unloading; processing operations; assembly and inspection

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Primary books:

1. “Introduction to Robotics analysis, Systems & Applications” - Saeed B. Niku - Pearson Education Singapore P. Ltd., 2002.

2. “Robotic Technology and Flexible Automation” - S.R. Deb, Tata McGraw Hill Publishing Co. Ltd., 2003.

3. “Robotics & Control”- R.K. Mittal, I.J. Nagrath - Tata McGraw & Hill, 2005.

References Book:

1."Fundamentals of Robotics, analysis & Control" Robert J. Schilling, Prentice Hall of India P. Ltd., 2002

OUTCOMES

The students will be able to

- Explain robot locomotion
- Implement vision algorithms for robotics
- Implement robot localization techniques
- Implement robot mapping techniques
- Explain planning and navigation in robotics

HIGH PERFORMANCE COMPUTING

Objectives:

- To introduce the concepts of Modern Processors.
- To introduce Optimization techniques for serial code.

- To introduce Parallel Computing Paradigms.
- To introduce Parallel Programming using OpenMP and MPI

Unit I

Modern Processors: Stored Program Computer Architecture General purpose cache- based microprocessor-Performance based metrics and benchmarks- Moore's Law- Pipelining- Super scalarity SIMD- Memory Hierarchies Cache- mapping- Multicore processors- Multithreaded processors- Vector Processors- Design Principles- Maximum performance estimates- Programming for vector architecture.

Unit II

Parallel Computers : Taxonomy of parallel computing paradigms Shared memory computers- Cache coherance- UMA – ccNUMA-Distributed-memory computers- Hierarchical systems- Networks Basic performance characteristics- Buses- Switched and fat- tree networks- Mesh networks- Hybrids - Basics of parallelization - Why parallelize - Data Parallelism - Function Parallelism- Parallel Scalability- Factors that limit parallel execution- Scalability metrics- Simple scalability laws- parallel efficiency - serial performance Vs Strong scalability- Refined performance models Choosing the right scaling baseline.

Unit III

Distributed memory parallel programming with MPI: message passing - introduction to MPI – example - messages and point-to-point communication - collective communication – non blocking point-to-point communication- virtual topologies - MPI parallelization of Jacobi solver- MPI implementation - performance properties

Unit IV

Shared memory parallel programming with OpenMp : introduction to OpenMp - parallel execution - data scoping- OpenMp work sharing for loops- synchronization - reductions - loop scheduling - tasking - case study: OpenMp- parallel jacobi algorithm- advanced OpenMp

wavefront parallelization- Efficient OpenMP programming: Profiling OpenMP programs - Performance pitfalls Case study: Parallel Sparse matrix-vector multiply.

Unit V

Efficient MPI programming : MPI performance tools communication parameters- Synchronization, serialization, contention- Reducing communication overhead- optimal domain decomposition- Aggregating messages – Non blocking Vs Asynchronous communication- Collective communication Understanding intra-node point-to-point communication.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Text Book:

2. Georg Hager, Gerhard Wellein, Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall / CRC Computational Science series, 2011.

Reference Book:

1. Charles Severance, Kevin Dowd, High Performance Computing, O'Reilly Media, 2nd Edition, 1998.
2. 2. Kai Hwang, Faye Alaye Briggs, Computer Architecture and Parallel Processing, McGraw Hill, 1984.

Outcomes:

- Appreciate the concepts used in Modern Processors for increasing the performance.
- Appreciate Optimization techniques for serial code.
- Appreciate Parallel Computing Paradigms.
- Identify the performance issues in Parallel Programming using OpenMP and MPI

VALUE ADDED COURSES

Course Code: 22VAC01 **VAC-I**

HARDWARE AND NETWORK ESSENTIAL

Objectives:

- To introduce the importance of computer Hardware and its need.

- To create awareness on Hardware and Network devices.
- Networking is used to develop the future Business and Industry.
- To know about Communication Networks and their Applications.
- To know about Operating System and Storage devices

UNIT I

Introduction to Computer hardware

Definition of a Computer-History and Generations of Computers-Functions and Characteristics of a Computer-Operating a Computer.-Parts of a Computer - Different parts of a Computer and their Functions-Peripheral devices-Definition of Hardware- Input/output devices -Central Processing Unit (CPU)-Memory and Storage - Types of Memory: Internal and External, Storage Devices, Portable Storage, Hard Disk.

UNIT II

Computer Memory

Memory and Storage Devices - Primary (Cache, RAM and ROM) and Secondary memory, Storage Devices- Portable Storage- Hard Disk-Memory Units- bit-byte,-MB, GB, TB, and PB.

UNIT III

Operating Systems

Introduction to Operating Systems -Different types of OS-Need and Function of OS- Commonly used OS-Mobile OS-User Interface- Basics Computer Operations-Language Processors: Assemblers, Interpreters, and Compilers.

Computer Software

Introduction to Computer Software - Definition of Software, Types of Software: System and Application Software, Utility Software, Graphics- System Software.

UNIT IV

Introduction to Network

Types of networks-LAN-WAN-MAN- Network Topologies: bus topology-ring topology-star topology-tree topology-mesh topology and hybrid topology.-Network Models: Peer-to-Peer-protocol-client / server network and hybrid network. Servers: Different types of servers-Types of Network protocols.

UNIT V

Introduction to network standards

OSI reference model, TCP/IP Model- Difference between OSI reference model & TCP/IPmodel-Transmission Media: Types-Guided Media: twisted pair cable-coaxial cable-fibre optics-Unguided Media: radio wave-microwave-light wave- infrared and satellite.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Reference books:

1. V. Rajaraman, Fundamentals of Computers, PHI Publication.
2. Dr. Ajit Mittal, Dr. Ajay Rana, Mastering PC Hardware & Network.
3. Tannenbaum, A.S.: Computer Networks, Prentice Hall.
4. Networking: The Complete Reference, Mcgraw Hill Education.

E-Resources:

1. https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm
2. https://www.geeksforgeeks.org/computer-network-tutorials/

Outcomes:

- Students can able to understand the importance of computer Hardware and its need
- Students can acquire in-depth knowledge on Hardware and Network devices.
- Student can able to understand Networking to develop the future Business.
- Students can understand about the Communication Networks and their Applications.
- Students can able to know about Operating System and Storage devices

Course Code: 22VAC02 **VAC-II**

Augmented Reality and Virtual Reality

Objectives:

- To introduce the importance of augmented reality and its need.
- To create awareness on augmented reality and its application for the society.
- Visual Perception is used to develop the future Business and Industry.
- To know about Virtual Reality and their Applications.

- To know about Interface to the Virtual World

UNIT I

Introduction to Augmented Reality

History of augmented reality, The Relationship Between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum Between Real and Virtual Worlds, applications of augmented reality

UNIT II

Augmented Reality Hardware

Audio Displays, Haptic Displays, Visual Displays, Other sensory displays, Visual Perception, Requirements and Characteristics, Spatial Display Model. Processors – Role of Processors, Processor System Architecture, Processor Specifications..

UNIT III

Introduction to Virtual Reality

Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.

UNIT IV

Representing the Virtual World

Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR

UNIT V:

Visual Perception

Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Reference books:

1. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381

2. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India; First edition (12 October 2016),ISBN-10: 9332578494

3. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002

4. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.

E-Resources:

https://www.vttresearch.com/sites/default/files/pdf/science/2012/S3.pdf

http://lavalle.pl/vr/book.html

Outcomes:

- Students can able to understand the importance of augmented reality and its need.
- Students can acquire in-depth knowledge on augmented reality and its application.
- Students can be familiarizing with Visual Perception is used to develop the future.
- Students can understand the basic concept Virtual Reality.
- Students can able get interpretation about the Virtual Reality and augment reality.

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Course Code: 22VAC03 **VAC -III**

ETHICAL HACKING

Objectives:

- To introduce the concept of Hacking and how importance to secure from that.
- To create awareness on Hacking and its danger to the Society.
- Role of Security to develop the future Business and Industry.
- To know about Attacks and how to protect from them.
- To know about Virus and handling the Virus form the system

UNIT I

ETHICAL HACKING

Elements of Information Security-Authenticity and Non-Repudiation, Security Challenges-Effects of Hacking,-Hacker – Types of Hacker, Ethical Hacker-Hacktivism - Role of Security and Penetration Tester, Penetration Testing Methodology, Networking &Computer Attacks – Malicious Software (Malware)-Protection Against Malware-Intruder Attacks onNetworks and Computers, Addressing Physical Security – Key Loggers and Back Doors.

UNIT II

FOOT PRINTING AND SOCIAL ENGINEERING

Web Tools for Foot Printing-Conducting Competitive Intelligence-Google Hacking-Scanning-Enumeration-Trojans & Backdoors-Virus & Worms-Proxy & Packet Filtering-Denial of Service-Sniffer-Social Engineering – shoulder surfing, Dumpster Diving-Piggybacking.

UNIT III

DATA SECURITY

Physical Security – Attacks and Protection, Steganography – Methods, Attacks and Measures-Cryptography– Methods and Types of Attacks-Wireless Hacking-Windows Hacking-Linux Hacking.

UNIT IV

NETWORK PROTECTION SYSTEM & HACKING WEB SERVERS

Routers, Firewall & Honeypots- IDS & IPS- Web Filtering-Vulnerability-Penetration Testing-Session-Hijacking-Web Server-SQL Injection- Cross Site Scripting-Exploit Writing, Buffer Overflow,-Reverse-Engineering-Email Hacking-Incident Handling & Response- Bluetooth Hacking- Mobiles Phone Hacking.

UNIT V

ETHICAL HACKING LAWS AND TESTS

An introduction to the particular legal-professional and ethical issues likely to face the domain of ethicalhacking-ethical responsibilities-professional integrity and making appropriate use of the tools andtechniques associated with ethical hacking – Social Engineering- Host Reconnaissance-Session Hijacking-Hacking - Web Server-Database, Password Cracking- Network and Wireless-Trojan-Backdoor- UNIX-LINUX- Microsoft-NOVEL Server-Buffer Overflow- Denial of Service Attack-Methodical Penetration
Testing.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Reference books:

1.Michael T. Simpson, Kent Backman, James E. "Corley, Hands-On Ethical Hacking and NetworkDefense", Second Edition, CENGAGE Learning, 2010.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series – Elsevier

E-Resources:

3. https://www.tutorialspoint.com/prime-pack/ethical-hacking
4. https://www.geeksforgeeks.org/ethical-hacking.

Outcomes:

- Students can able to understand the concept of Hacking and how importance to secure
- Students can acquire in-depth knowledge on on Hacking and its danger to the Society.
- Students can be familiarizing with the Role of Security to develop the future Business
- Students can understand about the Attacks and how to protect from it.
- Students can able to know about Virus and handling the Virus form the system

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Course Code: 22VAC04 **VAC-IV**

ROBOTICS

Objectives:

- To introduce the importance of Robotics for Industrial needs.
- To create awareness on Robotics and its application for the society.
- Robot programming Methods is used to develop the future Business and Industry.
- To know about Operational Capabilities level of Robot and their Applications.
- To know about Internal Sensors and External Sensors for Robot.

UNIT I

Fundamental of Robotics

Historical Development of Robotics – Industrial Robot – Classification – Degree of Freedom and Degree of Motion – Manipulation of Robot Components.

UNIT II

Robot Programming

Robot programming Methods-Advantages and Disadvantages of Robot-Requirements for a Robot In a Industry –Specification for a Robot

UNIT III

Modular Components

Operational Capabilities level of robot-Modular Robot Components –Wrist Mechanism-Numerical Examples.

UNIT IV

Robot Sensors

Internal Sensors-ExternalSensors-Force-Sensors-Thermocouples-Performance Characteristics Of Robot-Static Performance Characterstics-Dynamic performance Characteristics.

UNIT V:

Advanced Robot Systems

Heuristics Decision for Robot-Fuzzy logic for robot control-Artificial Neural in Robotics-Robot Calibartion.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Reference books:

1. Appuu Kuttan , K.K,Robotics, I.K International Publishing House Pvt. Ltd.

2. Danny Staple, Learn Robotics Programming, Packt Publisher.

3. Bijoy K. Ghosh, Bhaskar Kumar Ghosh, Ning, Control in Robotics and Automation:Sensor-based Integration, Academic Press

E-Resources:

1.https://www.geeksforgeeks.org/robotics

2. https://www.britannica.com/technology/robot-technology

Outcomes:

- Students can able to understand the importance of the importance of Robotics.
- Students can acquire in-depth knowledge on Robotics and its application for the society.
- Students can be familiarizing with Robot programming Methods.
- Students can understand the basic concept and the operational capabilities of Robot.
- Students can able get interpretation about Internal Sensors and External Sensors for Robot.

FULL STACK DEVELOPEMENT

Objectives:

- To introduce the importance of Full Stack Development and its need.
- To create awareness on Full Stack Development and its application for the Society.
- Full Stack Development is used to develop the future Business and Industry.
- To know about Java Script and their Applications.
- To know about Bootstrap and AngularJS Applications

UNIT I

HTML & CSS

Introduction to HTML-Basic Structure of HTML-HTML Editors-HTML Tags-Paragraphs, Headings and Text-Formatting Tags-HTML. Introduction to CSS-Types of CSS-CSS.

UNIT II

JAVASCRIPT

Introduction to JavaScript – JavaScript - Displaying Output in JavaScript - Understanding JavaScript Syntax. - Variables & Datatypes - Operators - Math and String Manipulations. Conditional and looping Statements-Functions-Validations-Events.

UNIT III

BOOTSTRAP

Introduction to Bootstrap-Bootstrap Setup-Bootstrap Containers-Bootstrap Grids-Bootstrap Tables-Bootstrap Buttons,-Navbars-Alerts-Bootstrap Carousel-Bootstrap Forms.

UNIT IV

ANGULARJS

Introduction to Angular-Environment Setup-Installing Angular CLI-Directory Structure of Angular-Angular Fundamentals-Angular Building Blocks-Angular Data Binding-String Interpolation-Directives.

UNIT V

INTRODUCTION TO PYTHON

Introduction to Python - Unique features of Python - Install Python and Environment Setup-First Python Program-Python Identifiers- Keywords and Indentation-Comments and document interlude in Python-Command-line Arguments.

Unit VI

Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

Reference books:

1. Shay Howe , Learn to Code HTML and CSS Develop and Style Websites, Pearson Education.
2. Jeremy McPeak, Beginning JavaScript, Wiley Publisher.
3. Jake Spurlock, Bootstrap Responsive Web Development, O'Reilly Media Publisher.
4. Agus Kurniawan, AngularJS Programming by Example, PE Press, Publisher.

E-Resources:

5. https://www.w3schools.com/whatis_fullstack.asp
6. https://www.simplilearn.com/skills-required-to-become-a-full-stack-developer.

Outcomes:

- Students can able to understand the importance of Full Stack Development.
- Students can acquire in-depth knowledge on Full Stack Development and its application.
- Students can be familiarizing with Java Script used to develop the future.
- Students can understand the basic concept Full Stack Development.
- Students can able get interpretation about Bootstrap and AngularJS Applications.