# DEPARTMENT OF COMPUTER SCIENCE

## RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

**Rathinam Techzone, Pollachi Road, Eachanari, Coimbatore – 641021**



# Syllabus for

# M.Sc. Computer Science
# (M.Sc. CS)

# (I, II, III & IV Semester)

# 2017 – 2018 Batch onwards

**RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)**
*Scheme of curriculum for M.Sc. Computer Science*
for the Batch admitted during 2017 - 2018

Board of Studies – Computer Science (PG)

**Vision and Mission of the Institution:**

**VISION**

A world renowned INDUSTRY-INTEGRATED INSTITUTION that imparts knowledge, skill, and research culture in young men and women to suit emerging young India.

**MISSION**

To provide quality education at affordable cost, and to maintain academic and research excellence with a keen focus on INDUSTRY-INTEGRATED RESEARCH AND EDUCATION.

**MOTTO**

Meaningful INDUSTRY-READY education and research by all means

**Vision and Mission of the Department:**

## Vision

A world renowned INDUSTRY-INTEGRATED INSTITUTION that imparts knowledge, skill, and research culture in young men and women to suit emerging young India.

## Mission

To provide quality education at affordable cost, and to maintain academic and research excellence with a keen focus on INDUSTRY-INTEGRATED RESEARCH AND EDUCATION.

**Program Educational Objectives (PEO)**

| | | |
|---|---|---|
| PEO1 | : | Graduates of this programme will establish as effective professionals by learning technical skills for the computing field and can pursue higher education by accruing knowledge and research . |
| PEO2 | : | Graduates of the programme will continue to learn and adopt latest technologies to solve real life problems. |
| PEO3 | : | Graduates of the programme will continue to develop and update their knowledge and skills throughout their career. |
| PEO4 | : | Graduates of the Computer Science programme will have a sufficient understanding of the field of computer science including scientific principles, analysis techniques, and design methodologies. |
| PEO5 | : | |

**Mapping of Institute Mission to PEO**

| Institute Mission | PEO's |
|---|---|
| To provide quality education at affordable cost, and to maintain academic and research excellence with a keen focus on INDUSTRY-INTEGRATED RESEARCH AND EDUCATION. | PEO1, PEO3 |

**Mapping of Department Mission to PEO**

| Department Mission | PEO's |
|---|---|
| To provide quality education at affordable cost, and to maintain academic and research excellence with a keen focus on INDUSTRY-INTEGRATED RESEARCH AND EDUCATION. | PEO1, PEO3 |

**Program Outcomes (PO):**

| PO01 | : | Ability to identify, formulate, and develop solutions to computational challenges. |
|------|---|------------------------------------------------------------------------------------|
| PO2  | : | Ability to use a range of programming languages and tools to develop computer programs to solve problems effectively |
| PO3  | : | Design, and analyze precise specifications of algorithms, procedures, and interaction behaviour. |
| PO4  | : | Recognition of the need for and ability to engage in continuing professional development |
| PO5  | : | An ability to apply design and development principles in the construction of software systems of varying complexity. |
| PO6  | : | An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession. |
| PO7  | : | To Knowledge of business practices such as project management, risk management and change management; awareness on innovation; knowledge of sustainable development. |

**Correlation between the POs and the PEOs**

| Program Outcomes | | PEO1 | PEO2 | PEO3 | PEO4 | PEO5 |
|------------------|---|------|------|------|------|------|
| PO1 | : | √ | | √ | | √ |
| PO2 | : | | √ | | √ | |
| PO3 | : | √ | √ | | | √ |
| PO4 | : | | √ | | √ | √ |
| PO5 | : | √ | | √ | √ | |
| PO6 | : | | | √ | | √ |
| PO7 | : | √ | √ | | √ | |

*Approved in the BOS Meeting held on 28-04-2018*

**Components considered for Course Delivery is listed below:**

1. Class room Lecture

2. Laboratory class and demo

3. Assignments

4. Mini Project

5. Project

6. Online Course

7. External Participation

8. Seminar

9. Internship

**Mapping of POs with Course Delivery:**

| Program Outcomes | Course Delivery | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| PO1 | √ | √ | √ | √ | √ | | √ | √ | √ |
| PO2 | | √ | | √ | | √ | | | √ |
| PO3 | √ | | √ | | √ | | √ | √ | |
| PO4 | | √ | | | | √ | | | √ |
| PO5 | √ | √ | | √ | √ | √ | | | |
| PO6 | √ | | √ | | √ | | √ | √ | √ |
| PO7 | | √ | √ | √ | | √ | √ | | √ |

*Approved in the BOS Meeting held on 28-04-2018*

**RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)**
*Scheme of curriculum for M.Sc. Computer Science*
for the students admitted in the Batch during 2017 - 2018
Board of Studies – Computer Science (PG)

| S.No | Sem | Part | Type | Subject | Credit | Hour | Int | Ext | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | III | Theory | Core– I – Object Oriented Programming using C++ | 4 | 7 | 40 | 60 | 100 |
| 2 | 1 | III | Theory | Core– II – Analysis and Design of Algorithm | 4 | 7 | 40 | 60 | 100 |
| 3 | 1 | III | Theory | Core– III – Computer Networks | 4 | 6 | 40 | 60 | 100 |
| 4 | 1 | III | Practical | Core Practical – I – Object Oriented Programming & Algorithm Lab | 4 | 5 | 40 | 60 | 100 |
| 5 | 1 | III | Practical | Core Practical – II – Network Lab | 4 | 5 | 40 | 60 | 100 |
| | | | | | | | | | |
| 1 | 2 | III | Theory | Core Theory – IV - Web Technology | 4 | 5 | 40 | 60 | 100 |
| 2 | 2 | III | Theory | Core Theory – V –Software Engineering | 4 | 5 | 40 | 60 | 100 |
| 3 | 2 | III | Theory | Core– VI - Information Security and Cyber Law | 4 | 5 | 40 | 60 | 100 |
| 4 | 2 | III | Theory | Core– VII –Java Programming | 4 | 5 | 40 | 60 | 100 |
| 5 | 2 | III | Practical | Core Practical – III – Web Technology Lab | 4 | 5 | 40 | 60 | 100 |
| 6 | 2 | III | Practical | Core Practical – IV – Java Programming Lab | 4 | 5 | 40 | 60 | 100 |
| | | | | | | | | | |
| 1 | 3 | III | Theory | Core– VIII - Mobile Application Development | 4 | 6 | 40 | 60 | 100 |
| 2 | 3 | III | Theory | Elective - I | 4 | 6 | 40 | 60 | 100 |
| 3 | 3 | III | Theory | Elective - II | 4 | 6 | 40 | 60 | 100 |
| 4 | 3 | III | Practical | Core Practical – IV - Mobile Application Development Lab | 4 | 6 | 40 | 60 | 100 |
| 5 | 3 | III | Practical | Core Practical V – Elective Lab-I | 4 | 6 | 40 | 60 | 100 |
| 6 | 3 | III | Practical | Core Practical – VI – Industrial Training Report | 2 | - | 50 | - | 50 |
| | | | | | | | | | |
| 1 | 4 | III | Theory | Core Theory – IX - Advanced RDBMS | 4 | 5 | 40 | 60 | 100 |
| 2 | 4 | III | Theory | Elective- III | 4 | 5 | 40 | 60 | 100 |
| 3 | 4 | III | Theory | Elective- IV | 4 | 5 | 40 | 60 | 100 |
| 4 | 4 | III | Practical | Core Practical – VII – Elective Lab -II | 4 | 5 | 40 | 60 | 100 |
| 5 | 4 | III | Project | Core Project | 8 | 10 | 80 | 120 | 200 |
| | | | | | 90 | 120 | | | 2250 |

Note : Learning the courses – Programming in C, Web Technology, Database & SQL, Software Engineering and Career Enhancement Course – student shall appear for the NSDC Certification – Junior Software Developer.

*Approved in the BOS Meeting held on 28-04-2018*

List of Electives:

| Specialization | Elective - I | Elective - II | Elective - III | Elective - IV |
|---|---|---|---|---|
| **Networking Specialization** | Cryptography | TCP / IP Protocol Suite | Wireless Sensor Network | Adhoc Network |
| **Data Science** | Data Mining | R Programming | Big Data Analytics | Hadoop Programming |
| **Animation** | Principles of Multimedia | 3D Animation Essentials | Learning Maya 2 | Adobe illustrator & After Effects |
| **Testing** | Software Testing | Software Quality Assurance | Tools for Software Testing | Agile Testing |
| **Cloud Infrastructures** | Information Storage Management System | Grid Computing | Cloud Computing | Cloud Infrastructure Services |

*Approved in the BOS Meeting held on 28-04-2018*

**Mapping of Courses and POs:**

S- Strong Correlation     M – Medium Correlation     B – Blank

| Course Code | Course Name | Program Outcomes | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | P01 | PO2 | P03 | P04 | P05 | P06 | P07 |
| | Core– I – Object Oriented Programming using C++ | S | M | S | S | | S | |
| | Core– II – Analysis and Design of Algorithm | M | S | | S | M | S | |
| | Core– III – Computer Networks | S | M | S | | S | M | S |
| | Core Practical – I – Object Oriented Programming & Algorithm Lab | M | S | M | S | | M | S |
| | Core Practical – II – Network Lab | S | | M | S | M | | S |
| | | | | | | | | |
| | Core Theory – IV - Web Technology | S | M | | S | | S | |
| | Core Theory – V –Software Engineering | | S | | M | S | | S |
| | Core– VI - Information Security and Cyber Law | M | | S | S | M | | M |
| | Core– VII –Java Programming | | S | M | S | | M | |
| | Core Practical – III – Web Technology Lab | S | M | M | | S | M | |
| | Core Practical – IV – Java Programming Lab | M | S | | M | S | | S |
| | | | | | | | | |
| | Core– VIII - Mobile Application Development | | S | M | S | | M | S |
| | Elective - I | M | S | | M | | S | M |
| | Elective - II | S | | M | | M | S | |
| | Core Practical – IV - Mobile Application Development Lab | M | | S | M | | S | M |
| | Core Practical V – Elective Lab-I | | S | M | S | | M | |
| | Core Practical – VI – Industrial Training Report | S | M | | M | S | | M |
| | | | | | | | | |
| | Core Theory – IX - Advanced RDBMS | M | S | | M | S | M | |
| | Elective- III | S | | M | S | | M | S |
| | Elective- IV | | M | | S | M | S | |
| | Core Practical – VII – Elective Lab -II | M | S | | | M | | M |
| | Core Project | S | M | S | M | | S | S |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester : I**

| Subject Code: | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core  - I -** Object Oriented Programming using C++ | **4** | **5** | **2** | **0** | **Theory** |

**Introduction :**

Provides an overview of Object Oriented programming with C++.

**Objective :**

Students able to understand the object-oriented concepts and creates a knowledge for development of C++ programs.

**Course Outcome:**

| CO1 | : | Be exposed to basic hardware and software concepts .Be familiar with using C++ functions and the concepts related to good modular design. |
|---|---|---|
| CO2 | : | Be familiar with  issues related to software design |
| CO3 | : | Master using key structured programming constructs: declarations, sequence, selection, repetition, evaluating expressions |
| CO4 | : | Master one-dimensional and two-dimensional arrays. Be familiar with using C++ structures. |
| CO5 | : | Be familiar with using pointers and reference parameters. Be familiar with using text file input/output |

**Unit I:**     [12 Periods]
Introduction to object oriented programming – Need of object oriented Programming - characteristics of object-oriented languages. C and C++ - C++ Programming basics – Functions


**Unit II:**     [12 Periods]
Object and Classes: Making sense of core object concepts (Encapsulation, Abstraction, Polymorphism, Classes, Messages Association, Interfaces) Implementation of class in C++, C++ Objects as physical object, C++ object as data types constructor. Object as function arguments. The default copy constructor, returning object from function. Structures and classes. Classes objects and memory static class data. Const and classes.


**Unit III:**     [12 Periods]
Operator overloading: Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.

Inheritance: Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation : Classes within classes, inheritance and program development


*Approved in the BOS Meeting held on 28-04-2018*

**Unit IV:**                                                                                          [12 Periods]

Pointer : Addresses and pointers. The address of operator and pointer and arrays. Pointer and Faction pointer and C-types string. Memory management : New and Delete, pointers to objects, debugging pointers. Virtual Function : Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information


**Unit V:**                                                                                          [12 Periods]

Streams and Files : Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, and printer output. Templates and Exceptions : Function templates, Class templates Exceptions

**Textbook:**

1.   Object Oriented Programming in C++ by Robert Lafore,  Techmedia Publication, 2001.

**Reference :**

1.    Object-Oriented Programming Using C++, Fourth Edition, Joyce Farrell - Course Technology, 2010.
2.   Object –Oriented –Programming in C++ 6e by E Balagurusamy, McGraw-Hill, 2013.


|  |
|---|
| **Mapping of Course Outcomes with Program Outcomes:** |
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| **CO1** |  | M | H |  |  | H | H |  |
| **CO2** | H |  |  | H | H |  |  | H |
| **CO3** |  | M |  | M |  |  | M | H |
| **CO4** | H |  | M |  |  | H |  |  |
| **CO5** | H |  | M |  | H |  | H |  |
| H-High; M-Medium; L-Low | | | | | | | | |

**Semester I**

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | **Core Theory – II – Analysis and Design of Algorithm** | 5 | 2 | | 4 | Theory |

**Introduction :**

This course applies design and analysis techniques to numeric and nonnumeric algorithms which act on data structures. Analysis of algorithms is concerned with the resources an algorithm must use to reach a solution.

**Course Outcome:**

| CO1 | : | The main objective of this course is to make the student familiar with subjects concerning algorithm complexity. |
|---|---|---|
| CO2 | : | The objective of this course is to study paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice |
| CO3 | : | Apply design principles and concepts to algorithm design |
| CO4 | : | Have the mathematical foundation in analysis of algorithms |
| CO5 | : | Understand different algorithmic design strategies |

**Unit  - I :**

Introduction:- Notion of Algorithm – Algorithmic Problem solving - Analysis of Algorithm Efficiency:- Analysis framework – Asymptotic notations – Analysis of Non-recursive and recursive algorithms

**Unit – II :**

Divide and Conquer:- Merge sort – Quick Sort – Binary search – Large integer Multiplication and Strassens Matrix multiplication-closest pair and convex Hull problems - Decrease and conquer: - DFS and BFS, Topological sorting, Decrease – by – a – Constant - factor Algorithms, variable – size – Decrease Algorithms

**Unit – III:**

Transform and conquer:- Horner's Rule and Binary Exponentiation – Problem Reduction - Space and Time Tradeoffs:- Input Enhancement in String Matching - Dynamic Programming:- Warshall's and Floyd's Algorithm – Optional Binary Search Trees – knapsack Problem

**Unit – IV:**

Greedy Technique:- Prim's and kruskal's Algorithms, Dijkstra's Algorithm, Huffman Trees - Limitations of Algorithm Power:- Lower Bound Arguments – Decision Trees – P,NP and NP Complete problems

**Unit – V:**

Coping with limitations of Algorithmic Power:- Backtracking, Branch and Bound, Approximation Algorithms for NP – hard problems

*Approved in the BOS Meeting held on 28-04-2018*

**Text Book :**

1. Introduction to the design and analysis of Algorithms, Anany Levitin : Pearson Education, 2003.

**Reference:**

1. Fundamentals of Computer Algorithms,Horowitz and Sahni, Galgothia publications, 2001.
2. Introduction to Algorithms, Cormen, Leiserson and Rivest : Prentice Hall of India, 2003

<table>
<tr><td></td></tr>
<tr><td><strong>Mapping of Course Outcomes with Program Outcomes:</strong></td></tr>
<tr><td></td></tr>
</table>

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | | | H | | | M |
| **CO2** | | | M | H | | | H | |
| **CO3** | | | | | M | H | | |
| **CO4** | | H | | | | | | M |
| **CO5** | H | | | | H | | | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | **Core Theory – III – Computer Networks** | 5 | 1 | | 4 | Theory |

**Introduction :** Through this course, the students able to gain the knowledge on computer network and its Protocols.  Also they can learn the how communicates in a secured way.

| CO1 | : | To master the terminology and concepts of the OSI reference model and the TCP-IP reference model. |
|---|---|---|
| CO2 | : | To master the concepts of protocols, network interfaces, and   design/performance issues in local area networks and wide area networks |
| CO3 | : | To be familiar with wireless networking concepts |
| CO4 | : | To be familiar with contemporary issues in networking technologies. |
| CO5 | : | To be familiar with network tools and network programming |

**UNIT – I :**

Introduction, Network models – Internet model, OSI model Physical Layer: Signals – Analog, Digital, Digital Transmission – Coding, Sampling, Analog Transmission – Modulation of digital and analog signal, Multiplexing – FDM, WDM, TDM, Transmission Media – cable, wireless, Circuit switching and Telephone network, DSL Technology, Cable modern, SONET.

**UNIT – II :**

Data Link Layer: Error detection and correction, Data link control and Protocols – Stop and wait, Go-back-n, Selective repeat, HDLC, Point to point access, Channelizaiton, LANS – Traditional Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN's – IEEE 802.11, Blue tooth, Connecting LANs – Connecting devices, Backbone networks, Virtual LANS, Cellular telephony, Satelite networks, Virtual circuit switching, Frame relay, ATM.

**UNIT – III:**

 Network Layer: Inter-networks, Addressing, Routing, Network layer Protocols – ARP, IP, JCMP. IPV6, Routing – Introduction, Unicast routing, Protocols – RIP, OSPF, BGP, Multicast Routing, Protocols – DVMRP, MOSPF, CBT, PIM.

**UNIT – IV :**

Transport Layer: Process-to-Process Delivery, UDP, TCP, Data traffic, Congestion and Control, Quality of service (QOS) and techniques to improve QOS, Integrated services, QOS in Switched networks. Security: Introduction. Symmetric-key cryptography, Public key cryptography, Message security, Digital signature, User authentication, Key management, Kerberos, IP level security: IPSEC, Transport layer security, Application layer security: PGP, Firewalls, Virtual private networks.

**UNIT – V:**

Application Layer: Client-Server model, Socket interface Introduction to DNS, Distribution of name space,

DNS in the Internet, Resolution, DDNS, Electronic mail, SMTP, File Transfer, FTP, HTTP, World Wide web

**Text Book :**

1.  Forouzan B A, Data Communications and Networking, 4th edition, Tata McGraw-Hill, 2007.

**Reference:**

1. Stallings W, Data and Computer Communications, 7th edition, Pearson Education, 2004.
2. Gallo M A, and Hancock W M, Computer Communications and Networking Technologies, Thomson Brooks/Cole, 2002.
3. Comer D E, Computer Networks – and Internets with Internet Applications, 4th edition, Pearson Education, 2004.
4. Kutose J F, and Ross K W, Computer Networking – A Top-down Approach Fealuring the Internet, Pearson Education, 2001.
5. Tomasi W, Introduction to Data Communications and Networking, Pearson Education, 2004.

| | |
|---|---|
| **Mapping of Course Outcomes with Program Outcomes:** | |
| | |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | | H | | | H | H |
| **CO2** | | H | | | L | | H | H |
| **CO3** | H | | M | | | | | |
| **CO4** | | H | | M | H | **H** | | H |
| **CO5** | H | H | | M | | | H | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

Semester I :

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | Core Practical - I – Object Oriented Programming & Algorithm Lab | | | 5 | 4 | Practical |

**List of Practical**

1. Use divide and conquer method to recursively implement Binary Search
2. Use divide and conquer method to recursively implement Linear Search
3. Use divide and conquer method to recursively implement and to find the maximum and minimum in a given list of n elements.
4. Sort a given set of elements using the Merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
5. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
6. Obtain the Topological ordering of vertices in a given digraph.
7. Sort a given set of elements using Insertion sort method.
8. Print all the nodes reachable from a given starting node in a given digraph using Depth First Search method.
9. Print all the nodes reachable from a given starting node in a given digraph using Breadth First Search method.
10. Sort a given set of elements using the Heap sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
11. For a given set of elements construct an AVL Tree and also display balance factor for each node.
12. Implement 0/1 Knapsack problem using dynamic programming.
13. Compute the transitive closure of a given directed graph using Warshall's algorithm.
14. Implement All Pair Shortest paths problem using Floyd's algorithm.
15. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
16. Find Minimum Cost Spanning Tree of a given undirected graph using Prims algorithm
17. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
18. Find a subset of a given set S = {s1,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

*Approved in the BOS Meeting held on 28-04-2018*

**Semester I :**

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | **Core Practical -  II – Network Lab** | 0 | 0 | 5 | 4 | Practical |

**List of Practical**

1.  Implement the data link layer framing methods such as character, character stuffing and bit stuffing.

2.  Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP 15

3.  Implement Dijkstra's algorithm to compute the Shortest path thru a graph.

4.  Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table chart each node using distance vector routing algorithm

5.  Take an example subnet of hosts. Obtain broadcast tree for it

6.  Take a 64 bit plain text and encrypt the same using DES algorithm

7.  Write a program to break the above DES coding

8.  Using RSA algorithm Encrypt a text data and Decrypt the same

**Semester II**

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | **Core– V - Web Technology** | 4 | 1 | | 4 | Theory |

**Introduction :**

Technologies that are fundamental to understanding communication between web browsers and servers as well as how information is displayed by browser.

| CO1 | : | Employ fundamental computer theory to basic programming techniques. |
|---|---|---|
| CO2 | : | Use fundamental skills to maintain web server services required to host a website. |
| CO3 | : | Select and apply markup languages for processing, identifying, and presenting of information in web pages. |
| CO4 | : | Use scripting languages and web services to transfer data and add interactive components to web pages. |
| CO5 | : | Create and manipulate web media objects using editing software. Incorporate aesthetics and formal concepts of layout and organization to design websites that effectively communicate using visual elements. |

**UNIT – I :**

Introduction to Dynamic Web Content – HTTP and HTML: Berners-Lee's Basics – The Request/Response Procedure – The Benefits of PHP, MySQL, Javascript, CSS and HTML5 – The Apache Web Server – Setting up a Development server – What is a WAMP, MAMP or LAMP? – Installing a WAMP – Working Remotely – Logging In – Using FTP – Using an IDE - Introduction to PHP – Incorporating PHP within HTML – The structure of PHP

**UNIT – II :**

Expressions – Operators – Conditionals – Looping – Implicit and Explicit Casting – PHP dynamic Linking – PHP Functions – PHP Objects – PHP Arrays – Basic Access – Foreach..as loop -  Multidimensional arrays - Using Array Functions – Practical PHP

**UNIT – III:**

 Introduction to MySQL – MySQL Basics – Accessing MySQL via the Command Line – MySQL Commands – Datatypes – Creating an index – Querying a MySQL Database – Joining Tables together – using Logical Operators – MySQL Functions – Accessing MySQL via phpMyAdmin – Using phpMyAdmin – Accessing MySQL using PHP

**UNIT – IV :**

Javascript and HTML text – Using Comments – Variables – Operators – Functions- Expressions and Control flow in Javascript – Validating user input with Javascript – Redisplaying a form after PHP validation.

*Approved in the BOS Meeting held on 28-04-2018*

**UNIT – V:**

Introduction to CSS – Importing a Style sheet – Using Ids – Using Classes – Using Semicolons – CSS Rules – Style Types – Fonts and Typography – Text styles – CSS Colors – shorthand rules.

**Text Book :**

1. Learning PHP, MySQL, Javascript, CSS & HTML5by Robin Nixon, O'reilly Publishers, 3rd Edition, 2014.

**Reference:**

1. PHP for Absolute Begineers, Jason Lengstorf, Apress, 2010.
2. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.Deitel,
3. Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
4. Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.
5. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

| | |
|---|---|
| **Mapping of Course Outcomes with Program Outcomes:** | |
| | |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | | H | | | | H | | |
| **CO2** | H | M | M | | | | | |
| **CO3** | H | H | | M | | H | | H |
| **CO4** | | | | M | H | | H | |
| **CO5** | H | | M | | H | | H | H |
| H-High; M-Medium; L-Low | | | | | | | | |

**Semester : I**

| Subject Code: | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Core – II –Software Engineering | 4 | 5 | 2 | 0 | Theory |

**Introduction :**

To give an introduction on the concepts of Software engineering and make the students to know the fundamentals of development of software.

**Course Outcome:**

| CO1 | : | To provide an insight into the processes of software development |
|---|---|---|
| CO2 | : | To understand and practice the various fields such as analysis, design, development, testing of Software Engg . |
| CO3 | : | To develop skills to construct software of high quality with high reliability |
| CO4 | : | To apply metrics and testing techniques to evaluate the software |
| CO5 | : | To apply the method of strategic testing |

Unit I:                                                                                           [12 Periods]
The Nature of Software - Defining Software - Software Application Domains - Legacy Software - The Unique Nature of WebApps - Software Engineering - The Software Process - Software Engineering Practice - The Essence of Practice - General Principles - Software Myths

Unit II:                                                                                          [12 Periods]
A Generic Process Model - Defining a Framework Activity - Identifying a Task Set - Process Patterns - Process Assessment and Improvement - Prescriptive Process Models - The Waterfall Model - Incremental Process Models - Evolutionary Process Models - Concurrent Models -  A Final Word on Evolutionary Processes - Specialized Process Models - The Unified Process - Personal and Team Process Models - Process Technology- Agile Process – Extreme Programming.

                                                                                                 [12 Periods]
Unit III:
Requirements Engineering - Establishing the Groundwork - Eliciting Requirements - Developing Use Cases - Building the Requirements Model - Negotiating Requirements - Validating Requirements Requirements Analysis - Scenario-Based Modeling - UML Models That Supplement the Use Case - Data Modeling Concepts - Class-Based Modeling

                                                                                                 [12 Periods]

Unit IV:
Design within the Context of Software Engineering - The Design Process - Design Concepts - The Design Model. Software Architecture - Architectural Genres - Architectural Styles - Architectural

*Approved in the BOS Meeting held on 28-04-2018*

Design - Assessing Alternative Architectural Designs - Architectural Mapping Using Data Flow. Designing Class-Based Components - User Interface Analysis and Design - Interface Design Steps - WebApp Interface Design

Unit V:                                                                                          [12 Periods]

A Strategic Approach to Software Testing - Strategic Issues - Test Strategies for Conventional Software - Test Strategies for Object-Oriented Software - Test Strategies for Web Apps - Validation Testing - System Testing - The Art of Debugging

Textbook:
1   Roger S. Pressman, "Software Engineering: A Practitioner Approach", Seventh edition, McGrawHill, 2010.

Reference :
1.   Richard Fairley, " Software Engineering Concepts", Tata McGraw Hill Edition, 2008
2.   Ali Behforroz, Frederick J.Hudson, "Software Engineering Fundamentals", Oxford Indian Reprint, 2012
3.   Sommerville, "Software Engineering", Sixth Edition, Addison Wesley-Longman, 2004.
4.   Kassem A. Saleh, "Software Engineering", First Edition, J.Ross Publishing, 2009.

Pankaj Jalote, "An Integrated approach to Software Engineering", Third Edition, Springer Verlag, 2005

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | H | | | | H | | | M |
| CO2 | | | M | H | | | H | |
| CO3 | | | | | M | H | | |
| CO4 | | H | | | | | | M |
| CO5 | H | | | | H | | | |

H-High; M-Medium; L-Low

**Semester – II**

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | **Core VI – Information Security and Cyber law** | **4** | **1** | | **4** | **Theory** |

**Introduction :**

Define the Information Security and its need.  Cyber law in India and how it control cyber crime.

| CO1 | : | To master information security governance, and related legal and regulatory issues. |
|---|---|---|
| CO2 | : | To master understanding external and internal threats to an organization. |
| CO3 | : | To be familiar with how threats to an organization are discovered, analyzed, and dealt with. |
| CO4 | : | To be familiarity with information security awareness and a clear understanding of its importance. |
| CO5 | : | To master fundamentals of secret and public cryptography. |

**Unit - I:**

Introduction – 1960s – 1970s and 1980s – 1990s – 2000 to present – Security – Components of Information system. – Systems development Life Cycle – The Security Systems Development Life Cycle – Security Professionals and the organization – Information Security: Is it an Art or a Science. The need for Security – Business Needs – Threats – Attacks – Secure Software Development.

**Unit – II :**

Legal and Ethics in Information Security – International Laws and Legal Bodies – Ethics and Information Security – Codes of Ethics and Professional Organizations – Risk Management – Risk Identification – Risk Assessment – Risk Control Strategies – Selecting a risk Control Strategy.

**Unit – III:**

Planning for Security – Information security Planning and Governance – Information Security Policy, Standards and Practices – The information Security Blueprint – Security Education, Traning, and Awareness program – Security Technology – Firewalls and VPNs – Intrusion Detection and Prevention Systems and Other Security Tools.

**Unit – IV:**

Introduction – Need for Cyber Law – Cyber crime on the rise – Important Terms related to cyber law – need for cyber law in India – History of Cyber law in India – IT act, 2000 – other laws amended by IT Act 2000 – National Policy on Information Technology 2012. Overview of rules issued under the IT Act 2000.

**Unit – V:**

**Cyber Crimes** – definition – First cyber crime – types of cyber frauds – cyber frauds in India – Preventive measures – Cyber Crimes – penalties and offences under the IT Act, 2000 – offences under other legislations.

*Approved in the BOS Meeting held on 28-04-2018*

**Text Book :**

1. Michael E. Whitman, Herbert J. Mattord, "Principles of Information Security", Fourth Edition, Cenagage Learning, USA, 2015.
2. Pankaj Sharma, "Information Security and cyber Law", Vikas Publishing, 2001.

**Reference:**

1. http://www.indiancybersecurity.com/Cyber_law_overview.html
2. Mark Rhodes-Ousley, "Information Security – The Complete Reference", Mc Graw-Hill Education, 2013.

| Mapping of Course Outcomes with Program Outcomes: |
|---|
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** |  |  | H |  | H | H |  |  |
| **CO2** | H | H |  | H |  |  |  | H |
| **CO3** |  | H |  | H |  | H | H | H |
| **CO4** | H |  |  |  | H | H | M | H |
| **CO5** |  |  | H | M | H |  |  |  |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester II**

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | Core  VII - Java Programming | 4 | 1 | 0 | 4 | Theory |

**Introduction :**

To understand the concepts of object-oriented, event driven, and concurrent programming paradigms and develop Skill Based in using these paradigms using Java

| CO1 | : | use the Java programming language for various programming technologies (understanding) |
|---|---|---|
| CO2 | : | develop software in the Java programming language, (application) |
| CO3 | : | evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis) |
| CO4 | : | propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis) |
| CO5 | : | choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation) |

**UNIT-I:**

Object oriented programming concepts – objects – classes – methods and messages – abstraction and encapsulation – inheritance – abstract classes – polymorphism.- Objects and classes in Java – defining classes – methods - access specifies – static members – constructors – finalize method

**UNIT-II:**

Arrays – Strings - Packages – Java-Doc comments –- Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes

**UNIT-III:**

The Object class – Reflection – interfaces – object cloning – inner classes – proxies - I/O Streams - Graphics programming – Frame – Components – working with 2D shapes.

**UNIT-IV:**

Basics of event handling – event handlers – adapter classes – actions – mouse events – AWT event hierarchy – introduction to Swing – Model-View-Controller design pattern – buttons – layout management – Swing Components – exception handling – exception hierarchy – throwing and catching exceptions.

**UNIT-V:**

Motivation for generic programming – generic classes – generic methods – generic code and virtual machine – inheritance and generics – reflection and generics - Multi-threaded programming – interrupting threads – thread states – thread properties – thread synchronization – Executors – synchronizers.

*Approved in the BOS Meeting held on 28-04-2018*

**Text Book :**

Cay S. Horstmann and Gary Cornell, "Core Java: Volume I – Fundamentals", Eighth Edition, Sun Microsystems Press, 2008.

**Reference:**

1. K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000.
2. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.

| | |
|---|---|
| **Mapping of Course Outcomes with Program Outcomes:** | |
| | |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | H | | | H | | H | H |
| **CO2** | | H | | | | H | H | |
| **CO3** | | H | | H | | H | | H |
| **CO4** | M | | M | | H | | H | |
| **CO5** | M | | M | | | | H | H |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester II**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Core Practical – III – Web Technology Lab | 4 | 0 | 0 | 5 | Practical |

List of Practical's

1. Design the following static web pages required for an online book store web site. 1) HOME PAGE: The static home page must contain three frames. 2) LOGIN PAGE 3) CATOLOGUE PAGE:The catalogue page should contain the details of all the books available in the web site in a table. 4) CART PAGE: The cart page contains the details about the books which are added to the cart. 5) REGISTRATION PAGE.
2. Write JavaScript to validate the fields of the above registration page. Write JavaScript to validate the fields of the Login page.
3. Design a web page using CSS which includes the following: 1) Use different font, styles: 2) Set a background image for both the page and single elements on the page. 3) Control the repetition of the image with the backgroundrepeat property. 4) Define styles for links 5) Working with layers 6) Add a customized cursor.
4. Create a simple visual bean with a area filled with a color. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click. The color should also be changed if we change the color in the "property window ".
5. 1) Install TOMCAT web server and APACHE. 2) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in S.No 1 and 2. in the document root.
6. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following. 1. Create a Cookie and add these four user id's and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.
7. Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number Write a java program/PHP to connect to that database and extract data from the tables and display them. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.
8. Write a PHP which insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.
9. Create tables in the database which contain the details of items (books) of each category. Modify your catalogue page (week 2) in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.
10. Designing a scientific calculator using java script.
11. Creating animations using CSS3.

*Approved in the BOS Meeting held on 28-04-2018*

**Semester II**

| Subject Code | Subject Title | Lecture | Tutorial | Practical | Credit | Type |
|---|---|---|---|---|---|---|
| | Core Practical – IV – Java Programming Lab | 0 | 0 | 5 | 4 | Practical |

List of Practical's

1. Program to illustrate class, objects and constructors
2. Program to implement overloading, overriding, polymorphism etc
3. Program to implement the usage of packages
4. Program to create our own exception
5. Program for handling file operation
6. Implement the concept of thread programming
7. Program to implement Generic class and generic methods
8. Applet program for passing parameters
9. Applet program for running an audio file
10. Program for event-driven paradigm in Java
11. Event driven program for Graphical Drawing Application
12. Program that uses Menu driven Application
13. Develop a multi-threaded GUI application of your choice.

**Semester III :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Core– VIII - Mobile Application Development | 4 | 5 | 1 | 0 | Theory |

**Introduction :**

The Mobile Application Development is a device independent platform, which means that you can develop applications for various devices. These devices include, but aren't limited to phones, watches, tablets, cars, e-book readers, net books, televisions, and GPS devices. Finding out how to develop for the Mobile Application opens a large variety of development options for you. This syllabus covers Mobile Application Development, documentation, tips, tricks, and tutorials into a short, digestible format that allows you to springboard into your future as an Mobile developer. it gives you the basic knowledge to assemble various pieces of the Mobile Application Development to create interactive and compelling applications.

| CO1 | : | This Unit starts with an introduction to students can  have a good understanding of when you should develop a mobile app, and when a mobile website is sufficient. |
|---|---|---|
| CO2 | : | This Unit give knowledge of how to create services that your mobile app can consume. It gives an in-depth look at mobile design patterns and usability practices. |
| CO3 | : | Give knowledge of what it takes to get started developing apps on the Android platform. all the resources for a developer who has never developed on the Android platform to deploy an app. |
| CO4 | : | This Unit will help to develop an iOS app and Windows Phone 7 to mobile platforms. |
| CO5 | : | This Unit provides the reader with the knowledge of the necessary tools required to develop mobile apps for the BlackBerry platform. |

**Unit  - I :**

Preliminary Considerations : Reasons to Build a Mobile App - Costs of Developing a Mobile App - Importance of Developing a Mobile Strategy - Diffi culties in Mobile App Development - Mobile Application Development Today - Myths of Mobile Application Design - Explanation of Third-Party Mobile Frameworks .Diving into Mobile: Mobile Web Presence - Mobile Applications - Marketing - Your App as a Mobile Web App.

**Unit – II :**

Creating Consumable Web Services for Mobile Devices : What Is a Web Service? - Web Services Languages (Formats) - Creating an Example Web Service - Debugging Web Services . Introduction to Android : A Brief History of Mobile Software Development - Android Platform Differences – Setting up Andriod Environment - Writing Your First Android Application - Android Application Basics -Android User Interface Design Essentials.

**Unit – III:**

Android Application Design Essentials -Mobile User Interface Design : Eff ective Use of Screen Real Estate - Understanding Mobile Application Users - Understanding Mobile Information Design - Understanding

*Approved in the BOS Meeting held on 28-04-2018*

Mobile Platforms - Using the Tools of Mobile Interface Design. Mobile Websites : Choosing a Mobile Web Option - Adaptive Mobile Websites - Dedicated Mobile Websites - Mobile Web Apps with HTML5 . Getting Started with Android : Why Target Android? - Who Supports Android? - Getting the Tools You Need - Connecting to the Google Play - Android Development Practices - Building the Derby App in Android.

**Unit – IV:**

Getting Started with iOS : The iPhone Craze - Getting the Tools You Need - iOS Project - Debugging iOS Apps - Objective-C Basics - Hello World App - Building the Derby App in iOS - Other Useful iOS Things. Getting Started with Windows Phone 7: New Kid on the Block - Getting the Tools You Need- Windows Phone 7 Project - Building the Derby App in Windows Phone 7 - Other Useful Windows Phone Things

**Unit – V:**

Getting Started with BlackBerry : The BlackBerry Craze - Getting the Tools You Need - Other Useful BlackBerry Things - BlackBerry Distribution

**Text Book :**
**1.** Mobile Application Development, Jeff McWherter Scott Gowell , John Wiley & SonsPublications 2012, Inc.Indianapolis, Indiana
**Reference:**
1.Introduction to Android™ Application Development Android Essentials Fourth Edition Joseph   Annuzzi, Jr. Lauren Darcey Shane Conder ,2013
2. Android™ Application Development For Dummies®, 3rd Edition Published by: John Wiley &  Sons, Inc., 111 River Street, Hoboken, NJ 07030 5774,2015
3. Android Programming Cookbook , Kick Start your Android Projects, Exelixis Media P.C.,  2016
4. Beginning Android™ Application Development Wei-Meng Lee, Wiley Publishing, Inc,2011.
5.iPhone® Application Development For Dummies®, 4th Edition Published by John Wiley & Sons, Inc. ,2012

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | | | H | | | |
| **CO2** | | | M | M | | | H | |
| **CO3** | | H | | M | | H | | |
| **CO4** | | | H | | | | | M |
| **CO5** | | | | | H | | | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester III:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Practical – IV - Mobile Application Development Lab** | **4** | **0** | **0** | **6** | **Practical** |

**List of Lab Programs :**

1. Develop an application that uses GUI components, Font and Colours

2. Develop an application that uses Layout Managers and event listeners.

3. Develop a native calculator application.

4. Write an application that draws basic graphical primitives on the screen.

5. Develop an application that makes use of database.

6. Develop an application that makes use of RSS Feed.

7. Implement an application that implements Multi threading

8. Develop a native application that uses GPS location information.

9. Implement an application that writes data to the SD card.

10. Implement an application that creates an alert upon receiving a message.

11. Write a mobile application that creates alarm clock

*Approved in the BOS Meeting held on 28-04-2018*

**Elective – I**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Cryptography** | **4** | **0** | **0** | **6** | **Practical** |

**Introduction:**

Cryptography is the study of information hiding and verification. It includes the protocols, algorithms and strategies to securely and consistently prevent or delay unauthorized access to sensitive information and enable verifiability of every component in a communication.

| CO1 | : | Enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems. |
|---|---|---|
| CO2 | : | They will be able to combine these basics with their knowledge of experimental methodologies to identify, formulate, and solve engineering problems. |
| CO3 | : | Function effectively in their discipline of practice, and will continue their education through graduate/professional studies and/or participation in professional seminars and societies. |
| CO4 | : | Utilize their training and experience in creative and design processes toward their job functions. |
| CO5 | : | A working knowledge of fundamentals. Graduates will have knowledge of math and science fundamentals. |

**UNIT I**

Security trends - Attacks and services - Classical crypto systems - Different types of ciphers  -  LFSR sequences - Basic Number theory - Congruences - Chinese Remainder theorem - Modular exponentiation - Fermat and Euler's theorem - Legendre and Jacobi symbols - Finite fields - continued fractions.

**UNIT II**

Simple DES - Differential cryptoanalysis - DES - Modes of operation - Triple DES - AES - RC4 - RSA - Attacks - Primality test - factoring.

**UNIT III**

Discrete Logarithms - Computing discrete logs - Diffie-Hellman key exchange - ElGamal Public key cryptosystems - Hash functions - Secure Hash - Birthday attacks - MD5 - Digital signatures - RSA - ElGamal - DSA.

**UNIT IV**

Authentication applications - Kerberos, X.509, PKI - Electronic Mail security - PGP, S/MIME - IP security - Web Security - SSL, TLS, SET.

*Approved in the BOS Meeting held on 28-04-2018*

**UNIT V**

System  security  -  Intruders  -  Malicious  software  -  viruses  -  Firewalls  -  Security Standards.

**TEXT BOOKS:**

1.  Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with coding theory", 2nd ed, Pearson, 2007.

2. William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI, 4th ed, 2006.

**REFERENCES:**

1. W. Mao, "Modern Cryptography - Theory and Practice", Pearson Education, Second Edition, 2007.

2.  Charles P. Pfleeger, Shari Lawrence Pfleeger - Security in computing Third Edition - Prentice Hall of India, 2006

| | |
|---|---|
| | |

**Mapping of Course Outcomes with Program Outcomes:**

| | |
|---|---|
| | |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | | H | | | | | H | H |
| **CO2** | H | | H | | | | | |
| **CO3** | | M | | H | M | M | H | |
| **CO4** | H | H | | | | M | | |
| **CO5** | | | | H | | | | H |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective I**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Data Mining | 4 | 5 | 1 | | Theory |

**Introduction:**

Data mining is the process of extraction of relevant information from a collection of data. Mining of particular information related to a concept is done on the basis of the feature of the data.

**Objective:**

This course introduces the fundamental concepts of Data Mining.

| CO1 | : | Learn the fundamental functionality of Data Mining. |
|---|---|---|
| CO2 | : | Discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems, make predictions of outcomes. |
| CO3 | : | Association, a pattern is discovered based on a relationship between items in the same transaction |
| CO4 | : | The goal of classification is to accurately predict the target class for each case in the data. |
| CO5 | : | Clustering analysis is broadly used in many applications such as market research, pattern recognition, data analysis, and image processing |

**Unit - I :**

Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data reduction.

**Unit – II :**

Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architectures of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and summarization, Mining Class Comparison.

**Unit – III:**

Mining Association Rules: Basics Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy.

**Unit – V:**

Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods Density Based Methods – GRID Based Method – Model based Clustering Method.

**Text Book :**

1. i.J.Han and M. Kamber,2001,Data Mining Concepts and Techniques, Harcourt India Pvt. Ltd - New Delhi.

**Reference:**

1. K.P. Soman , Shyam Diwakar, V.Ajay ,2006, Insight into Data Mining Theory and Practice, Prentice Hall of India Pvt. Ltd - New Delhi.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | | H | | | | H |
| **CO2** | | M | | | H | | | H |
| **CO3** | H | M | H | H | | M | | |
| **CO4** | | M | | | H | M | H | |
| **CO5** | H | | | H | | | | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective -I**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Principles of Multimedia** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction:** Multimedia content, picture, voice, data. Multimedia service in the real time. Classification of the multimedia services

| CO1 | : | To understand the basic concept about multimedia |
|---|---|---|
| CO2 | : | To understand basic tools in multimedia |
| CO3 | : | Basic details about colour models in image |
| CO4 | : | To understand basic video and audio signals |
| CO5 | : | To understand audio and video compression techniques in multimedia |

**Unit - I:**

Introduction to Multimedia: What is Multimedia? - Components of Multimedia-Multimedia Research Topics and Projects-Multimedia and Hypermedia- History ofMu1timedia- Hypermedia and Multimedia. World Wide Web: History of the WWW-Hypertext Transfer Protocol (HTTP-Hypertext Mark-up Language (HTML) - Extensible Mark-up Language (XML) Overview of Mu1timedia Software Tools: Music Sequencing and Notation- Digital Audio-Graphics and Image Editing-Video Editing-Animation-Mu1timedia Authoring.

**Unit – II:**

Multimedia Authoring and Tools: Multimedia Authoring-Multimedia Authoring Metaphors-Multimedia Production-Multimedia Presentation- Automatic Authoring. Some Useful Editing and Authoring Tools: Adobe Premiere-Macromedia Director-Macromedia Flash-Dream weaves. VRML: Overview-Animation and Interactions-VR1 Specifics. Graphics and image Data Representations: Graphics image Data Types- l·Bit images- 8-Bit Gray Level Images- Image Data Types- 24~Bit Color Images- 8-Bit Color Images.

**Unit – III:**

Color in Image and Video: Color Science: Light and Spectra-Human Vision-Spectral Sensitivity of the Eye- Camera Systems- Gamma Correction-Color Monitor Specification-Out-of-Gamut Colors-White-Point Correction-XYZ to RGB Transform-Transform with Gamma Correction. Color' Models in Images: RGB Color Model for CRT Displays-Subtractive Color: CMY Color Model-Transformation from RGB to CMY-Printer Gamut's. Color Models in Video: Video Color Transforms- YUV Color Model-YIQ Color Model-Cyber Color Model.

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Fundamental Concepts in Video: Types of Video Signals- Component Video- Composite Video- S-Video- Ana log Video- Digital Video. Basics of Digital Audio: Digitization of Sound- MIDI: Musical Instrument Digital Interface- Quantization and Transmission of Audio.

**Unit – V:**

**Basic Video Compression Techniques:** Introduction to Video Compression- Video Compression Based on Motion Compensation-.Search for Motion Vectors- Sequential Search- 2D Logarithmic Search- Hierarchical Search. **Basic Audio Compression Techniques:** ADPCM in Speech Coding- ADPCM- ADPCM. Vocoders- Phase Insensitivity- Channel vocoder- Formant vocoder- Linear Predictive Coding.

**TEXT BOOK:**

1. Fundamentals of Multimedia   Ze-Nian Li and Mark S. Drew. Pearson Education International.


**REFEERENCE BOOK:**

2. Principles of Multimedia 2nd Edition by Ranjan parekh.


| 1. Mapping of Course Outcomes with Program Outcomes: | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Outcomes** | **Program Outcomes** | | | | | | |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | L | | | H | | |
| **CO2** | | H | | H | | H | | |
| **CO3** | | M | | | H | | H | |
| **CO4** | H | | M | | H | | H | H |
| **CO5** | H | | M | H | | | | H |
| 2. H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective I :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Software Testing** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

This course introduces the software engineering discipline of software quality engineering and to the legal and societal issues of software quality Software requirements analysis; design representation, programming methodologies; verification, validation, maintenance and software planning.

| CO1 | : | Upon completion of this course, The student should understand the software test life cycle. |
|---|---|---|
| CO2 | : | The relationship between testing, software quality and other verification techniques  and theoretical limits of software testing |
| CO3 | : | The concepts and techniques for black-box and white-box testing**.** The SPRAE (specification-premeditation-repeatability-accountability-economy) framework for testing practice. |
| CO4 | : | Design patterns for test automation**.** The challenges of object-oriented testing |
| CO5 | : | Test coverage measures such as statement, branch, and path coverage  management procedures for software testing. |

**Unit  - I :**

Testing : an Overview – what is software Quality? – Possible Definitions – New Approaches to quality – The overall course of a test – Planning – Execution – Evaluation – checking – List of Known errors – testing strategies – Exploratory Testing – Testing and improving – Automated Testing – Testing by using

**Unit – II :**

Testing by Documenting – Regression Testing – Smoke Tests – Embedded Testing – Live Testing – Testing Methods – Black Box Testing – White Box Testing – Gray Box Tests – Requirements – Based Testing – Design Based Testing – code Based Testing – Performance Testing –Stress Testing – Robustness Testing – Long-Term Testing – Installation Testing – Security Testing

**Unit – III:**

Random Data Testing – Spot Check Testing – Boundary value Testing – Phases of testing – The classic Test Planning Model – Integration of Phases in Rapid Application Testing – Design and code Reviews – Static code Analysis – Model Validation

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Risk Assessment – Setting Priorities – Various Risk Types – Risk assessment based on User Priorities – Function/risk Matrix – Testing Patterns , Patterns for Debugging – Best – Minimal, Maximal and Error Case- Equivalence Classes

**Unit – V:**

Boundary Values – Cause and Effect Diagrams –Decision Trees – Unit  Testing – Functional Testing – Structure Testing – Integration Testing – Transactions -  Linking to the interface – synchronization – System Testing – Functional Completeness – Run -Time Behavior.

**Text Book :**

1.Galileo Computing Software Testing and Internationalization © 2003 Lemoine International and the Localization Industry Standards Association (LISA)

**Reference:**

1. Beginners Guide To Software Testing -  Padmini C

2. The Art of Software Testing, Second Edition Glenford J. Myers Revised and Updated by Tom Badgett and Todd M. Thomas with Corey Sandler John Wiley & Sons, Inc.
3. Software Testing - Ron Patton Copyright © 2001 by Sams Publishing

4. Software Testing An ISTQB–ISEB Foundation Guide Second Edition

5.Introduction to Software Testing Paul Ammann George Mason University Jeff Offutt   George Mason University

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | H | | M | | | H |
| **CO2** | | H | H | | M | | H | |
| **CO3** | H | | | M | | H | | H |
| **CO4** | H | H | | M | | H | | |
| **CO5** | | H | | | M | | H | H |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective I :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Information Storage Management System** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction:**

The Information Storage and Management (ISM) course provides a comprehensive understanding of the varied storage infrastructure components in classic and virtual environments. It enables participants to make informed decisions in an increasingly complex IT environment.

| CO1 | : | The ability to understand the theoretical concept of information lifecycle and to know the disk drive performance. |
|---|---|---|
| CO2 | : | To understand the thorough knowledge of RAID concepts and The ability to manage the Clariion concepts. |
| CO3 | : | To know the basic knowledge of DAS and The ability to understand the Fibre channels. |
| CO4 | : | To understand the storage virtualization concepts. The ability to configure the storage virtualization |
| CO5 | : | The ability to observe the business continuity process and the backup analysis. |

**Unit - I :**

Introduction to Information Storage and Management - Information Storage - Evolution of Storage Technology and Architecture - Data Center Infrastructure - Key Challenges in Managing Information - Information Lifecycle - Components of a Storage System Environment - Disk Drive Components - Disk Drive Performance - Fundamental Laws Governing Disk Performance - Logical Components of the Host.

**Unit – II :**

Data Protection: RAID - Implementation of RAID - RAID Array Components - RAID Levels - RAID Comparison - RAID Impact on Disk Performance - Hot Spares - Components of an Intelligent Storage System - Concepts in Practice: EMC CLARiiON and Symmetrix.

**Unit – III:**

Direct-Attached Storage and Introduction to SCSI - Types of DAS - DAS Benefits and Limitations - Disk Drive Interfaces - Introduction to Parallel SCSI - SCSI Command Model - Fibre Channel: Overview - The SAN and Its Evolution - Components of SAN - FC Connectivity -Fibre Channel Ports - Fibre Channel Architecture - Zoning - Fibre Channel Login Types - FC Topologies.

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

iSCSI – FCIP - Forms of Virtualization - SNIA Storage Virtualization Taxonomy - Storage Virtualization Configurations - Storage Virtualization Challenges - Types of Storage Virtualization - Concepts in Practice.

**Unit – V:**

Information Availability - BC Terminology - BC Planning Lifecycle - Failure Analysis - Business Impact Analysis - BC Technology Solutions - Backup Purpose - Backup Considerations - Backup Granularity - Recovery Considerations - Backup Methods - Backup Process - Backup and Restore Operations - Backup Topologies - Backup Technologies.

**Text Book :**

G. Somasundaram Alok Shrivastava, "Information Storage and Management", Wiley publication, 2009.

**Reference:**

1. G. Somasundaram Alok Shrivastava, "Information Storage and Management" second edition, John Wiley publication, 2012.

| Mapping of Course Outcomes with Program Outcomes: |
|---|
| |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | H | | | | | | |
| **CO2** | | | H | H | | M | H | H |
| **CO3** | | L | H | | | H | H | H |
| **CO4** | | H | M | M | H | H | | H |
| **CO5** | H | | | M | H | M | H | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester III:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **TCP/IP Protocol Suite Practical Lab** | **4** | **0** | **0** | **6** | **Practical** |

| List of practical programs : |
|---|
| 1. Connect the computers in Local Area Network. |
| 2. Simple TCP/IP Client Communication. |
| 3. Configuring Internet IP address |
| 4. To Perform File Transfer in client and server using TCP/IP. |
| 5. Implementation of Remote Command. |
| 6. Implementation of Address Resolution Protocol |
| 7. Configure Host IP, Subnet Mask and Default Gateway in a System in LAN (TCP/IP Configuration). |
| 8. Transfer files between systems in LAN using FTP Configuration, install Print server in a LAN and share the printer in a network. |
| 9. Configure a Network topology using packet tracer software |
| 10. Decode header fields of IP datagram |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective  II :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **R Programming** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

In this course you will learn how to program in R and how to use R for effective data analysis. You will learn how to install and configure software necessary for a statistical programming environment and describe generic programming language concepts as they are implemented in a high-level statistical language. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code. Topics in statistical data analysis will provide working examples.

| CO1 | : | Ability to learn about the foundation for fluency in R programming, and an insight into the capabilities of the language as a productivity tool for data manipulation and statistical analyses. |
|---|---|---|
| CO2 | : | Ability to learn to Install R Studio and work on R interface, Learn the basics of R programming including objects, classes, vectors, attributes etc. |
| CO3 | : | Ability to learn more about vectors, frames and matrices. |
| CO4 | : | Ability to write functions including generic functions using various methods and loops. |
| CO5 | : | Ability to install various packages and work effectively in the R environment, summarizing data, compare samples, plot options. |

**Unit  - I : Introducing R: The Big Picture** - Benefits of Using R- Unique Features of R- **Exploring R-** Working with a Code Editor- Starting Your First R Session- Sourcing a Script-Navigating the Workspace- Manipulating the content of the workspace- **The Fundamentals of R**: Functions- Keeping Your Code Readable- Getting from Base R to More- packages.

**Unit – II : Getting Down to Work in R-** Arithmetic operations and functions- Organizing Data in Vectors- Getting Values in and out of Vectors- Working with Logical Vectors- Powering Up Your Math with Vector Functions- Manipulating Text- Factoring in Factors-levels-distinguish data types-working with ordered factors

**Unit – III: Working on dimensions-** Adding a Second Dimension- Using the Indices- Naming Matrix Rows and Columns- Calculating with Matrices- Combining Different Types of Values in a **Data Frame**- Manipulating Values in a Data Frame- Combining Different Objects in a List.

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV: Coding in R-** Moving from Scripts to Functions**-** Using Arguments the Smart Way**-** Coping with Scoping- Dispatching to a Method- Controlling the Logical Flow- Vectorizing Choices- Making Multiple Choices- Looping Through Values-Real-time examples with dataset

**Unit – V: Summarizing Data-** Whipping Your Data into Shape-starting right data- Continuous Variables-Describing Categories- Working with Tables- Testing Differences and Relations- Comparing Two Samples-Testing Counts and Proportions- Working with Models- **Working with Graphics-** Using Base Graphics-Creating Different Types of Plots- Controlling Plot Options and Arguments- Saving Graphics to Image Files-Changing Plot Options- Plotting Different Types- Plotting Data in Groups- Printing and Saving  Plot.

**Text Book**

**1**. Andrie de Vries, Joris Meys, "R For Dummies", 2nd Edition, Jul 2015,PP:1-432

**Reference:**

1. Jared P. Lander 2017"R for Everyone: Advanced Analytics and Graphics"2 nd Edition.

2. https://cran.r-project.org/doc/manuals/R-intro.html#Arrays.

3. Ihaka, Ross; Gentlman, Robert, 1996. "R: A Language for Data Analysis and Graphics" *Journal of Computational and Graphical Statistics*. American Statistical Association. **5** (3): 299–314.

|  |
|---|

**Mapping of Course Outcomes with Program Outcomes:**

|  |
|---|

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | H |  |  |  |  | H | H | H |
| CO2 | H |  | H | H |  | H |  |  |
| CO3 | H | M | H | H | H |  |  |  |
| CO4 | H |  |  | M |  | H | H | H |
| CO5 |  | M |  |  | H | H | H | M |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective II :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **3D Animation essentials** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

***3D animation has become*** a mainstay in film, television, and video games, and is becoming an integral part of other industries that may not have found it all that useful at first. Fields such as medicine, architecture, law, and even forensics now use 3D animation. To really understand 3D animation, you must look at its short history, which is tied directly to the history of the computer. 3D animation is an industry that borrows from many other fields, including film, art, photography, sculpting, painting, and technology. You will look at up-to-date techniques and practices related to those realms and also take a look at what is coming up in the near future.

| | | |
|---|---|---|
| CO1 | : | This lesson explores the different industries that utilize 3D animation in various ways. |
| CO2 | : | Almost all 3D animation is created in a team setting, and this chapter breaks down the steps that a studio uses to create 3D animated projects. |
| CO3 | : | All 3D animation must tell a story. This chapter presents basic 3D animation methods worked out through traditional 2D animation, basic storytelling theory, and film and pre visualization techniques with cameras. |
| CO4 | : | Rigging and Animation digs into the specifics of the closely linked animation and rigging roles to give you a good idea of their interrelatedness |
| CO5 | : | The 3D animation industry is changing constantly, so it's important to be aware of what is on the cutting edge and what is on the horizon. Techniques and methods such as real-time rendering, motion capture, stereoscopic 3D, and point cloud data are integral to the future of the industry |

**Unit  - I : 3D Animation Overview**

Defining 3D Animation-Exploring the 3D Animation Industry-Entertainment-Scientific and Other-The History of 3D Animation-1960s: The Dawn of Computer Animation-1970s: The Building Blocks of 3D Animation-1980s: The Foundations of Modern Computing-1990s: 3D Animation Achieves Commercial Success-2000s: The Refining of 3D Animation-Early Computers.

**Unit – II : Getting to Know the Production Pipeline**

Understanding the Production Pipeline's Components-Working in 3D Animation Preproduction-Working in 3D Animation Production-Working in 3D Animation Postproduction-Using Production Tools-Understanding Digital Imaging and Video-Understanding Digital Imaging-Pixels-Raster-Graphics vs. Vector Graphics-Anti-Aliasing-Basic Graphic-File Formats-Channels-Color Depth or Bit Depth-Color Calibration-Understanding Digital Video-Resolution- Device Aspect Ratio- Pixel Aspect Ratio-Safe Areas-Interlaced and Progressive Scanning –Compression-Frame Rate and Time code-Digital Image Capture

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – III: Exploring Animation, Story, and Pre-visualization**

Using Principles of Fine Art and Traditional Animation –Modeling-Texturing/Lighting-Character Animation –VFX-Building a Good Story-Story Arc-Character, Goal, and Conflict- The Hero's Journey -Other Storytelling Principles -Using Pre-visualization Techniques-Basic Shot Framing -Camera Movements-Editing-Understanding Modeling and Texturing **-**Modeling –Polygons-NURBS-Subdivision Surfaces-Modeling Workflows.

**Unit – IV: Rigging, Understanding Visual Effects, Lighting, and Rendering**

Rigging-Parenting -Pivot Positions -Skeleton System - Forward and Inverse Kinematics-Deformers – Constraints-Scripting-Expressions-Key frame- Graph Editor -Timeline-Dope Sheet –Workspace-Tracking Marks and Ghosting -FK and IK -Video Reference -The Basic Animation Workflow-Animation Techniques-Understanding Visual Effects, Lighting, and Rendering-Creating Visual Effects - Lighting-Light Types - Light Attributes -Lighting Techniques -The Basic Lighting Workflow -Rendering -Basic Rendering Methods-Global Illumination -Advanced Shader Functions-The Basic Rendering Workflow .

**Unit – V: Hardware and Software Tools of the Trade**

Choosing a Computer -Choosing a Computer Type -Understanding Operating Systems -Selecting the Components - Comprehensive 3D Animation Packages -CAD -Compositing -Digital Imaging -3D Specialty-Industry Trends **-** Using Motion Capture -Marker Systems - Markerless Systems -Creating Stereoscopic 3D - Integrating Point-Cloud Data -Providing Real-Time Capabilities-Real-Time Rendering -Real-Time Animation -Real-Time Motion Performance-Working in Virtual Studios .

**Text Book :**
1. 3D Animation Essentials (Essentials (John Wiley))" by Andy Beane
**Reference:**
1. Creating 3-D Animation: The Aardman Book of Filmmaking" by Peter Lord and Brian Sibley
2. Exploring 3D Animation with Maya 6 (Design Exploration)" by Peter Young and Patricia Beckmann
3. Understanding 3D Animation Using Maya" by John Edgar Park
4. Blender 3D by Example" by Romain Caudron and Pierre-Armand Nicq
5. IClone 4.31 3D Animation Beginner's Guide" by M D McCallum

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | | | | | M | |
| **CO2** | H | | H | H | | H | | M |
| **CO3** | | H | | | H | | | H |
| **CO4** | | M | | | | | M | |
| **CO5** | | H | H | H | | H | | H |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

*Rathinam College of Arts & Science (Autonomous), Coimbatore-21.*
*Admitted in M.Sc. Computer Science  from the academic year 2017-2018 & Onwards*

*Page 45 of 94*
*Regulations 2017*

**Elective II :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Software Quality Assurance** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction:**

Software Quality Assurance (SQA) goal is to objectively evaluate software processes. This course introduces the concepts and methods required for effective and efficient SQA

| CO1 | : | To understand the basic concepts of software quality Assurance. The ability to understand the software requirements. |
|---|---|---|
| CO2 | : | To know the theoretical concept of software quality factors. The ability to know the software life cycle. |
| CO3 | : | To understand the planning stages of software quality assurance. To know about the reviews of software quality assurance. |
| CO4 | : | To know the software development methodologies. The ability to know the verification and validation process. |
| CO5 | : | The ability to understand the testing concepts. To understand the cost of the projects. |

**.Unit  - I :**

The uniqueness of software quality assurance - The environments for which SQA methods are developed - What is software? - Software errors, faults and failures - Classification of the causes of software errors - Software quality – definition - Software quality assurance – definition and objectives - Software quality assurance and software engineering - The need for comprehensive software quality requirements  - Classifications of software requirements into software quality factors.

**.Unit – II :**

Product operation software quality factors - Product revision software quality factors - Product transition software quality factors - Alternative models of software quality factors - Who is interested in the definition of quality requirements? - Software compliance with quality factors - The SQA system – an SQA architecture - Pre-project components - Software project life cycle components - Infrastructure components for error prevention and improvement Management SQA components - SQA standards, system certification, and assessment components - Organizing for SQA – the human components - Considerations guiding construction of an organization's SQA system.

**Unit – III:**

The CFV Project completion celebration - The contract review process and its stages - Contract review objectives - Implementation of a contract review - Contract review subjects - Contract reviews for internal projects - Development plan and quality plan objectives - Elements of the development plan - Elements of the quality plan - Development and quality plans for small projects and for internal projects.

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Classic and other software development methodologies - Factors affecting intensity of quality assurance activities in the development process - Verification, validation and qualification - A model for SQA defect removal effectiveness and cost - Review objectives - Formal design reviews (DRs) - Peer reviews - A comparison of the team review methods - Expert opinions.

**Unit – V:**

Definition and objectives - Software testing strategies - Software test classifications - White box testing - Black box testing - The testing process - Test case design - Automated testing - Alpha and beta site testing programs.

**Text Book :**

Daniel Galin, "Software Quality Assurance", Pearson Publication, 2009.

**Reference:**

1. Claude y. laporte alain april, "Software Quality Assurance", Wiley Publication, 2017.

2. Murali Chemuturi, "Mastering Software Quality Assurance", J.Ross publishing, 2010.

3. Kshirasagar Naik and Priyadarshi Tripathy, "Software Testing and Quality Assurance", Wiley Publication, 2008.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | | M | | H | H | H |
| **CO2** | H | H | H | | | M | | |
| **CO3** | H | H | H | | H | | | |
| **CO4** | H | | | H | | H | H | H |
| **CO5** | M | H | | | M | M | | M |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective II :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | Grid Computing | 4 | 5 | 1 | 0 | Theory |

**Introduction :**

An environment that provides the ability to share and transparently access resources across a distributed and heterogeneous environment.

| CO1 | : | Learn and understand the technology  and  tool kits facilitating of grid computing. |
|---|---|---|
| CO2 | : | Understand where the grid computing could be effectively utilized by        illustrations of applications of grid computing. |
| CO3 | : | To appreciate the necessity of grid computing and thus its evaluation. |
| CO4 | : | Proper technology and toolkit for using grid computing |
| CO5 | : | To know the application of grid computing |

**Unit  - I :**

INTRODUCTION TO GRID COMPUTING : Introduction - The Grid - Past, Present and Future - Applications of grid computing organizations and their roles.

**Unit – II :**

GRID COMPUTING ARCHITURE : Grid Computing anatomy - Scheduling & Security - Next generation of Grid computing initiatives- Merging the Grid services architecture with Web services architecture.

**Unit – III:**

GRID COMPUTING TECHNOLOGIES :OGSA - Sample use cases that drive the OGSA platform components - OGSI and WSRF- OGSA Basic Services - Security standards for grid computing.

**Unit – IV:**

GRID COMPUTING TOOL KIT : Globus Toolkit -Versions - Architecture -GT Programming model -A sample grid service implementation.

**Unit – V:**

HIGH LEVEL GRID SERVICES : High level grid services - OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

*Approved in the BOS Meeting held on 28-04-2018*

**Text Book :**

1.Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson/PHI PTR-2015.

**Reference:**

1. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making the Global Infrastructure a reality ", John Wiley and sons,2015.

2. Ahmar Abbas, "Grid Computing: A Practical Guide to Technology and Applications", Charles River media, 2015.

| Mapping of Course Outcomes with Program Outcomes: |
|---|
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** |  | H |  | M |  | H |  | H |
| **CO2** | H |  | H |  | M |  | H |  |
| **CO3** | H |  | H |  |  | H | H |  |
| **CO4** |  | H |  |  | M |  | H |  |
| **CO5** |  | H |  | M |  | H |  | H |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective IV:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Wireless Sensor Network** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction:** Basic the concept of wireless sensor technology and middleware technologies for wireless sensor networks.

| CO1 | : | To understand the basic sensor network technology |
|---|---|---|
| CO2 | : | To understand the wireless transmission technology |
| CO3 | : | To understand Mac protocols for wireless sensor networks |
| CO4 | : | To understand routing protocols for wireless sensor networks |
| CO5 | : | To understand the basic concept of middleware technologies. |

**Unit - I:** Introduction and Overview of Wireless Sensor Networks: Background of Sensor Network Technology-Applications of Sensor Networks. Basic Overview of the Technology- Basic Sensor Network Architectural Elements-Brief Historical Survey of Sensor Networks- Challenges and Hurdles. Applications of Wireless Sensor Networks: Introduction-Range of Applications- Examples of Category 2 WSN Applications- Examples of Category 1 WSN Applications.

**Unit – II:** Basic Wireless Sensor Technology: Introduction-Sensor Node Technology-Overview-Hardware and Software-Sensor Taxonomy- WN Operating Environment- WN Trends. Wireless Transmission Technology and System: Introduction-Radio Technology Primer- Propagation and Propagation Impairments-Modulation. Available Wireless Technologies: Campus Applications- MAN/WAN Applications.

**Unit – III:** Medium Access Control Protocols for Wireless Sensor Networks: Fundamentals of MAC Protocols: Performance Requirements- Common Protocols. MAC Protocols for WSNs: Schedule-Based Protocols- Random Access-Based Protocols. Sensor-MAC Case Study-Protocol Overview- Periodic Listen and Sleep Operations-Schedule Selection and Coordination-Schedule Synchronization- Adaptive Listening-Access Control and Data Exchange- Message Passing.

**Unit – IV:** Routing Protocols for Wireless Sensor Networks: Introduction- Data Dissemination and Gathering- Routing Challenges and Design Issues in Wireless sensor networks. Network Scale and Time-Varying Characteristics- Resource Constraints-Sensor Applications Data Models. Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques-Flooding and Its Variants- Sensor Protocols for Information via Negotiation- Low-Energy Adaptive Clustering Hierarchy-Power-Efficient Gathering in Sensor Information Systems. Directed Diffusion-Geographical Routing

**Unit – V:** Transport Control Protocols for Wireless Sensor Networks: Traditional Transport Control Protocols- TCP (RFC 793)- UDP (RFC 768)- Mobile IP-Feasibility of Using TCP or UDP for WSNs-

Transport Protocol Design Issues- Examples of Existing Transport Control Protocols. Middleware for Wireless Sensor Networks: Introduction- WSN Middleware Principles- Middleware Architecture- Data-Related Functions- Architectures. Existing Middleware-MiLAN (Middleware Linking Applications and Networks),- IrisNet (Internet-Scale Resource-Intensive Sensor Networks Services),- AMF (Adaptive Middleware Framework)- DSWare (Data Service Middleware),- CLMF (Cluster-Based Lightweight Middleware Framework),- MSM (Middleware Service for Monitoring). Network Management for Wireless Sensor Networks: Introduction- Network Management Requirements-Traditional Network Management Models: Simple Network Management Protocol-Telecom Operation Map-Network Management Design Issues.

**Text Book :**

1. WIRELESS SENSOR NETWORKS: Technology, Protocols, and Applications KAZEM SOHRABY DANIEL MINOLI TAIEB ZNATI A john willey & sons,INC,.Publications

**Reference:**

1. Wireless Sensor Networks: IAN F. AKYILDIZ SERIES IN COMMUNICATIONS AND NETWORKING Ian F. Akyildiz Georgia Institute of Technology, USA

2. Mehmet Can Vuran University of Nebraska-Lincoln, USA.

| **Mapping of Course Outcomes with Program Outcomes:** |
| --- |
| |

| Course Outcomes | Program Outcomes | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | H | | H | H | H | | H | |
| CO2 | H | H | M | | | M | H | |
| CO3 | | M | | H | H | M | | H |
| CO4 | | H | H | H | H | H | | H |
| CO5 | | | H | H | H | | | M |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective III :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Big Data Analytics** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

**Big data** is a blanket term for the non-traditional strategies and technologies needed to gather, organize, process, and gather insights from large datasets. While the problem of working with data that exceeds the computing power or storage of a single computer is not new, the pervasiveness, scale, and value of this type of computing has greatly expanded in recent years.

| CO1 | : | Understand what Big Data is and  classical data analysis techniques and benefits that Big Data. |
|---|---|---|
| CO2 | : | Understand how Big Data can be analyzed to extract knowledge Communicate with data scientist |
| CO3 | : | Create predictive models using statistical, data mining and machine learning techniques, and evaluate and interpret such models to support fact-based decision making. |
| CO4 | : | Choose the right algorithms for data science problems and knowledge of statistical data analysis techniques used in decision making |
| CO5 | : | Understand Big Data and Hadoop ecosystem, HDFS, MapReduce programs and Write Hive and Pig scripts |

**Unit  - I :**

Getting to Know Big Data and Analytics-Looking at Big Data and Analytics-Volume-Velocity Variety-Examining Types of Analytics-Understanding the Business Need for BD&A Competitive advantage-Introducing BD&A Infrastructure.

**Unit – II :**

Getting Started with Big Data Analytics-Changing Focus with Big Data-The Role of the Data Analyst-Implementing Big Data Analytics within an Organization Using Alteryx-Blending Data from Multiple Sources-Looking at Alteryx Designer Desktop-Analyzing Big Data in Context-Focus on Context, Not Just Integration Combining Big Data with Spatial Data-Leveraging External Data Provider Resources-Getting Value from Predictive -Analytics and Big Data-Why Do Predictive Analytics on Big Data-Moving Predictive Analytics to the Front Lines-Gaining Real Business Value from Predictive Analysis-

.**Unit – III:**

Humanizing Big Data Analytics-Putting Big Data in the Hands of Those Who Need It Humanizing Data Design Principles-Humanizing Big Data Analytics Workflow -Considering Consumerization of Big Data Analytics-Getting an Alteryx Analytics Gallery Overview Publishing Data and Analytics to Cloud Service-Focusing on Consuming Applications The Best Platform for Strategic Analytics

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Writing Hadoop MapReduce Programs- Understanding the basics of MapReduce - Introducing Hadoop MapReduce -Writing Hadoop MapReduce Programs -Understanding the basics of MapReduce- Introducing Hadoop MapReduce- Listing Hadoop- MapReduce entities Understanding the Hadoop -MapReduce scenario -Understanding the limitations of MapReduce - Understanding Hadoop's ability to solve problems - Understanding the different Java concepts used in Hadoop programming .

**Unit – V:**

 Learning Data Analytics with R and Hadoop- Understanding the data analytics project life cycle Identifying the problem- Designing data requirement Preprocessing -data Performing analytics over data Visualizing data-Understanding data analytics problems- Exploring web pages categorization

**Text Book :**

1.Big data Analytics for Dummies By Michael Wessler, OCP & CISSP
2.Big Data Analytics with R and Hadoop By Vignesh Prajapati
**Reference:**
1.  Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data Hardcover by EMC Education Service
2.  Hadoop: The Definitive Guide Paperback – 2015 by Tom White
3. Big Data, Black Book: Covers Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization Paperback DT Editorial Services
4. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data Hardcover EMC Education Services
5. Hadoop Application Architectures Paperback – 1 Jan 2015 by Mark Grover

| **Mapping of Course Outcomes with Program Outcomes:** |
|---|
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | M | H | H | H | H |  | M |
| **CO2** | H |  | M |  |  |  | H |  |
| **CO3** | H | H |  |  |  | H | H |  |
| **CO4** |  | H | M | H |  | H | H |  |
| **CO5** |  | M |  | H |  |  | H | M |
| H-High; M-Medium; L-Low | | | | | | | | |

**Elective III :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Learning Maya2** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

Maya is a character animation and visual effects system designed for the professional animator. Built on a procedural. Students will learn an overview of the artist workflow as it relates to modeling, texturing, animation, lighting and rendering

| CO1 | : | An ability to understand the fundamentals of MAYA and to develop the scripting animation in MAYA. |
|---|---|---|
| CO2 | : | An ability to develop the knowledge of animations.  An ability to understand the knowledge and advertising skills to operate the animation skills of SQUASH and STRETCH. |
| CO3 | : | An ability to understand how the tools to implement with the animation. An ability to know how MAYA is useful for UI. |
| CO4 | : | An ability to create the skeleton joints and Ability to develop the creative animation pictures. |
| CO5 | : | An ability to edit the pictures according to their requirements, to rotate the pictures |

**Unit  - I :**

Understanding Maya: User Interface-Working in 3D-The Dependency Graph: Nodes-Attributes-Connections-Pivots-Hierarchies-MEL Scripting-Animation in MAYA: Key frame Animation- Path animation- Reactive animation- Dynamics-Modeling in Maya: NURBS Curves-NURBS Surfaces-Character Animation.

**Unit – II :**

Setting up Maya-Creating new project-Adding Character: Refining the animated channels-SQUASH and STRETCH- Adding a squash deformer- Animate the squash- Rendering: Hiding the general UI-Hotkeys-SHADING Groups-The Hypershade Panel-Creating a shading group-Creating a Texture map-Creating a ball material-Positioning the texture-LIGHTING: Placing a spot light-Rendering the scene-Rendering animations.

**Unit – III:**

Working with MAYA: The workspace-Layouts- View panels- View tools- Other Panel types- Saved Layouts-Tool manipulators-Transform manipulators-Selecting in MAYA: Selection masks- The selection user interface- Grouping and Parenting-Selection modes-Scene hierarchy mode- Object Mode-Component mode-RMB select-Combined select modes.

**Unit – IV:**

Animation: Adding skeleton Joints- IK Spline  Handle-Skinning-Setup the joint scaling-Constraining the head-Set up a character-Setting up for animating-Animate the jack in the box-Overlapping  Jack's extending-Anticipation-Add lattice to box-Animate the box deformations-Constrain crank to box surface.

**Unit – V:**

Animating a Walk Cycle: Initial setup- Animate the Pelvis-Animate the feet sliding- Edit the animation curves-Animate the feet (Up and Down)- Animate the pelvic rotations- Animate the heel rotation- Setting keys for the spine- The rotate plane IK solver-Blinking  Using MEL: What is MEL?-Typing commands-The command line- The Script Editor window-The Scripts: blink.mel- blinkwindow.mel.

**Text Book :**

1. Alias Wavefront Eductaion 1999, Learning Maya.

2. https://graphics.stanford.edu/courses/cs448b-01-fall/LEARNINGMAYA2.pdf

**Reference:**

1. Kelly L., Murdock, 2016 Autodesk Maya Basics Guide.

2. Complete Maya Programming Volume II: An In-depth Guide to 3D Fundamentals, Geometry, and Modeling: 2 (The Morgan Kaufmann Series in Computer Graphics) Paperback – Import, 20 Jun2005, by David Gould (Author)

3. Maya 6: The Complete Reference 1st Edition by Tom Meade (Author), Shinsaku Arima (Author).

| **Mapping of Course Outcomes with Program Outcomes:** |
|---|
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H |  |  |  |  |  |  | M |
| **CO2** |  | H |  |  | M |  |  |  |
| **CO3** |  |  | H |  |  | H | H | H |
| **CO4** |  |  | H | M | H |  |  |  |
| **CO5** | H |  |  | M |  |  | H |  |
| H-High; M-Medium; L-Low | | | | | | | | |

**Semester II:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Tools for Software Testing** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

This course introduces the In general, a Certified Tester Foundation Level – Software Tester is expected to have acquired the necessary different tools skills to working effectively within an testing team and environment.

| CO1 | : | Design and implement Test Plans and Procedures. |
|---|---|---|
| CO2 | : | Apply a wide variety of testing techniques at various testing levels. |
| CO3 | : | Students can use statistical techniques to evaluate the defect density and the likelihood of faults. |
| CO4 | : | Students can compute test coverage and yield, according to a variety of criteria |
| CO5 | : | Use test tools to effectively test software. |

**Unit - I :** Perspective of Testing – definition, approaches, testing during development life cycle, test policy, test planning, categories of defect, configuration management, risk analysis.

**Unit – II :** Levels of testing, acceptance testing, criticality of requirement, special tests –complexity, GUI, compatibility, security, recovery, installation, error handling ,smoke, sanity, parallel and execution testing.

**Unit – III:** Testing and test automation – The V model –Tool support for life-cycle testing – The promise of test automation, Common problems of test automation – The limitations of automating software testing, Script Preprocessing, Scripting Techniques.

**Unit – IV:** Selecting tools -requirements -tool market -tool selection project -tool selection team –Identifying requirements-Identifying constraints -Identifying tools availability in market -Evaluating the candidate tools -decision making, Testing Tools - Win Runner, Silk Test, Load Runner, JMeter

**Unit – V:** Verification, comparison, automation – comparators, dynamic comparison – post-execution comparison – simple comparison, complex comparison – test sensitivity – comparing different types of outcomes – comparison filters and guidelines – Test ware Architecture – Automating pre and post processing – Building maintainable tests.

*Approved in the BOS Meeting held on 28-04-2018*

**Text Book:** Limaye L G, "Software Testing – Principles, Techniques and Tools", Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2009

**Reference:**

1. Boris Beizer, "Software Testing Techniques", Dream Tech press, New Delhi, 1990.
2. Mark Fewster, Dorothy Graham., "Software Test Automation: Effective Use of Test Execution Tools", Addison Wesley, New Delhi, 1999.
3. William E Perry, "Effective Methods of Software Testing", John Wiley & sons, Singapore 2006.

Glenford J Myer, "The Art of Software Testing", second edition, John Wiley & Sons, Singapore, 2004.

|  |  |
|---|---|
| **Mapping of Course Outcomes with Program Outcomes:** |  |
|  |  |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | H |  | M | H |  |  | H |
| **CO2** |  |  |  | M | H |  |  |  |
| **CO3** |  |  |  |  | H | M | H | M |
| **CO4** | H | H | H |  | H |  | H | M |
| **CO5** | H | H | H |  |  |  | H | M |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective III :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Cloud Computing** | **4** | **5** | **1** |  | **Theory** |

| CO1 | : | Compare the strengths and limitations of cloud computing |
|---|---|---|
| CO2 | : | Identify the architecture, infrastructure and delivery models of cloud computing |
| CO3 | : | Apply suitable virtualization concept |
| CO4 | : | Choose the appropriate cloud player, Programming Models and approach. |
| CO5 | : | Address the core issues of cloud computing such as security, privacy and interoperability |

**Unit  - I : Introduction to Cloud Computing: Overview**, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks.

**Unit – II : Cloud Architecture, Services and Applications :**Exploring the Cloud Computing Stack, Connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Saas Vs. Paas, Using PaaS Application Frameworks, Software as a Service, Cloud Deployment Models, Public vsPrivate Cloud, Cloud Solutions, Cloud ecosystem , Service management, Computing on demand, Identity as a Service, Compliance as a Service

**Unit – III: Abstraction and Virtualization**: Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine  Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context Virtualization of CPU, Memory , I/O Devices , Virtual Clusters and Resource management, Virtualization for Data Center Automation.

**Unit – IV: Cloud Infrastructure and Cloud Resource Management** : Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources.

**Unit – V: Cloud Security** : Security Overview, Cloud Security Challenges and Risks, Software -as-a-Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security

*Approved in the BOS Meeting held on 28-04-2018*

**Text Book:**

Rajkumar Buyya et. el., Cloud Computing: Principles and Paradigms, Wiley India Edition

**Reference:**

1. Sosinsky B., "Cloud Computing Bible", Wiley India

2. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola & S. Thamarai

SelviMcGRAW HillPublication

3. Miller Michael, "Cloud Computing: Web Based Applications that Change the Way You Work and Collaborate Online", Pearson Education India

4. Velte T., Velte A., Elsenpeter R., "Cloud Computing –A practical Approach", Tata McGrawHill

|  |
|---|
| **Mapping of Course Outcomes with Program Outcomes:** |
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | H | M |  | H |  | H | H |
| **CO2** | H |  | M |  | H |  | H | H |
| **CO3** | H |  | H | H | M | H | H |  |
| **CO4** |  | H | H | H |  | H |  | H |
| **CO5** |  | H | H | H |  | H |  |  |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective IV:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Adhoc Network** | **4** | **5** | **1** | **0** | **Theory** |

**COURSE OUTCOME FOR THIS PAPER**

| CO1 | : | An ability to understand the wireless network, and to develop the creative context of Adhoc network |
|---|---|---|
| CO2 | : | An ability to develop the knowledge of MAC network and to knowledge and advertising skills to operate and develop Wireless Sensor Network |
| CO3 | : | An ability to understand the knowledge on demand approaches and to develop multicast routing in mobile networks. |
| CO4 | : | An ability to understand the Layers and to develop the creative context of Adhoc network through Transport Layers |
| CO5 | : | An ability to understand the Quality of services in Adhoc network and to understand the security measures |

**Introduction :**

Ad hoc Networks are the small area networks, especially designed with Wireless/Temporary connections to the different computer assisted nodes. Basically, an ad hoc network is the temporary network connections made to the information transferring purpose.

**Unit  - I :**

Ad Hoc Wireless: An introduction, Cellular vs. Adhoc wireless Networks, Applications of Adhoc wireless Networks, Issues in Adhoc wireless N/WS. Heterogeneity in Mobile devices, Wireless Sensor N/WS, traffic Profiles, Types of Adhoc Mobile Communications, Types of Mobile Host movements, Challenges facing Ad hoc mobile N/WS. Model of operation, symmetric Links, Layer-2 Ad Hoc solutions, Proactive versus reactive protocols, multicast, commercial Applications of Ad Hoc networking.

**Unit – II :**

Adhoc Protocols :- Adhoc Wireless Media Access Protocols, Introduction Synchronous MAC Protocol &asynchronous MAC protocol, Problems in Adhoc channel Access Receiver Initiated MAC protocols, Sender. Initiated MAC Protocol, Existing Adhoc MAC Protocol.

**Unit – III:**

Ad Hoc Routing Protocols: Table-Driven Approaches, DSDV, WRP ,CSGR, Source, Initiated On demand Approaches : AODV, DSR, TORA, SSR, LAR, PAR, ZRP, RDMAR., Multicast Routing in Mobile Ad Hoc Networks, Existing Ad Hoc Multicast Routing Protocols, ABAM : Associativity-Based Ad Hoc Multicast.

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Transport Layer for Ad Hoc Wireless Network : Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.

**Unit – V:**

Quality of service in Ad-hoc wireless networks: Issues and challenges in providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, Network Layer Solutions. Security issues in Ad Hoc Network: Security in Ad Hoc Wireless Network, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, and Secure Routing in Ad Hoc Wireless Networks.

**Text Book :**

Ad Hoc Wireless Networks: Architectures and protocols, C, Siva Ram Murthy and B.S. Manoj, Pearson Education.

**https://velchuriblog.files.wordpress.com/2016/12/wsn_c-siva-ram-murthyb-s-manoj.pdf**

**Reference:**

1. Ad Hoc Network, C E Perkins, Pearson Education.

2. Ad Hoc Mobile Wireless Networks: Protocols and Systems, C. K. Toh, Springer.

|  |
| --- |
| **Mapping of Course Outcomes with Program Outcomes:** |
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | | | M | | | H | H |
| **CO2** | H | H | | M | M | | | |
| **CO3** | H | H | | M | | H | H | H |
| **CO4** | | H | | M | M | H | | H |
| **CO5** | H | H | H | | | H | | H |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | Hadoop Programming | 4 | 5 | 1 | 0 | Theory |

**Introduction:**

**Hadoop Programming** are proposed to give you all around learning of the Big Data framework using Hadoop,HDFS and MapReduce. You will be able to learn how to use Pig, Hive, and Impala to practice and examine tremendous datasets stored in the HDFS, use for data ingestion.

| CO1 | : | Ability to explains how to install and run Hadoop both as a single node as well as a clusterand ability to understand set of advanced HDFS operations. |
|---|---|---|
| CO2 | : | Ability to understand how to configuration and security of a Hadoop installation and Debug, and also develop highly customized Efficient MapReduce Applications. |
| CO3 | : | Ability to understand the other projects related to Hadoop such HBase, Hive, and Pig |
| CO4 | : | Ability to identify several tools and techniques that use with Apache Hadoop to perform large-scale searching and indexing. |
| CO5 | : | Ability to understand and  perform data preprocessing and loading operations using Hadoop. |

**Unit  - I :**Getting Hadoop Up and Running in a Cluster: Introduction-Setting up Hadoop on your machine-Writing a WordCount MapReduce sample, bundling it, and running it using standalone Hadoop-Adding the combiner step to the WordCount MapReduce program -Setting up HDFS-HDFS basic command-line file operations-Setting Hadoop in a distributed cluster environment-Using MapReduce monitoring UI-Advanced HDFS-Introduction- Adding a new Datanode-Decommissioning DataNodes-Setting HDFS block size-Setting File Replication factor-Using HDFS Java API-Merging Files in HDFS.

**Unit – II :** Advanced Hadoop MapReduce Administration: Introduction-Tuning Hadoop configurations for clusters deployment-Reusing Java VM's to improve the performance-Fault tolerance and speculative execution-Debug scripts – analyzing task failures-Choosing appropriate Hadoop data types-Implementing a custom Hadoop Writable data type, Key type-Adding support for new input data formats – implementing a custom Input Format-Formatting the results of MapReduce computations – using Hadoop Output Formats-Broadcasting and distributing shared resources to tasks in a MapReduce job –Hadoop Distributed Cache-Using Hadoop with legacy applications – Hadoop Streaming-Adding dependencies between MapReduce jobs.

**Unit – III:** Hadoop Ecosystem: Introduction- Installing HBase-Data random access using Java client APIs-Running MapReduce jobs on HBase (table input/output)- Installing Pig- Running Pig commands-Set operation and sorting with Pig-Installing Hive-Simple analytics using MapReduce-Performing Group-By using MapReduce-Calculating frequency distributions and sorting using MapReduce-Calculating histograms and Scatter Plots using MapReduce-Parsing a complex dataset with Hadoop -Joining two datasets using MapReduce.

**Unit – IV:** Searching and Indexing: Introduction-Generating an inverted index using Hadoop MapReduce-Intra-domain web crawling using Apache Nutch-Indexing and searching web documents using Apache Solr-Deploying Apache HBase on Hadoop cluster- Elastic Search for Indexing and Searching - Content-based recommendations- Hierarchical Clustering-Collaborative Filtering Based recommendations- Classification using Navies Bayes classifier- Assigning advertisements to keywords using the Adwords balance algorithm.

**Unit – V:** Mass Text Data Processing- Introduction- Data preprocessing (extract, clean, and format conversion)-using Hadoop Streaming and Python-Data de-duplication using Hadoop Streaming- Loading large datasets to an Apache HBase data store using importtsv and bulkload tools- Creating TF and TF-IDF vectors for the text data-Clustering the text data- Running Hadoop MapReduce computations using Amazon Elastic MapReduce- Saving money by using Amazon EC2 Spot Instances to execute EMR Job Flows-Executing a Pig& Hive script using EMR-Creating an Amazon EMR Job flow using command line interface-

**Text Book :**

1.”Hadoop Mapreduce Cookbook” by Srinath Perera, Thilina Gunarathne, PACKT Publishing- Open source.

**Reference:**

1.” The Hadoop- The Definitive Guide” by Tom White, fourth Edition, o’reilly Publication.

2. “ Hadoop for Dummies” Special Edition  by Robert D. Schenider, John Wiley & sons Inc.,.

| **Mapping of Course Outcomes with Program Outcomes:** |
| --- |
|  |

| Course Outcomes | Program Outcomes | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H |  |  | M |  |  | H | H |
| **CO2** | H | H |  | M | M |  |  |  |
| **CO3** | H | H |  | M |  | H | H | H |
| **CO4** |  | H |  | M | M | H |  | H |
| **CO5** | H | H | H |  |  | H |  | H |
| H-High; M-Medium; L-Low | | | | | | | | |

**Elective IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Adobe Illustrator and After Effects** | 4 | 5 | 1 | 0 | **Core Theory** |

**Introduction:**

Identify the purpose, audience, and audience needs for preparing graphics and illustrations.

| CO1 | : | Identify elements of the Illustrator user interface and demonstrate knowledge of their functions. |
|---|---|---|
| CO2 | : | Demonstrate knowledge of how to work with brushes, symbols, graphic styles, and patterns. |
| CO3 | : | The usage of Color Tools and Shape tools |
| CO4 | : | Demonstrate knowledge of how to use drawing and shape tools |
| CO5 | : | Demonstrate knowledge of how to create the special effects. |

**Unit  - I :  Workspace:** Workspace Basics-Workspace overview-Customizing the workspace-Tools: Tool Panel Overview-Improved User Interface -Tool Galleries-Files and Templates-Using multiple-Art boards-Viewing Artwork.

**Unit – II:** Drawing Basics-Drawing simple lines and shapes-Drawing Pixel aligned paths for web Workflows-Drawing with the pen, Pencil or Flare tool-Editing Paths-Adjust Path Segments-Symbolism tools and symbol sets-Symbols.

**Unit – III:** Selecting Colors-Using and creating swatches-Color groups-Create color themes with kuler-Adjusting Colors. **Painting**: Painting with fills strokes-Live Paint groups-Brushes-Gradients-Meshes-Patterns.

**Unit – IV:** Selecting objects-Grouping and expanding objects-Moving, aligning, and distributing objects-Rotating and reflecting objects-Layers. Reshaping objects: Transforming objects-Scaling, shearing, and distorting objects-Reshape using envelopes-Combining objects.

 **Unit – V: Creating special effects:** Appearance attributes-Working with effects-Summary of effects-Create a drop shadow-Drop shadows, glows, and feathering-Creating sketches and mosaics-Graphic styles.

**Text Book :**

Adobe Illustrator-Help and tutorials

**Reference:**

Adobe Illustrator CS6 Classroom in a Book by adobe create team

*Approved in the BOS Meeting held on 28-04-2018*

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | H | | H | H | H | | | M |
| CO2 | H | | H | | | H | M | |
| CO3 | H | H | | M | M | H | H | |
| CO4 | | H | H | | | H | H | H |
| CO5 | | H | H | H | H | | | H |

H-High; M-Medium; L-Low

*Approved in the BOS Meeting held on 28-04-2018*

**Elective – IV**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Agile Testing** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :** This course introduces the In general, a Certified Tester Foundation Level – Agile Tester is expected to have acquired the necessary skills to working effectively within an Agile team and environment.

| CO1 | : | The background to testing in an Agile project and the roles and responsibilities of a typical Agile testing team. |
|---|---|---|
| CO2 | : | The definition of quality in an Agile project and Adapt existing testing experience and knowledge to Agile values and principles. |
| CO3 | : | Apply relevant methods and techniques for testing in an Agile project and test automation activities. |
| CO4 | : | Assist business stakeholders in defining understandable and testable user stories, scenarios, requirements and acceptance criteria as appropriate. |
| CO5 | : | Work and share information with other team members using effective communication styles and channels, The various tools available to Agile test teams to facilitate the testing of the project. |

**Unit  - I :**

What Is Agile Testing, Anyway? -  Agile Values - What Do We Mean by "Agile Testing"? - A Little Context for Roles and Activities on an Agile Team - Customer Team - Developer Team - Interaction between Customer and Developer Teams - How Is Agile Testing Different?- Working on Traditional Teams - Working on Agile Teams - Traditional vs. Agile Testing - Whole-Team Approach

**Unit – II :**

What's an Agile Tester? - The Agile Testing Mind-Set - Applying Agile Principles and Values - Provide Continuous Feedback - Deliver Value to the Customer - Enable Face-to-Face Communication - Have Courage - Keep It Simple - Practice Continuous Improvement –Respond to Change - Self-Organize - Focus on People

**Unit – III:**

Organizational Culture - Quality Philosophy - Sustainable Pace - Customer Relationships - Organization Size - Empower Your Team - Barriers to Successful Agile Adoption by Test/QA Teams - Loss of Identity - Additional Roles - Lack of Training - Not Understanding Agile Concepts - Past Experience/Attitude - Cultural Differences among Roles

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Introducing Change - Talk about Fears - Give Team Ownership - Celebrate Success - Management Expectations - Cultural Changes for Managers - Speaking the Manager's Language - Change Doesn't Come Easy - Be Patient - Let Them Feel Pain - Build Your Credibility - Work On Your Own Professional Development - Beware the Quality Police Mentality - Vote with Your Feet

**Unit – V:**

Team Logistics - Team Structure - Independent QA Teams - Integration of Testers into an Agile Project - Agile Project Teams - Physical Logistics – Resources - Tester-Developer Ratio - Hiring an Agile Tester - Building a Team - Self-Organizing Team - Involving Other Teams - Every Team Member Has Equal Value - Performance and Rewards - What Can You Do?

**Text Book :**

1. AGILE TESTING , A PRACTICAL GUIDE FOR TESTERS AND AGILE TEAMS Lisa Crispin

Janet Gregory.

**Reference:**

**1.**Agile testing and testing in agile software development, Matti Vuori, www.mattivuori.net

2.Agile Software Development Quality Assurance Ioannis G. Stamelos Aristotle University of Thessaloniki, Greece  Panagiotis Sfetsos Alexander Technological Educational Institution of Thessaloniki, Greece

3. Agile Development of  Diagnostic Knowledge Systems

| Mapping of Course Outcomes with Program Outcomes: |
|---|
| |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | | H | H | H | H | H | H | |
| CO2 | | | | | M | H | | |
| CO3 | H | | H | M | | | H | H |
| CO4 | H | H | | M | H | M | | |
| CO5 | H | H | H | | H | M | | H |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Elective  IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Cloud Infrastructure Services** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

Understanding cloud technologies tops the list of most important skills for any developer, system administrator or network computing professional seeking a lucrative career in technology. However, getting started and researching all things cloud can be complicated and time consuming. This course maps out the entire cloud landscape and explains how various tools and platforms fit together.

| CO1 | : | To understand the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing. |
|---|---|---|
| CO2 | : | To apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost by Load balancing approach. |
| CO3 | : | To illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as DAS & FC SAN. |
| CO4 | : | To discuss system virtualization and outline its role in enabling the cloud computing system model. |
| CO5 | : | To analyze various clouds programming models and apply them to solve problems on the cloud. |

**Unit  - I :**

 Journey to the Cloud - Essential Cloud Characteristics - Building  Cloud Infrastructure - Understand Existing Infrastructure - Classic Data Center - Virtualize the Infrastructure - Classic Data Center (CDC) - Application – DBMS.

**Unit – II :**

Classic Data Center (CDC): Compute - Examples of Compute System - Server Clustering - Logical Components of Compute - Storage : Storage Device Options - Redundant Array of Independent Disks (RAID) - RAID Techniques - RAID Levels - Intelligent Storage System - Components of an Intelligent Storage System

**Unit – III:**

Classic Data Center (CDC) : Storage Networking Technologies - Compute to Compute Communication - Compute to Storage Communication - Data Access by Compute - Direct Attached Storage (DAS) - Emergence of Storage Networking Technologies -  FC SAN - Components of FC SAN - Fibre Channel Fabric - Port Types - Zoning.

*Approved in the BOS Meeting held on 28-04-2018*

**Unit – IV:**

Virtualized Data Center - Compute Virtualization Overview - Need for Compute Virtualization - Hypervisor - Types of Hypervisor - Benefits of Compute Virtualization - Storage Virtualization Overview: Benefits of Storage Virtualization - Virtual Machine Storage - Storage for Virtual Machines - File System for Managing VM Files.

**Unit – V:**

Cloud Infrastructure and Management: Cloud Infrastructure and Service Creation - Cloud Infrastructure Framework - Physical Infrastructure - Virtual Infrastructure - Applications and Platform Software - Cloud Infrastructure Management and Service Creation Tools - Cloud Service Management: Overview of Cloud Service Management - Processes in Cloud Service Management - Capacity Management - Performance Management - Problem Management.

**Reference:**

1. Cloud Computing Bible. Barrie Sosinsky. John Wiley & Sons. ISBN-13: 978-0470903568.

2. Amazon Web Services For Dummies. Bernard Golden. For Dummies. ISBN-13: 978- 1118571835

3. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition

4. IAM Getting started Guide http://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started.html

5. Amazon.com Mashups by Francis Shanahan, Wrox, Wiley Publishing Inc.,  ISBN-13: 978-0470097779, ISBN-10: 0470097779

7. Building Applications in the Cloud: Concepts, Patterns and Projects by Christopher M. Moyer, Pearson Addison-Wesley Professional, ISBN-10: 0321720202, ISBN-13: 978-0321720207

8.  Cloud Computing Design Patterns by Thomas Erl, Prentice Hall, ISBN-10: 0133858561,  ISBN-13: 978-0133858563

| Mapping of Course Outcomes with Program Outcomes: |
|---|
| |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | H | H | H | M | M | H | M | M |
| **CO2** | | | | M | H | | | H |
| **CO3** | H | H | | | | H | M | |
| **CO4** | H | | H | | H | H | M | |
| **CO5** | | H | H | H | H | | H | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Advanced RDBMS** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction :**

- Introduce basic concepts and major techniques in DBMS implementations. These include concepts and techniques for data storage, query processing, concurrency control and transaction.
- management. Introduce research development ability in databases through technical survey and presentation

| CO1 | : | Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary. |
|---|---|---|
| CO2 | : | Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. |
| CO3 | : | Relational model concepts.  Referential integrity, entity integrity, and other constraints. Defining a relational schema from an ER diagram. |
| CO4 | : | The learner will be able to describe data models and schemas in DBMS |
| CO5 | : | Master the basic Concepts and appreciate the applications Of database systems. Master the basics of SQL and construct queries using SQL |

**Unit  - I :**

**Introduction to Database Systems:-** Overview – Data Abstraction – Data Models – Database System Architecture – Instances and Schemes – Data independence – DDL – DML – Database Users – Entity-Relationship Model:- Entity Sets – Keys – ER diagram – Structure – Extended E-R features – Design of an ER Database Schema – Reduction of E-R Schema to Tables.

**Unit – II :**

**Relational Model:-** Structure of Relational Databases – Relational Algebra – Extended Relational Algebra Operations – Modification of Database – Views – Tuple Relational Calculus – Domain Relational Calculus. **SQL :-** Background – Basic Structure – Set Operations -  Aggregate Functions – Null Values – Nested Sub queries – Views – Complex Queries – Modification of the database – Joined Relations – Data-definition language.

**Unit – III:**

**Integrity & Security: -** Domain Constraints – Referential Integrity – Assertions – Triggers – Security & Authorization – Authorization in SQL – Encryption and Authentication. **Relational Database Design: -**

*Approved in the BOS Meeting held on 28-04-2018*

First Normal Form – Second Normal form – Boyce-Codd Normal Form – Third Normal Form – Fourth Normal Form.

**Unit – IV:**

**Storage & File Structures :-** Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary Storage – Storage Access – File Organization – Organization of Records in Files – Data Dictionary Storage. **Indexing and Hashing: -** Basic Concepts – Ordered Indices – $B^+$-Tree Index Files – B-Tree Index Files – Static Hashing – Dynamic Hashing Index – Definition in SQL – Multiple-Key Access.

**Unit – V:**

**Transactions :-** Transaction Concept – Transaction State – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Recoverability – Implementation of Isolation – **Testing for Serializability Concurrency Control :-** Lock – Based Protocols – Timestamp Based Protocols – Validation – Based Protocols – Multiple Granularity – Deadlock Handling.

**Text Book :**

1. Silberschatz, Korth, Sudarshan, "Database System Concepts", 4th edition – McGraw Hill Higher Education, International Edition 2002.
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan "DATABASE SYSTEM CONCEPTS", 6th edition – McGraw Hill

**Reference:**

1. Fred R McFadden, Jeffery A Hoffer, Mary B.Prescott, "Modern Database Management", Fifth edition, Addison Wesley, 2000

2. Silberschatz, Korth, Sudarshan Database System Concepts, Fourth Edition The McGraw−Hill Companies, 2001

3. Hans-Petter Halvorsen Structured Query Language 2016.01.08

4. Dr. Radványi Tibor Advanced DBMS Kézirat lezárva: 2011. január 31.

| 1. Mapping of Course Outcomes with Program Outcomes: |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | H | H | | | | | H | H |
| CO2 | H | H | | | | | H | H |
| CO3 | | | H | H | | | | |
| CO4 | | | H | H | H | H | H | |
| CO5 | H | | | | H | H | | |

2. H-High; M-Medium; L-Low

*Approved in the BOS Meeting held on 28-04-2018*

**PROJECT**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Mini/Main Project Viva - Voce** | **4** | **6** | **2** | **0** | **Core** |

### GUIDELINES FOR PREPARING THE MINI PROJECT/PROJECT REPORT

## Core Main Project

- The project report should be submitted in **A4** size. Number of copies to be *submitted* : Three (One for Library, One for department, One for Internal Guide). The certificate should consists of names and roll numbers of all batch members for the above three copies. One copy for each batch member. The certificate should consist of batch member name and his/her roll number.

**Paper, Typing , Format:**

- Bond paper (A4 size) should be used for the preparation of the project report. Typing should be done on one side of the paper with character font in **size 12** of **Times New Roman.**
- The layout should provide a margin of 1.50 Inches on the left, 1.00 Inches on the top, bottom and right.
- Fresh paragraph should commence after **five spaces**. **Double-spacing or One and half line** spacing shall be provided throught the report.
- The page numbers should be indicated at the top-middle or bottom-middle of the each page.
- Should not underline the heading/subheadings and should not put colons ( : ) in headings or subheadings.

## Binding :

- The dissertation shall be properly bound, using Rexene of **Black color for CSE** reports. The bound front cover should indicate in suitable embossed letter the following:
  (See the sample format of front bound cover)

  Top:

  Title

  Name and Roll No.

  Bottom:

  Department of Computer Science

  Rathinam College of Arts and Science

  Year of submission: 2018

- **Two blank papers** should be provided at the beginning and at the end.

*Approved in the BOS Meeting held on 28-04-2018*

- The bound side must indicate M.Sc(DSA) name of the candidate and year.

**Third Page**

- The third page should contain the following (See the sample format )

**Arrangement of Chapters**

The following is suggested format for arranging the project report matter into various chapters:

1. Introduction
       This chapter must describe introduction about your project.

2. Literature Survey/Review of Literature
3. Define the problem.
     Define the modules and their functionalities
     Hardware / Software requirements
 4. System Design and Implementation
/* Actual Implementation of the problem should be described in this chapter. */

           The design part must include the following items

   - DFDs in case of Database projects

   - UML diagrams. This UML diagrams must include the following
         Class Diagrams

             Interaction diagrams-Sequence and Collaboration diagrams

             Object Diagrams

             Use case diagrams

   - Control Flow diagrams

   - Database Design
     For database projects, the report must include the following items.

   - E-R Diagrams

 5. Results and Discussions

         Various test cases ( two or three) for black box nad white box testing.

6. Conclusions & Future Enhancements / Recommendations
     References / Bibliography

*Approved in the BOS Meeting held on 28-04-2018*

Appendices (if any)

## Arrangement of Paragraph in a Chapter:

- Each paragraph in a chapter should be properly numbered for example, 2.1, 2.2 etc., where first digit represents the Chapter Number and second digit the paragrahph number. There is no need to indicate the number for the first paragraph in a chapter.
- Sub-paragraphs, if any indicated as 1.1.1, 1.1.2 etc. i.e. first digit representing the chapter, the second representing the paragraph and third representing the sub-paragraph.
- **Don't underline the headings or subheadings or side heading**. Instead use the bold letters.

## Photographs/Figures and Tables

- The figures, photographs and tables occurring in a chapter may be serially numbered as Fig. 1.1, 1.2 etc., where the first digit represents the chapter, the second digit represents Figure number.
- The photographs may be represented as Photo 1.1, 1.2 etc., the first digit representing chapter and the second digit represents Photograph number.
- The tables may be represented as Table 1.1, 1.2 etc., the first digit representing chapter and the second digit represents table number.

## Graphs
- The graph should clearly indicate the points, which are used for drawing the curve or curves.
  All the letters in the graphs should be written with stencils.

## Equations:

- All the equations used in the thesis should be properly numbered chapter wise
- [ eg. Eq.3.1 or eq.3.1 or 3.1 or (3.1)].
- The equations shown should be clearly referred and identified as Eq. or eq. followed by equation number.
- Repetition of the equations should be avoided. If needed, it may be referred by its number.
- Equations should never be mixed up with main text. It should be shown as separate object and Equation Editor can be used.

## Appendices:

- Important programs, derivations, data and any other useful material may be shown in the appendices with proper numbering.
- The appendices should be numbered in capital Roman numbers or capital letters from first chapter to the last chapter in ascending order.
- Using same ascending order numbers, the appendices should be shown with details after the last chapter.
- All the appendices should be referred in the main text.

### Bibliography or References:

- References should be numbered from 1st chapter to the last chapter in ascending order and should be shown in square brackets.

- The following format may be used for writing the Bibliography/References.

Author Name, Title of the book or paper, Publisher name, year.

Eg:

[1] Berry, Jason, Jonathan Foose, and Tad Jones. *Up from the Cradle of Jazz: New Orleans Music Since World War II*. Athens: U of Georgia P, 1986.

(An article in a journal)
Booth, Wayne C. "Kenneth Burke's Way of Knowing." Critical Inquiry 1 (1974): 1-22. Winks, Robin W. "The Sinister Oriental Thriller: Fiction and the Asian Scene." Journal of Popular Culture 19.2 (1985): 49-61.

- **The bibliography list should be made strictly in alphabetical order of the name of the authors**.

**CERTIFICATES**

1. Company certificates(if any) on Company letter head, College certificate on college letter head with Guide, HODs signatures( as per format in Figure No.2). Declaration of students' signatures on A4 paper ( as per format in Figure No.3).Acknowledgements ( as per format in Figure No.4) in the respective order.

<div style="border:1px solid black">

**LIST OF FIGURES**

**Figure  1.1**     **Block diagram of xyz model**          **Page no.**

**Figure  2.2**     **--------------------------------------**          **--------------**

</div>

LIST OF TABLES

<div style="border:1px solid black">

**LIST OF TABLES**

**Table  1.1**          **Name of the table**          **Page no.**

**Table  2.2**          **--------------**          **----------**

</div>

*Approved in the BOS Meeting held on 28-04-2018*

**ABSTRACT**

A brief description of project objectives, problem specifications, and contributions will be presented as abstract. Abstract should be about 500 words as per the following font formats.

| Heading | Font Style and Size | Details |
|---|---|---|
| Heading 1 | ARIAL, BOLD, FONT SIZE 14, CAPITALS, CENTRE ALIGNED | For all Chapter Titles cum Abstract page title, Contents page title, Appendix titles, Reference page title.<br><br>Chapter names should be with roman numbers (I, II, III, IV, V, VI, VII, VIII, IX, X, XI..etc) |
| Heading 2 | TIMES NEW ROMAN, BOLD, FONT SIZE 12, CAPITALS, CENTRE  ALIGNED | For sub titles, sub titles numbering should be like 1.1, 1.2-------, 2.1, 2.2-------p.n<br><br>Where p is chapter number and n is sub title number. |
| Heading 3 | TIMES NEW ROMAN, BOLD, FONT SIZE 12, LEFT ALIGNED | Useful for next level sub titles with numbering  c.n.l where c is chapter number, n is sub title number and l is serial number like 1.1.1, 1.1.2,-------2.1.1, 2.1.2---etc. |
| Normal Paragraph content | TIMES NEW ROMAN, FONT SIZE 12 | |

TABLE OF CONTENTS

PAGE NOS.

**Semester III**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **3D Animation Practical Lab** | **4** | **0** | **0** | **6** | **Practical** |

1. Write a C program to study 3D transformations.

2. 3D Translation Program Using C Programming

3. Implement DDA Algorithm for drawing a line segment between two given end points A (x1, y1) and B(x2, y2).

4. 3D Scaling Program Using C Programming

5. 3D Rotation Program Using C Programming

6. Write a C program to implement Bresenham's circle generation algorithm.

7. Write a C program for animation.

8. Write a program to produce animation effect of triangle transform into square and then into circle.

9.Program for creating simple car shape.

10. Implement morphing using Adobe Photoshop

| |
|---|
| **Mapping of Course Outcomes with Program Outcomes:** |
| |

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | | | | | H | H | | |
| **CO2** | H | H | | | H | H | | |
| **CO3** | | | H | H | | | H | H |
| **CO4** | H | H | | | H | M | | |
| **CO5** | | | H | | H | H | | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester IV**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Cryptography and TCP/IP Protocol Suite Lab | **4** | **0** | **0** | **6** | Practical |

1. Connect the computers in Local Area Network.

2. Simple TCP/IP Client Communication.

3. Configuring Internet IP address

4. To Perform File Transfer in client and server using TCP/IP.

5. Implementation of Remote Command.

6. Implementation of Address Resolution Protocol

7. Configure Host IP, Subnet Mask and Default Gateway in a System in LAN (TCP/IP Configuration).

8. Transfer files between systems in LAN using FTP Configuration, install Print server in a LAN and share the printer in a network.

9. Configure a Network topology using packet tracer software

10. Decode header fields of IP datagram

*Approved in the BOS Meeting held on 28-04-2018*

Elective - IV

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Data Mining and R Programming Lab** | **4** | **0** | **0** | **6** | **Theory** |

**List of Exercise:**

1. Formation of discrete and continuous frequency distributions descriptive statistics.
2. Graphs and diagrams: pie, bar, line and scatter diagram-histogram and normal probability plot.
3. Correlation coefficient rank correlation, partial and multiple correlation.
4. Regression: simple and multiple linear regression.
5. Curve estimation
6. Compare means: Independent sample test and paired t-test.
7. Cross tabulation and Chi-square-test.
8. One way and two way ANOVA-Factorial Designs.
9. Non-parametric test: Binomial tests, run test, sign test, Median test, Mann-Whitney test, Kruskal-Wallis, Kendall's and Fried man tests.

**Text Book:**

1. Brian Everett and Torsten Hothorn, "A Handbook of Statistical Analysis Using R" Chapman & Hall/CRC,Boca Raton,FL,2006, ISBN 1-584-88539-4.

**Reference Book:**

1. William N.Venables and Brian D.Ripley. "Modern Applied Statistics Analytics with S". Fourth Edition, Springer, New York,2002.ISBN 0-387-95457-0.
2. John Maindonald and John Braun."Data Analytics and Graphics Using R". Cambridge University  Press,Cambridge,2003.

**Elective IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Agile Testing Lab** | **4** | **0** | **0** | **5** | **Practical** |

**List of Programs:**

1. Using Selenium IDE, Write a test suite containing minimum 4 test cases.
2. Conduct a test suite for nay two web sites.
3. Install Selenium server and demonstrate it using a script in Java/PHP.
4. Write and test a program to login a specific web page.
5. Write and test a program to update 10 student records into table into Excel file.
6. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects).
7. Write and test a program to provide total number of objects present / available on the page.
8. Write and test a program to get the number of list items in a list / combo box.

*Approved in the BOS Meeting held on 28-04-2018*

**Elective I :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Information Storage Management Lab** | **4** | **0** | **0** | **5** | **practical** |

**List of Programs :**

1.Installation on a single computer from the Internet

2. How to download and run the Navishpere Manager Simulator.

3. Managing the Storage Infrastructure

4. Securing the Storage Infrastructure.

5. Identifying Security Vulnerabilities.

6. Backup and Recovery

**Semester  IV:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Wireless Sensor Network Practical Lab | **4** | **0** | **0** | **5** | **practical** |

**List of Programs :**

1. Introduction of Wireless sensor network applications and its Simulation.

2. Network Simulator installation of wireless sensor network.

3. Write TCL script for transmission between mobile nodes.

4. Write TCL script for sensor nodes with different parameters.

5. Generate TCL script for UDP and CBR traffic in WSN nodes.

6. Generate tcl script for TCP and CBR traffic in WSN nodes.

7. Implementation of routing protocol in NS2 for AODV protocol.

8. Implementation of routing protocol in NS2 for DSR protocol.

*Approved in the BOS Meeting held on 28-04-2018*

**Semester IV:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Hadoop Lab** | **4** | **0** | **0** | **5** | **practical** |

**List of Programs :**

1. Setting up the environment for the Hadoop.

2. Word Count using Hadoop.

3. Map Reduce using Hadoop.

4. Hadoop using Bigdata

5. HIVE using Hadoop

*Approved in the BOS Meeting held on 28-04-2018*

**Semester  IV:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Cloud Computing and Infrastructure services Lab** | **4** | **0** | **0** | **5** | **practical** |

**List of Programs :**

1. Create a Warehouse Application in Sales Force.com's Force.com.

2. Create an Application in SalesForce.com using Apex programming Language.

3. Study & Implement Web services in SOAP for JAVA Applications.

4. Implementation of Para- Virtualization using VM Ware's Workstation/ Oracle's Virtual Box and Guest O.S.

5. Installation and Configuration of Hadoop.

6. Create an application (Ex: Word Count) using Hadoop Map/Reduce.

*Approved in the BOS Meeting held on 28-04-2018*

**Elective III :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **TCP/IP Protocol Suite** | **4** | **5** | **1** | **0** | **Theory** |

**Introduction:** This course will focus on building fundamental concepts in computer networks, especially in Internet Protocol, and developing ability of the design choices of these networks for different types of network applications, and the design alternatives.

| CO1 | : | Ability to understanding of fundamentals of computer networks and major protocols. |
|---|---|---|
| CO2 | : | Ability to analysis and evaluate major Internet protocols. Understand the concept and importance of TCP/IP layered architecture |
| CO3 | : | Ability to understand and building the skills of sub netting and routing mechanisms |
| CO4 | : | Ability to identify DNS, different types of network devices and their functions within a network. |
| CO5 | : | Ability to understand the internet security and their functionalities. |

**Unit  - I :** Introduction: A Brief History-Protocols and Standards- Internet Standards- Maturity Levels - Requirement Levels - The OSI Model and TCP/IP Protocol Suit: Protocol Layers- The OSI Model- Layered Architecture- Layer-to-Layer Communication- Encapsulation- Layers in the OSI Model. TCP/IP Protocol Suit-Addressing- Physical Addresses- Logical Addresses- Port Addresses. Wired Local Area Network- Wireless Lan.

**Unit – II :**Introduction to network layer: Introduction- Switching-Packet Switching at network layer- Network layer Services- Other network layer issues- Error Control- Flow Control- Congestion Control- Quality of Service- IPv4 Addresses: Address space-Notation- range of addresses-Classful  Addressing- Classes - Classes and Blocks - Two-Level Addressing - Three-Level Addressing: Subnetting - Supernetting - Classless Addressing- Variable-Length Blocks - Two-Level Addressing - Block Allocation - Subnetting - Special Addressing- Special Blocks- Special Addresses in Each block. DATAGRAMS- FRAGMENTATION- Checksum

**Unit – III:** Introduction to transport Layer: Transport layer services- Process-to-Process Communication- Addressing: Port Numbers- Encapsulation and Decapsulation- Multiplexing and Demultiplexing- Flow Control- Error Control- Combination of Flow and Error Control- Congestion Control - Transport layer Protocols- Simple Protocol - Stop-and-Wait Protocol - Go-Back-*N* Protocol - Selective-Repeat Protoco - Bidirectional Protocols: Piggybacking - User Datagram protocols: Introduction- Services-UDP Packages- Control-Block Table- Input Queues- Control-Block Module- Input Module- Output Module Transmission control protocols(TCP) Services- TCP Packages.

**Unit – IV:** Introduction to Application Layer: CLIENT-SERVER PARADIGM- PEER-TO-PEER PARADIGM- Host Configuration: DHCP: Introduction- DHCP Operation- CONFIGURATION- Static Address Allocation- Dynamic Address Allocation- Domain Name System (DNS)- Name Space- DNS in the internet-Resolution-Types of Records-FTP-Connection-Communication- Command Processing- File Transfer- Anonymous FTP- Security for FTP-TFTP-Message-Connection- Data Transfer- UDP Ports- TFTP Example.

**Unit – V:** Cryptography and Network Security-Introduction- Security Goals- Attacks- Services- Techniques- TRADITIONAL CIPHERS- Key- Substitution Ciphers- Transposition Ciphers- Stream and Block Ciphers- MODERN CIPHERS- Modern Block Ciphers- Data Encryption Standard (DES)- Modern Stream Ciphers- ASYMMETRIC-KEY CIPHERS-Message Integrity- Message and Message Digest- Hash Functions.-Network layer Security- Transport layer- Application Layer Security- Firewalls.

**Text Book :**

1."TCP/IP Protocol Suite" by Behrouz A. Forouzan, Fourth Edition,Mc GrawHill Higher Education Publication

**Reference:**

1."Computer Networks" , by Andrew S. Tanenbaum, David, 5e (5th Edition),Pearson Publication.

2. "Computer Networks-A Top Down Approach" by James S. Kurose, Keith W.Ross, Pearson Publication.

3." Cryptography and Network Security - Principles and Practice" by Stallings William,7th Edition, Pearson Publication.

| Mapping of Course Outcomes with Program Outcomes: |
| --- |
| |

| Course Outcomes | Program Outcomes | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | | | H | | M | M | H | H |
| CO2 | H | | H | M | | M | | H |
| CO3 | H | H | H | | | | H | H |
| CO4 | H | H | | H | | M | H | |
| CO5 | H | H | | H | | | | |
| H-High; M-Medium; L-Low | | | | | | | | |

*Approved in the BOS Meeting held on 28-04-2018*

**Semester III:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Multimedia and 3D Animation Lab** | **4** | **0** | **0** | **3** | **Practical** |

1. Write a C program to study 3D transformations.

2. 3D Translation Program Using C Programming

3. Implement DDA Algorithm for drawing a line segment between two given end points A (x1, y1) and B(x2,y2).

4. 3D Scaling Program Using C Programming

5. 3D Rotation Program Using C Programming

6. Write a C program to implement Bresenham's circle generation algorithm.

7. Write a C program for animation.

8. Write a program to produce animation effect of triangle transform into square and then into circle.

9. Program for creating simple car shape.

10. Implement morphing using Adobe Photoshop

*Approved in the BOS Meeting held on 28-04-2018*

**Semester III:**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Grid Computing Lab** | **4** | **0** | **0** | **3** | **Core** |

1. To develop a new Web Service for Calculator using Globus toolkit.

2.To develop a OGSA-compliant Web Service using Globus Toolkit.

3.To develop a web Service using Apache Axis Webserver

4.To develop a Develop secured applications using basic security in Globus

5.To write a program for developing Grid API's using C++.

*Approved in the BOS Meeting held on 28-04-2018*

**Semester III**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Software Testing Lab** | **4** | **0** | **0** | **3** | **Core** |

1. Install Selenium server and demonstrate it using a script in Java/PHP.

2. Using Selenium IDE, Write a test suite containing minimum 4 test cases.

3. Conduct a test suite for nay two web sites.

4. Write and test a program to login a specific web page.

5. Write and test a program to update 10 student records into table into Excel file

6. Write and test a program to select the number of students who have scored more than 60 in any one subject ( or all subjects ).

7. Write and test a program to provide total number of objects present/available on the page.

8. Write and test a program to get the number of list items in a list/combo box.

9. Write and test a program to count number of check boxes on the page checked and unchecked count.

*Approved in the BOS Meeting held on 28-04-2018*

**Semester IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Wireless Sensor Network Lab** | **4** | **0** | **0** | **3** | **Core** |

1. Introduction of Wireless sensor network applications and its Simulation.

2. Network Simulator installation of wireless sensor network.

3. Write TCL script for transmission between mobile nodes.

4. Write TCL script for sensor nodes with different parameters.

5. Generate TCL script for UDP and CBR traffic in WSN nodes.

6. Generate tcl script for TCP and CBR traffic in WSN nodes.

7. Implementation of routing protocol in NS2 for AODV protocol.

8. Implementation of routing protocol in NS2 for DSR protocol

*Approved in the BOS Meeting held on 28-04-2018*

*Rathinam College of Arts & Science (Autonomous), Coimbatore-21.*
*Admitted in M.Sc. Computer Science from the academic year 2017-2018 & Onwards*

*Page 93 of 94*
*Regulations 2017*

**Semester IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Adobe illustrator Lab** | **4** | **0** | **0** | **3** | **Core** |

1. Transform and edit artwork using illustrator tool.

2.Change colour and strokes using illustrator tool.

3.Draw and edit curves using the Curvature tool using illustrator tool.

4.How to use the Color Picker using illustrator tool.

5.Edit drawings with Image Trace using illustrator tool.

6.Export assets for web and app design using illustrator tool.

*Approved in the BOS Meeting held on 28-04-2018*

**Semester  IV :**

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Hadoop Lab | 4 | 0 | 0 | 3 | Core |

**List of Program :**

1.Setting up the environment for the Hadoop

2.Word Count using Hadoop.

3.Map Reduce using Hadoop.

4. Hadoop using Bigdata

5.HIVE using Hadoop

*Approved in the BOS Meeting held on 28-04-2018*