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### 1. About the Department

Warangal being a backward Telangana area, **Chaitanya Degree College** being the first private degree college which was established in the year 1991. Students from rural and urban areas were admitted. Most of the students are from agricultural and coal belt sectors. The Department was started in June 1991 since the inception of the college with **Mr. Koteswar Rao** as the head of the Department. Our college was first to introduce **computer science** course at under Graduation level in the Kakatiya University with **B.Sc. (Maths, Physics, Computer Science) (E/M)** with 60 intakes. The MCA program was started in 1993. Later in 1992-93 the department has extended with **B.Sc (Maths, Statistics, Computer Science)** with 60 intake and **B.B.M** (with one of the Computer subjects in IInd & III year). The **M.Sc. (Computer Science)** program was started in the year 1997.

**In 1998-1999 the department has introduced new combinations**

Bachelor of Computer Applications. (B.C.A)

B.Sc(Maths, Electronics, Computer Science.)

B.A(Maths, Economics, Computer Science)

B.Sc(Vocational) (Maths, Statistics, Computer Applications)

In 1999-2000 The department has introduced some more new combinations for under graduation.

B.Sc (Maths, Chemistry, Computer Science)

B.Sc. (Microbiology, Chemistry, Computer Applications)

B.Sc(Botany, Chemistry, Computer Applications)

In 2000 - 2001 The department has further extended by introducing new combinations for under graduation.

B.Sc(MPCA)

B.Sc(BTZCA)

B.Com (CA)

**In 2003-04 The department has introduced some more new combinations for under graduation.**

B.Sc. Maths, Physics, Computer Science(T/M)

B.Sc. Maths, Statistics, Computer Science(T/M)

**In 2008 – 2009 the department has reintroduced the combination for under graduation**

Bachelor of Computer Applications. (B.C.A)

**In 2008-09 The department has introduced new combination for under graduation.**

B. Com. Banking & Insurance with Computer Applications.

**In 2009-10 The department has introduced new combination for under graduation.**

Bachelor of Business Administration (BBA).

**In 2012-13 The department has been running with 10 courses with different combinations**

B.Sc. (Maths, Physics, Computer Science)

B.Sc.(Maths, Statistics, Computer Science)

B.Sc. (Maths,Chemistry,Computer Science)  
B.Sc. (Maths,Electronics.Computer Science)  
B.Sc (Bio-Technology,Chemistry,Computer Application)  
B.C.A (Bachelor of Computer Applications)  
BBA (Bachelor of Business Administration)  
BBM (Bachelor of Business Management)  
B.Com(Banking & Insurance)  
B. Com (Computer Application)  
M.Sc. (Computer Science)  
Master of Computer Applications

UGC sanctioned a course called “**WEB PROGRAMMING**” under the Scheme of Career Oriented Course (F.No.4-321/2011(COC)) in January, 2012, we are conducting this Advanced Diploma in Web Programming as Add-On Career Oriented Course for Degree Second Year Students. In 2020-21 the following courses has been introduced with the collaboration of TCS with intake of 60.

B. Sc (Cognitive Systems).  
B. Com (BPM).

The Department has started with one laboratory with 30 systems in academic year 1991-92and now the department has equipped with very good infrastructure suchas L.C.Dprojectors, 500 systems arranged in 3 spacious labs with internet facility.

### **Open Elective offered by the Department**

The following electives offered by the Department According to guidelines of the UGC under CBCS from the Academic Year 2015- 16  
Computer Application – Software Testing.  
E-Commerce.

## **2. Courses Offered/Syllabus**

**BSC (CS)**  
**BCA**  
**B.Com (CA)**  
**BBA**  
**MCA**  
**MSc(DS)**  
**MSc(CS)**

**CHAITANYA**  
**(Deemed to be University)**  
**CBCS COMMON CORE SYLLABI FOR**  
**BSC (Computer Science) 4 Year Degree Course**  
**(w.e.f 2023-2024)**

**SEMESTER –I**  
**FUNDAMENTALS OF COMPUTER SCIENCE AND LANGUAGE**

Theory	4 Hours/Week	4 credit
Practical	3 Hours/Week	2 credit

**UNIT – I**

Development Of Computer And Types – Logical Organization Of Digital Computer – Memory- Main Memory – RAM And Cache – I/O Units – Secondary Memory – Operating Systems, - Dos Commands – Windows 98 And Windows 2000 Concepts – Windows Explorer – Working With Files And Folders – Running Program – Using Recycle Bin.

**UNIT – II**

Microsoft Office – Ms Word Basics – Headers, Footers, Tables – Graphics–Templates– Macros – Mail Merge.Power point Basics – Creating Presentations- Menus-Toolbar – Opening APresentation – Creating A New Slide- Deleting A Slide – Copying A Slide – Slide Numbering – Saving – Closing – Printing.

**UNIT – III**

Ms Excel – Worksheets – formatting – Functions – Charts – Graphics – Worksheets as Data Bases Strings.

**UNIT – IV**

Ms Access – Creating Data Bases – Tables – Queries – Forms – Reports – Sorting, Displaying And Printing – Relational Data Bases – Creating Graph Objects.

**TEXT BOOKS:**

1. Ron Mansfield., "Working in Microsoft Office", Tata McGraw Hill
2. Sharon Crawford and Neil J. Salking, "ABC's of Windows", BPB publication

**REFERENCE BOOK:**

1. Sanjay Saxena, "Ms Office 2000 for every one " Vikas publishing House
- 2.Galgotia , "Computers Today"

**SEMESTER –I**

## FUNDAMENTALS OF COMPUTER SCIENCE AND LANGUAGE-LAB

### MS- WORD

1. Design a visiting card for a managing director of a company as per the following specifications.  
Size of the visiting card: 3 ½" X 2"  
Name of the company with Big Font  
Use Different Font for caption or Quotation  
Phone and E-mail Address with appropriate symbols.  
Office and Residence addresses separated by a line.
2. Create 2 pages of Curriculum Vitae of an MCA Post Graduate.
3. Create a Macro to format a document as below.  
Line Spacing Double line  
  
Paragraph Left and Right Indents as 0.4"  
Justification formatting style  
Arial font with size 12
4. Create an interview call letter as the main document and create 10 records for 10 persons.

### MS-EXCEL

5. Create an electronic spreadsheet to convert the following Decimal, Binary, Octal and Hexadecimal numbers into other types.  
Decimal Numbers: 45, 335, 460.  
Binary Numbers: 101, 1110111, 11111.  
Octal Numbers: 77, 777, 1234.  
Hexadecimal Numbers: FF, 1A0F, 9999.
6. Calculate the net pay of the employees with the following conditions given below:

	A	B	P	D	E	F	G	H
1	Emp_Num	Emp_Name	Basic Pay	DA	HRA	Gross Pay	GPF	Net pay
2	1001	B.B.Reddy	20,000					
3								

DA: 55% of Basic Pay.  
HRA: 12.5% of Basic pay.  
GPF: 10% of the Basic Pay.  
Gross Pay: Basic Pay + DA + HRA.  
Net Pay: Gross Pay - GPF

7. Create a spreadsheet with marks of 20 students, calculate the total marks and average mark of each student and find the result and grade using conditions given below:

Result: "Pass", if Marks in each subject  $\geq 35$  else "Fail"  
Grade: "No Grade" if the Student is "Fail"

Else  
 “Distinction”, if Average  $\geq 75$   
 “First Class”, if Average  $\geq 60$  and  $< 75$   
 “Second Class”, if Average  $\geq 50$  and  $< 60$   
 “Third Class”, if Average  $\geq 35$  and  $< 50$

8. Represent the following data using Column Chart, Bar Chart & Pie Chart.

sector	amount(in Cr.s)
agriculture	2,500
Education	1,450
Medical	1,000
Revenue	2,000
Other	5,000

### MS- POWERPOINT

9. Make a PowerPoint presentation on one of your favorite Topics in Science.
10. Make a PowerPoint Presentation on Organizing an Event.

### MS- ACCESS

11. Create a database using MS-Access with two tables Student and Marks with at least 10 records related to same students.

Structure of the Table Student:

ADM_NO	SNAME	DOB	GENDER	CLASS
Primary Key	Maxlength 15	Date	Male/Female	MPCS/MSTCS/MELCS/MELCS/BTCCA

Structure of the Table Marks:

ADM_NO	ENGLISH	SL	OPT_1	OPT_2	OPT_3	TOTAL	AVERAGE	RESULT
Primary Key								Pass/Fail

Data must be in Sorted Order according to name.

12. Using the Above tables  
 Create a Relationship between two tables using Primary key.  
 Fill the fields Total, Average and Result using Update Query. Create a new table using select Query with fields HT\_NO, SNAME, TOTAL, AVERAGE and RESULT.

## SEMESTER – I PROGRAMMING IN C

Theory	4 Hours/Week	4 credit
Practical	3 Hours/Week	2 credit

### **UNIT – I**

Introduction to Programming-Algorithms and Flow charts, history of C - Identifiers, Variables, Constants- Operators, and Data Types – formatted input/output, - Structure of a C program, Flow of Control - Decision making statements-if else, switch & Loops.

### **UNIT – II**

Functions – Standard library functions-, User defined functions, Categories of Functions- Recursive Functions- Storage Classes - Communications between Functions.

### **UNIT – III**

Arrays – Single Dimensional Arrays, Sorting Techniques , Searching Techniques, passing Arrays to functions and Double Dimensional Arrays – Pointers- Operations on pointers, pointers to functions, Strings- String functions.

### **UNIT – IV**

Preprocessor Directives - Bit-Wise Operators and Enumeration Types -Structures and Unions – self referential Structures and Files- Input / Output Operations

#### **TEXT BOOK:**

1. Al Kelley and Ira Pohl,"A Book on C", Addison – Wesley, fourth edition

#### **REFERENCE BOOK:**

1. Balaguru Swamy, "Ansi C" , TMH, 3<sup>rd</sup> edition
2. Venu Gopal ,"Mastering C" ,TMH

## **SEMESTER – I**

### **PROGRAMMING IN C-LAB**

1. Write a program to interchange the values of two variables
2. Write a program to accept a roll number, name and marks in the three subjects and find the total and percentage
3. Write a program to find the roots of quadratic equation
4. Write a program to print the sum of the digits in a given number
5. Write a program to print reverse of the given number
6. Write a program to print given number is palindrome or not
7. Write a program to print given number is Armstrong or not

8. Write a program to print given number is prime or not
9. Write a program to print given number is perfect or not
10. Write a program to print given number is strong or not
11. Write a program to print the Fibonacci series
12. Write a menu driven program to implement different arithmetic operations between two variables (USING SWITCH CASE)?
13. Write a program to calculate the factorial of a number using recursion
14. Write a program to locate an element in an array using linear search
15. Write a program to locate an element in an array using binary search
16. Write a program to order the elements in an array using linear sort?
17. Write a program to order the elements in an array using bubble sort?
18. Write a program to swap two numbers using functions
19. Write a program to obtain the transpose of a matrix?
20. Write a program to perform addition of two matrices?
21. Write a program to perform multiplication of two matrices?
22. Write a program to find Sum of diagonals of a matrix.
23. Write a program to accept your name and then
  - a. Display its length?
  - b) Display its reverse?
  - c) Copy one string to other?
24. Write a program to process student records using structures?
25. Write a program to accept a employee details and store it

## **SEMESTER – II**

### **OPERATING SYSTEM**

Theory	4 Hours/Week	4 credit
Practical	3 Hours/Week	2 credit

#### **Unit I**

What is an Operating System? Types of operating systems, Introduction to MS DOS, Internal and External commands ,Introduction to Linux, basic Linux commands operating system structure, operatingsystemoperations,Computing Environments.

Windows-Hardware Basics, Operating System overview and Windows, Windows 7 Essential, Client OS-Windows 7-Users and Groups-IP Configuration, Client OS-Windows 7 Tools and Utilities-Client OS Windows 7- Installation-Features-Disk Management-File Systems.

#### **Unit II**

Process Scheduling , Operations on processes , Inter-process communication. PROCESS SCHEDULING: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.



Server OS-Windows Server 2012 Overview-Server DNS-Zone Creation - DHCP LAB-Advanced server storage Management-server ADS concepts andFSMO-Server OS Windows Server 2012 Roles and features- Server OS Windows Server 2012 File and Print Services.

### **Unit III**

The Critical-Section Problem , Peter son’s solution , Synchronization Hardware , Semaphores , Classic Problems of Synchronization , Monitors DEADLOCKS : System Model ,Deadlock Characterization ,Methods for handling Deadlocks , Deadlock Prevention , Deadlock Avoidance , Deadlock Detection, Recovery from Deadlock.

Server OS monitoring and managing Windows Server 2012-Server OS Windows Server 2012 DNS and DHCP- Server OS Windows server 2012 Administrative Tools and ADS

### **Unit IV**

Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table , Segmentation. Virtual- Memory Management: Background, Demand Paging, Copy-on-write , Page Replacement.

Server OS-Windows Server 2012-Storage and Backup Management-Client OS Windows 7 Devices and Printers-Server OS Windows Server 2012 Installation.

Group Policy Management-Server Windows Server 2012- File and print services-Group Policy- Server Storage Management –Server Scenario- Server OS Windows Server 2012- DNS and DHCP -Server- ADS scenario.

### **Reference Books**

1. Mitch Tulloch, “Windows 7 Essential Guidance”, 2009.
2. William PanekTylor Wentworth, “Microsoft Windows 7 Administration”, Wiley Publishing, 2010
3. Charles Edge, Chris Barker EhrenSchwiebert, “Beginning MacOSX Snow Leopard Server”, 2010
4. Greg Tomsho, “Guide to Operating System”, 5<sup>th</sup> Edition, 2017.

## **SEMESTER – II**

### **MANAGEMENT INFORMATION SYSTEM**

Theory                      4 Hours/Week                      4 credit

**Objective:** Provide knowledge for decision making from information system

**Outcome:** How different organizations manage information system

### **UNIT – I**

Introduction to Management Information System (MIS) – Evolution Definition – Role of MIS – Approaches to Management – Models Organization Structure – Information Technology Capabilities – Support Business Activities – Strategic uses of Information Technology Components of Information System

### **UNIT – II**

Structure of Information System – Information System for Strategic planning – Management Control and Operational Control – Organization Information Systems – Applications of Strategic Information System to Accounting – Types of Management Reports – Guidelines – For Design – Features

### **UNIT – III**

Decision Making Process – Intelligence Design and Choice-Structured and Un-Structured Decisions – Methods for Determining Among Alternatives pay-off Matrices – Decision Theory – Decision Support System (DSS) Inventory Model – Capital Budgeting – Break Even Analysis – Decision Support System (DSS) – Components – DSS .

### **UNIT – IV**

Planning and Developing Information System – MIS Planning – Need Objectives – Techniques of Planning – Implementation – Approaches Internal Problems related to MIS – Pit falls in MIS Development Organization for MIS Vs Decentralization.

### **TEXT BOOKS**

1. Robert Schultheis, Mary Summer Management Information Systems: The MANAGER'S View Tata Mc-Graw Hill Publishing Company limited, New Delhi.
2. W.S.Jawadeker Management Information Systems: Tata Mc-Graw Hill Publishing Company limited, New Delhi
3. Robert G.Murdick, Joel Ross James, Claggett. Information System for Modern Management. Prentice Hall of India Private Limited, New Delhi.

### **REFERENCE BOOKS:**

- 1 David Kroenke Management Information Systems: Tata Mc-Graw Hill Publishing Company
- 2 . Gordon B Davis, Margrethe H. Olson Management Information System – Conceptual Foundations – Structure and Development. Mc-Graw Hill International Edition.
- 3 S.Sadagopath Management Information System PHI

## **SEMESTER – II**

### **WEB PROGRAMMING**

Theory	4 Hours/Week	4 credit
Practical	3 Hours/Week	2 credit

### **Learning Objectives:**

Students will learn to create more static, dynamic and interactive websites using HTML5, JavaScript. Advanced HTML, CSS, and basic JavaScript enhance the client-side WebPages and students will learn to use these technologies for their specific purposes. This Subject is useful for Making own Web page and how to host own web site on internet

### **Learning Outcome:**

After completion of the course students will be able to

1. Describe the concepts of WWW including browser and HTTP protocol.
2. List the various HTML tags and use them to develop the user friendly web pages.
3. Define the CSS with its types and use them to provide the styles to the web pages at various levels.
4. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
5. Use the JavaScript to develop the dynamic web pages.
6. Identify the difference between the HTML and XML documents.
7. Identify the engineering structural design of XML and parse tree
8. Develop the modern Web applications using the web design fundamentals.

### **UNIT-I**

**Introduction**-world wide web, web Browsers, web Servers, uniform Resource Locators, HTTP. HTML5: Introduction, Formatting and Fonts - Commenting code, Links, Images, Multimedia, Lists, Tables, Frames- Creating Forms.

### **UNIT – II**

**Introduction to Cascading Style Sheets**, Inline Styles, Embedded Style Sheets, Linking External Style Sheets, Backgrounds, Box Model and Text Flow, Drop-Down Menus.

**JavaScript-Introduction**- Displaying a Line of Text with JavaScript in a Web Page, Modifying Your First Script, Obtaining User Input with prompt Dialogs, Dynamic Welcome Page, Adding Integers, Memory Concepts.

### **UNIT – III**

**JavaScript**-Operators, decision making, control structures, if... else statement, while, counter-controlled repetitions, switch statement, do... while statement, break and continue statements, Functions – program modules in JavaScript, programmer-defined functions,

functions definition, scope rules, global functions, Arrays- introduction, declaring and allocating arrays.

#### **UNIT– IV**

**JavaScript**-Objects – Math Object, String Object, Date Object, Boolean & Number Object, document and window Objects. Event Model – onclick, onload, onmouseover, onmouseout, onfocus, onblur, onsubmit, onreset, more DHTML events.

**Introduction**-XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3CXMLSchemaDocuments,XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

#### **TEXTBOOKS:**

1. Internet & World Wide Web-H. M. Deitel, P.J. Deitel, A. B. Goldberg-Third Edition
2. Web Programming –Chris Bates – Third edition.(Wiley)

#### **REFERENCEBOOKS:**

1. Programming World Wide Web by RWSebesta(Pearson)
2. An Introduction to Web Design + Programming by Wang &Katia(Pearson )
3. HTML & XML An Introduction NIIT(PHI)
4. HTML for the WWW with XHTML &CSS by Wlizabeth Castro(Pearson)
5. Fundamentals of the Internet an the World Wide Web byRaymond Green Law and Ellen Hepp (TMH)
6. Internet and Web Technologies by Raj Kamal (TMH)
7. Internet and Web Basica by Ned Snell, Bob Temple, TM Clark (Pearson)

### **SEMESTER-II**

#### **WEB PROGRAMMING-LAB**

1. A Web Page in HTML to show all the Text, Color, Background and Font Elements
2. A Web Page in HTML to show your resume using Appropriate Formatting Elements.
3. Write a program to explain about the attributes of “MARQUEE” Tag in HTML.
4. Develop a HTML program to create a webpage to show various confectionary items using ordered list and unordered list
5. Write a HTML program in HTML to show India map.
6. Create a table to show your class time table.
7. Develop a HTML program to explain the various elements of “FORM” Tag.
8. Write a HTML program to create a webpage with four frames (Picture, table, list, and hyperlink)..
9. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
10. Write a program in HTML to create a web page using style sheet.
11. Write a program to demonstrate “Embedding Style Sheets”.
12. Write a program to demonstrate “External style Sheets”.

13. Design a program to demonstrate Text and Font properties of CSS.
14. Explain the Border properties of CSS with a program.
15. Develop a program to display background properties of CSS.
16. Write a program to display the lists in HTML page using the styles of CSS
17. Write JavaScript program to add two numbers given through key board.
18. Write JavaScript program bitwise operators.
19. Write a JavaScript program to demonstrate for...in statement.
20. Write a JavaScript program to demonstrate functions.
21. Write a JavaScript program for creating and initializing arrays?
22. Write a JavaScript program to math object methods.
23. Write a JavaScript program for character processing methods
24. Write a JavaScript program using date object get and set methods.
25. Write a program to demonstrate Event Handling
  - i. Validation of registration form -Open a Window from the current window
  - ii. Change color of background at each click of button or refresh of a page
  - iii. Display calendar for the month and year selected from combo box  
Onmouseover event
26. Programs using-XML SCHEMA- XSLT/XSL

## SEMESTER – II

### DATA STRUCTURES USING C++

Theory	4 Hours/Week	4 credit
Practical	3 Hours/Week	2 credit

**Objective: Learning about Data structure**

**Outcome: Knowledge on representing Data Structure**

#### UNIT – I

**Introduction:** Introduction to data structures, types of data structures, linear data structures and Non linear data structures, ADT (Abstract Data type).

**Arrays:**Introduction to Arrays, types of arrays, Operations on Arrays, Pointers.

**Linked Lists:** Linked list concepts, Single Linked lists, Double Linked Lists, Circular Linked lists.

#### UNIT – II

**Stacks:** Basic Stack operations, Array implementation of stack, Stack-linked list implementation, Stack applications (converting form infix to postfix, evaluation of post fix expression).

**Queues:** Basic Queue operations, Array implementation of queue, Queue-linked list implementation, Types of Queues.

### **UNIT – III**

**Trees:** Basic Tree Concepts, Binary Trees, Binary tree traversals, Expression trees, General Trees.

**Graphs:** Definitions and concepts, Matrix Representation of graph, Adjacency list representation and graph traversal techniques – Breadth first search traversal – Depth first Search traversal.

### **UNIT – IV**

**Searching Techniques:** Searches – Linear search, Binary Search techniques.

**Hashing:** Introduction to Hashing, Hash functions

**Sorting Techniques:** General sort concepts Insertion sort, Linear Sort, Bubble Sort, Selection Sort and Quick Sort.

### **PRESCRIBED BOOKS:**

1. Sartaj Sahani, “Data structures.Algarthims and applications in C++”, McGraw Hill.

### **REFERENCES BOOKS:**

1. Yedudlag langsam, Moshe J.Augenstein, Aarib M tanebaum, “Data Structures using C++”, PHI
2. Venugopal, “Mastering in C++”, TMI.

### **SEMESTER-II**

#### **DATA STRUCTURES USING C++ LAB**

1. Write a program to perform stack operations such as push(),pop() functions using arrays.
2. Write a program to perform queue operations such as enqueue(),dequeue() functions using arrays.
3. Write a program to create circular queue by using the operations enqueue() and dequeue() functions using array method.
4. Write a program to create the linear linked list and display the list in LIFO method.
5. Write a program to add components to a linear linked list and delete existing components of it.
6. Write a program to construct a linear linked list and display the list in FIFO method.
7. Write a program to construct a stack using a linked list to implement push and pop functions.
8. Write a program to search for an element in using linear search technique.
9. Write a program to search for an element in using binary search technique.
10. Write a program to sort a list of elements using linear sort technique.
11. Write a program to sort a list of elements using bubble sort technique.

12. Write a program to sort a list of elements using selection sort technique.
13. Write a program to sort a list of elements using insertion sort technique.
14. Write a program to implement single linked list.
15. Write a program to implement double linked list.
16. Write a program for linear sort technique using template functions.
17. Write a program for bubble sort technique using template functions.
18. Write a program to demonstrate binary search tree.

**Learning Outcomes based Curriculum  
Framework  
for  
B.C.A.  
(*w.e.f.2020-2021*)**

**SEMESTER – I**

**FUNDAMENTALS OF INFORMATION TECHNOLOGY**

**UNIT – I**

Development Of Computer And Types – Logical Organization Of Digital Computer –

Memory- Main Memory – RAM And Cache – I/O Units – Secondary Memory – Operating Systems, - Dos Commands – Windows 98 And Windows 2000 Concepts – Windows Explorer – Working With Files And Folders – Running Program – Using Recycle Bin.

#### **UNIT – II**

Microsoft Office – Ms Word Basics – Headers, Footers, Tables – Graphics–Templates– Macros – Mail Merge. Power point Basics – Creating Presentations- Menus-Toolbar – Opening A Presentation – Creating A New Slide- Deleting A Slide – Copying A Slide – Slide Numbering – Saving – Closing – Printing.

#### **UNIT – III**

Ms Excel – Worksheets – formatting – Functions – Charts – Graphics – Worksheets as Data Bases Strings.

#### **UNIT – IV**

Ms Access – Creating Data Bases – Tables – Queries – Forms – Reports – Sorting, Displaying And Printing – Relational Data Bases – Creating Graph Objects.

#### **TEXT BOOKS:**

1. *Ron Mansfield., "Working in Microsoft Office", Tata McGraw Hill*
2. *Sharon Crawford and Neil J. Salking, "ABC's of Windows", BPB publication*

#### **REFERENCE BOOK:**

1. *Sanjay Saxena, "Ms Office 2000 for every one " Vikas publishing House*
2. *Galgotia , "Computers Today"*

### **SEMESTER – I PROGRAMMING IN C**

#### **UNIT – I**

Introduction to Programming-Algorithms and Flow charts, history of C - Identifiers, Variables, Constants- Operators, and Data Types – formatted input/output, - Structure of a C program, Flow of Control - Decision making statements-if else, switch & Loops.

#### **UNIT – II**

Functions – Standard library functions-, User defined functions, Categories of Functions- Recursive Functions- Storage Classes - Communications between Functions.



### **UNIT – III**

Arrays – Single Dimensional Arrays, Sorting Techniques , Searching Techniques, passing Arrays to functions and Double Dimensional Arrays – Pointers- Operations on pointers, pointers to functions, Strings- String functions.

### **UNIT – IV**

Preprocessor Directives - Bit-Wise Operators and Enumeration Types -Structures and Unions – self referential Structures and Files- Input / Output Operations

#### **TEXT BOOK:**

2. *Al Kelley and Ira Pohl, "A Book on C", Addison – Wesley, fourth edition*

#### **REFERENCE BOOK:**

1. *Balaguru Swamy, "Ansi C", TMH, 3<sup>rd</sup> edition*
2. *Venu Gopal , "Mastering C" ,TMH*

## **SEMESTER – II**

### **MANAGEMENT INFORMATION SYSTEM**

**UNIT – I:** Introduction to Management Information System (MIS) – Evolution Definition – Role of MIS – Approaches to Management – Models Organization Structure – Information Technology Capabilities – Support Business Activities – Strategic uses of Information Technology Components of Information System

**UNIT – II:** Structure of Information System – Information System for Strategic planning – Management Control and Operational Control – Organization Information Systems – Applications of Strategic Information System to Accounting – Types of Management Reports – Guidelines – For Design – Features

**UNIT – III:** Decision Making Process – Intelligence Design and Choice-Structured and Un-Structured Decisions – Methods for Determining Among Alternatives pay-off Matrices – Decision Theory – Decision Support System (DSS) Inventory Model – Capital Budgeting – Break Even Analysis – Decision Support System (DSS) – Components – DSS .

## **UNIT – IV**

Planning and Developing Information System – MIS Planning – Need Objectives – Techniques of Planning – Implementation – Approaches Internal Problems related to MIS – Pit falls in MIS Development Organization for MIS Vs Decentralization.

### **TEXT BOOKS**

4. Robert Schultheis, Mary Summer Management Information Systems: The MANAGER'S View Tata Mc-Graw Hill Publishing Company limited, New Delhi.
5. W.S.Jawadeker Management Information Systems: Tata Mc-Graw Hill Publishing Company limited, New Delhi
6. Robert G.Murdick, Joel Ross James, Claggett. Information System for Modern Management. Prentice Hall of India Private Limited, New Delhi.

### **REFERENCE BOOKS:**

- 4 David Kroenke Management Information Systems: Tata Mc-Graw Hill Publishing Company
- 5 . Gordon B Davis, Margrethe H. Olson Management Information System – Conceptual Foundations – Structure and Development. Mc-Graw Hill International Edition.
- 6 S.Sadagopath Management Information System PHI

## **SEMESTER – II**

### **DATABASE MANAGEMENT SYSTEM**

#### **UNIT – I**

**THE DATABASE ENVIRONMENT:** Basic concept and Definition: File processing system at pine valley Furniture Company. The range of Database Application. Advantages of the Database approach. Costs and Risks of the Database Approach, components of the Database Environment.

#### **UNIT – II**

**DATA DEVELOPMENT PROCESS:**Database development within information systems Development. Database Development process. Three-Schema Architecture for Database Development. (Chapter 1 & 2)

#### **UNIT – III**

**MODELING DATA IN THE ORGANIZATION:** Modeling the Rules of the organization. The E-R model , E- R Diagram, entity relationship model constructs – Entity, Attribute , relationships, Degree of Relationship.

#### **LOGIC DATABASE DESIGN AND THE RELATIONAL MODEL :**

The Relational data model - Integrity constraints , Transforming E-R model into relations , Introduction to normalization. The basic normal forms first , second , third .

#### **UNIT – IV**

**SQL:** The SQL Environment defining a Database in SQL. Inserting. Updating and Deleting Data. Internal Schema Definitions in RDBMS. Processing single tables.

#### **ADVANCED SQL:**

Processing multiple tables, ensuring transaction integrity, Data dictionary facilities.

Embedded SQL and Dynamic SQL (Chapters 7 & 8)

#### **TEXT BOOK**

1. MODERN DATA BASE MANAGEMENT By Jeffrey A. Hoffer. Mary B. Prescott and Fred. R. McFadden Pearson Education Asia - sixth Edition.
2. SQL: A Complete Reference Paperback by Mathews

#### **REFERENCE BOOKS:**

1. DATABASE SYSTEMS -By Ramez elmasri and Shamkant B. Navathe (Pearson Education Asia)

## **SEMESTER – II**

### **OBJECT ORIENTED PROGRAMMING WITH C++**

#### **UNIT – I**

Introduction to object oriented programming & concepts- Classes and Objects- defining member functions, creating and using objects, History of C++, Structure of C++ program, tokens, Basic Data types, User defined Data types, Reference variables, operators in c++,

control structures-if, switch, loops.

#### **UNIT – II**

Functions in C++, Function prototyping, call by value, call by reference, void functions, recursive functions, inline functions, private member functions, Friend Functions, Virtual functions, defining Class ADT'S.

#### **UNIT – III**

Constructors and Destructors, function overloading and operator overloading. Arrays- single dimensional and double dimensional arrays, Strings – String functions, Pointers and Dynamic Arrays

#### **UNIT – IV**

C++ Stream - unformatted console I/O operations-get(),put() functions formatted console I/O operations – ios format functions, manipulators Inheritance - single inheritance, multiple inheritance ,multilevel inheritance, hybrid, hierarchical inheritance , Polymorphism, templates functions.

#### **PRESCRIBED BOOKS:**

1. E.Balagurusamy,"Object oriented programming with C++", McGraw-Hill, fourth edition
2. Walter Savitch,"Problem Solving with C++", Addison-Wesley (low price edition).

#### **REFERENCES BOOKS:**

1. K.R. Venugopal, Rajkumar and T. Ravishankar,"Mastering C++", Tata McGraw Hill Publishing Co. Ltd. 2000

### **SEMESTER – III**

#### **SOFTWARE ENGINEERING**

**UNIT – I: Introduction to Software Engineering:** The evolving role of software, changing nature of software, software myths. **A Generic view of process:** Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. **Process models:** The waterfall model, incremental process models, evolutionary process models, the unified process.

**UNIT – II: Software Requirements:** Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. **Requirements engineering process:** Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. **System models:** Context models, behavioral models, data models, object models, structured methods.

**UNIT – III: Design Engineering:** Design process and design quality, design concepts, the design model. **Creating an architectural design:** software architecture, data design, architectural styles and Patterns, architectural design, conceptual model of UML, basic structural modelling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

**UNIT – IV: Metrics for Process and Products:** Software measurement, metrics for software quality. **Risk management:** Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

#### **TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

#### **REFERENCE BOOKS:**

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadkar, The McGraw-Hill Companies.

## **SEMESTER – III COMPUTER NETWORKS**

### **UNIT-I**

**Introductory Concepts:** Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer-transmission, switching methods, Integrated services digital networks.

## **UNIT-II**

**ERROR DETECTION AND CORRECTION:** Types of Errors, Detection, Vertical Redundancy Check (VRC), Longitudinal Redundancy Check (LRC), Cyclic Redundancy Check (CRC), Checksum, Error Correction.

## **UNIT – III**

**DATA LINK CONTROL:** Line Discipline, Flow Control, Error Control, Asynchronous Protocols, Synchronous protocols, Character-Oriented Protocols, Bit-Oriented Protocols, Link Access procedures.

**Network Layer:** Point-to Point networks, concept of virtual circuit and LAN, routing algorithms, congestion control algorithms, internetworking, TCP/IP protocol, UDP, SCTP, IP addresses, IPv6Packet Format, Subnetting.

## **UNIT-IV**

**TRANSPORT LAYER:** Duties of the Transport Layer, Connection, the OSI Transport Protocol.

Upper OSI Layers: Session Layer, Presentation Layer, Application Layer.

TCP/IP protocol suite: Overview of TCP/IP, Network Layer, Addressing, Subnetting, Other Protocols in The Network Layer, Transport Layer.

## **TEXT BOOK**

1. Behrouz A. Forouzan, Data Communication and Networking, 2<sup>nd</sup> Ed., Tata McGraw Hill.
2. Computer Networks with Internet Protocols by W Stallings, PearsonEducation

## **REFERENCE BOOKS**

1. Computer Networks by A. S Tanenbaum, 4<sup>th</sup> Edition”, Pearson education.
2. Internetworking with TCP/IP by PHI.
3. Data and Computer Communication by W. Stallings, Macmillan Press

## **SEMESTER – III**

### **DATA STRUCTURES WITH C++**

**UNIT – I****15Hrs**

**Introduction:** Introduction to data structures, types of data structures, linear data structures and Non linear data structures, ADT (Abstract Data type).

**Arrays:** Introduction to Arrays, types of arrays, Operations on Arrays, Pointers.

**Linked Lists:** Linked list concepts, Single Linked lists, Double Linked Lists, Circular Linked lists.

**UNIT – II****15Hrs**

**Stacks:** Basic Stack operations, Array implementation of stack, Stack-linked list implementation, Stack applications (converting from infix to postfix, evaluation of post fix expression).

**Queues:** Basic Queue operations, Array implementation of queue, Queue-linked list implementation, Types of Queues.

**UNIT – III****15Hrs**

**Trees:** Basic Tree Concepts, Binary Trees, Binary tree traversals, Expression trees, General Trees.

**Graphs:** Definitions and concepts, Matrix Representation of graph, Adjacency list representation and graph traversal techniques – Breadth first search traversal – Depth first Search traversal.

**UNIT – IV****15Hrs**

**Searching Techniques:** Searches – Linear search, Binary Search techniques.

**Hashing:** Introduction to Hashing, Hash functions

**Sorting Techniques:** General sort concepts Insertion sort, Linear Sort, Bubble Sort, Selection Sort and Quick Sort.

**PRESCRIBED BOOKS:**

1. Sartaj Sahani, “Data structures. Algorithms and applications in C++”, McGraw Hill.

**REFERENCES BOOKS:**

1. Yedudlag langsam, Moshe J. Augenstein, Aarib M tanebaum, “Data Structures using C++”, PHI
2. Venugopal, “Mastering in C++”, TMI.

**SEMESTER-III****DATA STRUCTURES USING C++ LAB**

19. Write a program to perform stack operations such as push(), pop() functions using arrays.
20. Write a program to perform queue operations such as enqueue(), dequeue() functions using arrays.
21. Write a program to create circular queue by using the operations enqueue() and dequeue() functions using array method.
22. Write a program to create the linear linked list and display the list in LIFO method.

23. Write a program to add components to a linear linked list and delete existing components of it.
24. Write a program to construct a linear linked list and display the list in FIFO method.
25. Write a program to construct a stack using a linked list to implement push and pop functions.
26. Write a program to search for an element in using linear search technique.
27. Write a program to search for an element in using binary search technique.
28. Write a program to sort a list of elements using linear sort technique.
29. Write a program to sort a list of elements using bubble sort technique.
30. Write a program to sort a list of elements using selection sort technique.
31. Write a program to sort a list of elements using insertion sort technique.
32. Write a program to implement single linked list.
33. Write a program to implement double linked list.
34. Write a program for linear sort technique using template functions.
35. Write a program for bubble sort technique using template functions.
36. Write a program to demonstrate binary search tree.



## **UNIT-I**

**Introduction**-world wide web, web Browsers, web Servers, uniform Resource Locators, HTTP. HTML5: Introduction, Formatting and Fonts - Commenting code, Links, Images, Multimedia, Lists, Tables, Frames- Creating Forms.

## **UNIT – II**

**Introduction to Cascading Style Sheets**, Inline Styles, Embedded Style Sheets, Linking External Style Sheets, Backgrounds, Box Model and Text Flow, Drop-Down Menus.

**JavaScript-Introduction**- Displaying a Line of Text with JavaScript in a Web Page, Modifying Your First Script, Obtaining User Input with prompt Dialogs, Dynamic Welcome Page, Adding Integers, Memory Concepts.

## **UNIT – III**

**JavaScript**-Operators, decision making, control structures, if... else statement, while, counter-controlled repetitions, switch statement, do... while statement, break and continue statements, Functions – program modules in JavaScript, programmer-defined functions, functions definition, scope rules, global functions, Arrays- introduction, declaring and allocating arrays.

**UNIT– IV: JavaScript**-Objects – Math Object, String Object, Date Object, Boolean & Number Object, document and window Objects. Event Model – onclick, onload, onmouseover, onmouseout, onfocus, onblur, onsubmit, onreset, more DHTML events.

**Introduction**-XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3CXMLSchemaDocuments,XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

### **TEXTBOOKS:**

1. Internet & World Wide Web-H. M. Deitel, P.J. Deitel, A. B. Goldberg-Third Edition
2. Web Programming –Chris Bates – Third edition.(Wiley)

### **REFERENCEBOOKS:**

1. Programming World Wide Webby RWSebesta(Pearson)
2. An Introduction to Web Design + Programming by Wang &Katia(Pearson )
3. HTML & XML An Introduction NIIT(PHI)
4. HTML for the WWW with XHTML &CSS by Wlizabeth Castro(Pearson)
5. Fundamentals of the Internet an the World Wide Web byRaymond Green Law and Ellen Hepp (TMH)

6. Internet and Web Technologies by Raj Kamal (TMH)
7. Internet and Web Basica by Ned Snell, Bob Temple, TM Clark (Pearson)

### **WEB PROGRAMMING**

#### **PRACTICAL QUESTION BANK**

27. A Web Page in HTML to show all the Text, Color, Background and Font Elements
28. A Web Page in HTML to show your resume using Appropriate Formatting Elements.
29. Write a program to explain about the attributes of “MARQUEE” Tag in HTML.
30. Develop a HTML program to create a webpage to show various confectionary items using ordered list and unordered list
31. Write a HTML program in HTML to show India map.
32. Create a table to show your class time table.
33. Develop a HTML program to explain the various elements of “FORM” Tag.
34. Write a HTML program to create a webpage with four frames (Picture, table, list, and hyperlink)..
35. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
36. Write a program in HTML to create a web page using style sheet.
37. Write a program to demonstrate “Embedding Style Sheets”.
38. Write a program to demonstrate “External style Sheets”.
39. Design a program to demonstrate Text and Font properties of CSS.
40. Explain the Border properties of CSS with a program.
41. Develop a program to display background properties of CSS.
42. Write a program to display the lists in HTML page using the styles of CSS
43. Write JavaScript program to add two numbers given through key board.
44. Write JavaScript program bitwise operators.
45. Write a JavaScript program to demonstrate for...in statement.
46. Write a JavaScript program to demonstrate functions.
47. Write a JavaScript program for creating and initializing arrays?
48. Write a JavaScript program to math object methods.
49. Write a JavaScript program for character processing methods
50. Write a JavaScript program using date object get and set methods.
51. Write a program to demonstrate Event Handling
  - iv. Validation of registration form -Open a Window from the current window
  - v. Change color of background at each click of button or refresh of a page
  - vi. Display calendar for the month and year selected from combo box  
Onmouseover event
52. Programs using-XML SCHEMA- XSLT/XSL

### **SEMESTER -IV**

#### **SOFTWARE TESTING**

**UNIT I      Testing Strategies:** A strategic approach to software testing – Verification and Validation –Organizing for Software Testing – Testing Strategies – Criteria for completion of testing – unit,integration, validation and system testing – debugging. TESTING TACTICS: Testing Fundamental – White Box, Black Box, and Control Structure Testing –Object Oriented Testing Methods PRODUCT METRICS: Software Quality – Mc Call’s Quality Factors – ISO 9126 Quality Factors –Measures, Metrics and Indicators – Measures for analysis, design, code and testing – metrics for maintenance. (Chapters-13,14,15)

**UNIT II      Project Management:** The Management Spectrum – The People – The Product – The Process –The Project – The W5HH Principle – Critical Practices. ESTIMATION: Observations on Estimation – The Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation – Decomposition Techniques – Empirical Estimation Models – Estimation for Object-Oriented Projects – Specialized Estimation Techniques– The Make/buy Decision. (Chapters -21,23)

**UNIT III      Risk Management:** Reactive vs. Proactive Risk Strategies – Software Risks – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring, and Management – The RMMM Plan. QUALITY MANAGEMENT: Quality Concepts – Software Quality Assurance – Software Reviews – Formal Technical Reviews – Formal Approaches To SQA – Statistical Software Quality Assurance –Software Reliability – The ISO 9000 Quality Standards – The SQA Plan. (Chapters - 25, 26)

**UNIT IV      Test Planning Management, Execution, and Reporting:** Introduction, Test Planning, Test Management, Test Process, Test Reporting Software Test Automation—What To Automate, Scope Of Automation, Design And Architecture for Automation, Generic Requirements For Test Tool Framework, Process Model for Automation, Selecting a Testing Tool (Chapters-15,16 from Book-II)

**TEXT BOOKS:**

1. Software Engineering By R.S. Pressman (Mcgraw Hill Sixth Edition)
2. Software Testing Principles And Practices--- Srinivasan Desikan, Gopalaswamy Ramesh

**REFERENCE BOOKS:**

1. Software Engineering By Ghazzi (Phi)
2. Software Engineering By Fairley (Mcgraw Hill)

**SEMESTER-IV**  
**DIGITAL MARKETING**

### **UNIT-I**

Introduction to E-commerce: Definition, History of E-commerce, E-business Models B2B, B2C, C2C, C2B, legal; Environment of E-commerce, Dimensions of E-commerce, ethical issues, electronic data interchange, value chain and supply chain, E-commerce Marketing, Ecommerce Strategy, E-commerce Infrastructure, Advantages and Disadvantages of e-commerce.

### **UNIT - II**

Electronic payment systems: payment gateways, payment cards, credit cards, debit cards, smart cards, e-credit accounts, e-money, marketing on the web, categories of e-commerce, EDI, marketing strategies, advertising on the web, customer service and support, internet banking, introduction to m-commerce,

### **UNIT - III**

E-government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance. E-readiness, e-government readiness, E- Framework, step & issues.

### **UNIT - IV**

Digital payment initiatives in India, Digital Payment platforms and applications. E-government systems security: challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.

#### References:

- Gary P. Schneider, "E-Commerce", Cengage Learning India.
- C.S.R. Prabhu, "E-Governance: Concept and Case Study", PHI Learning Private Limited.
- P. Tjoseph, S.J., "E-Commerce an Indian Perspective", Prentice-Hall of India.
- V. Rajaramn, "Essentials of E-Commerce Technology", PHI Learning Private Limited.
- Amir Manzoor " E-Commerce: an Introduction", Lambert

## **SEMESTER-IV**

### **PROGRAMMING IN JAVA**

## UNIT I

**Fundamentals of Object-Oriented Programming-** Introduction, Object-Oriented Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of OOP, Applications of OOP.

**Java Evolution-** Java History, Java Features, How Java Differs From C and C++, Java and Internet, Java and World Wide Web, Web Browsers, Java Support Systems, Java Environment.

**Overview of Java Language-** Simple Java Program, Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments.

**Constants , Variables and Data Types-** Constants, Variables, Data Types, Typecasting.

**(Chapters: 1, 2, 3, 4)**

## UNIT II

**Operators and Expressions-** Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise and Special Operators, Arithmetic Expressions, Evaluation of Expressions, Operator Precedence and Associativity.

**Decision Making and Branching-** Decision Making with If, Simple If, If...Else Statements, The Switch Statement, The ? : Operator.

**Decision Making and Looping-** while, do, for Statement.

**Classes, Objects and Methods-** Defining a class, Fields Declaration, Methods Declaration, Creating Objects, Accessing Class Members, Constructors, Method Overloading, Static Members, Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes.

**(Chapters: 5, 6, 7, 8)**

## UNIT III

**Arrays, Strings, and Vectors-** One-dimensional Arrays, Creating an Array, Two-dimensional Arrays, Strings, Vectors, Wrapper Classes, Enumerated Types.

**Interfaces: Multiple Inheritance-** Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

**Packages: Putting Classes Together-** Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes, Static Import.

**Multithreaded Programming-** Creating Threads, Extending the Thread Class, Life Cycle of a Thread, Thread Priority, Synchronization, Implementing the 'Runnable' Interface.

**(Chapters: 9, 10, 11, 12)**

## UNIT IV

**Managing Errors and Exceptions-** Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions.

**Applet Programming-** How Applets Differ From Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to Html File, Running the Applet.

**Graphics Programming Using AWT, Swing, and Layout Manager-** The Graphics Class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Polygons, Line Graphs, Introduction to AWT Package, Window Fundamentals, Closing an AWT Window or Frame, Working with Fonts, Layout Managers, Handling Events on AWT Components, Introduction to Swing Package, Components and Containers.

**(Chapters: 13, 14, 15)**

**TEXT BOOK:** Programming with JAVA, 6<sup>th</sup> Edition, By E. Balaguruswamy @2019 | Published: March 19, 2019.

**REFERENCES:**

1. Deitel and Dietel, Java How To Program (late objects), 2015, 10<sup>th</sup> Edition, Prentice Hall.
2. Herbert Schildt, Java TM: The Complete Reference, Eleventh Edition, Oracle Press.
3. An Introduction to JAVA Programming By Y. Daniel Liang, Publishers: Tata Mc-Hill.
4. Introduction to Programming and OOD Using Java By Jaino Nine and Fa Hosch (John Wiley).
5. Starting Out With Java – Jony Gaddis (Dream Tech Press).

**SEMESTER IV  
PROGRAMMING IN JAVA LAB**

1. Write a program to demonstrate command line arguments.
2. Write a program to read two integer numbers along with an operator to perform an arithmetic operations depending on the operator entered.
3. Write a program to demonstrate labeled loops.
4. Write a program to demonstrate a class declaration, methods and instantiation of object.
5. Write a program to demonstrate default, parameterized and copy constructor.
6. Write a program to demonstrate access specifiers.
7. Write a program to demonstrate overloading.
8. Write a program to demonstrate overriding.
9. Write a program to demonstrate inheritance.
10. Write a program to sort the given numbers through keyboard using liner sort.
11. Write a program to search using binary search.
12. Write a program to sort an array of strings.
13. Write a program to demonstrate methods of String class.
14. Write a program to demonstrate methods of StringBuffer class.
15. Write a Program to demonstrate Vectors in Java.
16. Write a program to demonstrate Interface.
17. Write a program to demonstrate multiple inheritance using Interface.
18. Write a program to demonstrate Package Creation and using that Package outside of that package.
19. Write a program to create a thread by extending Thread class.
20. Write a program to create a thread by implementing Runnable interface.
21. Write a program to create multiple threads.
22. Write a program to explain Thread priorities.
23. Write a program to demonstrate Exceptional handling.

24. Write an exceptional handling program with multiple catch blocks.
25. Write a program to demonstrate throw and throws keywords.
26. Design an applet program to print your college name.
27. Design an applet program to pass parameters to applets.
28. Design an applet program to accept input from user and perform operations on that input.
29. Write an applet program to draw the various polygons.
30. Write a program to include checkbox, radio button in window using swings.

**SEMESTER IV**  
**OPERATING SYSTEM**

### **UNIT-I**

Introduction to the Operating System (OS), Types of Operating System: Batch System, TimeSharing System, Real Time System. Multi Programming, Distributed System, Functions and Services of OS.

### **UNIT-II**

Process Management: Process Concept, Process State, Process Control Block, Process Scheduling, CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Preemptive & Non-Preemptive Scheduling.

### **UNIT - III**

Deadlocks-System model, Characterization, Deadlock Prevention, Deadlock Avoidance and Detection, Recovery from deadlock.

Memory Management: Logical Address, Physical Address, External and Internal Fragmentation.

### **UNIT - IV**

Concept of paging, Page table structure - Hierarchical Paging, Hashed Page Tables, Inverted PageTable.

Information Management: File Concept, Access Methods, Directory Structure. Device Management: Disk Structure, Disk Scheduling Algorithms.

### **Text Books:**

1. Silbershatz and Galvin, " Operating System Concept", Addison Wesley, 2002.
2. Nutt, G., "Operating Systems", Addison-Wesley.
3. GodboleAhyut, "Operating System", PHI, 2003.

### **Reference Books:**

1. Flynn, Mchoes, "Understanding Operating System", Thomson Press, Third Edition, 2003
2. Tannenbaum, "Operating System Concept", Addison Weseley, 2002.
3. Joshi, R. C. and Tapaswi, S., "Operating Systems", WileyDreamtech.

## **SEMESTER – V**

### **SEC 3 (ARTIFICIAL INTELLIGENCE)**

#### **Unit I**



Introduction: Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

## **Unit II**

Problem Solving and Searching Techniques: Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A\* algorithm, Constraint Satisfaction Problem,

## **Unit III**

Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

Knowledge Representation: Introduction to First Order Predicate Logic, Propositional Logic Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules

## **Unit IV**

Applications of AI – Text classification – Natural Language Processing - Robotics.

### **BOOKS RECOMMENDED:**

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. Russell &Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.
3. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.
4. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.
5. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3rd edition, 2000

## **SEMESTER – V**

### **SEC 3 (CRYPTOGRAPHY AND NETWORK SECURITY)**

## **Unit I**

Introduction: Security Trends, Security Attacks, Security Services, Security Mechanisms, Model for Network Security,

Symmetric Ciphers: Classical Encryption Techniques, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography.

## **Unit II**

Data Encryption Standard: Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles. Advanced Encryption Standard: Evaluation Criteria For AES, The AES Cipher.

## **Unit III**

Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems, the RSA Algorithm,

Public-Key Cryptosystems: Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

## **Unit IV**

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and Macs.

Digital Signatures and Authentication Protocols: Digital Signatures, Kerberos, X.509 Authentication Service, Public-Key Infrastructure.

### **Text book:**

1. W. Stallings, Cryptography and Network Security Principles and Practices, 4th Ed., Prentice-Hall of India, 2006.

### **Book Recommended**

1. C. Pfleeger and S.L. Pfleeger, Security in Computing, 3rd Ed., Prentice-Hall of India, 2007.

2. M.Y. Rhee, Network Security, John Wiley and Sons, NY, 2002.

## **SEMESTER – V**

### **SEC 3 (ETHICAL HACKING)**

**UNIT I****15 Hrs**

**ETHICAL HACKING OVERVIEW:** Introduction to Ethical Hacking– Cracking the Hacker Mindset - Developing Your Ethical Hacking Plan - Hacking Methodology

(Chapter 1 to 4)

**UNIT II****15 Hrs****SOCIAL ENGINEERING AND PHYSICAL SECURITY**

Introduction to Social Engineering – Performing Social Engineering Attacks - Social Engineering Countermeasures – Introduction to physical security – Handling the passwords

(Chapter 5 to 7)

**UNIT III****15 Hrs**

**HACKING NETWORKS:** Introduction to Port Scanning – Types of PortScan – Port Scanning Tools - Conducting Ping Sweeps –Introduction to War Dialing -Network Infrastructure - Wireless LANs -Hacking Wireless Network- Wireless Technology – Wireless Network Standards –Authentication

(Chapter 8 to 10)

**UNIT IV****15 Hrs****HACKING OPERATING SYSTEM**

Hacking windows Operating System –Selecting the essential Tools– Information Gathering – RPC - Hacking Linux Operating System-Information Gathering –NFS-File Permission-Physical Security -Introduction to Navell Netware – Authentication

(Chapter 11 to 13)

**TEXT BOOK:**

1. Kevin Beaver, “Hacking for Dummies”, Wiley Publication, India, 2007.

**REFERENCE BOOKS:**

1. Ankit Fadia, “Unofficial Guide to Ethical Hacking”, Macmillan Company, New Delhi, 2001.
2. Michael T. Simpson, “Ethical Hacking and Network Defense”, Cengage Learning, New Delhi, 2010.
3. Jon Erickson, Hacking: The Art of Exploitation, SPD
4. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.
5. Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Gray Hat Hacking: The Ethical Hackers' Handbook, TMH Edition

## **SEMESTER – V**

### **ADVANCED JAVA**

#### **UNIT – I**

Files and Streams, introduction, Data Hierarchy, Creating a Sequential Access Files and Random Access Files, Reading the Writing data from the files.

**(Chapters 17 and 21 from Book 1)**

#### **UNIT –II**

Network Programming, Establishing a Simple Client, Client/Server Interaction with Stream Socket Connections and Connectionless Client/ Server Interaction with Data grams.

**(Chapter 20 from Book 1)**

#### **UNIT – III**

JDBC and DATABASE ACCESS- introduction, exploring JDBC Drivers, Exploring the features of JDBC, Jdbc APIs, exploring major classes and interfaces, java.sql package

**(Chapters 26 and 27 from Book 2)**

#### **UNIT – IV**

Introduction to Servlets, Working with servlets, Overview of Serves, Types of Servlets, The Life Cycle of a Servlet, Saving Client State, The servletrunner Utility, Running Servlets.

**(Chapters 34 to 39 from Book 2)**

#### **TEXT-BOOKS**

1. Java How to Program, Third Edition- Deitel and Deitel
2. The Java Tutorial Continued Compoine, Walrath, Huml, Tutorial Team – Addison Wesley
3. Advance Java Technology – Prof. Savaliya- Dreamtech Press.

#### **REFERENCE BOOKS**

1. Java Server Pages –Hans Bergsten, SPD O'Reilly.
2. J2EE 1.4 Bible (Dreamtech-2003).
3. Java Server Programming (J2EE), Block Book, DreamTech Press

## **SEMESTER – V**

### **ADVANCED JAVA – LAB**

- 1) Writeaprogramtocreatesequentialfileusing FileOutputStreamclass.
- 2) Writeaprogramtocopydatafromonefiletoanotherfile.
- 3) WriteaprogramtoReadFileUsingFileInputStreamclass.
- 4) WriteaprogramtoReadanyjavaSourcefileandCountthenumberofCapitallettersinfile.
- 5) WriteaprogramtocreatafileandWritetheprimivedataintothe file.

- 6) Write a program to Read Primitive type of data from the file.
- 7) Write a program to create a sequential text file using Formatter and Scanner classes.
- 8) Write a program to read the data from a sequential file.
  
- 9) Write a Program on Random Access File Example
- 10) Develop a client/server program Using TCP Socket.
- 11) Develop a client/server chatting program Using TCP
- 12) Write a client/server Communication program Using UDP.
- 13) Develop a client/server chatting program Using UDP  
(Datagram Socket and Datagram Packet).
- 14) Write a Jdbc program to Create a table.
- 15) Write a Jdbc program to insert a single record into a table.
- 16) Write a Jdbc program to update a single record in a table.
- 17) Write a Jdbc program to Delete a Single record from a table.
- 18) Write a Jdbc program to insert the records into a table using Prepared Statement interface.
- 19) Write a Jdbc program to Retrieves records from the table.
- 20) Write a Jdbc program on Scrollable ResultSet.
- 21) Write a program on DemoServlet
- 22) Write a program on Login Servlet
- 23) Write a program on Servlet Cookies

**SEMESTER – V**  
**SCRIPTING LANGUAGES**

## **UNIT-I**

**MARKUP LANGUAGE (HTML):** Introduction to HTML - Formatting and Fonts – Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms-Introduction to CSS

## **UNIT II**

**INTRODUCTION TO SCRIPTING:** Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages.

**JAVASCRIPT LANGUAGE:** Data Types and Variables, Basic, JavaScript Syntax, Calculations and Operators, Control Structures, Built-in Functions, User-Defined Functions.

## **UNIT III**

**PHP BASICS:** Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions, File Operation.

## **UNIT IV**

**PYTHON BASICS:** Introduction to Python language, Basic Python Syntax, Data Types and Variables, Calculations and Operators, Control Structures, Regular Expressions, Built-in Functions, User-Defined Functions, File Operations.

### **TEXT BOOKS:**

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech.)

## **SEMESTER – V SCRIPTING LANGUAGES – LAB**

1. Write a HTML program to demonstrate heading tags.
2. Write a HTML program to demonstrate image tag and marquee tag.
3. Write a HTML program on List tags(ordered ,unordered and definition )
4. Write a HTML program to to create a table with attributes.
5. Write a HTML program to create frame tag.
6. Write a HTML program to demonstrate a form tag.

7. Write a HTML program to using anchor tags
8. Write a HTML program on inline style sheets.
9. Write a HTML program on embedded style sheets.
10. Write a HTML program on linking external style sheets.
11. Write a JS program obtaining user input with prompt dialog box.
12. Write a JS program to perform Arithmetic operations.
13. Write a JS program using switch case.
14. Write a JS program using for loop.
15. Write a JS program using functions (find 1 to 10 square values).
16. Write a JS program to create login page and whether username and password is correct or not.
17. Write a JS program to demonstrate string object.
18. Write a JS program to demonstrate date object.
19. Write a JS program to demonstrate math object.
20. Write a PHP program to display your details.
21. Write a PHP program using an array.
22. Write a PHP program to collect your details from front end using forms and displaying details from back end.
23. Write a PHP program to create login and testpage.
24. Write a PHP program using regular expression.
25. Write a PHP program using setType and getType functions.
26. Write a PHP program using Switch case.
27. Write a PHP using for each statement
28. Write a python program to calculate sum of two numbers.
29. Write a python program using if...else.
30. Write a python program using if...elseif...else.
31. Write a python program using for loop.
32. Write a python program using calendar module.
33. Write a python program using try and except.
34. Write a python program using regular expressions.

**SEMESTER – V**  
**.NET PROGRAMMING WITH VB.NET**

**UNIT – I**

Creating a windows application, Web application, Console application, The System Namespaces, The VB IDE environment, IntelliSense, The Toolbox, The Properties Window, Keywords, Statements, The Option and Import Statements, Creating Enumerations, Data types, operators, operator precedence, if-else statements, select case, do loop, for loop, for each next loop, while loop, Math methods, Handling Dates and times, sub procedures and functions, understanding scope, Handling Exceptions.

(Chapters 1 to 3)

**UNIT – II**

All Bout Windows Forms, Using the MsgBox function, using the InputBox function, Working with Multiple Forms, Creating MDI applications, Creating Dialog Boxes, handling mouse events and keyboard events, Text boxes, Rich text boxes, labels, Buttons, Checkboxes, Radio Buttons, Panels, Group Boxes, List boxes, combo boxes, picture boxes,

(Chapters 4 to 7)

**UNIT – III**

Scroll Bars, Splitters, Track Bars, pickers, Tool Tips and Timers. Menus, Context Menus, The Built-in Dialog Boxes, Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, Print Preview Dialogs, Page Setup Dialogs, Image Lists, Toolbars, Status and Progress Bas, Tab Controls.

(Chapters 8 to 10)

**UNIT – IV**

Using the Graphics, Pen and Brush classes, Handling Images, Working with Web Forms, Creating a Web application, Adding Controls to a Web form, running a Web application, ADO.NET Data Objects, Accessing data with the server Explorer, Binding Controls to Databases, Simple Binding, Complex binding, using the DataGrid Class.

(Chapters 13, 15, 21, 22)

**TEXT BOOK**

1. Visual Basic .NET Programming (Black Book) by Steven Holzner.



**SEMESTER – V**  
**.NET Programming – Lab**

**Console Applications:**

1. Write a program to demonstrate Enumeration.
2. Write a program to demonstrate select case.
3. Write a program to demonstrate Sub Procedures.
4. Write a program to demonstrate Functions.
5. Write a program to demonstrate Optional Arguments.
6. Write a program to demonstrate ParamArray.
7. Write a program to demonstrate Unstructured Exception handling.
8. Write a program to demonstrate Structured Exception handling.
9. Write a program to demonstrate Mathematical functions.
10. A VB.Net Program to demonstrate Date and Time functions.

**Windows Applications:**

1. Design a VB.net program to demonstrate Label, textbox and Button Controls.
2. Design a VB.Net Program to change back color of form using RadioButtons.
3. Design a VB.Net Program to change back color of form at regular intervals using timer.
4. Design a program to Launch a Rocket Using Timer and PictureBox.
5. Write a program to display your college name as Marquee using timer control
6. Write a program to Display System time on the form using timer and label.
7. Write a Program to Blink Your Name on the form.
8. Write a program to Demonstrate List box.
9. Design a program to display “CDC” in a label at Random parts on the form at regular intervals.
10. Design a Program to demonstrate Checkbox.
11. Design a VB.Net program to create Notepad Software.

**SEMESTER – VI**  
**SEC 4 (MACHINE LEARNING)**

**UNIT – I**

Introduction – Learning – Machine Learning – Types of Machine Learning – Supervised Learning – Un Supervised Learning – Reinforcement Learning- Supervised Learning VS Un Supervised Learning - Applications of Machine Learning - Features of Machine Learning Regression – The Machine Learning Process – Some Terminology – Data Preprocessing – Some Examples of Machine Learning .

**UNIT – II**

**Supervised Learning**

Introduction to Supervised Learning - Supervised Learning working process- Types of Supervised Learning – Regression – Classification-Regression and types of Regression – Linear Regression – Non-Linear Regression – Advantages of supervised Learning – Disadvantages of Supervised Learning .

**UNIT – III**

**Introduction to Classification** – Regression Vs Classification - Classification Algorithms in Machine Learning- **Linear Models**-Logistic Regression- Support Vector Machines - **Non-linear Models** -K-Nearest Neighbors - Naïve Bayes - Decision Tree Classification - Some popular use cases of Classification Algorithms - Introduction to Neural Networks – Perception - Multi-Layer Perception – Going Forwards – Going Backwards: Back Propagation Error.

**UNIT – IV**

**Introduction Un Supervised Learning** – Unsupervised Learning – Working process of Unsupervised Learning – Types of Un Supervised Learning – Association – Clustering - Advantages and Disadvantages of Un Supervised Learning - **K-means clustering - hierarchical cluster analysis – Dimensionality Reduction in Machine Learning.**

**Text Book**

1. Stephen Marshland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

**References**

1. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

3. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

## **SEMESTER – VI**

### **SEC 4 (INTERNET OF THINGS)**

#### **UNIT –I**

##### **INTRODUCTION TO IOT, PROTOCOLS AND SOFTWARES**

What is Internet of Things? History of IOT, About IOT, Overview and Motivations, Examples of Applications, Internet of Things Definition and Framework: IOT Definition, IOT Architecture, General Observations, IOT Frameworks.

Examples of IoT infrastructure MQTT, UDP, MQTT brokers, publish subscribe modes, HTTP, COAP, XMPP and gateway protocols.

#### **UNIT –II :IOT POINT TO POINT AND M2M COMMUNICATION TECHNOLOGIES**

IoT Communication Pattern, IoT protocol Architecture, Selection of Wireless technologies

(6LoWPAN, Zigbee, WIFI, BT, BLE, SIG, NFC, LORA, Lifi, Widi)

**UNIT –III: IOT AND M2M (MACHINE TO MACHINE):** Software defined networks, network function virtualization, Difference between SDN and NFV for IOT, Basics of IOT system management with NETCOZF, YANG – NETCOZF, YANG, and SNMP NETOPPER.

**UNIT –IV : IOT SECURITY :** Need for encryption, standard encryption protocol, light weight cryptography, Quadruple Trust Model for IoT-A – Threat Analysis and model for IoT-A, Cloud security

#### **Text Book(s)**

1. Alessandro Bassi, Martin Bauer, Martin Fiedler, Thorsten Kramp, Rob van Kranenburg, Sebastian Lange, Stefan Meissner, “Enabling things to talk – Designing IoT solutions with the IoT Architecture Reference Model”, Springer Open, 2016
2. Internet of Things- A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti Universities Press, 2015, ISBN: 9788173719547
3. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, “From Machine to Machine to Internet of Things”, Elsevier Publications, 2014.

#### **Reference Books**

1. LuYan, Yan Zhang, Laurence T. Yang, Huansheng Ning, The Internet of Things: From RFID to the Next-Generation Pervasive Network, Aurbach publications, March,2008.

**SEMESTER – VI**  
**SEC 4 (CYBER SECURITY)**

**UNIT I :- INTRODUCTION TO SECURITY TRENDS :** The Computer Security Problem - Targets and Attacks - Approaches to Computer Security - Ethics - Basic Security Terminology - Security Models.

**UNIT II :- Operational and Organizational Security:** Policies, Procedures, Standards, and Guidelines - Security Awareness and Training - Interoperability Agreements - The Security Perimeter - Physical Security - Environmental Issues - Wireless - Electromagnetic Eavesdropping - People—A Security Problem - People as a Security Tool

**UNIT III :- Cryptography in Practice** - Historical Perspectives - Algorithms - Hashing Functions - Symmetric Encryption - Asymmetric Encryption - Quantum Cryptography- Cryptography Algorithm Use

**UNIT – IV :- Authentication and Remote Access:** User, Group, and Role Management - Password Policies - Single Sign-On - Security Controls and Permissions - Preventing Data Loss or Theft - The Remote Access Process - Remote Access Methods.

**TEXT BOOKS :**

- 1 .W.A.Coklin, G.White, Principles of Computer Security: Fourth Edition, McGrawHill, 2016
- 2.William Stallings, Cryptography and Network Security Principles and Practices,SeventhEdition,Pearson

**REFERENCE BOOKS :**

- 1.Achyut S. Godbole, Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing, Tata McGraw-Hill Education, 2013

**E BOOKS:**

1. <https://www.newhorizons.com/promotions/cybersecurity-ebooks>

**MOOC 1:** <https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks#syllabus>

## **SEMESTER – VI**

### **OBJECT ORIENTED DESIGN IN UML**

#### **UNIT - I**

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

#### **Unit II**

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

#### **UNIT - III**

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

Basic Behavioral Modeling-I: Interactions, Interaction diagrams.

#### **UNIT-IV**

Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

**Case Study:** The Unified Library application

#### **TEXT BOOKS**

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education. 2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

#### **REFERENCES**

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGraw Hill
5. Craig Larman Applying UML and Patterns: An introduction to Object - Oriented Analysis and Design and Unified Process, Pearson Education.

**Learning Outcomes based Curriculum  
Framework  
for  
B.Com.(Computer Applications)  
(*w.e.f.* 2020-2021)**

**SEMISTER-I**

**INFORMATION TECHNOLOGY**

**UNIT-I**

**INTRODUCTION TO INFORMATION TECHNOLOGY**

Development of computers-Generations of computers-An overview of computer system –Types of computers-Input & output Devices. Looking inside the machine: Basic components of a computer system-control unit-ALU-input/output functions-Memory-RAM-ROM-EPROM-PROM and other types of memory. Meaning-Definition & Functions-Types of Operating Systems-DOS-Commands (internal & external)-GUI-Wild card characters. Windows: start menu-Using multiple windows

**UNIT-II**

## **WORD PROCESSING**

Application of word processing software-Menus & Tool Bars-opening word processor-creating-Entering-saving & printing the document-Editing & Formatting Text –Mail merge and Macros (preferably latest version of ms word or libre office writer).

## **UNIT-III**

### **WORKSHEET/SPREADSHEET**

Application of work sheet/Spread sheet-Menus & Toolbars-Creating a worksheet-Entering and editing of numbers –Cell reference-Worksheet to analyse data with graphs and charts. Advanced tools: Functions-Formulae-Formatting numbers –Macros-Sorting, Filtering-Validation & consolidation of data (preferably latest version of ms excel or libre office calc).

## **UNIT-IV**

### **PRESENTATION**

Application of presentation –Menus & Tool Bars-Creating Presentations-Adding – Editing and deleting slides-Templates and manually-slide show-saving-opening and closing a presentation-Types of slides-Slide views-Formatting-Insertion of objects and charts in slides-Custom Animations and transition (preferably latest version of ms powerpoint or libre office Impress).

### **SUGGESTED READINGS:**

1. Introduction to computers: Peter Norton, McGraw Hill.
2. Fundamentals of Information Technolgy: Dr.NVN Chary, Kalyani Publishers.

## **SEMESTER-II**

### **OFFICE AUTOMATION**

#### **UNIT - I**

**DATABASE VOCABULAR, CONCEPTS AND DESIGN TOOLS:** Data and information, Database, DBMS, information system, Database Building Blocks, Database Tables and their Components , Entity Integrity and Referential Integrity, Attribute Characteristics, Relationship types, Database Design, Business rules.

**DATABASE DESIGN PROCESS:** Database System Development, Business Rules and ERD segments.

#### **UNIT – II**

**IMPLEMENTING THE DATABASE DESIGN** – Data base Storage Location, Creating New Database, Creating Tables with Database Structure, Modifying Table Structure, Indexes, Data Entry, Edit and Delete, importing and Exporting Tables, Creating Relationships.

**UNIT – III**

**Queries** – Query Basics, Select Queries-Action Queries-Update – Delete – Append – Make-table –crosstab query.

**FORM DEVELOPMENT:** Forms Prerequisites , Creating a form with wizard , Modifying the form , List Boxes on Forms, Embedded and Linked Objects.

**UNIT – IV**

**REPORT AND LABELS** – Creating a report, Creating Reports with Subtotals and Totals, Reports Based on Crosstab Queries, Report Graphics, Mailing Labels, Form Letters.

**MACROS AND MACRO GROUP:** Creating a Macro group, Attaching Macro to Command Button, Transaction management with Macros.

**TEXT BOOK**

1. *Peter Rob and Elte Semum, " Databases" TMH –2001*

**SEMESTER III**

**DATABASE MANAGEMENT SYSTEM**

**UNIT-I**

**Introduction to databases:** Basic concept and definition, Traditional File Processing System, Advantages and Disadvantages of DBMS, The range of Database Applications, Costs and Risks of the Database Approach, Components of the Database Environment, Types of DBMS, Database Development within Information Systems, Database Development Process, Three Schema Architecture for Database Development..

**UNIT-II**

**SQL:** Introduction, SQL Data types, Integrity Enhancement Feature-Domain Constraints, Creating a Database, Inserting-Updating and Deleting Data, Operators, SQL Functions, Processing Single Tables, Referential Integrity,Sub-queries, Creating an Index, Removing an Index, Views-Creating a view, Removing a view.

**UNIT-III**

**Modelling Data in the Organization:**

Modelling the Rules of Organization,Business rules and Characteristics, The E-R model, E-R Diagram, Entity Relationship model constructs-Types of Entities,Types ofAttributes, Cardinality Constraints, Types of Relationships, Degree of Relationship,

**UNIT-IV**

**Logical Database Design and the Relational model:**



The Relational data model –Integrity constraints, Transforming E-R model into relations, Introduction to Normalization, Anomalies, Data Redundancy and Functional Dependencies, The Basic Normal Forms 1NF, 2NF, 3NF.

### **Physical Database Design and Performance:**

Physical database design process, designing fields, designing physical records, designing physical files, Designing databases.

### **TEXT BOOK:**

1. Jeffrey A Hoffer, Mary B. Prescott and Fred R Mc Fadden “Modern database Management “, Pearson Education Asia – Sixth Edition.
2. SQL: A Complete Reference Paperback by Mathews.

### **REFERENCE BOOKS:**

1. Ramez Elmasri and Shamkant BNavathe, “Database Systems”, Pearson Education Asia – 2002.
2. Raghu Ramakrishnan, Johannes Gehrke ,DataBase Management System.
3. Concepts C Coronel, S Morris, Peter Rob, Database Systems: Design, Implementation and Management.

## **SEMESTER-III DATABASE MANAGEMENT SYSTEM LAB**

### **EXP: 1 DDL (CREATE, ALTER, DROP, DESC)**

1. Check the current version, edition of database.
2. Check the current user.
3. Clear the screen.
4. Create a table STAFF with fields staffid, name, age.
5. Display the structure of STAFF table.
6. Add a column (mobilen) to staff table.
7. Add three columns (course, DOB, email) to STAFF table.
8. Increase the column (name) size to 30.
9. Remove a column (email) from STAFF table.
10. Display the structure of STAFF table.
11. Rename the table name (STAFF and FACULTY).
12. Display the structure of renamed table.
13. Create a copy of another table (FACULTY as CDCEMP).
14. Display structure of FACULTY and CDCEMP.
15. Remove the table FACULTY.

### **EXP: 2 DML (INSERT, UPDATE, DELETE, SELECT)**

1. Create a table EVENT with columns sno, name, and game.
2. Insert a record into a table EVENT.
3. Insert 10 records into a table EVENT at a time (note: leave some field values empty).
4. Display all the records in a table EVENT.

5. Display the records who are participating in a particular game. (Eg: chess).
6. Display only two columns (sno, name) from EVENT table.
7. Change a particular record using UPDATE command.
8. Fill the records which are left empty.
9. Delete a particular record based on SNO.
10. Delete the records who are participating in a game(eg: chess).
11. Display all records from EVENT table.
12. Delete all the records from EVENT table.
13. Display all records from EVENT table.
14. Display all the tables in the database.

### **EXP:3 CONSTRAINTS(PRIMARY KEY,FOREIGN KEY,UNIQUE ,NOT NULL)**

#### **OPERATIONS(DISABLE,ENABLE,DROP).**

1. Create a table admission with fields Admno,Name,Course,Age,Fee.  
(Conditions: Admno PRIMARY KEY ,name NOT NULL,Course NULL,Age (18-20).
2. Create a table exam with fields htno,admno,result.
3. Add a constraint primary key to htno (give constraint name).
4. Add a constraint foreign key to admno (give constraint name).
5. Add a constraint check to result (pass/fail) (give constraint name).
6. Insert one record into exam table.
7. Disable the foreign constraint from exam table.
8. Insert three records into exam table.
9. Display the records from exam table.
10. Delete all records from exam table.
11. Enable the constraint foreign key for exam table.
12. Remove the constraint foreign key for exam table.
13. Remove the constraint of primary key for exam table.

### **EXP:4 TCL COMMANDS(GRANT,REVOKE,SAVEPOINT,ROLLBACK,COMMIT).**

1. Create a table order with fields ordid, ord\_prd, ord\_date.
2. Insert five records into order.
3. Save the records permanently.
4. Display all records from order table.
5. Create a savepoint.
6. Insert five records into order table.
7. Display all records from order table.
8. Go back to a savepoint.
9. Check the records in order table.
10. Create a new user.
11. Give all permissions to new user.
12. Remove all permissions to a new user.
13. Remove a user.

### **EXP:5 OPERATORS.**

1. Display all the records present in EMP and dept table.
2. Display the records EMPNO and SALARY with 1000 increment from EMP table.
3. Display the records EMPNO and SALARY with 500 decrement from EMP table.

4. Display the records EMPNO, ENAME and SALARY with 10% increment from EMP table.
5. Display the records from EMP table whose sal is greater than 2000.
6. Display the records from EMP table whose sal is less than 2000.
7. Display EMPNO and ENAME fields from EMP who belongs to Department 10,20,30,40 individually.
8. Display all the of employees who joined the year 1981.
9. Display employees whose commission is NULL.
10. Display employees whose commission is not NULL.
11. Display all the records whose employee names second letter A.
12. Display all the records whose employee names having 2 A's.
13. Display employees whose belongs to department 20 and Sal above 2000.
14. Display all the records who belongs to department 10 or 20.
15. Create two tables (ProdA,ProdB) with fields (itemno,itemname).
16. Insert 5 records into both tables(ProDA,ProdB)[note: some records should be same in both tables].
17. Display all the records from ProDA and ProdB using UNION operator.
18. Display all the records from ProDA and ProdB using UNION ALL operator.
19. Display all the records from ProDA and ProdB using INTERSECT operator.
20. Display all the records from ProDA and ProdB using MINUS operator.

#### **EXP:6 (DATE FUNCTIONS)**

1. Write a query to display system date.
2. Write a query to display the date of day after two months to system date.
3. Write a query to display the date of day before three months to system date.
4. Write a query to display the last date in the month of February, 2000.
5. Write a query to display the last date in the month of February, 2017.
6. Write a query to display the last date in the current month.
7. Write a query to display the date of next Sunday after system date.
8. Write a query to display the date of next Friday after 1<sup>st</sup> January, 2017.
9. Write a query to display your age in no. of months.
10. Write a query to display the age of Independent India in number of months.

#### **EXP:7 (NUMERIC FUNCTIONS)**

1. Write a query to print Absolute value of the given no.
2. Write a query to print Square root value of the given no.
3. Write a query to print the remainder value when we divide a no. with other no.
4. Write a query to round the number 123.456 into zero, one and two decimal places.
5. Write a query to demonstrate the function 'SIGN'.
6. Write a query to print the power of a no. raise to any no.
7. Write a query to demonstrate the function 'FLOOR'.
8. Write a query to demonstrate the function 'CEIL'.
9. Write a query to demonstrate the function 'LN'.
10. Write a query to print values of sin(0), sin(45), sin(60) and sin(90).
11. Write a query to print values of cos(0), cos(45), cos(60) and cos(90).
12. Write a query to print values of tan(0), tan(45), tan(60) and tan(90).

### **EXP:8(String Functions)**

1. Write a query to print a string in uppercase.
2. Write a query to print any column contents of a table in upper case.
3. Write a query to print the first letter of the given string in upper case.
4. Write a query to print the first letter of any column contents of a table in upper case.
5. Write a query to join or combine two strings into one string;
6. Write a query to join or combine two columns contents into single string.
7. Write a query to find the length of a text.
8. Write a query to find the length of contents of a column of a table.
9. Write a query to demonstrate the function 'REPLACE'.
10. Write a query to demonstrate the function 'ASCII'.
11. Write a query to demonstrate the function 'SUBSTR'.
12. Write a query to demonstrate the function 'INSTR'.

### **EXP:9(Conversion Functions)**

1. Write a query to print the Month of a Date in two digits.
2. Write a query to print the Month name (like jan, feb...) of a date.
3. Write a query to print the Month name (like January, February...) of a date.
4. Write a query to print the number of Weekday name (1 for Sunday, 2 for Monday...) of a date.
5. Write a query to print the date in two digits.
6. Write a query to print the total no. of days of a date from the 1<sup>st</sup> January of that year.
7. Write a query to print the short cut Weekday name (like sun, mon,.....) of a date.
8. Write a query to print the Full Weekday name (like Sunday, Monday.....) of a date.
9. Write a query to print the last two digits of the year of a date.
10. Write a query to print the year of date.
11. Write a query to print the year in string (Like twenty seventeen) of a date.
12. Write a query to print hours of the system time.
13. Write a query to print minutes of the system time.
14. Write a query to print whether the system time is am or pm.

### **EXP:10(Sub Queries)**

1. Create a table with name faculty with fields f\_id(number, primary key), fname(varchar2), dept(varchar2), salary(number);
2. Enter 10 to fifteen records.
3. Display the maximum salary in each department.
4. Display the records of the faculty member who take highest salary in their departments.
5. Display the records of the faculty member who take lowest salary in their departments.
6. Display the name, total employees of the department which contain maximum faculty members.
7. Display the records of all employees drawing more salary than average salary of the employees.
8. Display the records of top 5 employees who are earning more salary.

9. Display the total number of employees working in each department.
10. Display record of the employee who is drawing highest salary among all the employees.
11. Display record of the employee who is drawing second highest salary among all the employees.

## **SEMESTER IV**

### **PROGRAMMING IN C**

**Outcome :** Basic Logical skills and Programming Capability

#### **UNIT – I**

Introduction to Programming-Algorithms and Flow charts, history of C - Identifiers, Variables, Constants- Operators, and Data Types – formatted input/output, - Structure of a C program, Flow of Control - Decision making statements-if else, switch & Loops.

#### **UNIT – II**

Functions – Standard library functions-, User defined functions, Categories of Functions- Recursive Functions- Storage Classes - Communications between Functions.

#### **UNIT – III**

Arrays – Single Dimensional Arrays, Sorting Techniques , Searching Techniques, passing Arrays to functions and Double Dimensional Arrays – Pointers- Operations on pointers, pointers to functions, Strings- String functions.

#### **UNIT – IV**

Preprocessor Directives - Bit-Wise Operators and Enumeration Types -Structures and Unions – self referential Structures and Files- Input / Output Operations

#### **TEXT BOOK:**

3. *Al Kelley and Ira Pohl, "A Book on C", Addison – Wesley, fourth edition*

#### **REFERENCE BOOK:**

1. *Balaguru Swamy, "Ansi C", TMH, 3<sup>rd</sup> edition*
2. *Venu Gopal, "Mastering C", TMH*

### **PROGRAMMING IN C LAB**

1. Write a program to interchange the values of two variables
2. Write a program to accept a roll number, name and marks in the three subjects and find the total and percentage
3. Write a program to find the roots of quadratic equation
4. Write a program to print the sum of the digits in a given number

5. Write a program to print reverse of the given number
6. Write a program to print given number is palindrome or not
7. Write a program to print given number is Armstrong or not
8. Write a program to print given number is prime or not
9. Write a program to print given number is perfect or not
10. Write a program to print given number is strong or not
11. Write a program to print the Fibonacci series
12. Write a menu driven program to implement different arithmetic operations between two variables (USING SWITCH CASE)?
13. Write a program to calculate the factorial of a number using recursion
14. Write a program to locate an element in an array using linear search
15. Write a program to locate an element in an array using binary search
16. Write a program to order the elements in an array using linear sort?
17. Write a program to order the elements in an array using bubble sort?
18. Write a program to swap two numbers using functions
19. Write a program to obtain the transpose of a matrix?
20. Write a program to perform addition of two matrices?
21. Write a program to perform multiplication of two matrices?
22. Write a program to find Sum of diagonals of a matrix.
23. Write a program to accept your name and then
  - a) Display its length?
  - b) Display its reverse?
  - c) Copy one string to other?
24. Write a program to process student records using structures?
25. Write a program to accept a employee details and store it

## **SEMESTER-V WEB TECHNOLOGIES**

### **UNIT-I**

**Introduction**-world wide web, web Browsers, web Servers, uniform Resource Locators, HTTP. HTML5: Introduction, Formatting and Fonts - Commenting code, Links, Images, Multimedia, Lists, Tables, Frames- Creating Forms.

### **UNIT – II**

**Introduction to Cascading Style Sheets**, Inline Styles, Embedded Style Sheets, Linking External Style Sheets, Backgrounds, Box Model and Text Flow, Drop-Down Menus.

**JavaScript-Introduction**- Displaying a Line of Text with JavaScript in a Web Page, Modifying Your First Script, Obtaining User Input with prompt Dialogs, Dynamic Welcome Page, Adding Integers, Memory Concepts.

### **UNIT – III**

**JavaScript**-Operators, decision making, control structures, if... else statement, while, counter-controlled repetitions, switch statement, do... while statement, break and continue statements, Functions – program modules in JavaScript, programmer-defined functions, functions definition, scope rules, global functions, Arrays- introduction, declaring and allocating arrays.

### **UNIT– IV**

**JavaScript**-Objects – Math Object, String Object, Date Object, Boolean & Number Object, document and window Objects. Event Model – onclick, onload, onmouseover, onmouseout, onfocus, onblur, onsubmit, onreset, more DHTML events.

**Introduction**-XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3CXMLSchemaDocuments,XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

### **TEXTBOOKS:**

1. Internet & World Wide Web-H. M. Deitel, P.J. Deitel, A. B. Goldberg-Third Edition
2. Web Programming –Chris Bates – Third edition.(Wiley)

### **REFERENCEBOOKS:**

1. Programming World Wide Webby RWSebesta(Pearson)
2. An Introduction to Web Design + Programming by Wang &Katia(Pearson )

3. HTML & XML An Introduction NIIT(PHI)
4. HTML for the WWW with XHTML & CSS by Wlizabeth Castro(Pearson)
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6. Internet and Web Technologies by Raj Kamal (TMH)
7. Internet and Web Basica by Ned Snell, Bob Temple, TM Clark (Pearson)

## **WEB TECHNOLOGIES**

### **PRACTICAL QUESTION BANK**

1. A Web Page in HTML to show all the Text, Color, Background and Font Elements
2. A Web Page in HTML to show your resume using Appropriate Formatting Elements.
3. Write a program to explain about the attributes of “MARQUEE” Tag in HTML.
4. Develop a HTML program to create a webpage to show various confectionary items using ordered list and unordered list
5. Write a HTML program in HTML to show India map.
6. Create a table to show your class time table.
7. Develop a HTML program to explain the various elements of “FORM” Tag.
8. Write a HTML program to create a webpage with four frames (Picture, table, list, and hyperlink)..
9. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
10. Write a program in HTML to create a web page using style sheet.
11. Write a program to demonstrate “Embedding Style Sheets”.
12. Write a program to demonstrate “External style Sheets”.
13. Design a program to demonstrate Text and Font properties of CSS.
14. Explain the Border properties of CSS with a program.
15. Develop a program to display background properties of CSS.
16. Write a program to display the lists in HTML page using the styles of CSS
17. Write JavaScript program to add two numbers given through key board.
18. Write JavaScript program bitwise operators.
19. Write a JavaScript program to demonstrate for...in statement.
20. Write a JavaScript program to demonstrate functions.
21. Write a JavaScript program for creating and initializing arrays?
22. Write a JavaScript program to math object methods.
23. Write a JavaScript program for character processing methods
24. Write a JavaScript program using date object get and set methods.
25. Write a program to demonstrate Event Handling
  - vii. Validation of registration form -Open a Window from the current window
  - viii. Change color of background at each click of button or refresh of a page
  - ix. Display calendar for the month and year selected from combo box Onmouseover event
26. Programs using-XML SCHEMA- XSLT/XSL



**SEC3**  
**SEMESTER – V**  
**E-COMMERCE**

**UNIT-I**

Introduction to E-Commerce – Categories of E-Commerce – Economic forces and Electronic Commerce – E-Commerce opportunities – Internet and World Wide Web – Intranet and Extranet – Internet Connection options.

**UNIT-II**

Revenue models – revenue Model in Transition – Strategy issue – Creating an effective web presence – Web Marketing Strategies – Advertising on Web – Technology ECRM – Brands on web.

**UNIT-III**

Business to Business purchasing, logistics and support activities – EDI – EDI Data interchange – EDI on internet – online Auction and related business – legal environmental of E-Commerce – Ethical issues – Taxation and electronic commerce.

**UNIT- IV**

Software for web server – Web server hardware – Communication channel security – Payment cards – Electronic Cash – Electronic Wallets – Stored Value Cards.

References:

1. Schneider, E-Commerce, Thomson Publishing.
2. Albert Napier H, Rivers N Ollie, Wagnere W Stuart and Napier JB(2008) E-Business – Creating a  
Wining, 2<sup>nd</sup> Edition.
3. Murthy CSV ( 2009) E-Commerce – Concepts, Models, Strategies.
4. Bharat Bhasker (2009) Electronic Commerce – Framework Technologies and Application ,  
3<sup>rd</sup> Edition,  
New Delhi, Tata McGraw Hill Publising Company Limited.

5. ParagDiwan and Sunil Sharma (2005), E-Commerce, New Delhi, Excel Books.

### **SEC3**

## **SEMESTER V**

### **ETHICAL HACKING**

**UNIT I -ETHICAL HACKING OVERVIEW:** Introduction to Ethical Hacking– Cracking the Hacker Mindset - Developing Your Ethical Hacking Plan - Hacking Methodology

(Chapter 1 to 4)

### **UNIT II-SOCIAL ENGINEERING AND PHYSICAL SECURITY**

Introduction to Social Engineering – Performing Social Engineering Attacks - Social Engineering Countermeasures – Introduction to physical security – Handling the passwords

(Chapter 5 to 7)

**UNIT III-HACKING NETWORKS:** Introduction to Port Scanning – Types of Port Scan – Port Scanning Tools - Conducting Ping Sweeps – Introduction to War Dialing -Network Infrastructure - Wireless LANs -Hacking Wireless Network- Wireless Technology – Wireless Network Standards –Authentication

(Chapter 8 to 10)

### **UNIT IV-HACKING OPERATING SYSTEM**

Hacking windows Operating System –Selecting the essential Tools– Information Gathering – RPC - Hacking Linux Operating System-Information Gathering –NFS-File Permission-Physical Security -Introduction to Novell Netware – Authentication

(Chapter 11 to 13)

### **TEXT BOOK:**

1. Kevin Beaver, “Hacking for Dummies”, Wiley Publication, India, 2007.

### **REFERENCE BOOKS:**

1. Ankit Fadia, “Unofficial Guide to Ethical Hacking”, Macmillan Company, New Delhi, 2001.
2. Michael T. Simpson, “Ethical Hacking and Network Defense”, Cengage Learning, New Delhi, 2010.
3. Jon Erickson, Hacking: The Art of Exploitation, SPD
4. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.

**SEC-3**  
**SEMESTER-V**  
**BUSINESS INTELLIGENCE**

**UNIT - I IMPORTANT CONCEPTS**

Introduction to Data, Information, and Knowledge, Design and implementation aspect of OLTP, Introduction to Business Intelligence and Business Models, Design and implementation aspect of OLAP/Data Warehouse, BI Definitions & Concepts, Business Applications of BI, Role of DW in BI, BI system components, Components of Data Warehouse Architectures.

**UNIT - II DIMENSIONAL MODELLING AND DW DESIGN**

Star schema, Snow flake schema, and Fact Constellation schema, Grain of dimensional model, transactions, Recurring Snapshots, Accumulating Snapshots, Dimensions (SCD types, conformed dimensions) Clickstream Source Data (Google Analytics as a Clickstream Data Source), Facts (additive, semi-additive, non-additive), Hierarchy in dimensions, parent child relationships, Many-Many Dimensional relationship, Multi Valued Dimensions and Dimension Attributes.

**UNIT – III ROLE OF ETL IN BUSINESS INTELLIGENCE**

Data Quality, Data profiling, Data enrichment, data duplication, ETL Architecture and what is ETL, Extraction concept and Change data capture, Transformation concept, lookups, time lag, formats, consistency, loading concept, Initial and Incremental loading, late arriving facts, what is Staging, Data marts, Cubes, Scheduling and dependency matrix.

**UNIT – IV REPORTING**

Metadata Layer, Presentation Layer, Data Layer, use of different layers and overall Reporting architecture, Various report elements such as Charts, Tables, prompts Data aggregation: Table based, Materialized views, Query rewrite, OLAP, MOLAP, Dashboards, Ad-hoc reports, interactivity in analysis (drill down, drill up), Security: report level, data level (row, column), Scheduling.

**Text Books**

1. Reema Thareja, “Data Warehouse”, Publisher: Oxford University Press.
2. Jiawei Han, Micheline Kamber, Jian Pei “Data Mining: concepts and techniques”, 2nd Edition, Publisher: Elsevier/Morgan Kaufmann.

3.Ralph Kimball, Margy Ross, “The Data Warehouse Toolkit”, 3rd edition, Publisher: Wiley

## **SEMESTER-VI**

### **COMPUTER APPLICATIONS IN ACCOUNTING**

#### **UNIT – I**

Accounting software package : Features – Creation of Accounts – Voucher Entry – Numbering, Editing, Deleting, preparation of Purchase Book, Sales Book, Bills Receivable and Bills Payable Book. Cash Book,

#### **UNIT – II**

Preparation of Trial Balance – Income Statement – Balance Sheet of Sole Trader, Partnership, Joint Stock Companies – Grouping of Accounts.

#### **UNIT – III**

Preparation of Bank Reconciliation Statement, Registers – Inventory, Accounting – Stock Levels of EOQ – Stock Ledger – Valuation and Reporting.

#### **UNIT – IV**

What-if Analysis, Goal Seek, Scenario Manager, Data Table, Vlookup.

Financial statement Analysis : Horizontal and Vertical Analysis using Ms-Excel.

#### **TEXT BOOK**

1. *“WORK BOOK ON TALLY”* Peter Norton, *“INTRODUCTION TO COMPUTER”*, TMH.

#### **REFERENCE BOOK**

1. *Horngreen C, “INTRODUCTION TO MANAGEMENT ACCOUNTING”*, Prentice Hall, Norton.

SEC4  
**SEMESTER V**  
**INTERNET OF THINGS**

**UNIT –I**

**Introduction to IOT**

What is Internet of Things? Definition & Characteristics of IOT, Things in IOT, IOT protocols, IOT functional blocks, IOT communication models & APIs, IOT levels & Deployment Templates.

(Chapters 1.1 to 1.3.3, 1.5 to 1.5.6)

**UNIT –II**

**Domain Specific IOTs**

Introduction, Home automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle.

**IOT And M2M (MACHINE TO MACHINE)-** Introduction, M2M, Difference between IOT and M2M, SDN and NFV for IOT.

(Chapters 2.1 to 3.4)

**UNIT –III**

**IOT System Management with NETCONF-YANG**

Need for IOT System Management, Simple Network Management Protocol (SNMP), Network Operator Requirements, NETCONF, YANG, IOT Systems Management with NETCONF-YANG, NETOPEER.

(Chapters 4.1 to 4.6.1)

**UNIT –IV**

**IOT Platforms Design Methodology**

Introduction, IOT Design Methodology

**IOT Physical Device & Endpoints-** What is an IOT device, Basic Building Blocks of and IOT Device, Exemplary Device: Raspberry PI

(Chapters 5.1 to 5.2.10, 7.1 to 7.3)

**Text Book**

Internet of Things- A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti

## **Reference Books**

LuYan, Yan Zhang, Laurence T. Yang, Huansheng Ning, The Internet of Things: From RFID to the Next-Generation Pervasive Network, Aurbach publications, March,2008.

## **SEC 4 SEMESTER VI Cyber Security**

**UNIT I: – INTRODUCTION TO SECURITY TRENDS :** The Computer Security Problem - Targets and Attacks - Approaches to Computer Security - Ethics - Basic Security Terminology - Security Models.

**UNIT II :- Operational and Organizational Security:** Policies, Procedures, Standards, and Guidelines - Security Awareness and Training - Interoperability Agreements - The Security Perimeter - Physical Security - Environmental Issues - Wireless - Electromagnetic Eavesdropping - People—A Security Problem - People as a Security Tool

**UNIT III: – Cryptography in Practice** - Historical Perspectives - Algorithms - Hashing Functions - Symmetric Encryption - Asymmetric Encryption - Quantum Cryptography- Cryptography Algorithm Use

**UNIT – IV :- Authentication and Remote Access:** User, Group, and Role Management - Password Policies - Single Sign-On - Security Controls and Permissions - Preventing Data Loss or Theft - The Remote Access Process - Remote Access Methods.

### **TEXT BOOKS:**

1 .W.A.Coklin, G.White, Principles of Computer Security: Fourth Edition, McGrawHill, 2016

2.William Stallings, Cryptography and Network Security Principles and Practices,SeventhEdition,Pearson

### **REFERENCE BOOKS:**

1.Achyut S. Godbole, Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing, Tata McGraw-Hill Education, 2013

### **E BOOKS:**

1. <https://www.newhorizons.com/promotions/cybersecurity-ebooks>

**MOOC 1:** <https://www.coursera.org/learn/introduction-cybersecurity-cyber-attacks#syllabus>

**SEC-4**  
**SEMESTER-VI**  
**WEB ANALYTICS**

**Unit I:**

**Introduction to Web Analytics:** Concept of web analytics, Importance and benefits of Web Analytics, Selecting a web analytic tool, Web Metrics – Visits and Visitors, Time on page and Time on site, Bounce Rate, Exit Rate, Conversion rate, Engagement, Attributes of metrics, Strategic elements related to web metrics

**Unit II:**

**Click stream Analysis and KPI's:** Understanding the web metrics of a web site, Producing web analytics report, Foundational Analytical strategies – Segmentation, Focus on Customer Behaviour, Different Clickstream Analysis, Web analytics challenges, Actionable outcome KPIs, understanding the conversion rates, measuring macro and micro conversions.

UNIT–III:

**Leveraging Qualitative Data, Testing and Experimentation:** Lab Usability Studies, Usability Alternatives, Surveys, Web-enabled emerging user research options, Testing – A/B Testing, Multivariate Testing, Actionable Testing ideas, Controlled Experiments, Creating and Nurturing a testing culture, Competitive Intelligent Analysis – CI data sources, types and secrets, web traffic analysis, search and keyword analysis

UNIT–IV:

**Emerging Analytics: Social Analytics** – Data challenge, content democracy evolution, twitter revolution, analyzing offline customer experiences, analyzing mobile customer experiences, Measuring the success of blogs, Quantifying the impact of Twitter, Analysing performance of videos, Challenges in Online data mining and Predictive Analytics

TEXTBOOK

Kaushik, A. (2013), Web Analytics 2.0., New Delhi: Wiley India.

REFERENCE BOOKS

1. Kaushik, A. (2010), Web Analytics: An hour a day, New Delhi: Wiley India
2. Waisberg, D. (2015), Google Analytics Integration, New Delhi: Wiley India.
3. Clifton, B. (2012), Advanced Web Metrics with Google Analytics, New Delhi: Wiley India.





**B.B.A.**  
**CBCS Common core Syllabi**  
**(w.e.f. 2020-2021)**

**SEMESTER – I**

**Business Informatics**

**UNIT – I**

**INTRODUCTION TO COMPUTERS:** Introduction – characteristics of computer – Block Diagram of a Computer – Types of Computers and features – Mini Computers, Macro Computers, Mainframe Computers, Super Computers.

**Types of Programming Languages** Machine Languages, Assembly Languages, High Level Languages. **Data Organization:** Drives, Files, Directories.

**Types of Memory (Primary and Secondary)** RAM, ROM, PROM, EPROM, Secondary Storage Devices (FD, HD, CD, Pen Drives) **Input and Output devices:** Scanners, Digitizers, Plotters, LCD, Plasma Display.

**Number Systems:** Introduction to Binary, Octal, Hexa decimal Systems, Conversations.

**UNIT – II**

**Operating System and Services in OS:**

DOS – History, files and directories, Internal and External Commands, Batch files, Types of OS.

**Windows Operating Environment:**

Features of MS – Windows, Control Panel, Task Bar, Desk Top, Windows applications, Icons, Windows Accessories, Notepad, Paint brush.

### **UNIT – III**

#### **Editors and Word Processors:**

Basic Concepts, Examples: MS-Word, Introduction to Desktop Publishing, MS-Power Point.

### **UNIT – IV**

#### **Spread Sheets and Database Packages:**

Purpose, Uses, Commands, MS-Excel, Creation of files in MS-Access, Switching between Applications

#### **Text Books:**

1. *V.Rajaraman, “Fundamentals of Computers” Prentic Hall*
2. *P.K.Sinha, “Fundamentals of Computers” B.P.B.Publications*
3. *Steve Sagman, “MS – Office 2007 for Windows”*

## **SEMESTER – II**

### **Database Management System**

#### **Unit – I**

##### **The Database Environment:**

Basic concept and definition: File Processing system. The range of Database application, advantages of the database approach, costs and risks of the database approach, components of the database environment.

##### **Data Development process:**

Database development within information system development, database development process, three schema architecture for database development, three tiered database location architecture.

#### **Unit – II**

##### **Modeling data in the organization:**

Modeling the Rules of the organization. The E-R model , E- R Diagram, entity relationship model constructs – Entity, Attribute , relationships, Degree of Relationship.

#### **Unit – III**

##### **Logic database design and the Relational model :**

The Relational data model - Integrity constraints , Transforming E-R model into relations Introduction to normalization. The basic normal forms first , second , third .

**Physical Database Design and Performance :**

Physical database design process , designing fields , designing physical records , designing physical files . Designing databases

**Unit – IV**

**SQL :**The SQL environment defining a database in SQL , Inserting , updating and Deleting data. Processing Single tables.

**Advanced SQL :**Processing Multiple Tables , Triggers and Routines .

**Text Book :**

Jeffrey A Hoffer , Mary B. Prescott and Fred R Mc Fadden “ Modern database Management “ , Pearson Education Asia – Sixth Edition.

SQL: A Complete Reference Paperback by Alexis Leon , Mathews Leon.

**Reference Text Books :**

1. Ramez Elmasri and Shamkant b Navathe , “ Database Systems” , Pearson Edc. Asia 4<sup>Th</sup> edition.
2. Raghurama Krishna and Johannes Gehrke , “ Database Management System “ , Mc Graw Hill.

**SEMESTER – III****E-COMMERCE****UNIT-I**

Introduction to E-Commerce – Categories of E-Commerce – Economic forces and Electronic Commerce – E-Commerce opportunities – Internet and World Wide Web – Intranet and Extranet – Internet Connection options.

**UNIT-II**

Revenue models – revenue Model in Transition – Strategy issue – Creating an effective web presence – Web Marketing Strategies – Advertising on Web – Technology ECRM – Brands on web.

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3<sup>rd</sup> Edition,  
New Delhi, Tata McGraw Hill Publising Company Limited.
5. ParagDiwan and Sunil Sharma (2005), E-Commerce, New Delhi, Excel Books.

## **SEMESTER – IV**

### **WEB TECHNOLOGIES**

#### **UNIT-I**

**Introduction**-world wide web, web Browsers, web Servers, uniform Resource Locators, HTTP. HTML5: Introduction, Formatting and Fonts - Commenting code, Links, Images, Multimedia, Lists, Tables, Frames- Creating Forms.

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**Introduction to Cascading Style Sheets**, Inline Styles, Embedded Style Sheets, Linking External Style Sheets, Backgrounds, Box Model and Text Flow, Drop-Down Menus.

**JavaScript-Introduction**- Displaying a Line of Text with JavaScript in a Web Page, Modifying Your First Script, Obtaining User Input with prompt Dialogs, Dynamic Welcome Page, Adding Integers, Memory Concepts.

#### **UNIT – III**

**JavaScript**-Operators, decision making, control structures, if... else statement, while, counter-controlled repetitions, switch statement, do... while statement, break and continue statements, Functions – program modules in JavaScript, programmer-defined functions, functions definition, scope rules, global functions, Arrays- introduction, declaring and allocating arrays.

#### **UNIT– IV**

**JavaScript**-Objects – Math Object, String Object, Date Object, Boolean & Number Object, document and window Objects. Event Model – onclick, onload, onmouseover, onmouseout, onfocus, onblur, onsubmit, onreset, more DHTML events.

**Introduction**-XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3CXMLSchemaDocuments,XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

**TEXTBOOKS:**

1. Internet & World Wide Web-H. M. Deitel, P.J. Deitel, A. B. Goldberg-Third Edition
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**WEB TECHNOLOGIES**

**PRACTICAL QUESTION BANK**

1. A Web Page in HTML to show all the Text, Color, Background and Font Elements
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  - x. Validation of registration form -Open a Window from the current window
  - xi. Change color of background at each click of button or refresh of a page
  - xii. Display calendar for the month and year selected from combo box  
Onmouseover event
26. Programs using-XML SCHEMA- XSLT/XSL

# Master of Computer Applications

## CBCS Common core Syllabi

### *(w.e.f.2020-2021)*

#### SEMISTER-I

#### OPERATINGSYSTEMS

#### UNIT – I

##### **INTRODUCTION:**

What Operating Systems? Types of operating systems, Introduction to MS DOS, Internal and External commands, Introduction to Linux, basic Linux commands operating system structure, operating system operations, Computing Environments.

SYSTEM STRUCTURES: Operating system Services, User Operating system Interface , System calls, Types of system calls, System programs, Operating system Design and implementation, Virtual Machine . **(CHAPTERS 1,2)**

#### UNIT– II

**PROCESS CONCEPT:** Overview, Process Scheduling , Operations on processes , Inter-process communication , Examples of IPC Systems, Communication in Client-server systems **MULTITHREADED PROGRAMMING :** Overview, Multithreading Models Window 2000 threads, Linux Threads **PROCESS SCHEDULING:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Process Scheduling Models. **(CHAPTERS 3, 4, 5)**

#### UNIT–III

**SYNCHRONIZATION:** Background, The Critical-Section Problem, Peterson's solution, Synchronization Hardware, Semaphore, Classic Problems of Synchronization , Monitors, Synchronization Examples, Atomic Transactions. **DEADLOCKS :** System Model ,Deadlock Characterization ,Methods for handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. **(Chapters 6, 7)**

## UNIT– IV

**Memory-Management:** Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation. Virtual- Memory Management: Background, Demand Paging, Copy-on-write, Page Replacement, Allocation Of Frames, Thrashing. Secondary-Storage Structure: Overview of Mass-storage structure, Disk structure, Disk Attachment, Disk Scheduling, Disk Management, RAID Swap Space Management, RAID Structure, Stable storage Implementation. **(Chapters 8, 9 And 12)**

### TEXTBOOK:

1. OperatingSystemPrinciples (7<sup>th</sup>Edition)By– Abraham Silberschatz, Peter BaerGalvin, Gr

### REFERENCEBOOKS:

1. OperatingSystems(IvEdition)By-WilliamStallingsPhi(2002)
2. OperatingSystemsBy-GaryNutt(PearsonEducation)
3. OperatingSystemsBy-CharlesCrowley Tmh(2000)
4. ModernOperatingSystemsBy -A.S.Tanenbaum(Phi)(2002)
5. OperatingSystemsBy– DmDhamdhere

## OPERATINGSYSTEM-LAB

- a. MSDOSInternalandExternalcommands
- b. Linuxbasic commands
- c. Unixshellprogramsusingvariouscontrol structures
- d. SimulatethefollowingCPUSchedulingalgorithms
  - i. RoundRobin
  - ii. SJF
  - iii. FCFS
  - iv. Priority
- e. Simulateallfileallocationstrategies.
  - i. Sequential
  - ii. Indexed
  - iii. Linked
- f. SimulateallFileorganizationtechniques.
  - i. Singleleveldirectory
  - ii. Twolevel
  - iii. Hierarchical
  - iv. DAG
- g. SimulateBankersAlgorithmforDeadLockAvoidance
- h. SimulateBankersAlgorithmDeadLockPrevention.
- i. SimulateallPagereplacementalgorithms.
  - i. FIFO
  - ii. LRU
  - iii. LFU
  - iv. Etc....
- j. SimulatePagingTechniquesofmemorymanagement



**SEMESTER – I**  
**DATABASE MANAGEMENT SYSTEMS**

**UNIT-I**

**Overview Of Database Systems:** File Systems Versus A Dbms - Advantages Of A Dbms - Describing And Storing Data In A Dbms- Structure Of A Dbms

**Introduction To Database Design:** Database Design And ER Diagrams- Entities, Attributes And Entity Sets- Relationships And Relationship Sets- Additional Features Of The ER Model-Case Study-The Internet Shop

**The Relational Model:** Introduction To The Relational Model- Integrity Constraints Over Relations- Enforcing Integrity Constraints - Querying Relational Data- Introduction To Views- Destroying/Altering Tables And Views- Case Study

**(Chapters 1.3,1.4,1.5,1.8,2.1,2.2,2.3,2.4,2.8,3.1,3.2,3.3,3.4,3.6,3.8)**

**UNIT-II**

**Relational Algebra And Calculus:** Relational Algebra- Relational Calculus

**Schema Refinement And Normal Forms:** Introduction To Schema Refinement, Functional Dependencies, Reasoning About FDs, Normal Forms, Properties Of Decompositions, Normalization, Schema Refinement In Database Design, Other Kinds Of Dependencies.

**(Chapters 4.2,4.3,19.1 To 19.8)**

**UNIT – III**

**Overview Of Transaction Management:** The Acid Properties, Transactions And Schedules, Concurrent Execution Of Transactions, Lock-Based Concurrency Control, Transaction Support In Sql,

**Concurrency Control:** Introduction To Lock Management, Lock Conversions, Dealing With Deadlocks, Specialized Locking Techniques, Concurrency Control Without Locking.

**(Chapters 16.1 To 16.6,17.2,17.3,17.4,17.5,17.6)**

**UNIT –IV**

**Crash Recovery:** Introduction To ARIES, The Log, Other Recovery-Related Structures, The Write-Ahead Log Protocol, Check pointing, Recovering From A System Crash

**Overview Of Storage And Indexing:** Data On External Storage, File Organizations And Indexing, Index Data Structures, Comparison Of File Organizations Tree-Structured Indexing: Intuition For Tree Indexes, Indexed Sequential Access Method (ISAM).

**(Chapters 18.1 To 18.6, 8.1 To 8.4 ,10.1,10.2)**

**TEXT BOOKS:**

- 1) Data Base Management System 3rd Edition By Raghu Rama Krishna & J Gehrke
- 2) Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Fifth Edition.
- 3) Database System Concepts (Iv Edition) By - Silber Schatz, Korth G. Sudarshan (Tmh 2002)

**REFERENCES BOOKS:**

- 1) Database Management Systems By - Alexi's Leon And Mathews Leon ( Lionvikas -2002)
- 2) Database Management Systems (Ii Edition) - Gerald. V. Post
- 3) Modern Databse Management(IV Ed)By F.R.McFadden, J.A.Hoffer, B.Prescott(Addison Wisley 2K)
- 4) Databse Management (Iii Edition) By - Pratt And J.J. Adamski (Thomson Education-2002)
- 5) Database Application Development & Design-Manino(McgrawHil)
- 6) Database Systems Connoly, Begg (Pearson) 8 Database System Implementation – Garcia, Molna, Ullman, Widon (Phi)

**SEMESTER– I**

**Object Oriented Programming**

Theory	4 Hours/Week	4 credit
Practical	4 Hours/Week	2 credit

**UNIT – I**

Introduction to object oriented programming & concepts- Classes and Objects- defining member functions, creating and using objects, History of C++, Structure of C++ program, tokens, Basic Data types, User defined Data types, Reference variables, operators in C++, control structures-if, switch, loops.

**UNIT – II**

Functions in C++, Function prototyping, call by value, call by reference, void functions, recursive

functions, inline functions, private member functions, Friend Functions, Virtual functions, defining Class ADT'S.

### **UNIT – III**

Constructors and Destructors, function overloading and operator overloading. Arrays- single dimensional and double dimensional arrays, Strings – String functions, Pointers and Dynamic Arrays

### **UNIT – IV**

C++ Stream - unformatted console I/O operations-get(),put() functions formatted console I/O operations – ios format functions, manipulators Inheritance - single inheritance, multiple inheritance ,multilevel inheritance, hybrid, hierarchical inheritance , Polymorphism, templates functions.

### **PRESCRIBED BOOKS:**

3. *E.Balagurusamy,"Object oriented programming with C++", McGraw-Hill, fourth edition*
4. *Walter Savitch,"Problem Solving with C++", Addison-Wesley (low price edition).*

### **REFERENCES BOOKS:**

1. *K.R. Venugopal, Rajkumar and T. Ravishankar,"Mastering C++", Tata McGraw Hill Publishing Co. Ltd. 2000*

## **SEMESTER – II**

### **COMPUTER NETWORKS**

#### **UNIT I - Introduction**

Networks, The Internet, protocols and standards, the OSI model, layers in OSI model, TCP/IP suite, Addressing, Physical Layer: Digital Transmission, Multiplexing, Transmission media. (Chapter: 1, 2, 3.1, 4, 6.1, 7)

#### **UNIT II - Switching-circuit**

Switched networks, Datagram networks, virtual circuit networks, switch and Telephone network. Data link layer: Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels. Medium Access sub layer: Random access, controlled access, channelization, IEEE standards, Ethernet, Fast Ethernet, Giga-Bit Ethernet. (Chapter: 8, 9, 10, 11.1, 11.2, 11.3, 11.4, 11.5, 12, 13)

#### **UNIT III - Connecting LANs-Connecting Devices:**

Frame Relay and ATM. Network Layer: Logical addressing, Internetworking,IPV4,IPV6,

Delivery, Forwarding, uni-cast routing protocols, multicast routing protocols.

(Chapter: 15.1, 18.1, 18.2, 19.1, 19.2, 20.1, 20.2, 20.3, 22 )

#### **UNIT IV - Transport Layer:**

Process to process delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion control, Two Examples, QoS, Techniques to improve QoS. Application Layer – Name Space, Domain name space, Distribution of Name Space, DNS in internet, Remote Logging, Electronic mail, FTP, HTTP

**(CH:23.1,23.2,23.3,24.1, 24.2,24.3,24.4,24.5,24.6,,25.1,25.2,25.3,25.4, 26 ,27.3)**

#### **TEXT BOOK:**

1. Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition TMH, 2006.

#### **REFERENCE BOOKS:**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
3. Computer and Communication Networks Nader F. Mir, Person Education
4. Computer Networking: A Top-Down Approach Featuring the Internet, James Kurose, K.W. Ross, 3<sup>rd</sup> Edition, Pearson Education.
5. Computer Networks -- Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

## **Computer Network Lab**

**The following experiments shall be conducted using either NS228/OPNET or any other simulators.**

1. Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped.
2. Simulate a four node point-to-point network, and connect the links as follows:  
n0- n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/UDP.
3. Simulate the different types of Internet traffic such as FTP a TELNET over a network and analyze the throughput.
4. Simulate the transmission of ping message over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
5. Simulate an Ethernet LAN using N-nodes(6-10), change error rate and data rate and compare the throughput.

6. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and determine collision across different nodes.
7. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and plot congestion window for different source/destination.  
Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation  
And determine the performance with respect to transmission of packets.

## **SEMESTER– II**

### **Internet Technologies**

#### **UNIT-I**

INTRODUCTION TO INTERNET: Internet Overview- Networks - Web Protocols — Web Organization and Addressing - Web Browsers and Web Servers - Security and Vulnerability- Web System Architecture – URL - Domain Name Client-side and server-side scripting.

WEB DESIGNING HTML5 – Form elements, Input types and Media elements, CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface

#### **UNIT-II**

CLIENT-SIDE PROCESSING AND SCRIPTING JavaScript Introduction – Functions – Arrays – DOM, Built-in Objects, Regular Expression, Exceptions, Event handling, Validation.

SERVER SIDE PROCESSING AND SCRIPTING - PHP Introduction to PHP – Operators – Conditionals – Looping – Functions – Arrays- Date and Time Functions – String functions - File Handling - File Uploading

#### **UNIT-III**

SESSION MANAGEMENT and DATABASE CONNECTIVITY Sessions-Cookies-MYSQL Basics – Querying single and multiple MYSQL Databases with PHP – PHP BOOTSTRAP 4: Overview, Environment setup, Layout, Grid System, Content, Components, Utilities

#### **UNIT-IV**

APPLICATION DEVELOPMENT USING NODE JS: Introduction to Node.js- Installing Node.js - Using Events, Listeners, Timers, and Callbacks in Node.js – Introduction to MongoDB- Accessing MongoDB from Node.js

**Text books:**

1. Paul Deitel, Harvey Deitel, Abbey Deitel, Internet & World Wide Web - How to Program, 5th edition, Pearson Education, 2012
2. Stephen Radford, Learning Web Development with Bootstrap and AngularJS.
3. Brad Dayley, Brendan Dayley, and Caleb Dayley , Node.js, MongoDB and Angular Web Development: The definitive guide to using the MEAN stack to build web applications, 2nd Edition, Pearson Education, 2018

**Reference book:**

1. Lindsay Bassett, Introduction to JavaScript Object Notation, 1st Edition, O'Reilly Media, 2015
2. Fritz Schneider, Thomas Powell , JavaScript – The Complete Reference, 3rd Edition, McGraw Hill, 2017
3. Steven Holzener , PHP – The Complete Reference, 1st Edition, Mc-Graw Hill, 2017
4. Sandeep Kumar Patel, Developing Responsive Web Applications with AJAX and JQuery, Packt Publications, 2014
5. [www.Tutorialspoint.com](http://www.Tutorialspoint.com).

**SEMISTER–II**

**Software Engineering**

**UNIT I: PROCESS**

Product and Process – Evolution Process and Activities – Software Development Lifecycle Models: Waterfall Model – Incremental Models – Evolutionary Models – Spiral Model – Unified model – Prototype model – Agile methods. Functional and Non Functional Requirements – Software Requirements Document – Requirements Specification – Requirements Engineering Processes – Requirements Elicitation & Analysis – Requirements Validation – Requirements Management.

**UNIT II: ANALYSIS AND DESIGN**

Analysis Modeling Approaches: Scenario Based Modeling – UML Models – Data Modeling Concepts: Class Based Modeling, Flow Oriented Modeling – Design Process and Concepts – Design Model – Architectural Design – Pattern Based Design – Web App Design – Real Time Software Design – System Design – Data flow Oriented Design – Designing for Reuse User Interface Design: Interface analysis, Interface Design – Component level Design: Designing Class Based Components, Traditional Components. SRS Document, IEEE Standards for SRS.

### **UNIT III: SOFTWARE TESTING**

Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality. Frameworks, ISO 9000 Models, SEI-CMM Model. Software Testing Strategies – White Box Testing – Black Box Testing – Basis Path Testing – Control Structure Testing – Regression Testing – Unit testing – Integration Testing – Validation Testing – System testing – Art of Debugging.

### **UNIT IV MANAGEMENT AND METRICS**

Software Configuration Management – Product metrics- Project management concepts – Process and Project Metrics – Estimation for software projects – Project scheduling – Risk Management – Maintenance and Re – engineering – CASE Tools.

### **REFERENCES:**

Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, Seventh Edition, McGraw Hill International edition, 2009.

Ian Sommerville, “Software Engineering, Ninth Edition”, Pearson Education, 2008.

Watts S. Humphrey, “A Discipline for Software Engineering”, Pearson Education, 2007.

## **SEMESTER-II**

### **Java Programming**

#### **UNIT – I**

**FILES AND STREAMS:** Introduction, Data Hierarchy, Files and Streams, Creating a Sequential-Access File, Random-Access Files, Reading Data Sequentially from a Random Access File.

**NETWORKING:** Introduction, Manipulating URLs, Reading a File on a Web Server, Establishing a Simple Server, Establishing a Simple Client, Client/Server Interaction with Stream Socket Connections, Connectionless Client/Server Interaction with Datagram’s, Client/Server Tic-Tac-Toe Using a Multithreaded Server, Security and the Network.

#### **UNIT –II**

**JDBC:** JDBC Overview, Architecture, Types of JDBC Drivers, Driver Manager; Database Connection Statements , Result Set, transaction, Data Base Metadata, Result Set Metadata and Aggregate functions, Prepared Statement, Callable Statement, Connection to various back ends.; New Features in the JDBC 2.0 /3.0 /4.0 API

**RMI:** Introduction, Defining the Remote Interface Implementing the Remote Interface, Define the Client, Compile and Execute the Server and the Client. Case Study on creating a distributed system with database programming.RMI Security.

### **U N I T – III**

**SERVLETS:** Servlet Basics, Setting up Servlet API. Creating a Java Web Application, The Servlet URL and Invoking Web Page, Servlet Structure, Testing a Servlet, Passing Data. Overview of Serves, Interacting with Clients, Servlet Runner Utility, Running Servlets. WEB SERVERS: Server installation, configuration and deployment procedure. MORE ON SERVLETS: The javax. servlet HTTP package, Handling Http Request & Responses, Accessing a Database Data Manipulation Operations via a Servlet; Using Cookies-Session Tracking, Security Issues.

### **U N I T – IV**

**INTRODUCTION TO JSP:** The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture's APPLICATION DEVELOPMENT: Generating Dynamic Content, JSP Tags, Using Scripting Elements Implicit JSP Objects, JSPRationale behind JSP's, compilation and execution, collaborating with Servlets, JSP's in Action, Error Pages, Using JSP's to access databases and remote databases.

### **TEXT-BOOK**

1. An Introduction to Network Programming with Java, Jan Graba (Springer)
2. Java how to Program Third Edition - Deitel & Deitel
3. The Java Tutorial contined, Compione, Walrath, Huml, Tutorial Team - Addison Wesley

### **REFERENCE BOOKS**

1. Java Server Pages –Hans Bergsten, SPD O'Reilly.
2. J2EE 1.4 Bible (Dreamtech-2003).
3. Advance Java Technology – Prof. Savaliya- Dreamtech Press.
4. Java Server Programming, J2EE 1.6- KONGENT- Dreamtech press.

## **SEMISTER–II**

### **Data Analytics**

#### **UNIT I : INTRODUCTION TO BIG DATA AND HADOOP**



Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to InfosphereBigInsights and Big Sheets.

## **UNIT II : HDFS(Hadoop Distributed File System)**

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, DataIngest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

## **UNIT III : Map Reduce**

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

## **Unit IV : Hadoop Eco System**

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase :HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction

## **Text Books**

1. Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
2. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.

## **References**

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics
4. with Oracle R
5. Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle
6. press.
7. AnandRajaraman and Jeffrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
8. Pete Warden, “Big Data Glossary”, O’Reily, 2011.
9. Michael Mineli, Michele Chambers, AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
10. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012

## SEMESTER III

### ARTIFICIAL INTELLIGENCE

#### UNIT – I

15 Hrs

**Introduction** – What is AI? – History of AI – **Intelligent Agents** – Agents and Environment – Good Behavior – The Nature of Environments – The Structure of Agents

#### **Problem Solving**

Solving Problems by Searching – Problem Solving Agent – Example Problems – Searching for Solution – Uniformed Search Strategies

(Chapter 1- 1.1,1.3, 2, 2.1 to 2.4, 3, 3.1 to 3.4)

#### UNIT – II

15 Hrs

#### **Informed Search and Exploration**

Informed search – Strategies – A\* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm

#### **Adversarial Search**

Optimal decisions in games - Pruning - Imperfect decisions –Alpha-Beta pruning – Games that include an element of chance.

(chapters 4,4.1, 4.2, 4.3, 6, 6.1, 6.2, 6.3, 6.4, 6.5)

#### UNIT – III

15 Hrs

#### **Knowledge and Reasoning**

Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules – First-order logic – Syntax and semantics – Situation calculus – Building a knowledge base – Electronic circuit domain – Ontological Engineering – Forward and backward chaining – Resolution – Truth maintenance system -Mental Events and Mental Objects.

(Chapters 7, 7.1 to 7.4,8, 8.1 to 8.3, 9.1 to 9.4, 10.1,10.2)

#### UNIT – IV

15 Hrs

#### **Applications**

AI applications – Language Models –Text Classification - Information Retrieval- Information Extraction – Natural Language for Communication – Phrase Structure – Syntactic Analysis – Machine Translation – Speech Recognition – Robot

(chapters 22,23, 25) 3<sup>rd</sup> Edition

#### **Text Book**

1. Stuart J. Russel, Peter Norvig, "Artificial Intelligence A Modern Approach ", 2<sup>nd</sup> Edition, Pearson Education, 2003.
2. Stuart J. Russel, Peter Norvig, "Artificial Intelligence A Modern Approach ", 3<sup>rd</sup> Edition, Pearson Education, 2009

**Reference Books**

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009.
2. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc., 1<sup>st</sup> Edition, 2008.

## SEMESTER III

### MOBILE APPLICATION DEVELOPMENT

#### UNIT I

Get started, Build your first app: Install Android Studio and run Hello world, make your first interactive UI, using layouts, Working with TextView Elements, Learning about available Resources, **Activities**: Create and Start activities, Activity LifeCycle and State, Activities and Implicit Intents, Testing, debugging and using support libraries, User Interaction, Delightful user experience, Testing your UI

#### UNIT 2:

**Background Tasks**: create an AsyncTask, Connect to the Internet with AsyncTask and AsyncTaskLoad, Broadcast Receivers, **Triggering, scheduling and optimizing background tasks**: Notifications, Alarm Manager, Job Scheduler

#### UNIT 3

All about data, Preferences and Settings: Shared Preferences, Adding settings to an App, Storing data using SQLite: SQLite Database, Searching a SQLite Database, Sharing data with content providers, Loading data using Loaders

#### UNIT 4

Permissions, Performance and Security, Firebase and AdMob, Publish

#### Course outcomes:

The students should be able to:

- Create, test and debug Android application by setting up Android development environment
- Implement adaptive, responsive user interfaces that work across a wide range of devices.
- Infer long running tasks and background work in Android applications
- Demonstrate methods in storing, sharing and retrieving data in Android applications
- Analyze performance of android applications and understand the role of permissions and security
- Describe the steps involved in publishing Android application to share with the world

#### Text Books:

1. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017.
2. <https://www.gitbook.com/book/google-developer-training/android-developerfundamentals-course-concepts/details> (Download pdf file from the above link)

## **Reference Books:**

1. Erik Hellman, “Android Programming – Pushing the Limits”, 1st Edition, Wiley India Pvt Ltd, 2014.
2. Dawn Griffiths and David Griffiths, “Head First Android Development”, 1st Edition, O’Reilly SPD Publishers, 2015.
3. J F DiMarzio, “Beginning Android Programming with Android Studio”, 4th Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
4. Anubhav Pradhan, Anil V Deshpande, “ Composing Mobile Apps” using Android, Wiley 2014, ISBN: 978-81-265-4660-2

## **SEMESTER III**

### **.NET PROGRAMMING WITH C#**

#### **UNIT – I**

Introduction: architecture and components of .NET framework 4.5, managed code, intermediate language, meta data and JIT compiler, common language runtime, automatic memory management, private and shared assemblies, exploring Visual Studio .NET IDE. Introduction to C#: identifiers, keywords, data types, variables, constants, operators, precedence, associativity, type conversion, decision and loop statements, generics, enumerations, namespaces. Object Oriented Programming: encapsulation, inheritance, polymorphism, abstraction, interfaces. ( Chapters 1, 3, 4, 5)

#### **UNIT – II**

Introduction to Windows Programming: creating windows forms, windows controls, menus and dialogue boxes, overview of xml. Window programming vs. Window presentation foundation, main features of WPF 4.5, WPF 4.5 architecture, WPF 4.5 class hierarchy, types of WPF applications, WPF 4.5 designer interface, Using XAML in WPF 4.5 applications, WPF properties, WPF events, working with dialog boxes in WPF application, compiling and running WPF 4.5 applications, WPF 4.5 controls, resources, styles, templates, commands. (Chapter 8)

#### **UNIT – III**

Introduction to ASP.NET: ASP.NET life cycle, exploring ASP.NET 4.5 web application, creating a sample ASP.NET 4.5 website, application structure and state, global.asax application file, web forms – standard controls, validation controls, master pages, webservice. (Chapters: 18, 20, 21, 23)

## UNIT – IV

Introduction to SQL, architecture of ADO.NET, creating a connection to a database, OLEDB database, using OLEDB adapter for excel file, ODBC data source, ADO.NET commands, data adapters, creating data view, data reader. (Chapters:11, 12)

Text Kogent Learning Solutions Inc., .NET 4.5 Programming – Black Book (dreamtech)

### References

1. Joseph Albahari, Ben Albahari, C# 6.0 in a Nutshell
  2. Christian Nagel, Professional C# 6 and .NET Core 1.0
  3. Andrew Troelsen, Philip Japikse, C# 6.0 and the .NET 4.6
  4. Paul Deitel, Harvey Deitel, Visual C# 2012 – How to Program
  5. Bill Sempf, Chuck Sphar, Stephen R Davis, C# 5.0 all-in-one for Dummies
  6. Mark J Price, C# 6 and .NET Core 1.0 – Modern Cross-platform Development
- Benjamin Perkins, Jacob Vibe Hammer, Jon D. Reid, Beginning C# 6 Programming with Visual Studio 2015

## SEMESTER III

### CRYPTOGRAPHY AND NETWORK SECURITY

#### ELECTIVE I

##### UNIT I

**Introduction** -The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security (1.2, 1.3, 1.4, 1.5, 1.6)

**Classical Encryption Techniques** - Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. (2.1, 2.2, 2.3, 2.4, 2.5)

**Block Ciphers and the Data Encryption Standard** – Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles (3.1, 3.2, 3.3, 3.5)

##### UNIT II

**Confidentiality Using Symmetric Encryption** – Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation (7.1, 7.2, 7.3, 7.4)

**Introduction to Number Theory** – Prime Numbers, Fermat's and Euler's Theorems, Discrete Logarithms (8.1, 8.2, 8.5)

**Public- Key Cryptography and RSA** – Principles of Public – Key Cryptosystems, The RSA Algorithm (9.1, 9.2)

**Key Management; Other Public-Key Cryptosystems**- Key Management, Diffie -Hellman Key Exchange, Elliptic Curve Cryptography (10.1, 10.2, 10.4)

### **UNIT III**

**Message Authentication and Hash Functions** – Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs (11.1, 11.2, 11.3, 11.4, 11.5)

**Digital Signatures and Authentication Protocols** – Digital Signatures, Authentication Protocols, Digital Signature Standard (13.1, 13.2, 13.3)

**Electronic Mail Security** – Pretty Good Privacy, S/ MIME (15.1, 15.2)

### **UNIT IV**

**IP Security** – IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management (16.1, 16.2, 16.3, 16.4, 16.5, 16.6)

**Intruders** – Intruders, Intrusion Detection, Password Management (18.1, 18.2, 18.3)

**Malicious Software** – Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks (19.1, 19.2, 19.3)

**Firewalls** – Firewall Design Principles, Trusted Systems (20.1, 20.2)

**TEXT BOOK:** CRYPTOGRAPHY AND NETWORK SECURITY Principles and Practices, 4<sup>th</sup> Edition By William Stallings (Prentice Hall)

### **REFERENCES:**

1. Cryptography And Network Security By Atul Kahate ,TMH
2. Introduction to cryptography by J A Buchanan (Springer).
3. Bruce Schneier, “Applied Cryptography” , 2<sup>nd</sup> Edition, Toha Wiley And Sons ,1996.
4. Douglas R. Stinson “Cryptography – Theory and Practice”, CRC Press ,1995.
5. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security,Wiley India Pvt. Ltd.
6. Behrouza Foruzan,Cryptography and Network Security, Tata McGraw Hill 2007.

**SEMISTER-III**  
**DESIGN PATTERNS**  
**(ELECTIVE-I)**

**UNIT-I**

Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

**UNIT-II**

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary. Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

**UNIT-III**

Structural Pattern Part-I : Adapter, Bridge, Composite. Structural Pattern Part-II : Decorator, façade, Flyweight, Proxy.

**UNIT-IV**

Behavioral Patterns Part-I : Chain of Responsibility, Command, Interpreter, Iterator. Behavioral Patterns Part-II : Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

**TEXT BOOK :**

1. Design Patterns By Erich Gamma, Pearson Education

**REFERENCES**

1. Pattern's in JAVA Vol-I By Mark Grand ,Wiley Dream Tech.
2. Pattern's in JAVA Vol-II By Mark Grand ,Wiley Dream Tech.
3. JAVA Enterprise Design Patterns Vol - III By Mark Grand ,Wiley Dream Tech.
4. Head First Design Patterns By Eric Freeman-Oreilly-sp
5. Design Patterns Explained By Alan Shalloway, Pearson Education.



6. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

## SEMESTER III

### ELECTIVE - I

#### DESIGN AND ANALYSIS OF ALGORITHMS

##### OBJECTIVES:

- To understand and apply the algorithm for analysis.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem.
- To understand different algorithm design techniques.
- To understand the limitations of Algorithmic power.

##### COURSE OUTCOMES:

- Ability to analyze the performance of algorithms.
- Ability to choose appropriate algorithm design techniques for solving problems.
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.
- To introduce P and NP classes.

##### UNIT – I

**Introduction:** Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types. **Fundamentals of the Analysis of Algorithm:** The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive & Recursive Algorithms. **Brute Force Search:** Selection Sort, Bubble Sort, Sequential Search, Brute-Force String Matching, Exhaustive Search, Depth-First Search, Breadth-First Search.

(Chapters 1.1 to 1.3, 2.1 to 2.4, 3.1 to 3.5)

##### UNIT – II

**Decrease-&-Conquer:** Insertion Sort, Topological Sorting, Binary Search, Interpolation Search. **Divide-and-Conquer:** Merge Sort, Quick Sort, Multiplication of Large Integers, Strassen's Matrix Multiplication, **Transform-and-Conquer:** Presorting, Balanced Search Trees, Heaps and Heap Sort, Problem Reduction. **Space and Time Trade-Offs:** Hashing, B-Trees.

(Chapter 4.1 to 4.5, 5.1, 5.2, 5.4, 6.1,6.3,6.4,6.6, 7,7.3,7.4)

##### UNIT – III

**Dynamic Programming:** Knapsack Problem, Optimal Binary Search Trees, Warshall's and Floyd's Algorithms. **Greedy Technique:** Prim's Algorithm, Kruskal's Algorithm, Dijkstra's

Algorithm, Huffman Trees and Codes. **Iterative Improvement:** Simplex Method, Maximum-Flow Problem.

(chapter 8,8.2,8.3,8.4, 9,9.1,9.2,9.3,9.4, 10,10.1,10.2)

#### **UNIT – IV**

**Limitations of Algorithm Power:** Lower-Bound Arguments, Decision Trees, P, NP, and NP-Complete Problems. **Backtracking:** n-Queens Problem, Hamiltonian Circuit Problem, Subset-Sum Problem, **Branch-and-Bound:** Assignment Problem, Knapsack Problem, Traveling Salesman Problem, Approximation Algorithms for the Knapsack Problem.

(Chapter 11, 11.1, 11.2, 11.3, 12.1, 12.2, 12.3)

#### **TextBook**

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms (3e)

#### **References**

1. Richard Neapolitan, Foundations of Algorithms
2. Thomas H. Cormen, Introduction to Algorithms
3. E. Horowitz, S. Sahni, Fundamentals of Computer Algorithms

### **SEMESTER III**

#### **ELECTIVE - I**

#### **SOFTWARE TESTING**

**Credits: 4**

**IA: 30 Marks**

**Contact Hrs: 4  
Marks**

**End Exam: 70**

#### **OBJECTIVES:**

- To learn the criteria for test cases.
- To learn the design of test cases.
- To understand test management and test automation techniques.
- To apply test metrics and measurements.

#### **OUTCOMES:**

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

- Design test cases suitable for a software development for different domains.
- Identify suitable tests to be carried out.
- Prepare test planning based on the document.
- Document test plans and test cases designed.

#### **UNIT – I      Testing Strategies:**

A strategic approach to software testing – Verification and Validation –Organizing for Software Testing – Testing Strategies – Criteria for completion of testing – unit, integration, validation and system testing – debugging. TESTING TACTICS: Testing Fundamental – White Box, Black Box, and Control Structure Testing –Object Oriented Testing Methods PRODUCT METRICS: Software Quality – Mc Call’s Quality Factors – ISO 9126 Quality Factors –Measures, Metrics and Indicators – Measures for analysis, design, code and testing – metrics for maintenance.

(Chapters-13,14,15)

## **UNIT – II Project Management:**

The Management Spectrum – The People – The Product – The Process –The Project – The W5HH Principle – Critical Practices. ESTIMATION: Observations on Estimation – The Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation – Decomposition Techniques – Empirical Estimation Models – Estimation for Object-Oriented Projects – Specialized Estimation Techniques– The Make/buy Decision.

(Chapters -21,23)

## **UNIT – III Risk Management:**

Reactive vs. Proactive Risk Strategies – Software Risks – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring, and Management – The RMMM Plan. QUALITY MANAGEMENT: Quality Concepts – Software Quality Assurance – Software Reviews – Formal Technical Reviews – Formal Approaches To SQA – Statistical Software Quality Assurance –Software Reliability – The ISO 9000 Quality Standards – The SQA Plan.

(Chapters - 25, 26)

## **UNIT – IV Test Planning Management, Execution, and Reporting:**

Introduction, Test Planning, Test Management, Test Process, Test Reporting Software Test Automation—What To Automate, Scope Of Automation, Design And Architecture for Automation, Generic Requirements For Test Tool Framework, Process Model for Automation, Selecting a Testing Tool

(Chapters-15,16 from Book-II)

## **TEXT BOOKS:**

3. Software Engineering By R.S. Pressman (Mcgraw Hill Sixth Edition)
4. Software Testing Principles And Practices--- Srinivasan Desikan, Gopalaswamy Ramesh

## **REFERENCE BOOKS:**

1. Software Engineering By Ghazzi (Phi)
2. Software Engineering By Fairley (Mcgraw Hill)
3. Software Engineering By Behforouz And Hudson ?9Oxford University Press)
4. Software Engineering Theory & Practice By Pfleeger (Pearson)

5. Software Engineering By KR Agarwal & Yogesh Singh (New A

**SEMESTER IV**  
**INTERNET OF THINGS**

**Credit: 4**

**Objectives:**

To introduce the terminology, technology and its applications.

To introduce the concept of M2M (Machine to Machine) with necessary protocols.

**Outcomes:**

Understanding of IOT structure, applications areas and technologies involved

Understanding the IOT protocols and web of things

Understanding the concept of M2M and security issues in IOT

**UNIT –I**

**INTRODUCTION TO IOT, PROTOCOLS AND SOFTWARES**

What is Internet of Things? History of IOT, About IOT, Overview and Motivations, Examples of Applications, Internet of Things Definition and Framework: IOT Definition, IOT Architecture, General Observations, IOT Frameworks.

Examples of IoT infrastructure MQTT, UDP, MQTT brokers, publish subscribe modes, HTTP, COAP, XMPP and gateway protocols.

**UNIT –II**

**IOT POINT TO POINT AND M2M COMMUNICATION TECHNOLOGIES**

IoT Communication Pattern, IoT protocol Architecture, Selection of Wireless technologies (6LoWPAN, Zigbee, WIFI, BT, BLE, SIG, NFC, LORA, Lifi, Widi)

**UNIT –III**

**IOT AND M2M (MACHINE TO MACHINE)**

Software defined networks, network function virtualization, Difference between SDN and NFV for IOT, Basics of IOT system management with NETCOZF, YANG – NETCOZF, YANG, and SNMP NETOPPER.

**UNIT –IV**

**IOT SECURITY**

Need for encryption, standard encryption protocol, light weight cryptography, Quadruple Trust

Model for IoT-A – Threat Analysis and model for IoT-A, Cloud security

### **Text Book(s)**

1. Alessandro Bassi, Martin Bauer, Martin Fiedler, Thorsten Kramp, Rob van Kranenburg, Sebastian Lange, Stefan Meissner, “Enabling things to talk – Designing IoT solutions with the IoT Architecture Reference Model”, Springer Open, 2016
2. Internet of Things- A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti Universities Press, 2015, ISBN: 9788173719547
3. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, “From Machine to Machine to Internet of Things”, Elsevier Publications, 2014.

### **Reference Books**

1. LuYan, Yan Zhang, Laurence T. Yang, Huansheng Ning, The Internet of Things: From RFID to the Next-Generation Pervasive Network, Aurbach publications, March,2008.

## **SEMESTER IV**

### **ELECTIVE - II**

#### **(MACHINE LEARNING)**

**No. Of Credits : 4**

### **OBJECTIVES:**

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To understand the various dimensionality reduction techniques
- To understand graphical models of machine learning algorithms

### **OUTCOMES:**

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

- To have a thorough understanding of the Supervised and Unsupervised learning techniques, design of Neural Networks, etc.
- To apply different models on datasets and design suitable problem solutions
- To understand graphical models of machine learning algorithm

**UNIT – I****15 Hrs**

Introduction – Learning – Machine Learning – Types of Machine Learning – Supervised Learning – Regression – Classification – The Machine Learning Process – Some Terminology – The Brain and the Neuron – Neural Networks – Perceptron

(Chapter 1,1.2 to 1.5, 2.1,3.1,3.2,3.3)

**UNIT – II****15 Hrs**

Multi-Layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Deriving Back-Propagation – RBF Network

(Chapters 4.1,4.2,4.3,4.4,4.6, 5.2)

**UNIT – III****15 Hrs**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis — Locally Linear Embedding – Isomap – Probability Learning – Nearest Neighbour methods – K Mean Algorithm – Support Vector Machine Algorithm - Least Square Optimization Algorithm - Genetic Algorithm

(Chapters 6,7,8.3,9.2,10.1)

**UNIT – IV****15 Hrs**

Reinforcement Learning – Overview – Example - Markov Decision Process – Learning with Trees – Boosting – Bagging – Random Forests – MCMC Methods - Graphical Models

(Chapters 11,12 , 13.1,13.2,13.3,15,16)

**Text Book**

2. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

**References**

4. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014
5. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.
6. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

**SEMESTER – IV**  
**ELECTIVE –II**  
**(PYTHON PROGRAMMING)**

**No.Of Credits : 4**

**OBJECTIVE**

- Learn basics of Python Programming
- Implement Object Oriented Programming concepts in Python.
- Knowledge on Database Connectivity
- Knowledge on Data Processing and Visualization

**COURSE OUTCOMES**

After the completion of the course the student will be able to

- Write, test and debug Python programs
- Develop programs by utilizing the modules Lists, Tuples, Sets and Dictionaries in Python
- Implement Object Oriented programs with exception handling
- Write programs in Python to process data stored in files by utilizing the modules Numpy, Matplotlib, and Pandas

**UNIT – I**

Introduction to Python – Writing Our First Python Program – Installing software and packages – Data Types in Python – Operators in Python – Input and Output – Control Statements – Arrays in Python – Importing Modules

(Chapters 1 to 7)

**UNIT - II**

String and Characters – Functions – Lambda function – List and Tuples – Dictionaries – Introduction to OOPs – Classes and Objects – Inheritance and Polymorphism

(Chapters 8 to 14)

**UNIT - III**

Abstract Classes and Interfaces – Exception – Files in Python – Regular Expression in Python – Python Database Connectivity

(Chapter 13 to 18,24)

**UNIT - IV**

Data Science Using Python – Creating Data Frames from an Excel, .CSV, Dictionary, List – Operation on Data Frame – Data Visualization – Bar Graph – Histogram – Creating a Pie Chart – Creating Line graph

(Chapter 25)

## **Text Book**

1. Dr. R. Nageshwara Rao, “Core Python Programming”, Second Edition - 2018.

### **Reference Books**

1. Kenneth A Lambert., Fundamentals of Python: First Programs, 2/e, Cengage Publishing, 2016
  2. Wes McKinney, Python for Data Analysis, 2/e, Shroff / O’Reilly Publishers, 2017
- Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2/e, Schroff, 2016

## **SEMESTER IV**

### **(Elective-II)**

## **CYBER FORENSIC**

**No of Credits: 4**

### **OBJECTIVE**

- To correctly define and cite appropriate instances for the application of computer forensics Correctly collect and analyze computer forensic evidence
- Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics

### **OUTCOMES**

- Define **cyber and computer forensics**.
- Identify the process in taking **digital** evidence.
- Describe how to conduct an investigation using methods of memory, operating system, network and email **forensics**.
- Assess the different **forensics** tools.
- Differentiate among different types of security attacks

### **.UNIT–I**

**15 Hrs**

Introduction: Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Computer Forensics Systems – Vendor and Computer Forensics Services.

(Chapters 1 to 4)

### **UNIT–II**

**15 Hrs**

Computer forensics evidence and capture: Data Recovery – Evidence Collection and Data Seizure- Duplication and Preservation of Digital Evidence- Computer Image Verification and Authentication.

(Chapters 5 to 8)

### **UNIT–III**

**15 Hrs**

Computer forensic analysis: Discover of Electronic Evidence-Identification of Data – Reconstructing Past Events – Networks



(chapters 9 to 12)

**Unit–IV**

**15 Hrs**

Fighting against Macro Threats –Defensive strategies for Governments and Industry Groups-  
Information Warfare Arsenal Tactics of the Military – Tactics of Terrorist and Rogues –  
Tactics of Private Companies

(chapters 13 to 16)

**TEXT BOOK**

1. John R. Vacca, “Computer Forensics: Computer Crime Scene Investigation”, Cengage Learning, 2nd Edition, 2005.

**REFERENCE BOOKS**

1. MariE-Helen Maras, “Computer Forensics: Cybercriminals, Laws, and Evidence”, Jones & Bartlett Learning; 2nd Edition, 2014.
2. Chad Steel, “Windows Forensics”, Wiley, 1st Edition, 2006.
3. Majid Yar, “Cybercrime and Society”, SAGE Publications Ltd, Hardcover, 2nd Edition, 2013.
4. Robert M Slade, “Software Forensics: Collecting Evidence from the Scene of a Digital Crime”, Tata McGraw Hill, Paperback, 1st Edition, 2004.

**SEMESTER IV**

**(Elective – II)**

**ETHICAL HACKING**

**No of Credits:04**

**OBJECTIVE**

- Introduces the concepts of Ethical Hacking.
- Gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security.
- Learning the concepts related to Network Hacking and Hacking Wireless Network.
- Apply Ethical hacking tools to perform various activities.

**OUTCOMES**

After completion of course, students would be able to:

- Understand the core concepts related to vulnerabilities and their causes.
- Understand ethics behind hacking and vulnerability disclosure.
- Appreciate the impact of hacking.
- Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

**UNIT I****15 Hrs**

**ETHICAL HACKING OVERVIEW:** Introduction to Ethical Hacking – Cracking the Hacker Mindset - Developing Your Ethical Hacking Plan - Hacking Methodology

(Chapter 1 to 4)

**UNIT II****15 Hrs****SOCIAL ENGINEERING AND PHYSICAL SECURITY**

Introduction to Social Engineering – Performing Social Engineering Attacks - Social Engineering Countermeasures – Introduction to physical security – Handling the passwords

(Chapter 5 to 7)

**UNIT III****15 Hrs**

**HACKING NETWORKS:** Introduction to Port Scanning – Types of Port Scan – Port Scanning Tools - Conducting Ping Sweeps – Introduction to War Dialing -Network Infrastructure - Wireless LANs - Hacking Wireless Network- Wireless Technology – Wireless Network Standards –Authentication

(Chapter 8 to 10)

**UNIT IV****15 Hrs****HACKING OPERATING SYSTEM**

Hacking windows Operating System –Selecting the essential Tools – Information Gathering –RPC - Hacking Linux Operating System- Information Gathering –NFS-File Permission- Physical Security -Introduction to Navell Netware – Authentication

(Chapter 11 to 13)

**TEXT BOOK:**

2. Kevin Beaver, “Hacking for Dummies”, Wiley Publication, India, 2007.

**REFERENCE BOOKS:**

1. Ankit Fadia, “Unofficial Guide to Ethical Hacking”, Macmillan Company, New Delhi, 2001.
2. Michael T. Simpson, “Ethical Hacking and Network Defense”, Cengage Learning, New Delhi, 2010.
3. Jon Erickson, Hacking: The Art of Exploitation, SPD
4. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.
5. Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Gray Hat Hacking: The Ethical Hackers' Handbook, TMH Edition

**SEMESTER IV**  
**ELCETIVE II**  
**BIG DATA ANALYTICS**

**OBJECTIVES:**

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

**UNIT I**

**INTRODUCTION TO BIG DATA** -Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of HighPerformance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model (textbook2 chapter

**UNIT II**

**CLUSTERING AND CLASSIFICATION** - Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes' Theorem - Naïve Bayes Classifier.

**UNIT III**

**ASSOCIATION AND RECOMMENDATION SYSTEM** - Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System:-A model for recommendation systems, Collaborative Filtering- Content Based Recommendation – dimensionality reduction- .(textbook 1 chapter 9.1 to 9.4)

**UNIT IV**

**STREAM MEMORY** : Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window(Text book 1 : chapters 4.1-4.7)

**NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION:** NoSQL Databases : Schema-less Models|: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding -- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R. (text book 2)

**TEXT BOOKS:**

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

**REFERENCES:**

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.

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

## **CBCS Common core Syllabi**

### **(w.e.f.2020-2021)**

#### **SEMETER-III**

#### **.NET PROGRAMMING USING C#**

Theory:	4 Hours/Week	4 Credits	
Practical:	4 Hours/Week		2 Credits

Objective: The original objective of the C# Programming language along with the .NET framework allow you to build applications on the Windows platform (around 2001).

Outcomes: Understand code solutions and compile C# projects within the .NET application; Demonstrate knowledge of object-oriented concepts Design user .Library, Advanced UI Programming & Data Binding concepts; Design and Implement .

#### UNIT – I

Introduction: architecture and components of .NET framework 4.5, managed code, intermediate language, meta data and JIT compiler, common language runtime, automatic memory management, private and shared assemblies, exploring Visual Studio .NET IDE. Introduction to C#: identifiers, keywords, data types, variables, constants, operators, precedence, associativity, type conversion, decision and loop statements, generics, enumerations, namespaces. Object Oriented Programming: encapsulation, inheritance, polymorphism, abstraction, interfaces. ( Chapters 1, 3, 4, 5)

#### UNIT – II

Introduction to Windows Programming: creating windows forms, windows controls, menus and dialogue boxes, overview of xml. Window programming vs. Window presentation foundation, main features of WPF 4.5, WPF 4.5 architecture, WPF 4.5 class hierarchy, types of WPF applications, WPF 4.5 designer interface, Using XAML in WPF 4.5 applications, WPF properties, WPF events, working with dialog boxes in WPF application, compiling and running WPF 4.5 applications, WPF 4.5 controls, resources, styles, templates, commands. (Chapter 8)

#### UNIT – III

Introduction to ASP.NET: ASP.NET life cycle, exploring ASP.NET 4.5 web application, creating a sample ASP.NET 4.5 website, application structure and state, global.asax application file, web forms – standard controls, validation controls, master pages, web services. (Chapters:18, 20, 21, 23)

#### UNIT – IV

Introduction to SQL, architecture of ADO.NET, creating a connection to a database, OLEDB database,using OLEDB adapter for excel file, ODBC data source, ADO.NET commands, data adapters, creating data view, data reader. (Chapters:11, 12)

### **Text Kogent Learning Solutions Inc., .NET 4.5 Programming – Black Book (dreamtech)**

#### **References**

1. Joseph Albahari, Ben Albahari, C# 6.0 in a Nutshell
2. Christian Nagel, Professional C# 6 and .NET Core 1.0
3. Andrew Troelsen, Philip Japikse, C# 6.0 and the .NET 4.6
4. Paul Deitel, Harvey Deitel, Visual C# 2012 – How to Program
5. Bill Sempf, Chuck Sphar, Stephen R Davis, C# 5.0 all-in-one for Dummies
6. Mark J Price, C# 6 and .NET Core 1.0 – Modern Cross-platform Development
7. Benjamin Perkins, Jacob Vibe Hammer, Jon D. Reid, Beginning C# 6 Programming with Visual Studio 2015

.Net Programming Using C#: Practical to be based upon concern theory paper

### **SEMESTER III**

### **CRYPTOGRAPHY AND NETWORK SECURITY**

**Theory**

**4 Hours/Week**

**4 Credit**

Objectives:

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary approaches and techniques to build protection mechanisms in order to secure computer networks.

Outcomes:

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

- Understand the fundamentals of network security, security architecture.
- Apply the different cryptographic operations of symmetric cryptographic algorithms.
- Apply the different cryptographic operations of public key cryptography.
- Apply the various Authentication schemes to simulate different applications.

- Understand various security practices and system security standards.

## **UNIT I**

Introduction -The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security (1.2, 1.3, 1.4, 1.5, 1.6)

Classical Encryption Techniques - Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. (2.1, 2.2, 2.3, 2.4, 2.5)

Block Ciphers and the Data Encryption Standard – Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles (3.1, 3.2, 3.3, 3.5)

## **UNIT II**

Confidentiality Using Symmetric Encryption – Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation (7.1, 7.2, 7.3, 7.4)

Introduction to Number Theory – Prime Numbers, Fermat’s and Euler’s Theorems, Discrete Logarithms (8.1, 8.2, 8.5)

Public- Key Cryptography and RSA – Principles of Public – Key Cryptosystems, The RSA Algorithm (9.1, 9.2)

Key Management; Other Public-Key Cryptosystems- Key Management, Diffie -Hellman Key Exchange, Elliptic Curve Cryptography (10.1, 10.2, 10.4)

## **UNIT III**

Message Authentication and Hash Functions – Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs (11.1, 11.2, 11.3, 11.4, 11.5)

Digital Signatures and Authentication Protocols – Digital Signatures, Authentication Protocols, Digital Signature Standard (13.1, 13.2, 13.3)

Electronic Mail Security – Pretty Good Privacy, S/ MIME (15.1, 15.2)

## **UNIT IV**

IP Security – IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management (16.1, 16.2, 16.3, 16.4, 16.5, 16.6)

Intruders – Intruders, Intrusion Detection, Password Management (18.1, 18.2, 18.3)

Malicious Software – Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks (19.1, 19.2, 19.3)

Firewalls – Firewall Design Principles, Trusted Systems (20.1, 20.2)

**TEXT BOOK:** CRYPTOGRAPHY AND NETWORK SECURITY Principles and Practices, 4<sup>th</sup> Edition By William Stallings (Prentice Hall)

## REFERENCES:

1. Cryptography And Network Security By Atul Kahate ,TMH
2. Introduction to cryptography by J A Buchanan (Springer).
3. Bruc, Schneier, “Applied Cryptography” , 2<sup>nd</sup> Edition, Toha Wiley And Sons ,1996.
4. Douglas R. Stinson “Cryptography – Theory and Practice”, CRC Press ,1995.
5. C K Shyamala, N Harini and Dr.T R Padmanabhan: Cryptography and Network Security,Wiley India Pvt.Ltd.
6. Behrouza,Foruzan,Cryptography and Network Security, Tata McGraw Hill 2007.

## SEMESTER III

### DESIGN PATTERNS

#### (ELECTIVE-I)

#### UNIT-I

Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

#### UNIT-II

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary. Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

#### UNIT-III

Structural Pattern Part-I : Adapter, Bridge, Composite. Structural Pattern Part-II : Decorator, açade, Flyweight, Proxy.

#### UNIT-IV

Behavioral Patterns Part-I : Chain of Responsibility, Command, Interpreter, Iterator. Behavioral Patterns Part-II : Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

#### TEXT BOOK :

1. Design Patterns By Erich Gamma, Pearson Education

## REFERENCES

1. Pattern’s in JAVA Vol-I By Mark Grand ,Wiley Dream Tech.
2. Pattern’s in JAVA Vol-II By Mark Grand ,Wiley Dream Tech.



3. JAVA Enterprise Design Patterns Vol - III By Mark Grand ,Wiley Dream Tech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd
5. Design Patterns Explained By Alan Shalloway, Pearson Education.
6. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

### **SEMESTER III**

#### **(ELECTIVE – I)**

### **DESIGN AND ANALYSIS OF ALGORITHMS**

**Theory: 4 Hours/Week**

**Credits: 4**

#### **OBJECTIVES:**

- To understand and apply the algorithm for analysis.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem.
- To understand different algorithm design techniques.
- To understand the limitations of Algorithmic power.

#### **COURSE OUTCOMES:**

- Ability to analyze the performance of algorithms.
- Ability to choose appropriate algorithm design techniques for solving problems.
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.
- To introduce P and NP classes.

#### **UNIT – I**

Introduction: Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types. Fundamentals of the Analysis of Algorithm: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive & Recursive Algorithms. Brute Force Search: Selection Sort, Bubble Sort, Sequential Search, Brute-Force String Matching, Exhaustive Search, Depth-First Search, Breadth-First Search.

(Chapters 1.1 to 1.3, 2.1 to 2.4, 3.1 to 3.5)

#### **UNIT – II**

Decrease-&-Conquer: Insertion Sort, Topological Sorting, Binary Search, Interpolation Search. Divide-and-Conquer: Merge Sort, Quick Sort, Multiplication of Large Integers, Strassen's Matrix Multiplication, Transform-and-Conquer: Presorting, Balanced Search

Trees, Heaps and Heap Sort, Problem Reduction. Space and Time Trade-Offs: Hashing, B-Trees.

(Chapter 4.1 to 4.5, 5.1, 5.2, 5.4, 6.1,6.3,6.4,6.6, 7,7.3,7.4)

### **UNIT – III**

Dynamic Programming: Knapsack Problem, Optimal Binary Search Trees, Warshall's and Floyd's Algorithms. Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes. Iterative Improvement: Simplex Method, Maximum-Flow Problem.

(chapter 8,8.2,8.3,8.4, 9,9.1,9.2,9.3,9.4, 10,10.1,10.2)

### **UNIT – IV**

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP, and NP-Complete Problems. Backtracking: n-Queens Problem, Hamiltonian Circuit Problem, Subset-Sum Problem, Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesman Problem, Approximation Algorithms for the Knapsack Problem.

(Chapter 11, 11.1, 11.2, 11.3, 12.1, 12.2, 12.3)

### **Text Book**

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms (3e)

### **References**

1. Richard Neapolitan, Foundations of Algorithms
2. Thomas H. Cormen, Introduction to Algorithms
3. E. Horowitz, S. Sahni, Fundamentals of Computer Algorithms

## **SEMESTER III**

### **ELECTIVE - I**

## **SOFTWARE TESTING**

### **OBJECTIVES:**

- To learn the criteria for test cases.
- To learn the design of test cases.
- To understand test management and test automation techniques.
- To apply test metrics and measurements.

### **OUTCOMES:**

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

- Design test cases suitable for a software development for different domains.

- Identify suitable tests to be carried out.
- Prepare test planning based on the document.
- Document test plans and test cases designed.

#### **UNIT – I Testing Strategies:**

A strategic approach to software testing – Verification and Validation –Organizing for Software Testing – Testing Strategies – Criteria for completion of testing – unit, integration, validation and system testing – debugging. TESTING TACTICS: Testing Fundamental – White Box, Black Box, and Control Structure Testing –Object Oriented Testing Methods PRODUCT METRICS: Software Quality – Mc Call’s Quality Factors – ISO 9126 Quality Factors –Measures, Metrics and Indicators – Measures for analysis, design, code and testing – metrics for maintenance.

(Chapters-13,14,15)

#### **UNIT – II Project Management:**

The Management Spectrum – The People – The Product – The Process –The Project – The W5HH Principle – Critical Practices. ESTIMATION: Observations on Estimation – The Project Planning Process – Software Scope and Feasibility – Resources – Software Project Estimation – Decomposition Techniques – Empirical Estimation Models – Estimation for Object-Oriented Projects – Specialized Estimation Techniques– The Make/buy Decision.

(Chapters -21,23)

#### **UNIT – III Risk Management:**

Reactive vs. Proactive Risk Strategies – Software Risks – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring, and Management – The RMMM Plan. QUALITY MANAGEMENT: Quality Concepts – Software Quality Assurance – Software Reviews – Formal Technical Reviews – Formal Approaches To SQA – Statistical Software Quality Assurance –Software Reliability – The ISO 9000 Quality Standards – The SQA Plan.

(Chapters - 25, 26)

#### **UNIT – IV Test Planning Management, Execution, and Reporting:**

Introduction, Test Planning, Test Management, Test Process, Test Reporting Software Test Automation—What To Automate, Scope Of Automation, Design And Architecture for Automation, Generic Requirements For Test Tool Framework, Process Model for Automation, Selecting a Testing Tool

(Chapters-15,16 from Book-II)

#### **TEXT BOOKS:**

1. Software Engineering By R.S. Pressman (Mcgraw Hill Sixth Edition)

2. Software Testing Principles And Practices--- Srinivasan Desikan, Gopalaswamy Ramesh

**REFERENCE BOOKS:**

1. Software Engineering By Ghazzi (Phi)
2. Software Engineering By Fairley (Mcgraw Hill)
3. Software Engineering By Behforouz And Hudson (Oxford University Press)
4. Software Engineering Theory & Practice By Pfleeger (Pearson)
5. Software Engineering By KR Agarwal & Yogesh Singh (New Age)

**SEMETER-III****UNIX NETWORKING PROGRAMMING**

**Theory:                               4 Hours/Week                               4 Credits**

Objective: The objective of this assignment is for you to get used to read (and understand!) code.

Outcomes: helped a generation of programmers write code with exceptional power, performance, and reliability. Now updated for today's

**UNIT – I**

Unix System over view Introduction: Unix architecture Logging In Files and Directories Input and Output Programs and processes Error Handling User Identification Signals Time Values System Calls and Library Functions File I/O: Introduction File Descriptors open and openat Functions create Function close Function lseek Function read Function write Function I/O Efficiency File Sharing Atomic Operation dup and dup2 Functions sync, fsync, and fdatasync Functionsfcntl Function ioctl Function Files and Directories: Introduction stat, fstat, fstatat and lstat Functions File Types Set-User-ID and Set-Group-ID File Access Permissions Ownership of New Files and Directories access and faccessat Functions umask Function chmod fchmod and fchmodat Functions Stick Bit chown, fchown and fchownat and lchown Functions File Size File Truncation File Systems link, linkat, unlink, unlinkat and remove Functions rename and renameat Functions Symbolic Links Creating and Reading Symbolic Links File Times futimens, utimensat and utimes Functions mkdir, mkdirat and rmdir Functions Reading Directories chdir, fchdir, and getcwd Functions Device Special Files Summary of File Access Permission Bits. ( Chapters 1, 3, 4)

**UNIT – II**

Standard I/O Library: Introduction Stream and File Objects Standard Input, Standard Output and Standard Error Buffering Opening a Stream Reading and Writing Stream Line-at-Time I/O Standard I/O Efficiency Binary I/O Positioning a Stream Formatted I/O Implementation Details Temporary Files Memory Streams Alternatives to Standard I/O Advanced I/O: Introduction Nonblocking I/O Record Locking I/O Multiplexing Asynchronous I/O readv and writev Functions readn and written Functions Memory-Mapped I/O. (Chapter 5, 14)

### **UNIT – III**

Process Control: Introduction Process Identifiers fork Function vfork Function exit Function wait and waitpid Functions waited Function wait3 and wait4 Functions Race Conditions exec Functions Changing User IDs and Group ID Interpreter Files System Function Process Accounting User Identification Process Scheduling Process Times. Threads: Introduction Thread Concepts Thread Identification Thread Creation Thread Termination Thread Synchronization. (Chapters: 8, 11)

### **UNIT – IV**

Interprocess Communication: Introduction Pipes popen and pclose Functions Coprocesses FIFOs XSI IPC Message Queues Semaphores Shared Memory Client-Server Properties. Network IPC: Socket: Introduction Socket Descriptors Addressing Connection Establishment Data Transfer Socket Options Out-of-Band Data Nonblocking and Asynchronous I/O. (Chapters:15, 16)

**Text Book:** Advanced Programming in the UNIX Environment Third Edition  
W.Richard Stevens Steohen A. Rago Person Education

### **References**

1. UNIX Network Programming Volume 1, Second Edition W. Richard Stevens(Prentice Hall)
2. Unix System Programming –K. A. Robbins, .Robbins (pearon)
3. Unix The C ODYSsey –M. Gandhi, Shetty and Shah (BPB Publications)

### **SEMESTER-III**

#### **ELECTIVE-1**

#### **IMAGE PATTERNS**

**Credits: 4**

#### **Course Outcome:**

Students who successfully complete this course will have demonstrated an ability to understand the fundamental concepts of image processing; Apply the basic equation of transformations to transform images into different domains; Use of enhancement and filtering techniques in different domains and apply them in original images; Use of morphological operations and usefulness in segmentation problems leads to solve research works.

#### **UNIT-I**

**Introduction:** Digital Image- Steps of Digital Image Processing, The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Components of an Image Processing System, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships Between Pixels.

(chapter 1,2)

#### **UNIT-II**

**Image Enhancement-** Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Smoothing Spatial Filters, Sharpening Spatial Filters, Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering. (chapters 3,4)

### **UNIT-III**

**Color Image Processing-**Color Fundamentals, Color Models, Pseudocolor Image Processing, Basic of Full- Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation. (chapter 6)

**Image Compression-**Fundamentals, Image Compression Models, Elements of Information Theory, Error-Free Compression, Lossy Compression, Image Compression Standards. (chapter 8)

### **UNIT-IV**

**Morphology-**Dilation, Erosion, Opening and Closing. Hit and Miss Algorithms, Boundary extraction, Region filling, extraction of connected components. (9.1,9.2,9.3,9.4,9.5.1,9.5.2,9.5.3)

**Image Segmentation:** Point detection, Edge Detection - Line Detection - Curve Detection - Edge Linking and Boundary Extraction, Thresholding, Region based segmentation, watershed, clustering. Feature Analysisboundary descriptors, regional descriptors(chapter10.1-10.6)

### **TEXT BOOKS:**

1. Digital Image Processing, Gonzalez.R.C & Woods. R.E., 3/e, Pearson Education, 2008.
2. Digital Image Processing, Kenneth R Castleman, Pearson Education, 1995.
3. Digital Image Processing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, McGraw Hill Education, 2009.
4. Fundamentals of Digital image Processing, Anil Jain.K, Prentice Hall of India, 1989.
5. Image Processing, Sid Ahmed, McGraw Hill, New York, 1995

## **SEMESTER IV ARTIFICIAL INTELLIGENCE**

### **COURSE OUTCOMES**

- An ability to identify, analyze the search algorithm for the AI problems.
- Represent a problem using first order logic.

- Provide the knowledge based agent to solve the problem.
- Understand the Informed search strategies.
- Knowledge on AI applications.

## UNIT – I

15 Hrs

**Introduction** – What is AI? – History of AI – **Intelligent Agents** – Agents and Environment – Good Behavior – The Nature of Environments – The Structure of Agents

### Problem Solving

Solving Problems by Searching – Problem Solving Agent – Example Problems – Searching for Solution – Uniformed Search Strategies

(Chapter 1- 1.1,1.3, 2, 2.1 to 2.4, 3, 3.1 to 3.4)

## UNIT – II

15 Hrs

### Informed Search and Exploration

Informed search – Strategies – A\* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm

### Adversarial Search

Optimal decisions in games - Pruning - Imperfect decisions –Alpha-Beta pruning – Games that include an element of chance.

(chapters 4,4.1, 4.2, 4.3, 6, 6.1, 6.2, 6.3, 6.4, 6.5)

## UNIT – III

15 Hrs

### Knowledge and Reasoning

Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules – First-order logic – Syntax and semantics – Situation calculus – Building a knowledge base – Electronic circuit domain – Ontological Engineering – Forward and backward chaining – Resolution – Truth maintenance system -Mental Events and Mental Objects.

(Chapters 7, 7.1 to 7.4,8, 8.1 to 8.3, 9.1 to 9.4, 10.1,10.2)

## UNIT – IV

15 Hrs

### Applications

AI applications – Language Models –Text Classification - Information Retrieval- Information Extraction – Natural Language for Communication – Phrase Structure – Syntactic Analysis – Machine Translation – Speech Recognition – Robot

(chapters 22,23, 25) 3<sup>rd</sup> Edition

### Text Book

1. Stuart J.Russel, Peter Norvig, “Artificial Intelligence A Modern Approach ”, 2<sup>nd</sup> Edition, Pearson Education, 2003.

2. Stuart J. Russel, Peter Norvig, "Artificial Intelligence A Modern Approach ", 3<sup>rd</sup> Edition, Pearson Education, 2009

### **Reference Books**

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009.
2. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc., 1 st Edition, 2008.

## **SEMESTER IV**

### **ELECTIVE - II**

#### **(MACHINE LEARNING)**

### **OUTCOMES:**

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

- To have a thorough understanding of the Supervised and Unsupervised learning techniques, design of Neural Networks, etc.
- To apply different models on datasets and design suitable problem solutions
- To understand graphical models of machine learning algorithm

### **UNIT – I**

**15 Hrs**

Introduction – Learning – Machine Learning – Types of Machine Learning – Supervised Learning – Regression – Classification – The Machine Learning Process – Some Terminology – The Brain and the Neuron – Neural Networks – Perceptron

(Chapter 1,1.2 to 1.5, 2.1,3.1,3.2,3.3)

### **UNIT – II**

**15 Hrs**

Multi-Layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Deriving Back-Propagation – RBF Network

(Chapters 4.1,4.2,4.3,4.4,4.6, 5.2)

### **UNIT – III**

**15 Hrs**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Probability Learning – Nearest Neighbour methods – K Mean Algorithm – Support Vector Machine Algorithm - Least Square Optimization Algorithm - Genetic Algorithm

(Chapters 6,7,8.3,9.2,10.1)

### **UNIT – IV**

**15 Hrs**



Reinforcement Learning – Overview – Example - Markov Decision Process – Learning with Trees – Boosting – Bagging – Random Forests – MCMC Methods - Graphical Models

(Chapters 11,12 , 13.1,13.2,13.3,15,16)

### **Text Book**

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

### **References**

1. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.
3. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

## **SEMESTER IV**

### **(Elective-II)**

## **CYBER FORENSIC**

### **OUTCOMES**

- Define **cyber and computer forensics**.
- Identify the process in taking **digital** evidence.
- Describe how to conduct an investigation using methods of memory, operating system, network and email **forensics**.
- Assess the different **forensics** tools.
- Differentiate among different types of security attacks

#### **.UNIT–I**

**15 Hrs**

Introduction: Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Computer Forensics Systems – Vendor and Computer Forensics Services.

(Chapters 1 to 4)

#### **UNIT–II**

**15 Hrs**

Computer forensics evidence and capture: Data Recovery – Evidence Collection and Data Seizure- Duplication and Preservation of Digital Evidence- Computer Image Verification and Authentication.

(Chapters 5 to 8)

### **UNIT–III**

**15 Hrs**

Computer forensic analysis: Discover of Electronic Evidence-Identification of Data – Reconstructing Past Events – Networks

(chapters 9 to 12)

### **Unit–IV**

**15 Hrs**

Fighting against Macro Threats –Defensive strategies for Governments and Industry Groups- Information Warfare Arsenal Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies

(chapters 13 to 16)

### **TEXT BOOK**

1. John R. Vacca, “Computer Forensics: Computer Crime Scene Investigation”, Cengage Learning, 2nd Edition, 2005.

### **REFERENCE BOOKS**

1. MariE-Helen Maras, “Computer Forensics: Cybercriminals, Laws, and Evidence”, Jones & Bartlett Learning; 2nd Edition, 2014.
2. Chad Steel, “Windows Forensics”, Wiley, 1st Edition, 2006.
3. Majid Yar, “Cybercrime and Society”, SAGE Publications Ltd, Hardcover, 2nd Edition, 2013.
4. Robert M Slade, “Software Forensics: Collecting Evidence from the Scene of a Digital Crime”, Tata McGraw Hill, Paperback, 1st Edition, 2004.

## **SEMESTER IV**

**(Elective – II)**

### **ETHICAL HACKING**

### **OUTCOMES**

After completion of course, students would be able to:

- Understand the core concepts related to vulnerabilities and their causes.
- Understand ethics behind hacking and vulnerability disclosure.
- Appreciate the impact of hacking.
- Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

### **UNIT I**

**15 Hrs**

**ETHICAL HACKING OVERVIEW:** Introduction to Ethical Hacking – Cracking the Hacker Mindset - Developing Your Ethical Hacking Plan - Hacking Methodology

(Chapter 1 to 4)

**UNIT II**

**15 Hrs**

**SOCIAL ENGINEERING AND PHYSICAL SECURITY**

Introduction to Social Engineering – Performing Social Engineering Attacks - Social Engineering Countermeasures – Introduction to physical security – Handling the passwords

(Chapter 5 to 7)

**UNIT III**

**15 Hrs**

**HACKING NETWORKS:** Introduction to Port Scanning – Types of Port Scan – Port Scanning Tools - Conducting Ping Sweeps – Introduction to War Dialing -Network Infrastructure - Wireless LANs - Hacking Wireless Network- Wireless Technology – Wireless Network Standards –Authentication

(Chapter 8 to 10)

**UNIT IV**

**15 Hrs**

**HACKING OPERATING SYSTEM**

Hacking windows Operating System –Selecting the essential Tools – Information Gathering –RPC - Hacking Linux Operating System- Information Gathering –NFS-File Permission- Physical Security -Introduction to Navell Netware – Authentication

(Chapter 11 to 13)

**TEXT BOOK:**

1. Kevin Beaver, “Hacking for Dummies”, Wiley Publication, India, 2007.

**REFERENCE BOOKS:**

1. Ankit Fadia, “Unofficial Guide to Ethical Hacking”, Macmillan Company, New Delhi, 2001.
2. Michael T. Simpson, “Ethical Hacking and Network Defense”, Cengage Learning, New Delhi, 2010.
3. Jon Erickson, Hacking: The Art of Exploitation, SPD
4. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.
5. Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Gray Hat Hacking: The Ethical Hackers' Handbook, TMH Edition

**SEMESTER IV**  
**ELCETIVE II**  
**BIG DATA ANALYTICS**

**CREDITS: 4**

**INTERNAL MARKS: 30**

**EXTERNAL MARKS:70**

**OBJECTIVES:**

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

**UNIT I**

**INTRODUCTION TO BIG DATA** -Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of HighPerformance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model (textbook2 chapter

**UNIT II**

**CLUSTERING AND CLASSIFICATION** - Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes' Theorem - Naïve Bayes Classifier.

**UNIT III**

**ASSOCIATION AND RECOMMENDATION SYSTEM** - Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System:-A model for recommendation systems, Collaborative Filtering- Content Based Recommendation – dimensionality reduction- .(textbook 1 chapter 9.1 to 9.4)

## **UNIT IV**

**STREAM MEMORY** : Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window(Text book 1 : chapters 4.1-4.7)

**NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION:** NoSQL Databases : Schema-less Models: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding -- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R. (text book 2)

## **OUTCOMES:**

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

- Work with big data tools and its analysis techniques
- Analyze data by utilizing clustering and classification algorithms
- Learn and apply different mining algorithms and recommendation systems for large volumes of data
- Perform analytics on data streams
- Learn NoSQL databases and management.

## **TEXT BOOKS:**

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/Elsevier Publishers, 2013.

## **REFERENCES:**

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.

## SEMESTER-IV

### SEMANTICS WEB

**Outcome:** Knowledge Representation for the Semantic Web

#### UNIT –I:

Web Intelligence: Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today’s Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

#### UNIT -II:

Knowledge Representation for the Semantic Web:Ontologies and their role in the semantic web,

Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

#### UNIT-III:

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

#### UNIT-IV:

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base , XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

#### TEXT BOOKS:

- Thinking on the Web – Berners Lee, Godel and Turing, Wiley inter science, 2008.
- Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

#### REFERENCE BOOKS:

- Semantic Web Technologies, Trends and Research in Ontology Based Systems, J. Davies, R. Studer, P. Warren, John Wiley & Sons.
- Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
- Information sharing on the semantic Web – Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
- Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O’Reilly, SPD.

## **SEMESTER-IV**

### **HUMAN COMPUTER INTERACTION**

**Outcome:** Upon completion of the course, the student should be able to:

Design effective dialog for HCI.

Design effective HCI for individuals and persons with disabilities.

#### **UNIT-I: FOUNDATIONS OF HCI:**

The Human I/O channels-Memory-Reasoning and Problem solving, The Computer Devices-Memory-Processing and networks, Interaction: Models,-frameworks-Ergonomics-styles-elements-Interactivity-Paradigms.

#### **UNIT-II: DESIGN AND SOFTWARE PROCESS**

Interactive Design basics-process-scenarios-navigation-screen design-Iteration and prototyping HCI in software process-software life cycle-usability engineering-Prototyping in practice-design rationale, Design rules-Principles, standards, guidelines, rules, Evaluation Techniques-Universal Design.

#### **UNIT-III: MODELS AND THEORIES**

Cognitive models-Socio-Organizational issues and stake holder requirements-communication and collaboration models, Hypertext, Multimedia and WWW.

#### **UNIT-IV: MOBILE HCI**

Mobile Ecosystem: Platforms, Application frameworks-types of mobile applications: Widgets, Applications, Games-Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

#### **Web Interface Design:**

Designing web interfaces-Drag and Drop, Direct selection, Contextual Tools,Overlays,Inlays and Virtual Pages, Process Flow, Case Studies.

#### **TEXT BOOKS:**

1. Alan Dix,Janet Finlay,Gregory Abowd,Russeli Beale,"Human Computer Interaction",3<sup>rd</sup> Edition,Pearson Education,2004(UNIT I,II & III).
2. Brian Fling,"Mobile Design and Development",First Edition,O'Reilly Media inc.,2009(UNIT-IV).
3. Bill Scott and Theresa Neli,"Designing Web Interface",First Edition , O'Reilly Media inc.,2009(UNIT-IV).

# **M.Sc. (Data Science)**

## **CBCS Common core Syllabi**

### **(w.e.f.2022-2023)**

#### **SEMESTER - I**

#### **STATISTICS FOR DATA SCIENCE**

##### **Unit – I**

Measures of Central tendency and Dispersion, Moments, measures of Skewness and Kurtosis

##### **Unit – II**

Random experiment, sample space, event, Definition of Probability - classical, axiomatic approaches to probability, Theorem on probability, conditional probability, independent events. Baye's theorem and its applications

##### **Unit – III**

Random variables: Discrete and continuous random variables, p.m.f. p.d.f, Expectation of random variable and its properties. moment generating function, cumulant generating function and characteristic function.

##### **Unit – IV**

Binomial, Poisson, Geometric, negative binomial ,Rectangular and normal, distributions.

##### **Books Recommended**

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11th Ed., Sultan Chand and Sons, 2007.
2. A.M. Goon, M.K. Gupta & B. Dasgupta, An outline of Statistical Theory (Vol. I), 4th Ed., World Press, Kolkata, 2003.
3. R.V. Hogg, A.T. Craig, and J.W. Mckean, Introduction to Mathematical Statistics, 6th Ed. Pearson Education, 2005.
4. A.M. Mood, F.A. Graybill and D.C. Boes, Introduction to the Theory of Statistics, 3rd Ed., Tata McGraw Hill Publication, 2007.
5. S. Rohatgi V.K and Saleh E, An Introduction to Probability and Statistics, 3rd edition, John Wiley & Sons Inc., New Jersey, 2015.
6. Mukhopadhyay P, Mathematical Statistics, Books and Allied (P) Ltd, Kolkata, 2015. A. Ross, Introduction to Probability Models, 9th Ed., Academic Press, 2007.



**SEMESTER I**  
**FUNDEMENTAL OF DATA SCIENCE**

**UNIT I**

Big Data and Data Science - Big Data Analytics, Business intelligence vs Big data, big data frameworks, Current landscape of analytics, data visualization techniques, visualization software

Exploratory Data Analysis (EDA), statistical measures, Basic tools (plots, graphs and summary statistics) of EDA, Data Analytics Lifecycle, Discovery

**UNIT II**

**Inference**

Developing Initial Hypotheses, Identifying Potential Data Sources, EDA case study, testing hypotheses on means, proportions and variances

**Regression models**

Regression models: Simple linear regression, least-squares principle, MLR, logistic regression, Multiple correlation, Partial correlation

**UNIT III**

**Linear Algebra Basics**

Matrices to represent relations between data, Linear algebraic operations on matrices, Matrix decomposition: Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

**UNIT IV**

**Data Pre-processing and Feature Selection**

Data cleaning - Data integration - Data Reduction - Data Transformation and Data

Discretization, Feature Generation and Feature Selection, Feature Selection algorithms: Filters- Wrappers - Decision Trees - Random Forests

**Basic Machine Learning Algorithms**

Classifiers - Decision tree - Naive Bayes - k-Nearest Neighbors (k-NN), k-means – SVM  
Association Rule mining – Ensemble methods

### **Text Books**

1. Mining of Massive Datasets. v2.1, Jure Leskovek, Anand Rajaraman and Jeffrey Ullman., Cambridge University Press. (2019). (free online)
2. Big Data Analytics, paperback 2nd ed., Seema Acharya, Subhasini Chellappan, Wiley (2019).

### **Reference Books .**

1. Doing Data Science, Straight Talk From The Frontline, Cathy O'Neil and Rachel Schutt, O'Reilly (2014).
2. Data Mining: Concepts and Techniques”, Third Edition, Jiawei Han, Micheline Kamber and Jian Pei, ISBN 0123814790,(2011).
3. Big Data and Business Analytics, Jay Liebowitz, CRC press (2013)
4. Data mining methods,2nd edition, C. Rajan, Narosa (2016)

## **SEMESTER I PYTHON PROGRAMMING FOR DATA SCIENCE**

### **Objective:**

The objective of this course is to provide comprehensive knowledge of python programming paradigms required for Data Analytics.

### **Outcomes:**

Explain the basics of Python Programming constructs., Sub divides larger problems into smaller ones using functions, apply various data structures for problem solving, apply object-oriented programming features for solving a given problem, select an appropriate exception handling depending on application, Demonstrate the use of basic idea of Data Analysis, Demonstrate significant experience with python program development environment, Implement numerical programming, data handling and visualization through NumPy, Pandas and Matplotlib modules

### **UNIT – I**

**Basics of Python Programming:** Variables and Identifiers, Data types, Operators and Expressions in Python, Other Data types-Tuples, dictionary, list. Decision control statements, Basic Loop structure.

**Functions and modules**-Need for functions, Lambda functions, Recursive functions  
Modules—modules and Namespace, Packages in Python, Standard Library modules.

**Python Strings:** Introduction—concatenating, Appending, multiplying strings, Strings are Immutable, string formatting operator, Built-in String methods and functions, slice operation. The String module.

## **UNIT- II**

**Python Strings:** Introduction—concatenating, Appending, multiplying strings, Strings are Immutable, string formatting operator, Built-in String methods and functions, slice operation. The String module.

**Regular Expressions**—match(),search(),sub( ), findall(), Finditer() functions, Data Structures: Sequence, Lists, Tuple, sets, Dictionaries.

**Classes and objects**-Introduction, defining classes, creating objects, Inheritance - Introduction, inheriting classes in Python, Types of Inheritance, Operator overloading—Introduction, Implementing operator overloading.

## **Unit-III**

**Error and Exception Handling-** Introduction to errors and exceptions, handling exceptions, Raising Exceptions, Instantiating exceptions, handling exceptions in invoked functions, Built-in and user defined exceptions, the finally block,

**File handling:** Read and write operations on different types of files

**Using NumPy**-Basics of NumPy-Computation on NumPy-Aggregations-Computation on Arrays-Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data: NumPy's Structured Array.

## **Unit-IV**

**Data Manipulation with Pandas**-Introduction to Pandas Objects - Data indexing and Selection - Operating on Data in Pandas -Handling Missing Data - Hierarchical Indexing - Combining Data Sets - Aggregation and Grouping - Pivot Tables.

**Visualization and Matplotlib** -Basic functions of matplotlib - Simple Line Plot, Scatter Plot - Density and Contour Plots -Histograms, Binnings and Density - Customizing Plot Legends, Colour Bars - Three-Dimensional Plotting in Matplotlib.

## **TEXT BOOKS:**

1. Thareja, Reema. 2017. **Python Programming**. 3<sup>rd</sup> Edition. New Delhi: Oxford HED
2. Jake VanderPlas, Python Data Science Handbook - Essential Tools for Working with Data, O'Reilly Media Inc., 2016.
3. Zhang.Y, An Introduction to Python and Computer Programming, Springer Publications, 2016.

## **REFERENCES**

1. Joel Grus, Data Science from Scratch First Principles with Python, O'Reilly Media, 2016.
2. T. R. Padmanabhan, Programming with Python, Springer Publications, 2016.

## **SEMETER I**

### **DATA MINING**

#### **UNIT-I**

Introduction: What Motivated Data Mining? Why is it Important? What is Data Mining, Data Mining-On what kind of Data? Data Mining Functionalities, Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining, Why Process the Data? Descriptive Data Summarization and Data Cleaning.

(Chapters 1, 2.1 to 2.3)

#### **UNIT-II**

Data Integration and Transformation: Data Reduction, Data Discretization and Concept Hierarchy Generation. What is a Data Warehouse?, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. (Chapters 2.4 to 2.6, 3)

#### **UNIT-III**

Basic Concepts and a Road Map: The Apriori Algorithm, Mining Multilevel Association Rules, what is Classification? What is Prediction?, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Tree Pruning, Bayes' Theorem, Bayesian Belief Networks, Classification by Back Propagation.

(Chapters 5.1, 5.2.1, 5.3.1, 6.1, 6.2, 6.3.1, 6.3.3, 6.4.1, 6.4.2, 6.6)

#### **UNIT – IV**

Cluster Analysis: What is cluster, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density- Based Methods, Sequential Pattern Mining.

(Chapters 7.1 to 7.6.2, 8.3)

#### **TEXT BOOK**

1. Data Mining Concepts & Techniques By Jiawei Han, Micheline & Kamber (2nd Edition) Harcourt India (Elsevier Publishing Company)

#### **REFERENCE BOOKS**

1. Data Mining Introductory And Advanced Topics –Margaret H Dunham, Pearson

Education

2. Data Mining Techniques – Arun K Pujari, University Press.
3. Data Warehousing In The Real World – Sam Anahory& Dennis Murray. Pearson Edn, Asia.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley Student Edition
5. Data Warehousing, Data Mining & Olap By Alex Berson And Stephen J. Smith(Tmh)

## **SEMESTER I**

### **COMPUTER NETWORK**

#### **UNIT I - Introduction**

Networks, The Internet, protocols and standards, the OSI model, layers in OSI model, TCP/IP suite, Addressing, Physical Layer: Digital Transmission, Multiplexing, Transmission media.

(Chapter : 1, 2, 3.1,4,6.1,7)

#### **UNIT II - Switching-circuit**

Switched networks, Datagram networks, virtual circuit networks, switch and Telephone network. Data link layer: Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels. Medium Access sub layer: Random access, controlled access, channelization, IEEE standards, Ethernet, Fast Ethernet, Giga-Bit Ethernet.

(Chapter :8,9,10, 11.1, 11.2,11.3,11.4,11.5,12, 13)

#### **UNIT III - Connecting LANs-Connecting Devices:**

Frame Relay and ATM. Network Layer: Logical addressing, Internetworking,IPV4,IPV6, Delivery, Forwarding, uni-cast routing protocols, multicast routing protocols.

(Chapter 15.1, 18.1,18.2,19.1,19.2,20.1,20.2,20.3,22 )

#### **UNIT IV - Transport Layer:**

Process to process delivery,UDP and TCP protocols,Data Traffic,Congestion,Congestion control,Two Examples,QoS, Techniques to improve QoS. Application Layer –Name Space, Domain name space, Distribution of Name Space, DNS in internet, Remote Logging, Electronic mail, FTP,HTTP

(Chapter:23.1,23.2,23.3,24.1, 24.2,24.3,24.4,24.5,24.6,,25.1,25.2,25.3,25.4, 26 ,27.3)

#### **TEXT BOOK:**

2. Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition TMH,2006.

#### **REFERENCE BOOKS:**

6. An Engineering Approach to Computer Networks-S.Keshav,2nd Edition,Pearson Education.

7. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
8. Computer and Communication Networks Nader F. Mir, Person Education
9. Computer Networking: A Top-Down Approach Featuring the Internet, James Kurose, K.W. Ross, 3rd Edition, Pearson Education.
10. Computer Networks -- Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

## **SEMESTER – II**

### **SOFTWARE ENGINEERING**

#### **UNIT I: PROCESS**

Product and Process – Evolution Process and Activities – Software Development Lifecycle Models: Waterfall Model – Incremental Models – Evolutionary Models – Spiral Model – Unified model – Prototype model – Agile methods. Functional and Non Functional Requirements – Software Requirements Document – Requirements Specification – Requirements Engineering Processes – Requirements Elicitation & Analysis – Requirements Validation – Requirements Management.

#### **UNIT II: ANALYSIS AND DESIGN**

Analysis Modeling Approaches: Scenario Based Modeling – UML Models – Data Modeling Concepts: Class Based Modeling, Flow Oriented Modeling – Design Process and Concepts – Design Model – Architectural Design – Pattern Based Design – Web App Design – Real Time Software Design – System Design – Data flow Oriented Design – Designing for Reuse User Interface Design: Interface analysis, Interface Design – Component level Design: Designing Class Based Components, Traditional Components. SRS Document, IEEE Standards for SRS.

#### **UNIT III: SOFTWARE TESTING**

Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality. Frameworks, ISO 9000 Models, SEI-CMM Model. Software Testing Strategies – White Box Testing – Black Box Testing – Basis Path Testing – Control Structure Testing – Regression Testing – Unit testing – Integration Testing – Validation Testing – System testing – Art of Debugging.

#### **UNIT IV:**

##### **MANAGEMENT AND METRICS**

Software Configuration Management – Product metrics- Project management concepts – Process and Project Metrics – Estimation for software projects – Project scheduling – Risk Management – Maintenance and Re-engineering – CASE Tools.

#### **REFERENCES:**

1. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, Seventh Edition, McGraw Hill International edition, 2009.
2. Ian Sommerville, “Software Engineering, Ninth Edition”, Pearson Education, 2008.
3. Watts S. Humphrey, “A Discipline for Software Engineering”, Pearson Education, 2007.

## **SEMESTER II**

### **NATURAL LANGUAGE PROCESSING**

#### **UNIT – I**

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

#### **UNIT – II**

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues.

#### **UNIT – III**

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software. Predicate-Argument Structure, Meaning Representation Systems, Software.

#### **UNIT – IV**

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.

#### **Text Books**

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

#### **Reference Books**

1. Speech and Natural Language Processing – Daniel Jurafsky & James H Martin, Pearson Publications

## **SEMESTER II**

### **ARTIFICIAL INTELLIGENCE**

#### **COURSE OUTCOMES**

- An ability to identify, analyze the search algorithm for the AI problems.
- Represent a problem using first order logic.
- Provide the knowledge based agent to solve the problem.
- Understand the Informed search strategies.
- Knowledge on AI applications.

#### **UNIT I**

**Introduction** – What is AI? – History of AI – **Intelligent Agents** – Agents and Environment – Good Behavior – The Nature of Environments – The Structure of Agents

#### **Problem Solving**

Solving Problems by Searching – Problem Solving Agent – Example Problems – Searching for Solution – Uniformed Search Strategies

(Chapter 1- 1.1,1.3, 2, 2.1 to 2.4, 3, 3.1 to 3.4)

#### **UNIT II**

#### **Informed Search and Exploration**

Informed search – Strategies – A\* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm

#### **Adversarial Search**

Optimal decisions in games - Pruning - Imperfect decisions –Alpha-Beta pruning – Games that include an element of chance.

(chapters 4,4.1, 4.2, 4.3, 6, 6.1, 6.2, 6.3, 6.4, 6.5)

#### **UNIT III**

#### **Knowledge and Reasoning**

Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules – First-order logic – Syntax and semantics – Situation calculus – Building a knowledge base – Electronic circuit domain – Ontological Engineering – Forward and backward chaining – Resolution – Truth maintenance system -Mental Events and Mental Objects.

(Chapters 7, 7.1 to 7.4,8, 8.1 to 8.3, 9.1 to 9.4, 10.1,10.2)

#### **UNIT IV**



## **Applications**

AI applications – Language Models – Text Classification - Information Retrieval- Information Extraction – Natural Language for Communication – Phrase Structure – Syntactic Analysis – Machine Translation – Speech Recognition – Robot

(chapters 22,23, 25) 3<sup>rd</sup> Edition

## **Text Book**

1. Stuart J.Russel, Peter Norvig, “Artificial Intelligence A Modern Approach ”, 2<sup>nd</sup> Edition, Pearson Education, 2003.
2. Stuart J.Russel, Peter Norvig, “Artificial Intelligence A Modern Approach ”, 3<sup>rd</sup> Edition, Pearson Education, 2009

## **Reference Books**

1. Elaine Rich, Kevin Knight, “Artificial Intelligence”, 3rd Edition, Tata McGraw Hill, 2009.
2. M. Tim Jones, “Artificial Intelligence: A Systems Approach (Computer Science)”, Jones and Bartlett Publishers, Inc., 1 st Edition, 2008.

## **SEMESTER II**

### **R PROGRAMMING**

#### **Course Objective**

- Learn the R language programming
- Handling Datasets
- Visualizing Data

#### **Course Outcome**

- Practical Knowledge on R programming
- Practical Knowledge on Holding dataset and visualizing

#### **Unit- I**

Introduction- What Is R?, Installing R, Choosing an IDE, Your First Program, Installing Extra Related Software, Scientific Calculator- Mathematical Operations and Vectors, Assigning Variables, Special Numbers, Logical Vectors; Inspecting Variables- Classes, Different Types of Numbers, Other Common Classes, Checking and Changing Classes, Examining Variables,Workspace

#### **Unit II**

Vectors, Matrices, and Arrays; Lists and Data Frames-Lists, NULL, Pairlists, Data Frames; Environments and Functions

#### **Unit III**

Strings and Factors, Flow Control and Loops, Advanced Looping; Packages- Loading Packages, Installing Packages, Maintaining Packages; Dates and Times-Date and Time Classes, Conversion to and from Strings, Time Zones, Arithmetic with Dates and Times, Lubridate.

#### **Unit IV**

Getting Data-Built-in Datasets, Reading Text Files, Reading Binary Files, Web Data, Accessing Databases; Cleaning and Transforming- Cleaning Strings, Manipulating Data Frames, Sorting, Functional Programming; Exploring and Visualizing- Summary Statistics, Three Plotting Systems, Scatterplots, Line Plots, Histograms, Box Plots, Bar Charts, Other Plotting Packages and Systems

#### **Text Book:**

1. Richard cotton “A step-by-step function guide to data analysis: Learning R”  
First edition, O’REILLY,2013

#### **References:**

1. Michael J. Crawley “The R Book” Second Edition A John Wiley & Sons,  
Ltd., Publication, 2013.
2. Garrett Grolemond “Hands-On Programming with R” First Edition, O’Reilly Media, 2014
3. Roger D. Peng “R Programming for Data Science” Leanpub, 2014-15.

#### **R Programming Lab**

1. Installation of R Programming
2. Simple Programming
3. Program on handling dataset
4. Program on visualizing charts for dataset

### **SEMESTER II**

#### **REGRESSION ANALYSIS AND INFERENCE STATISTICS**

#### **Outcome:**

Upon successful completion of this course, students will be able to understand the regression theory of estimation, large sample and small sample tests.

#### **UNIT – I**

Bivariate data: Scatter diagram, Correlation and regression. Karl Pearson coefficient of correlation, Lines of regression, Spearman's rank correlation coefficient, multiple and partial correlations

#### **UNIT – II**

Concept of population, parameter, random sample, statistic Theory of estimation: Criteria of a good estimator – consistency unbiasedness efficiency and sufficiency ; maximum likelihood estimation of the parameters of Binomial, Poisson, Normal and Exponential distributions by these methods. Statement of asymptotic properties of MLE. Concept of interval estimation, confidence intervals of parameters of normal distributions.

### **UNIT-III**

Concepts of null hypothesis alternative hypothesis, critical region, two types of errors, level of significance large sample test, Testing of a single mean and a single proportion and difference of two means, difference of two standard deviations and two proportions, Fisher's Z-transformation and its uses.

### **UNIT-IV**

Small sample tests, Test of significance based on t, F-test, Chi Square test for goodness of fit, test for independence of attributes. (2 X 2, 2 X K, r X S), ANOVA introduction and one -way classification of data , ANOVA two - way classification of data.

Reference Books:

1. Fundamentals of mathematical statistics by V.K. Kapoor and S.C.Gupta
2. Fundamentals of statistics Vol II, Goon AM, Gupta MK, Das Gupta B, World press Calcutta.
3. Fundamentals of mathematical statistics by Hoel. PG.
4. Introduction to estimation by Hogg and Criag.
5. Statistical Inference by Surendran and Saxena, S.Chand and Company.
6. An introduction to probability theory and Mathematical statistics, Rohatgi VK, John Wiley & Sons.
7. Introduction to theory of statistics mood AM, Graybill FA and Bose DC M.C.Graw Hill.
8. D.C Montgomery, E. A. Peck and G. G Vining, Introduction to Linear Regression Analysis, John Wiley and Sons, Inc. NY, 2003.

## SEMETER III

### OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML

#### Learning Objectives:

1. Description of the importance, aims and principles of modeling.
2. Understand the OOPs concepts and Object Oriented Modeling and its advantages.
3. Describe the introduction of UML and conceptual model of the UML.
4. Define the different Things, Diagrams and Relationships in UML.
5. Describe the UML architecture and various phases of Software development life cycle.
6. Modeling a real word application using Class and object Diagram
7. Describe the sequence and collaboration diagrams for interaction.
8. Describe the different events and signal for state chart diagrams
9. Modeling a real word application using component and deployment diagram.
10. Describe the unified library Application, ATM case study and modeling diagrams using UML.

#### Learning Outcome:

After learning the course the students should be able to:

1. After successful completion of this course, student will be able to demonstrate the importance of modelling in the software development life cycle.
2. Become familiar with the Unified modelling Language.
3. Understand the object-oriented approach to analysing and designing systems and software solutions. Employ the Unified modelling Language notations to create effective and efficient system designs.
4. Understand the difference between writing programs for the software and doing analysis and design.

#### UNIT - I

**Introduction to UML:** Importance of modeling, principles of modeling, object oriented modeling, Introducing the UML, An Overview of the UML, A Conceptual Model of the UML, Architecture, Software development Life Cycle.

#### UNIT – II

**Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams.

**Class & Object Diagrams:** Terms, concepts, modeling techniques for Class & Object Diagrams.

#### UNIT – III

Basic Behavioral Modeling-I: Interactions, Interaction diagrams

Basic Behavioral Modeling-II: Use cases, Use case Diagrams, Activity Diagrams.

## **UNIT – IV**

**Advanced Behavioral Modeling:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

**Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams.

**CASE STUDY:** This unit covers all the OOAD aspects Covered in Previous units of this course Automation of Library, ATM system

### **TEXT BOOKS**

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.

### **REFERENCES**

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.

2. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.

3. AtulKahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.

4. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGrawHill

5. Craig Larman Applying UML and Patterns: An introduction to Object - Oriented Analysis and Design and Unified Process, Pearson Education.

6. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

## **UML LAB**

### **Objective:**

Main objective of this lab is to enable the student to practice the object-oriented analysis and design through UML on a particular application (project) so that he will apply same methodology in mini project which has to be done in final year. And also it will give exposure to tools that support UML and Object oriented software development.

UML diagrams to be developed are: 1. Use Case Diagram. 2. Class Diagram. 3. Sequence Diagram. 4. Collaboration Diagram. 5. State Diagram. 6. Activity Diagram. 7. Component Diagram. 8. Deployment Diagram. 9. Test Design Problems that may be considered are

- i. Library Management System
- ii. Cellular phone system
- iii. ATM System

## **SEMETER III**

### **DATA ANALYTICS**

**Objective:** The main goal of this course is to help students learn, understand, and practice big data analytics and machine learning approaches, which include the study of modern computing big data technologies and scaling up machine learning techniques focusing on industry applications.

**Outcomes:** The Student will be able to understand the key issues in big data management and its associated applications in intelligent business and scientific computing.

#### **UNIT I : INTRODUCTION TO BIG DATA AND HADOOP**

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to InfosphereBigInsights and Big Sheets.

#### **UNIT II : HDFS(Hadoop Distributed File System)**

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, DataIngest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

#### **UNIT III : Map Reduce**

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

#### **Unit IV :Hadoop Eco System**

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase :HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.Big SQL : Introduction

#### **Publications in chronological order:**

1. Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.

2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

### **References**

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics  
4. with Oracle R
5. Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle  
6. press.
7. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
8. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
9. Michael Mineli, Michele Chambers, AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
10. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", MC Press, 2012

## **SEMESTER III**

### **CRYPTOGRAPHY AND NETWORK SECURITY**

#### **Outcomes:**

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

- Understand the fundamentals of network security, security architecture.
- Apply the different cryptographic operations of symmetric cryptographic algorithms.
- Apply the different cryptographic operations of public key cryptography.
- Apply the various Authentication schemes to simulate different applications.
- Understand various security practices and system security standards.

#### **UNIT I**

Introduction -The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security (1.2, 1.3, 1.4, 1.5, 1.6)

Classical Encryption Techniques - Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. (2.1, 2.2, 2.3, 2.4, 2.5)

Block Ciphers and the Data Encryption Standard – Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Block Cipher Design Principles (3.1, 3.2, 3.3, 3.5)

#### **UNIT II**

Confidentiality Using Symmetric Encryption – Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation (7.1, 7.2, 7.3, 7.4)

Introduction to Number Theory – Prime Numbers, Fermat’s and Euler’s Theorems, Discrete Logarithms (8.1, 8.2, 8.5)

Public- Key Cryptography and RSA – Principles of Public – Key Cryptosystems, The RSA Algorithm (9.1, 9.2)

Key Management; Other Public-Key Cryptosystems- Key Management, Diffie -Hellman Key Exchange, Elliptic Curve Cryptography (10.1, 10.2, 10.4)

### **UNIT III**

Message Authentication and Hash Functions – Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs (11.1, 11.2, 11.3, 11.4, 11.5)

Digital Signatures and Authentication Protocols – Digital Signatures, Authentication Protocols, Digital Signature Standard (13.1, 13.2, 13.3)

Electronic Mail Security – Pretty Good Privacy, S/ MIME (15.1, 15.2)

### **UNIT IV**

IP Security – IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management (16.1, 16.2, 16.3, 16.4, 16.5, 16.6)

Intruders – Intruders, Intrusion Detection, Password Management (18.1, 18.2, 18.3)

Malicious Software – Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks (19.1, 19.2, 19.3)

Firewalls – Firewall Design Principles, Trusted Systems (20.1, 20.2)

TEXT BOOK: CRYPTOGRAPHY AND NETWORK SECURITY Principles and Practices, 4<sup>th</sup> Edition By William Stallings (Prentice Hall)

### **REFERENCES:**

1. Cryptography And Network Security By Atul Kahate ,TMH
2. Introduction to cryptography by J A Buchanan (Springer).
3. Bruce Schneier, “Applied Cryptography” , 2<sup>nd</sup> Edition, John Wiley And Sons ,1996.
4. Douglas R. Stinson “Cryptography – Theory and Practice”, CRC Press ,1995.
5. C K Shyamala, N Harini and Dr.T R Padmanabhan: Cryptography and Network Security,Wiley India Pvt.Ltd.
6. Behrouza,Forouzan,Cryptography and Network Security, Tata McGraw Hill 2007.



## **SEMESTER III**

### **CLOUD COMPUTING**

#### **Learning Outcome:**

- Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- Explain the core issues of cloud computing such as resource management and security.
- Be able to install and use current cloud technologies.
- Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

#### **UNIT I**

Cloud Computing Basics-Overview, Applications, Intranets and the Cloud. Your Organization and Cloud Computing- Benefits, Limitations, Security Concerns. Hardware and Infrastructure- Clients, Security, Network, Services. Software as a Service (SaaS) - Understanding the Multitenant Nature of SaaS Solutions, Understanding SOA.

#### **UNIT II**

Platform as a Service (PaaS)-IT Evolution Leading to the Cloud, Benefits of PaaS Solutions, Disadvantages of PaaS Solutions. Infrastructure as a Service (IaaS)-Understanding IaaS, Improving Performance through Load Balancing, System and Storage Redundancy, Utilizing Cloud-Based NAS Devices, Advantages, Server Types within an IaaS Solution. Cloud Storage-Overview, Cloud Storage Providers.

#### **UNIT III**

Virtualization-Understanding Virtualization, History, Leveraging Blade Servers, Server Virtualization, Data Storage Virtualization. Securing the Cloud- General Security Advantages of Cloud-Based Solutions. Disaster Recovery- Understanding the Threats, Service Oriented Architecture-Understanding SOA, Web Services Are Not Web Pages, Understanding Web Service Performance, Web Service and Reuse, Web Service and Interoperability.

#### **UNIT IV**

Developing Applications-Google, Microsoft, Cast Iron Cloud, Bungee Connect, Development. Migrating to the Cloud-Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, and Migration. Coding Cloud Based Applications-Creating a Mashup using Yahoo Pipe, Using Google App Engine and creating a Windows Azure “Hello, World” Application. Application Scalability - Load-Balancing Process, Designing for Scalability, Scalability and Diminishing Returns and Performance Tuning.

#### **Text Books:**

1. Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by the McGraw-Hill.
2. Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more. By Dr. Kris Jamsa.

**References:**

1. Cloud Computing Bible by Barrie Sosinsky, Published by Wiley Publishing, 2011.
2. Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, and Dr. Fern Halper, Wiley Publishing, 2010.
3. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

## **SEMESTER III MACHINE LEARNING**

**OUTCOMES:**

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

- To have a thorough understanding of the Supervised and Unsupervised learning techniques, design of Neural Networks, etc.
- To apply different models on datasets and design suitable problem solutions
- To understand graphical models of machine learning algorithm

**UNIT – I**

Introduction – Learning – Machine Learning – Types of Machine Learning – Supervised Learning – Regression – Classification – The Machine Learning Process – Some Terminology – The Brain and the Neuron – Neural Networks – Perceptron

(Chapter 1,1.2 to 1.5, 2.1,3.1,3.2,3.3)

**UNIT – II**

Multi-Layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Deriving Back-Propagation – RBF Network

(Chapters 4.1,4.2,4.3,4.4,4.6, 5.2)

**UNIT – III**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap

– Probability Learning – Nearest Neighbour methods – K Mean Algorithm – Support Vector Machine Algorithm - Least Square Optimization Algorithm - Genetic Algorithm

(Chapters 6,7,8.3,9.2,10.1)

#### **UNIT – IV**

Reinforcement Learning – Overview – Example - Markov Decision Process – Learning with Trees –Boosting – Bagging – Random Forests – MCMC Methods - Graphical Models

(Chapters 11,12 , 13.1,13.2,13.3,15,16)

#### **Text Book**

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

#### **References**

1. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.
3. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

## **SEMESTER IV**

### **INTERNET OF THINGS**

#### **Outcomes:**

Understanding of IOT structure, applications areas and technologies involved

Understanding the IOT protocols and web of things

Understanding the concept of M2M and security issues in IOT

#### **UNIT –I**

##### **Introduction to IOT**

What is Internet of Things? Definition & Characteristics of IOT, Things in IOT, IOT protocols, IOT functional blocks, IOT communication models & APIs, IOT levels & Deployment Templates.

(Chapters 1.1 to 1.3.3, 1.5 to 1.5.6)

#### **UNIT –II**

##### **Domain Specific IOTs**

Introduction, Home automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle.

**IOT And M2M (MACHINE TO MACHINE)-** Introduction, M2M, Difference between IOT and M2M, SDN and NFV for IOT.

(Chapters 2.1 to 3.4)

### **UNIT –III**

#### **IOT System Management with NETCONF-YANG**

Need for IOT System Management, Simple Network Management Protocol (SNMP), Network Operator Requirements, NETCONF, YANG, IOT Systems Management with NETCONF-YANG, NETOPEER.

(Chapters 4.1 to 4.6.1)

### **UNIT –IV**

#### **IOT Platforms Design Methodology**

Introduction, IOT Design Methodology

**IOT Physical Device & Endpoints-** What is an IOT device, Basic Building Blocks of and IOT Device, Exemplary Device: Rasberry PI

(Chapters 5.1 to 5.2.10, 7.1 to 7.3)

#### **Text Book**

Internet of Things- A Hands-on Approach, Arshdeep Bahga and Vijay Madiseti

#### **Reference Books**

LuYan, Yan Zhang, Laurence T. Yang, Huansheng Ning, The Internet of Things: From RFID to the Next-Generation Pervasive Network, Aurbach publications, March,2008.

## **SEMESTER IV**

### **ETHICAL HACKING**

#### **OUTCOMES**

SAfter completion of course, students would be able to:

- Understand the core concepts related to vulnerabilities and their causes.
- Understand ethics behind hacking and vulnerability disclosure.
- Appreciate the impact of hacking.
- Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

### **UNIT I**

**ETHICAL HACKING OVERVIEW:** Introduction to Ethical Hacking – Cracking the Hacker Mindset - Developing Your Ethical Hacking Plan - Hacking Methodology

(Chapter 1 to 4)

## **UNIT II**

### **SOCIAL ENGINEERING AND PHYSICAL SECURITY**

Introduction to Social Engineering – Performing Social Engineering Attacks - Social Engineering Countermeasures – Introduction to physical security – Handling the passwords

(Chapter 5 to 7)

## **UNIT III**

**HACKING NETWORKS:** Introduction to Port Scanning – Types of Port Scan – Port Scanning Tools - Conducting Ping Sweeps – Introduction to War Dialing -Network Infrastructure - Wireless LANs - Hacking Wireless Network- Wireless Technology – Wireless Network Standards – Authentication

(Chapter 8 to 10)

## **UNIT IV**

### **HACKING OPERATING SYSTEM**

Hacking windows Operating System –Selecting the essential Tools – Information Gathering –RPC - Hacking Linux Operating System- Information Gathering –NFS-File Permission-Physical Security - Introduction to Navell Netware – Authentication

(Chapter 11 to 13)

### **TEXT BOOK:**

3. Kevin Beaver, “Hacking for Dummies”, Wiley Publication, India, 2007.

### **REFERENCE BOOKS:**

1. Ankit Fadia, “Unofficial Guide to Ethical Hacking”, Macmillan Company, New Delhi, 2001.
2. Michael T. Simpson, “Ethical Hacking and Network Defense”, Cengage Learning, New Delhi, 2010.
3. Jon Erickson, Hacking: The Art of Exploitation, SPD
4. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.
5. Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Gray Hat Hacking: The Ethical Hackers' Handbook, TMH Edition

### **3.Program/Course Outcomes**

**BSC(CS)**

**SEMESTER – II**

**MANAGEMENT INFORMATION SYSTEM**

**Objective:** Provide knowledge for decision making from information system

**Outcome:** How different organizations manage information system

**SEMESTER – II**

**WEB PROGRAMMING**

**Learning Outcome:**

After completion of the course students will be able to

1. Describe the concepts of WWW including browser and HTTP protocol.
2. List the various HTML tags and use them to develop the user friendly web pages.
3. Define the CSS with its types and use them to provide the styles to the web pages at various levels.
4. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
5. Use the JavaScript to develop the dynamic web pages.
6. Identify the difference between the HTML and XML documents.
7. Identify the engineering structural design of XML and parse tree
8. Develop the modern Web applications using the web design fundamentals.

**SEMESTER – II**

**DATA STRUCTURES USING C++**

**Objective:** Learning about Data structure

**Outcome:** Knowledge on representing Data Structure

**BCA**

**SEMESTER – III**

## SOFTWARE ENGINEERING

### Course Outcomes

- Structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

### SEMESTER – III

#### DATA STRUCTURES WITH C++

- **Outcome: Knowledge on representing Data Structure**

### SEMESTER – III

#### WEB PROGRAMMING

#### Learning Outcome:

After completion of the course students will be able to

1. Describe the concepts of WWW including browser and HTTP protocol.
2. List the various HTML tags and use them to develop the user friendly web pages.
3. Define the CSS with its types and use them to provide the styles to the web pages at various levels.
4. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
5. Use the JavaScript to develop the dynamic web pages.
6. Identify the difference between the HTML and XML documents.
7. Identify the engineering structural design of XML and parse tree
8. Develop the modern Web applications using the web design fundamentals.

### SEMESTER IV

#### SOFTWARE TESTING

#### OUTCOMES:

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

- Design test cases suitable for a software development for different domains.
- Identify suitable tests to be carried out.
- Prepare test planning based on the document.
- Document test plans and test cases designed.

**SEMESTER IV**  
**DIGITAL MARKETING**

**Course Outcome:**

- Explain and demonstrate E-Governance Initiatives at the National Level in India
- Make Classification of E-Commerce and E- Governance
- Think innovatively and analyze critically to startup New Successful Business Ideas.

**SEMESTER IV**  
**PROGRAMMING IN JAVA**

**Outcome :**

On completion of this course, student should be able to

- Design, develop, test, document and debug Java programs using Object-oriented principles in conjunction with development tools .
- Build applications that have an event-driven graphical user interface using the standard Java libraries.

**SEMESTER – V**  
**SEC 3 (ARTIFICIAL INTELLIGENCE)**

**Course Outcomes**

- Identify the Rational Agent structure how it will sense the environment with help of sensors and we can apply some of the searching techniques and we can represent the knowledge in AI.

**SEMESTER – V**  
**SEC 3 (CRYPTOGRAPHY AND NETWORK SECURITY)**

**Course Outcomes**

Identify and learn the data encryption principles and like public key cryptosystems and RSA algorithm

Students learn the digital signatures and authentication protocols

**SEMESTER – V**  
**SEC 3 (ETHICAL HACKING)**

**Course Outcomes**

After completion of course, students would be able to:

- Understand the core concepts related to vulnerabilities and their causes.



- Understand ethics behind hacking and vulnerability disclosure.
- Appreciate the impact of hacking.
- Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

**SEMESTER – V**  
**ADVANCED JAVA**

**Course Outcomes**

- After completion of the course students can come with some of the concept related to Client and server environment and connecting with data base and servlet concepts

**SEMESTER – V**  
**SCRIPTING LANGUAGES**

**Course Outcomes**

After completion of this course student learn how validate client side validation in web applications using various languages like java script and Php and Python

**SEMESTER – V**  
**.NET PROGRAMMING WITH VB.NET**

**Course Outcomes**

After completion of this course students learn development of console and windows based applications using various control like text box, msgbox and input box and handling mouse events

**SEMESTER – VI**  
**SEC 4 (MACHINE LEARNING)**

**Course Outcomes:**

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

- To have a thorough understanding of the Supervised and Unsupervised learning techniques, design of Neural Networks, etc.
- To apply different models on datasets and design suitable problem solutions

**SEMESTER – VI**  
**SEC 4 (INTERNET OF THINGS)**

**Course Outcomes:**

- Understanding of IOT structure, applications areas and technologies involved
- Understanding the IOT protocols and web of things
- Understanding the concept of M2M and security issues in IOT

**SEMESTER – VI**  
**SEC 4 (CYBER SECURITY)**

**Course outcomes:**

- Understand the broad set of technical, social & political aspects of Computer Security
- Describe the operational and organizational security Aspects
- Have understood the fundamentals of cryptography
- Explain Authentication Methods

**SEMESTER – VI**

**OBJECT ORIENTED DESIGN IN UML**

**Course Outcomes**

- After completion of this course students can learn draw the various use case diagrams and activity diagram, class and object diagrams.

**B.Com(Computer Applications)**

**SEMESTER III**

**DATABASE MANAGEMENT SYSTEM**

**Outcome:** Knowledge on representing Database using Oracle

**SEMESTER IV**

**PROGRAMMING IN C**

**Outcome :** Basic Logical skills and Programming Capability

**SEMESTER-V**

**WEB TECHNOLOGIES**

**Learning Outcome:**

After completion of the course students will be able to

1. Describe the concepts of WWW including browser and HTTP protocol.
2. List the various HTML tags and use them to develop the user friendly web pages.
3. Define the CSS with its types and use them to provide the styles to the web pages at various levels.
4. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
5. Use the JavaScript to develop the dynamic web pages.
6. Identify the difference between the HTML and XML documents.

7. Identify the engineering structural design of XML and parse tree
8. Develop the modern Web applications using the web design fundamentals.

**SEC3**

**SEMESTER – V**

**E-COMMERCE**

**Course Outcome:**

- Make Classification of E-Commerce
- Analyse companies strategies to improve business
- Think innovatively and analyse critically to start-up New Successful Business Ideas.

**SEC3**

**SEMESTER V**

**ETHICAL HACKING**

**OUTCOMES**

After completion of course, students would be able to:

- Understand the core concepts related to vulnerabilities and their causes.
- Understand ethics behind hacking and vulnerability disclosure.
- Appreciate the impact of hacking.
- Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

**SEC-3**

**SEMESTER-V**

**BUSINESS INTELLIGENCE**

**Course Outcomes:**

1. Design and implement OLTP, OLAP and Warehouse concepts.
2. Design and develop Data Warehouse using Various Schemas & Dimensional modelling.
3. Use the ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data.
4. Report the usable data by using various reporting concepts, techniques/tools, and use charts, tables for reporting in BI.

**SEC4**

**SEMESTER V**

**INTERNET OF THINGS**

**Outcomes:**

Understanding of IOT structure, applications areas and technologies involved

Understanding the IOT protocols and web of things

Understanding the concept of M2M and security issues in IOT

**SEC 4  
SEMESTER VI  
Cyber Security**

**OUTCOMES:**

- Understand the broad set of technical, social & political aspects of Computer Security
- Describe the operational and organizational security Aspects
- Have understood the fundamentals of cryptography
- Explain Authentication Methods

**SEC-4  
SEMESTER-VI  
WEB ANALYTICS**

- **Learning outcomes**
- The World Wide Web along with social media produces huge amount of data every day. This data may provide lot of insight on not only the user's usage behavior but his/her tastes, preferences and thoughts. Web Analytics is a field in data analytics that will help in understanding user's attitudes and characteristics and help a business in targeting the potential customer.

**B.B.A  
SEMESTER – III  
E-COMMERCE**

**Course Outcome:**

- Make Classification of E-Commerce
- Analyse companies strategies to improve business
- Think innovatively and analyse critically to start-up New Successful Business Ideas.

**SEMESTER – IV  
WEB TECHNOLOGIES**

**Learning Outcome:**

After completion of the course students will be able to

1. Describe the concepts of WWW including browser and HTTP protocol.
2. List the various HTML tags and use them to develop the user friendly web pages.
3. Define the CSS with its types and use them to provide the styles to the web pages at various levels.
4. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
5. Use the JavaScript to develop the dynamic web pages.

6. Identify the difference between the HTML and XML documents.
7. Identify the engineering structural design of XML and parse tree
8. Develop the modern Web applications using the web design fundamentals.

**MCA  
SEMESTER III  
ARTIFICIAL INTELLIGENCE**

**COURSE OUTCOMES**

- An ability to identify, analyze the search algorithm for the AI problems.
- Represent a problem using first order logic.
- Provide the knowledge based agent to solve the problem.
- Understand the Informed search strategies.
- Knowledge on AI applications.

**SEMESTER III  
MOBILE APPLICATION DEVELOPMENT**

**Course outcome:** This course will enable students to

- Learn to setup Android application development environment
- Illustrate user interfaces for interacting with apps and triggering actions
- Interpret tasks used in handling multiple activities
- Identify options to save persistent application data
- Appraise the role of security and performance in Android applications

**SEMESTER III  
.NET PROGRAMMING WITH C#**

**Outcomes:** Understand code solutions **and** compile C# projects within the .NET application; Demonstrate knowledge of object-oriented concepts Design user .Library, Advanced UI **Programming** & Data Binding concepts; Design **and** Implement .

**SEMESTER III  
CRYPTOGRAPHY AND NETWORK SECURITY  
ELECTIVE I**

**Outcomes:**

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

- Understand the fundamentals of network security, security architecture.
- Apply the different cryptographic operations of symmetric cryptographic algorithms.
- Apply the different cryptographic operations of public key cryptography.
- Apply the various Authentication schemes to simulate different applications.
- Understand various security practices and system security standards.

**SEMESTER III  
ELECTIVE - I  
DESIGN AND ANALYSIS OF ALGORITHMS**

**OBJECTIVES:**

- To understand and apply the algorithm for analysis.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem.
- To understand different algorithm design techniques.
- To understand the limitations of Algorithmic power.

**COURSE OUTCOMES:**

- Ability to analyze the performance of algorithms.
- Ability to choose appropriate algorithm design techniques for solving problems.
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.
- To introduce P and NP classes.

**MSC (DS)  
SEMESTER - I  
STATISTICS FOR DATA SCIENCE**

**Outcome:**

Upon successful completion of this course, students will be able to understand the quantitative data, probability, random experiment and distributions.

**SEMESTER I  
PYTHON PROGRAMMING FOR DATA SCIENCE**

**Outcomes:**

Explain the basics of Python Programming constructs., Sub divides larger problems into smaller ones using functions, apply various data structures for problem solving, apply object-oriented programming features for solving a given problem, select an appropriate exception handling depending on application, Demonstrate the use of basic idea of Data Analysis, Demonstrate significant experience with python program development environment,

Implement numerical programming, data handling and visualization through NumPy, Pandas and Matplotlib modules.

**SEMESTER II**  
**ARTIFICIAL INTELLIGENCE**

**Outcomes:**

- An ability to identify, analyze the search algorithm for the AI problems.
- Represent a problem using first order logic.
- Provide the knowledge based agent to solve the problem.
- Understand the Informed search strategies.
- Knowledge on AI applications.

**SEMESTER II**  
**R PROGRAMMING**

**Outcome:**

- Practical Knowledge on R programming
- Practical Knowledge on Holding dataset and visualizing

**SEMESTER II**  
**REGRESSION ANALYSIS AND INFERENCE STATISTICS**

**Outcome:**

- Upon successful completion of this course, students will be able to understand the regression theory of estimation, large sample and small sample tests.

**SEMESTER III**  
**OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML**

**Outcome:**

After learning the course the students should be able to:

1. After successful completion of this course, student will be able to demonstrate the importance of modelling in the software development life cycle.
2. Become familiar with the Unified modelling Language.

3. Understand the object-oriented approach to analysing and designing systems and software solutions. Employ the Unified modelling Language notations to create effective and efficient system designs.
4. Understand the difference between writing programs for the software and doing analysis and design.

### **SEMETER III**

#### **DATA ANALYTICS**

**Outcomes:** The Student will be able to understand the key issues in big data management and its associated applications in intelligent business and scientific computing.

### **SEMESTER III**

#### **CRYPTOGRAPHY AND NETWORK SECURITY**

Outcomes:

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

- Understand the fundamentals of network security, security architecture.
- Apply the different cryptographic operations of symmetric cryptographic algorithms.
- Apply the different cryptographic operations of public key cryptography.
- Apply the various Authentication schemes to simulate different applications.
- Understand various security practices and system security standards.

### **SEMESTER III**

#### **CLOUD COMPUTING**

**Outcome:**

- Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- Explain the core issues of cloud computing such as resource management and security.
- Be able to install and use current cloud technologies.
- Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

### **SEMESTER III**

#### **MACHINE LEARNING**

**OUTCOMES:**

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



- To have a thorough understanding of the Supervised and Unsupervised learning techniques, design of Neural Networks, etc.
- To apply different models on datasets and design suitable problem solutions
- To understand graphical models of machine learning algorithm

**SEMESTER IV  
INTERNET OF THINGS**

**Outcomes:**

Understanding of IOT structure, applications areas and technologies involved

Understanding the IOT protocols and web of things

Understanding the concept of M2M and security issues in IOT

**SEMESTER IV  
ETHICAL HACKING**

**OUTCOMES**

After completion of course, students would be able to:

- Understand the core concepts related to vulnerabilities and their causes.
- Understand ethics behind hacking and vulnerability disclosure.
- Appreciate the impact of hacking.
- Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

**4.HOD/BOS Chairperson:**

Prof.A.Ramesh Babu

**5.BOS MEMBERS:**

Members Present in the Third Board of Studies in Computer Science of Chaitanya (Deemed to be University)

Sl. No.	NAME	Designation
1.	Prof. A. Ramesh Babu	Chairperson
2.	Prof. Sriram G. Sanjeevi	Subject Expert
3.	Prof. P. Niranjan Reddy	Subject Expert

4.	Prof. M. Jagadeeshwar	Member
5.	V. Madhukar	Member

## 6. DRC

- |                             |                |
|-----------------------------|----------------|
| 1. Prof. A. Ramesh Babu     | Chairman       |
| 2. Prof. Sriram G. Sanjeevi | Subject Expert |
| 3. Prof. P.Niranjana Reddy  | Subject Expert |
| 4. Prof. M. Jagadeeshwar    | Member         |
| 5. V. Madhukar              | Member         |

## 7. Faculty

### Teaching Faculty Details with Qualification

SI No.	Name	Designation	Qualification
1	Prof.A.Ramesh Babu	Professor & Head	M.Tech, Ph.D.
2	Prof. M. Jagadeeshwar	Professor & Director MCA Programme	M.Tech.,B.Ed. M.Phil,Ph.D.

3	Dr.V.Madhukar	Assistant Professor	MCA.,M.Phil,Ph.D.
4	Dr.G.Madhavi Reddy	Assistant Professor	MSc, M.Tech, Ph.D.
5	Mr.M. Varaprasad	Assistant Professor	MCA
6	Mr.K.Praveen Kumar	Assistant Professor	MCA
7	Mrs.K.Srilatha	Assistant Professor	MCA.,M.Tech.
8	Mr.G.Sathish Kumar	Assistant Professor	MCA.,M.Tech.
9	Mrs.P.Prathima	Assistant Professor	M.Sc (CS)
10	Mrs.CH.Himabindu	Assistant Professor	MCA
11	Mrs.E.Varnika	Assistant Professor	M.Sc(CS)
12	Mrs.S.Shirisha	Assistant Professor	MCA
13	Mrs.A.Sumalatha	Assistant Professor	M.Sc(CS)
14	Mrs.G.Radhika	Assistant Professor	MCA
15	Mrs. M.Ashwini	Assistant Professor	MCA
16	Mrs. K.Sandhya	Assistant Professor	MCA
17	Mrs.CH.Laxmi prasanna	Assistant Professor	MCA

18	Mr.P.Ramana	Assistant Professor	M.Sc(CS)
19	Mrs. Priyanka	Assistant Professor	MCA
20	Mrs.Srivani	Assistant Professor	MCA
21	Mr.S.Rajesh	Technical staff	B.Com
22	Mr. Sandeep Reddy	Technical staff	B.Tech
23	Mr.G.Srikanth	Technical staff	MA

## **8.NON-TEACHING STAFF:**

### **Technical Staff:**

1. Mr.S.Rajesh
2. Mr.Sandeep Reddy
3. Mr.G.Srikanth

## **9.Facilities:**

1. Department Library
2. Internet Facility
3. Wi-Fi
4. Remedial Classes (for slow learners)

## **10. Workshops/FDP'S/Webinars/Seminars:**

1. Dr. V. Madhukar has attended 3 Workshops and 34 Webinars during 2021-2022.
2. Mr. K. Praveen Kumar has attended 2 FDP's and 1 Webinar during 2021-22 and 10 FDP's and 6 Webinars in 2020-21.
3. Mrs. Srilatha Komakula has attended 2 FDP's and one Workshop during 2021-22 and 8 FDP's, and 18 webinars in 2020-21.
4. Mrs. P. Prathima has attended 2 FDP's, one workshop and 3 webinars during 2020-21, 2021-22.
5. Mrs. CH. Himabindu has attended 3 FDP's, and 3 webinars during 2020-21, 2021-22.
6. Mrs. E.Varnika has attended 5 FDP's and 10 webinars during 2020-21.
7. Mrs. A. Sumalatha has attended 3 FDP's and 05 webinars during 2020-21.
8. Mr. G. Radhika has attended 5 webinars during 2020-21.

## **11.Publications 2020-21 and 2021-2022 and 2023:**

### **Prof.A. Ramesh Babu Published following papers**

1. **“Named Entity Recognition For English Language Using Deep Learning Based Bi Directional LSTM-RNN”** in May 2023 with ISSN No. 2321-8169 Vol.11, Issue 05.
2. **“A Study of Challenges and Recommendations for Teaching: DevOps Education”** in International Journal on Recent and Innovation Trends in Computing and Communication with ISSN: 2321-8169,vol: 11, issue: 09 and PP: 796-802.
3. **“Shift left testing in DevOps: A Study of Benefits, Challenges and Best Practices”** in IEEE 2<sup>nd</sup> International Conference on Automation, Computing and Renewable Systems on December, 2023.
4. **“Leveraging Teaching Methods to Overcome Challenges in DevOps Education”** in ZKG International (Web of Science) Journal, vol: 08, issue:02, PP:542-552. ISSN: 2366-1313.

5. **“Deep Learning Based Named Entity Recognition Using Bi-Directional Short-Term Memory”** in January 2024 in Journal ZKG International with ISSN NUMBER ISSN: 2366-1313, Vol: IX and Issue: 01.

**Prof M.Jagadeeshwar published following papers:**

1. **“International Conference on Computational Intelligence and sustainable Development-2023”** with Azteca University, Mexico entitled **“VIEW INVARIANT HUMAN GAIT RECOGNITION FROM 3D SKELETON BODY POSTURES”** during 18-19 August, 2023.
2. **“BC driven IoT-based food quality traceability system for dairy product using deep learning model”** in EISEVIER(High-Confidence Computing) in March 2023 with ISSN number 2667-2952.
3. **“ONE TIME KEY AUTHORIZATION BASED ATTRIBUTE ENCRYPTION AND DECRYPTION FOR SECURED MESSAGE COMMUNICATION”** in scopus (Journal of Xi'an University of Architecture & Technology) in 2023 with ISSN number: 1006-7930, Volume XV and Issue 2,

**Other CS faculty members published papers.**

1. **Role of Recommendation system in E-Business**, Dr. V. Madhukar, published in International Journal of Scientific Research in Engineering and Management, Volume 5, Issue April 2021, Issue 4, Page No: 1 to 7 with ISSN :2582-3930
2. **Recommender System in E-Commerce**, Dr. V. Madhukar, published in International Journal of Multidisciplinary Education Research, Volume 10, Issue 4(1) Issue April 2021, Page No. 148 to 155 with ISSN:2277-7881.
3. **Online Education During Covid-19 Pandemic – Teacher and Students Perspective – A Study**, Dr. V. Madhukar, published in International Journal of Scientific & Engineering Research Volume 9, Issue 7, Page No. G72 to G79 with July-2021 ISSN 2320-2882.
4. **DevOps: Test early Test often-The changing Face of SoftwareTesting** , Mrs. Vallem Shobha Rani, Dr. A. Ramesh Babuin The International Journal of Analytical and Experimental Modal Analysis (IJAEMA), Volume XIII, Issue VIII, August/2021, ISSN No:0886-9367, Page No: 529-537.
5. **A Survey on Devops in Education and Industry-Shift Left Paradigm Change in Agile DevOps Model**, Mrs. Vallem Shobha Rani, Dr. A. Ramesh Babuin The Compliance Engineering Journal, Volume 12, Issue 10, October/2021, ISSN No:0898-3577, Page No: 160-168.

6. **Review on Characteristics and Services of Cloud Computing** , Mr. K.Praveen Kumar, K.Avanthi ,in The International Journal of Research Publication and Review (IJRPR), Volume 02, Issue 02 Page No:202-204, ISSN 2582-7421.
7. **Recognition of Identity Theft in Cyber Security By Using Confidentiality Tools** , Mrs. Srilatha Komakula, Dr. M. Jagadeeshwar, in The International Journal of Analytical and Experimental Modal Analysis(IJAEMA), Volume XIII, Issue VIII, August/2021, ISSN No: 0886-9367, Page No :415-422.
8. **Identity Theft In Cyber Security: Literature Survey** ,Mrs. Srilatha Komakula, Dr. M. Jagadeeshwar, in Strad Research, Volume 8, Issue 9, Sep,2021, ISSN NO: 0039-2049. Pages: 104-109, <https://doi.org/10.37896/sr8.9/014>.
9. **Honey Encryption With Quantum Key Distribution**, Mrs. Srilatha Komakula, Mrs. V. Shobha Rani,in International Journal for Innovative Engineering and Management Research(IJIEMR), Volume 09, Issue 01, Jan 2020, Pages: 23-29, ISSN 2456-5083,.
10. **Analysis of Graph Spectroscopic Clustering**, Mrs. Deepthi Kothapeta, Mrs. Srilatha Komakula, in International Journal for Innovative Engineering and Management Research(IJIEMR), Volume 09, Issue 01, Jan 2020,Pages: 16-22, ISSN 2456-5083.
11. **Efficient Wireless Fog Networks Management By Using Software Defined Network**, Mrs.Kothapeta Deepthi, Dr. M. Jagadeeshwar published a paper in The International Journal of Analytical and Experimental Modal Analysis (IJAEMA), Volume XIII, Issue VII, July/2021 , Page No :2798-2802, ISSN No: 0886-9367.
12. **An Advanced Lattice based Data Security in Cloud Environment** , G. Sathish Kumar published a paper in IJIEMR ,Volume 10, Issue 08, PP: 94-102, August , 2021, ISSN:2456-5083.
13. G.SathishKumar dept of Computer Science has published a paper entitled “**Comparative analysis of light weight algorithms based on encryption in cloud data security environment**” in **Journal ZKG International (Web of Science)** in January 2023 with ISSN NUMBER
  - a. 2366-1313, Vol: 08, Issue: 01 and Impact factor: 0.13
14. **A Study: Extraction of Text on Image**, T. Ranjith Kumar, P. Prathima in IJARIEE, Volume 07, Issue 1, p904-p909, Feb 2021 with ISSN:2395-4396.
15. **Study on Applications of SQL and Not only SQL Databases used for Big Data Analytics**, Mrs. A. Sumalatha, Mr. V. Ramu in IJRDT, Volume 15, Issue 03, March 2021 with ISSN NO: 2349-3585.
16. **Study on Conversion of Relational Databases to Big Data (VoltDB)**, Mr. V. Ramu, in IJIRCCE Volume 9, Issue 3, March 2021 with ISSN NO:2320-9801.

17. **Architecture and Applications of Cloud servers used for IoT MQTT-Case study**, Mr. V. Ramu, in CAJTAS Volume: 02 Issue: 03 March 2021 with ISSN NO:2660-5357.
18. **Comparison on Iris Dataset using Classification Techniques**, P. Prathima, T. Ranjith Kumar, in JETIR, Volume 08, Issue 08, p25-p29, August 2021 with ISSN: 2349-5162.
19. **A Model Identifying Iris Species using Machine Learning** , P. Prathima, T. Ranjith Kumar in IJSREM, Volume 05, Issue 08,p01-p03, August 2021 with ISSN: 2582-3930.
20. **Implementation of Application- Level Semantics in Data Compression**, Mrs.CH. Himabindu, Mrs.E.Varnika, in IJAEMA, Volume-12, Issue-10, Oct-2020, ISSN NO-0886-9367.
21. **A Review on Machine Learning Models Used for Anomaly Detection**, Mrs. E. Varnika in JIDPTS, Volume-4, Issue 8, p09-p15,Aug-2021, ISSN NO-2581-6934.
22. **Federated Concept Based Machine Learning Technology”** (2022) in IJIRSET- Volume 11, Special Issue 1, April 2022.
23. **Applications of Deep learning in Medical diagnosis focusing on MRI**, Mrs. CH. Himabindu in JIDPTS, Volume-4, Issue-7, July-2021, ISSN NO-2581-6934.
24. **Analysis on software implementation of methodology for Python-based Raspberry Pi** , Mrs. CH. Himabindu in IJARST , Volume-11, Issue- 08, Aug-2021, ISSN NO-2457-0362.
25. **Graph Spectroscopic Based Analysis** , Mrs. A.Sreelatha in IJAEMA, ,Volume-12,Issue 10, October-2020, Page: 1116-1120, ISSN NO-0886-9367.
26. **A Review on Machine Learning Models Used for Anomaly Detection**, Mrs. E. Varnika in JIDPTS, Volume-4, Issue 8, p09-p15,Aug-2021, ISSN NO-2581-6934.
27. **Privacy Aware KP-ABE with user outsourcing of cloud storage**, Mrs. E. Varnika ,Mrs.CH.Himabindu in IJR,Volume-9, Issue 10,p215-p223, Oct-2020, ISSN NO-2236-6124.
28. **Convolutional Neural Network Based Medical Image Classification: A Review** , Mrs. K. Avanthi, Mr. K. Praveen Kumar in IJAEMA, Volume-8, Issue-7,p2598-p2601,July2021, ISSN NO-0886-9367.
29. **Evaluation of Efficiency of Database System Used for IOT Applications-Review** ,Mrs. A. Sumalatha, Mr. V. Ramu in Central Asian Journal of Theoretical and Applied Sciences Volume 2, Issue 3, March 2021, Page: 71-76,ISSN NO-2660-5317.
30. **Report Generation Mechanism Infrastructure as A Service (IaaS) Framework Designing – Review**, Mr. K. Suresh, Mrs. Radhika in Central Asian Journal of



Mathematical Theory and Computer Science (CAJMTCS), Vol.2 Issue 2, Page:1-4 ,Feb 2021,  
ISSN No:2660-5309.

31. **Societal outcomes of Deep Reinforcement Learning and its applications**, Mrs. Radhika,  
Mr. K. Suresh in Social Science Research Network, Vol 10, Issue 3, Pgeno: 3210-3213,  
April-21, ISSN No: 2319-8753.

### a. BOOKS

S.No	Author(s)	Title	Publisher	ISBN No.	Year
1	Dr. S.Suman Kumar Dr. A.Ramesh Babu Dr.M.Jagad eeshwar	Internet Applications and Network Security	Lulu Press	9781678103033	Jan 2020

### Projects:

S. No	Investigator(s)	Title	Agency	Period	Grant/ Amount mobilized (Rs.)	Status
1	G.SATHISH KUMAR	Implementation of IPTV Service delivery through Virtualization using Optimized Cloud Resources	UGC	2017-19	2,10,000.00	Submitted
2	Dr.M.Jagadeesh war	Minimization of External Intrusion Detection in an Heterogeneous WSN.	UGC - SERO	2017-19	2,10,000.00	Submitted

### b.Articles

NA

### 12.Dept Journal

NA

## 13.PATENTS

**TITLE:**METHOD AND SYSTEM FOR PROVIDING WOMAN SECURITY  
USINGIOT-BASEDINTELLENTELECTRONICPROGRAMMABLEJEWELRY

<b>NAME</b>	<b>Address</b>
<b>Dr. V. Madhukar(AssistantProfessor)</b>	Department of Computer Science ,Chaitanya(DeemedtobeUniversity) Kishanpura, Hanamkonda Warangal-506001 – TelanganaState Email:vmadhukar@chaitanya.edu.in
<b>Mrs. K. Srilatha(Research Scholar)</b>	Department of Computer Science,Chaitanya(DeemedtobeUniversity) Kishanpura, Hanamkonda Warangal-506001 –TelanganaState Email:lathamurthy @chaitanya.edu.in

## 14.Lab Equipment

- No of Computers in the lab: 218
- No of Air Conditioners :10
- No of Printers: 02
- No of Projectors: 02

## 15. Research Scholars:

### a. with fellowship

NA

### b. without fellowship

#### COMPUTER SCIENCE Ph.D. – 2020

Sl. No.	Scholar Name
1	V. Shobharani
2	G. Sathish Kumar
3	B. Manasa
4	D. Sanjay Kumar
5	V. Sree Ranganayaki
6	N. Maneesha
7	K. Srilatha
8	K. Deepthi
9	M. Prasad
10	T. Ranjith kumar.

#### COMPUTER SCIENCE Ph.D. – 2021

Sl. No.	Scholar Name
1	G. Narsimha Chary
2	Husam Abdul Aziz Alalloush (Foreign)
3	P. Prathima
4	Ch. Himabindu
5	G. Kalpana
6	E. Varnika
7	D. Srikanth

#### COMPUTER SCIENCE Ph.D. - 2022

Sl. No.	Scholar Name
1	Md. Ismail
2	T. Lalitha Kumari
3	K. Kavitha
4	B. Naresh Kumar
5	G. Balachander
6	M. Kiran Kumar (Foreign)
7	V. Chenna Goud
8	B. Manoj Kumar
9	Abdirahman Hasan Ahmed (Foreign)
10	A. Sumalatha
11	K. kala Bharathi

- 12 G. Vijay
- 13 B. Anil Kumar
- 14 S. Sathish Babu

### **16.Scholars Awarded**

NA

### **17.Course Intake**

B.Sc(MPCs)	60
B.Sc(MCCs)	60
B.Sc(MStCs)	60
B.Sc(MEICs)	60
B.Sc(BtCCa)	60
BCA	60
B.Com(CA)	80
BBA	120
MCA	96
MSc(DS)	45
MSc(CS)	45

### **18.Achievements of the Faculty**

1. Dr. V. Madhukar,
  - a. Appointed as Member for “**Internal Complaints Committee for Prevention of Sexual Harassment**”.
  - b. Appointed as Member for “**Constitution of AISHE Committee**”.
  - c. Appointed as Member for “**Constitution of NIRF Committee**”.
  - d. **Appointed as** “Coordinating Officer of UGC Affairs”.
2. Dr. M. Jagadeeshwar and Dr. A. Ramesh Babu faculty from the department have been Published a Book “Internet Applications and Network Security” ISBN No. 9781678103033 in 2020
3. Dr.V.Madhukar and Dr.G.Madhavi Reddy faculty from the department have been awarded Ph.D in the academice year of 2020
4. The department launched Web Server with Windows 2003 Server and host websites for our Chaitanya (Deemed to be University). These Websites developed and maintained by our faculty. .
5. G.Sathish Kumar Received **Best Researcher Award** from **Elsevier SSRN** Organized by International Journal for Innovative Engineering and Management Research on 8<sup>th</sup> , August 2021 at Vijayawada.



Prof.A.Ramesh Babu given extension lecture at Kakatiya Degree College for computer science students on 23 NOV 2022.



Interactive session with TCS-AIP director to the students of cognitive system.

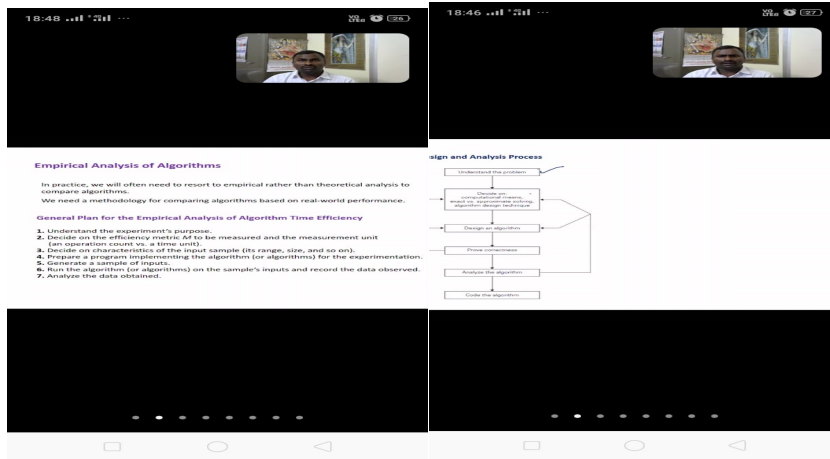


**Conducted RDS to the Research Scholars of Dept. of Computer Science on 26-NOV-2022.**





Conducted research orientation program on “Computer Algorithms” to the research scholars by Dr.P.Venkata SubbaReddy Assistant Professor NIT Warangal.



## 19.Achievements of the Students

- The students of this department have been securing university ranks since the inception. They have proved their excellence by taking part in events such as seminars, paper presentations conducted by other institutions.
- Apart from that, the students have conducted a quiz event **SMART QUIZ**” a mobile application .
- The students have achieved placement in many MNC companies such as Infosys, TCS, Wipro, Mahindra Satyam, IBM, Syntel, etc.
- The students of MCA also appeared Certification Exams **DB2, Oracle Certified Associate, Microsoft Technology Associate** conducted by IBM, Oracle and Microsoft respectively. And 90% of students certified.
- The student of MCA **Bollapally Manideepak** working in **Quantphi Analytics** as Senior Machine Learning Engineer got Highest Package i.e., **16 LPA**
- MCA & MSc (Computer Science) Students have **Published 22 Research Papers** in the Journal of IJARST (International Journal for Technology Research in Science & Technology)
- MCA IV Students have presented Poster Presentation on Topic: Deep Learning and its Applications
- BSC (CS)-III yr. (Shouri-Attended parade in 26-jan-2024).

## 20.Collaboration

- TCS
- IBM

## 21.ALUMINI Coordination Cell

- |                      |   |
|----------------------|---|
| 1. Dr.M.Jagadeeshwar | Director,MCA,Chaitanya postgraduate College |
| 2. G.Sathish Kumar   | Asst.Professor, Chaitanya degree college    |
| 3. K.Srilatha        | Asst.Professor, Chaitanya degree college    |
| 4. P.Prathima        | Asst.Professor, Chaitanya degree college    |
| 5. Ch.Himabindu      | Asst.Professor, Chaitanya degree college    |
| 6. E.Varnika         | Asst.Professor, Chaitanya degree college    |
| 7. M.Ashwini         | Asst.Professor, Chaitanya degree college    |
| 8. K.Sandhya         | Asst.Professor, Chaitanya degree college    |
| 9. Ch.Laxmiprasanna  | Asst.Professor, Chaitanya degree college    |
| 10. P.Ramana         | Asst.Professor, Chaitanya degree college    |
| 11. V.Srivani        | Asst.Professor, Chaitanya degree college    |

## 22.PHOTO GALLERY

Conducted computer awareness program to the school students of rural area by Post Graduate students as a part of community service.



**Community Service:**



1. MCA-IV Sem students conducted computer awareness program for Rural Govt School as a part of community service.





### **23.CONTACT INFO**

1. Prof.A.RAMESH BABU
2. Prof.M.JAGADEESHWAR

**MOBILE.NO:9866826110**  
**MOBILE.NO:7293662221**