

J.J. College of Arts and Science (Autonomous)
Pudukkottai

B.Sc.

COMPUTER SCIENCE

SYLLABUS

FROM THE ACADEMIC YEAR

2023 - 2024

B.Sc. COMPUTER SCIENCE

Proposed Course Structure based on UGC - LOCF and TANSCHÉ

(Choice Based Credit System)

(Applicable for the candidates admitted from the academic year 2023-2024 onwards)

Sl. No.	Course Category	Course Code	Course	Overall Credits	Total Hours/ Week	Marks		
						CIA	ESE	Total
Semester I								
1	Part - I	U1R3TL1/HL1/FL1	Language Course–I	3	6	25	75	100
2	Part - II	U1R3EL1	English Language Course–I	3	6	25	75	100
3	Part - III	U1R3CSCC1	Python Programming	5	5	25	75	100
4		U1R3CSCC2P	Python Programming Practical	5	5	40	60	100
5		U1R3CSDSE1 :1/1:2	Anyone from the List	3	4	25	75	100
6	Part - IV	U1R3CSSEC1 (NME)	To be opted from other Department	2	2	25	75	100
7		U1R3CSFC	Problem Solving Techniques	2	2	25	75	100
Total				23	30			700
Semester II								
1	Part - I	U2R3TL2/HL2/FL2	Language Course– I (Tamil/Hindi/French)	3	5	25	75	100
2	Part - II	U2R3EL2	English Language Course– II	3	5	25	75	100
3	Part-III	U2R3CSCC3	Data Structures and Algorithms	5	6	25	75	100
4		U2R3CSCC4P	Data Structures and Algorithms Practical	5	5	40	60	100
5		U2R3CSDSE 2:1 / 2:2	Graph Theory and its applications/ Digital Computer Fundamental	3	5	25	75	100
6	Part- IV	U2R3CSSEC2 (NME2)	To be opted from other Department	2	2	25	75	100
7		U2R3CSSEC 3:1 / 3:2	Advanced Excel/ R Programming	2	2	25	75	100
Total				23	30			700

Semester III								
1	Part - I	U3R3TL3/ HL3/FL3	Language Course–III (Tamil/Hindi/French)	3	6	25	75	100
2	Part - II	U3R3EL3	English Language Course–III	3	6	25	75	100
3	Part - III	U3R3CSCC5	Relational Database Management System	5	5	25	75	100
4		U3R3CSCC6P	RDBMS Practical	5	5	40	60	100
5		U3R3CSDSE 3:1/ 3:2	Applied Physics / Internet Programming	3	4	25	75	100
6	Part - IV	U3R3CSSEC 4:1/ 4:2	PHP Programming/ Visual Programming	2	2	25	75	100
7		U3R3VE	Value Education	2	2	25	75	100
Total				23	30			700
Semester IV								
1	Part - I	U4R3TL4/HL 4/ FL4	Tamil/Hindi/French	3	5	25	75	100
2	Part - II	U4R3EL4	English	3	5	25	75	100
3	Part - III	U4R3CSCC7	Java Programming	5	6	25	75	100
4		U4R3CSCC8P	Java Programming Practical	5	5	40	60	100
5		U4R3CSDSE 4:1P/4:2P	Applied Physics Practical/ Internet Programming Practical	3	3	40	60	100
6	Part - IV	U4R3CSSEC 5:1/5:2	Information Security/J2EE	2	2	25	75	100
7		U4R3CSSEC 6:1/ 6:2	Soft Skills/ Emotional Intelligence and Social Skills	2	2	25	75	100
8		U4R3ES	Environmental Studies	2	2	25	75	100
Total				25	30			800

Semester V								
1	Part–III	U5R3CSCC9	Data Communication Networks	5	6	25	75	100
2		U5R3CSCC10	Software Engineering	4	6	25	75	100
3		U5R3CSCC11	Dot NET Programming	4	6	25	75	100
4		U5R3CSCC12P	Dot NET Practical	4	4	40	60	100
5		U5R3CSDSE 5:1/5:2	Operating System/ Mobile Ad-hoc Network	3	4	25	75	100
6		U5R3CSDSE 6:1/6:2	HTML and Web Design/Web Services	3	4	25	75	100
7	Part – IV	U5R3CSINT	Internship (During Semester IV Summer Vacation. Credits shall be awarded in Semester V)	2	-	-	-	100
Total				25	30			700
Semester VI								
1	Part - III	U6R3CSCC13	Microprocessor and Its Applications	4	6	25	75	100
2		U6R3CSCC14P	Microprocessor and Its Applications Practical	4	6	40	60	100
3		U6R3CSCC15PW	Software Application Project	4	6	-	-	100
4		U6R3CSDSE 7:1/7:2	Data Science/ Linux and Shell Programming	3	3	25	75	100
5		U6R3CSDSE 8:1/8:2	Computer Graphics and Multimedia / Fundamentals of Machine Learning	3	5	25	75	100
6	Part - IV	U6R3CSSEC 7:1/7:2	Industry 4.0/ Software Testing	2	2	25	75	100
7	Part - V	U6R3GS	Gender Studies	1	2	25	75	100
8		-	Extension Activities	1	-	-	-	-
			SWAYAM Online Courses- MOOCS	2				
Total				22(2)	30			700
Grand Total				141(2)				4300

Core Course I–Python Programming

Course Code: U1R3CSCC1	Credit: 5
Category: Core Course	Hrs/Week: 5, Total Inst.Hrs: 75
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- ☐ To make students understand the concepts of Python programming.
- ☐ To apply the OOPs concept in PYTHON programming
- ☐ To impart knowledge on demand and supply concepts
- ☐ To make the students learn best practices in PYTHON programming
- ☐ To know the costs and profit maximization

Unit-I : BASICS OF PYTHON PROGRAMMING Hours: 15

History of Python – Features of Python – Literal – Constants – Variables – Identifiers – Keywords - Built-in Data Types – Output Statements – Input Statements - Comments – Indentation-Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.

Unit – II: CONTROL STATEMENTS Hours: 15

Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.

Unit-III: FUNCTIONS Hours:15

Function Definition – Function Call – Variable Scope and its Life time –Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments -Recursion. Python Strings: String operations - Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace–Defining our own modules.

Unit-IV: LISTS**Hours:15**

Creating a list – Access values in List - Updating values in Lists – Nested lists –Basic list operations – List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples –Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary –Dictionary Functions and Methods-Difference between Lists and Dictionaries.

Unit-V: PYTHON FILE HANDLING**Hours: 15**

Types of files in Python -Opening and Closing files - Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods–with keyword – Splitting words –File methods-File Positions-Renaming and deleting files.

Text Books

1. ReemaThareja, “Python Programming using problem solving approach”, First Edition, 2017, Oxford University Press.
2. Dr. R. NageswaraRao, “Core Python Programming”, First Edition, 2017, Dream tech Publishers.

Reference Books

1. VamsiKurama, “Python Programming: A Modern Approach”, Pearson Education.
2. Mark Lutz, ”Learning Python”, Orielly.
3. Adam Stewarts, “Python Programming”, Online.
4. Fabio Nelli, “Python Data Analytics”, APress.
5. Fabio Nelli, “Python Data Analytics”, APress.

Web Resources

1. <https://www.programiz.com/python-programming>
2. <https://www.guru99.com/python-tutorials.html>
3. https://www.w3schools.com/python/python_intro.asp
4. <https://www.geeksforgeeks.org/python-programming-language/>
5. [https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

COURSE OUTCOMES

	COURSE OUTCOMES
CO:1	Learn the basics of python, Do simple programs on python, Learn how to use an array.
CO:2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements
CO:3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.
CO:4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.
CO:5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.

Core Course II – Python Programming Practical

Course Code: U1R3CSCC2P	Credit: 5
Category: Core Course	Hrs/Week: 4, Total Inst.Hrs: 60
Nature of the Course: Employability	Marks: CIA: 40 + EXT: 60 = 100

COURSE OBJECTIVES

- Be able to design and program Python applications.
- Be able to create loops and decision statements in Python.
- Be able to work with functions and pass arguments in Python.
- Be able to build and package Python modules for reusability.
- Be able to read and write files in Python.

List of Exercises:

1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.

COURSE OUTCOMES:

The learners would have the ability to

	COURSE OUTCOMES
CO:1	Demonstrate the understanding of syntax and semantics of PYTHON language
CO:2	Identify the problem and solve using PYTHON programming techniques.
CO:3	Identify suitable programming constructs for problem solving.
CO:4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.
CO:5	Develop a PYTHON program for a given problem and test for its correctness.

Discipline Specific Course I

1. Numerical Methods

Course Code: U1R3CSDSE1:1	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 5, Total Inst.Hrs: 75
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES:

- To introduce the various topics in Numerical methods.
- To make understand the fundamentals of algebraic equations.
- To apply interpolation and approximation on examples.
- To solve problems using numerical differentiation and integration.
- To solve linear systems, numerical solution of ordinary differential equations.

Unit I: Fundamentals of Algebraic Equations Hours: 15

Solution of algebraic and transcendental equations-Bisection method – Fixed point iteration method – Newton Raphson method –linear system of equations – Gauss elimination method – Gauss Jordan method .

Unit II: Iterative and Interpolation Hours: 15

Iterative methods - Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices. Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation(Proof no needed)

Unit III: Interpolation with Equal interval Hours: 15

Difference operators and relations. -Interpolation with equal intervals – Newton's forward and backward difference formulae. (Problems only).

Unit IV: Numerical Differentiation and Integration Hours: 15

Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule

Unit V: Initial Value Problems For ODE Hours: 15

Single step methods – Taylor's series method – Euler's method – Runge Kutta method for solving(first, second , Third and 4th) order equations.

Text books

1. **Introductory methods of numerical analysis**, S.S. Sastry, Prentical Hall India, 1994.
2. **Numerical Methods**, N. Subramaniam, Scm Publishers, Erode.

e – Resources:

1. <https://youtu.be/pUDeeE-ugyc>
2. <https://www.maths.dur.ac.uk/users/anthony.yeates/na17.pdf>

Reference Books:

1. **Numerical Methods**, P.Kandasamy, S.Chand & Co., New Delhi, .1998
2. **Statistics**, R.S.N. Pillai and Bagavathi S, Chand & Co Ltd., New Delhi, 1999.

COURSE OUTCOMES

The learners would have the ability to,

	COURSE OUTCOMES
CO:1	Know how to solve various problems on numerical methods
CO:2	Use approximation to solve problems
CO:3	Differentiation and integration concept are applied
CO:4	Know about numerical methods to solve Numerical differentiation and Integration.
CO:5	Numerical solution of ordinary differential equations

2. Statistical Analysis Using R

Course Code: U1R3CSDSE1:2	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 5, Total Inst.Hrs: 75
Nature of the Course: Employability	Marks: CIA: 40 + EXT: 60 = 100

COURSE OBJECTIVES:

- Acquire programming skills in R Programming
- Acquire Object-oriented programming skills in R Programming.
- Develop the skill of designing graphical-user interfaces (GUI) in R Programming
- Acquire R Programming skills to move into specific branches
- To work with matrices in R-programming

List of Topics

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Write a program to find list of even numbers from 1 to n using R-Loops.
4. Create a function to print squares of numbers in sequence.
5. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.
6. Implement different String Manipulation functions in R.
7. Implement different data structures in R (Vectors, Lists, Data Frames)
8. Write a program to read a csv file and analyze the data in the file in R.
9. Create pie chart and bar chart using R.
10. Create a data set and do statistical analysis on the data using R.
11. Program to find factorial of the given number using recursive function
12. Write a R program to count the number of even and odd numbers from array of N numbers.

COURSE OUTCOMES

The learners would have the ability to,

	COURSE OUTCOMES
CO:1	Understand the problem solving approaches
CO:2	Learn the basic programming constructs in R Programming
CO:3	Practice various computing strategies for R Programming -based solutions to real world problems
CO:4	Use R Programming data structures - lists, tuples, dictionaries
CO: 5	Create the R- Programming documentations

Skill Enhancement Course I

1. Office Automation

Course Code: SEC1:1	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- Understand the basics of computer systems and its components.
- Understand and apply the basic concepts of a word processing package.
- Understand and apply the basic concepts of electronic spreadsheet software.
- Understand and apply the basic concepts of database management system
- Understand and create a presentation using PowerPoint tool.

UNIT-I: Introductory concepts

Hours:6

Introductory concepts: Memory unit – CPU-Input Devices: Key board, Mouse and Scanner.Output devices:Monitor,Printer.Introduction to Operating systems&its features:DOS–UNIX–Windows.Introduction to Programming Languages.

UNIT-II: Word Processing

Hours:6

Word Processing: Open, Save and close word document; Editing text – tools, formatting,bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headersandfooters,numbering; printing– Preview,options,merge.

UNIT-III: Spreadsheets

Hours:6

Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas –entering, handling and copying; Charts – creating, formatting and printing, analysis tables,preparation of financial statements,introduction to data nalytics.

UNIT-IV: Database Concepts

Hours:6

Database Concepts: The concept of database management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files;

Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS-Access).

UNIT-V: Powerpoint

Hours: 6

Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.

RECOMMENDED BOOK

1. Peter Norton, "Introduction to Computers" – Tata McGraw-Hill.

REFERENCE BOOKS

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, Microsoft 2003", Tata McGraw-Hill.

WEB REFERENCES

1. Web content from NDIL/SWAYAM or open source web resources

COURSE OUTCOMES

	COURSE OUTCOMES
CO:1	Possess the knowledge on the basics of computers and its components
CO:2	Understand and apply the basic concepts of a word processing package.
CO:3	Learn the concepts of Database and implement the Query in Database.
CO:4	Demonstrate the understanding of different automation tools.
CO:5	Utilize the automation tools for documentation, calculation and presentation purpose.

Skill Enhancement Course I

2. Markup and Scripting Languages

Course Code: SEC1:2	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To understand Web based programming and scripting languages.
- To learn the basic web concepts and to create rich internet applications that use most recent client-side programming technologies.

UNIT-I: HTML

Hours:6

HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment links-tables-frames

UNIT-II: Forms & Images

Hours:6

Forms & Images Using Html: Graphics: Introduction-

How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html form text box, password, list box, combobox, text area, tools for building web page front page

UNIT-III: XML & DHTML

Hours:6

XML & DHTML: Cascading style sheet (CSS)- what is CSS- Why we use CSS- adding CSS to your web pages- Grouping styles- extensible markup language (XML). Dynamic

HTML: Document object model (DCOM)-

Accessing HTML & CSS through DCOM Dynamic content styles & positioning- Event bubbling- data binding.

UNIT-IV: JavaScript

Hours:6

JavaScript: Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition, Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations

UNIT-V: Ajax

Hours:6

Ajax: Introduction, advantages & disadvantages, Purpose of it, ajax based web application, alternatives of ajax JavaScript & AJAX: Introduction to array-operators, making statements-

date&time-mathematicsstrings-Eventhandling-formproperties.AJAX.IntroductiontojQueryand AngularJS.

REFERENCE BOOKS

- LauraLemay,RafeColburn,JenniferKyrnin,“MasteringHTML,CSS&JavascriptWebPublishing”, 2016.
- DTEditorialServices(Author),“HTML5BlackBook(CoversCSS3,JavaScript,XML,XHTML, AJAX,PHP,jQuery)”,Paperback 2016,2nd Edition.

WEB REFERENCES

- 1.NPTEL&MOOCcoursestitledWebDesignandDevelopment

COURSE OUTCOMES

	COURSE OUTCOMES
CO:1	Communicateclearlyandconcisely,visually,verballyandinwriting,usingtechniquesap propriatefortheintended audience.
CO:2	Demonstrateknowledgeofdiscipline-specificskillsandvocabulary
CO:3	Interpret theethical,legal, andsocialimpactsofvariousmodesofmedia delivery
CO:4	Participateasateammembertomakecollaboratedecisionstowardsharedobjectiveswit hinterpersonal skills
CO:5	Constructabodyofworkthatdemonstratesvisualintelligence,conceptualunderstanding ,collaborationandtechnicalfacilityataprofessionallentrylevelin mediadesign andproduction

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Foundation Course I–Problem Solving Techniques

Course Code: U1R3CSFC	Credit: 2
Category: FoundationCourse	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
- Implement different programming constructs and decomposition of problems into functions.
- Use data flow diagram, Pseudo code to implement solutions.
- Define and use of arrays with simple applications.
- Understand about operating system and their uses.

UNIT–I: Introduction

Hours:6

Introduction: History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. Programming Languages: Machine language, Assembly language, High-level language, 4GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.

UNIT–II: Data&Programming: Algorithm

Hours: 6

Data: Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC). **Structured Programming:** **Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. **Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. Program design: Modular Programming.

UNIT–III: Selection Structures

Hours:6

Selection Structures: Relational and Logical Operators -Selecting from Several Alternatives – Applications of Selection Structures. Repetition Structures: Counter Controlled Loops –Nested Loops– Applications of Repetition Structures.

UNIT-IV: Data&Arrays**Hours:6**

Data: Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.

UNIT-V: Data Flow Diagrams&Program Modules**Hours:6**

Data Flow Diagrams: Definition, DFD symbols and types of DFDs. Program Modules: Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. Files: File Basics-Creating and reading a sequential file- Modifying Sequential Files.

RECOMMENDED BOOK

1. R.G.Dromey,*HowtoSolve itby Computer*,PearsonIndia,2007.

REFERENCE BOOKS

1. George Polya, Jeremy Kilpatrick, The Stanford Mathematics Problem Book: With HintsandSolutions, DoverPublications,2009(KindleEdition2013).
2. Greg W.Scragg,ProblemSolvingwithComputers,Jones &Bartlett1stedition,1996.

COURSE OUTCOMES:

On completion of this course, students will

	COURSE OUTCOMES
CO:1	Study the basic knowledge of Computers.Analyze the programming languages.
CO:2	Study the data types and arithmetic operations.Know about the algorithms.Develop program using flow chart and pseudocode.
CO:3	Determine the various operators.Explain about the structures.Illustrate the concept of Loops
CO:4	Determine the various operators.Explain about the structures.Illustrate the concept of Loops.
CO:5	Explain about DFDIllustrate program modules.Creating and reading Files

Core Course III – Data Structures and Algorithms

Course Code: U2R3CSCC3	Credit: 5
Category: Core Course	Hrs/Week: 6, Total Inst. Hrs: 90
Nature of the Course: Employability	Marks: CIA: 25 + EXT: 75 = 100

COURSE OBJECTIVES

- To impart the basic concepts of data structures and algorithms.
- To acquaint the student with the basics of the various data structures and make the students knowledgeable in the area of data structures.
- To provide knowledge about the categories of data structures
- This course also gives insight into the various algorithm design techniques
- To give more experience about the algorithm types with example problems.

UNIT-I: INTRODUCTION TO DATA STRUCTURES

Hours: 18

1. **Data Structures:** Definition- Time & Space Complexity,
2. **Arrays:** Representation of arrays, Applications of arrays, sparse matrix and its representation,
3. **Linear list:** Singly linked list implementation, insertion, deletion and searching operations on linear list
4. **Circular linked list:** implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists- Dynamic Storage management.

UNIT-II: STACKS

Hours: 18

- **STACKS:** Operations, array and linked representations of stack, stack applications, infix to postfix conversion, postfix expression evaluation, recursion implementation

UNIT-III: QUEUES, TREES & GRAPHS

Hours: 18

QUEUES, TREES & GRAPHS:

- **Queues:** operations on queues, array and linked representations.
- **Circular Queue:** operations, applications of queues.
- **Trees:** Definitions and Concepts- Representation of binary tree, Binary tree traversals (Inorder, Postorder, Preorder),

- Binary search trees
- **Graphs:** Representation of Graphs- Types of graphs -Breadth first traversal – Depth first traversal- -Applications of graphs.

UNIT–IV: INTRODUCTION TO ALGORITHMS

Hours: 18

- **Introduction:** Definition of Algorithms- Overview and importance of algorithms- pseudocode conventions, Asymptotic notations, practical complexities.
- **Divide-and-Conquer:** : General Method – Binary Search- Quick Sort- Merge Sort.
- **Greedy Method:** General method- Knapsack problem- Tree vertex splitting- Job sequencing with deadlines

UNIT–V: DYNAMIC PROGRAMMING, BACKTRACKING & BRANCH & BOUND

Hours: 18

- **Dynamic programming:** General method, Multistage Graphs, All pairs shortest path, Single source shortest path.
- **Backtracking:** General method, 8 , Graph coloring, Hamiltonian cycle.
- **Branch & Bound:** General method, Travelling salesperson problem.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) – Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Skills acquired from the course: Knowledge, Problem Solving and Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.

RECOMMENDED BOOKS

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Second Edition , “Fundamentals of Data in C”, Universities Press
2. E. Horowitz, S. Sahni and S. Rajasekaran, Second Edition ,“Fundamentals of Computer Algorithms “ Universities Press

REFERENCE BOOKS

1. Seymour Lipschutz,”Data Structures with C”, First Edition, Schaum’s outline series in computers, Tata McGraw Hill.
1. R.Krishnamoorthy and G.Indirani Kumaravel, Data Structures using C, Tata McGrawHill – 2008.
1. A.K.Sharma, Data Structures using C , Pearson Education India,2011.

1. G. Brassard and P. Bratley, “Fundamentals of Algorithms”, PHI, New Delhi, 1997.
1. A.V. Aho, J.E. Hopcroft, J.D. Ullmann,, “The design and analysis of Computer Algorithms”, Addison Wesley, Boston, 1974
1. Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms, Third edition, MIT Press, 2009
1. Sanjoy Dasgupta, C.Papadimitriou and U.Vazirani , Algorithms , Tata McGraw-Hill, 2008.

WEB REFERENCES

1. Web resources from NDL Library, E-content from opensource libraries

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO:1	Have a good understanding about the concepts of Data structures and to understand simple linear Data structures.
CO:2	Have a good knowledge on the basics of stack Data structure, its implementation and application.
CO:3	Use the appropriate Data structures in context of solution of given problem and demonstrate a familiarity with major Data structures.
CO:4	Have an idea about the basic concepts of algorithms
CO:5	To have clear idea on algorithmic design paradigms like Dynamic Programming, Backtracking, Branch and Bound

Core Course IV – Data Structures and Algorithms Practical

Course Code: U2R3CSCC4P	Credit: 5
Category: Core Course	Hrs/Week: 3, Total Inst. Hrs: 45
Nature of the Course: Employability	Marks: CIA: 40 + EXT: 60 = 100

COURSE OBJECTIVES

- To understand and implement basic data structures using C
- To apply linear and non-linear data structures in problem solving.
- To learn to implement functions and recursive functions by means of data structures
- To implement searching algorithms.
- To provide a deep learning experience about sorting algorithms

List of Exercises:

Implement the following exercises using C Programming language:

1. Array implementation of stacks
2. Array implementation of Queues
3. Linked list implementation of stacks
4. Linked list implementation of Queues
5. Binary Tree Traversals (Inorder, Preorder, Postorder)
6. Implementation of Linear search and binary search
7. Implementation Insertion sort, Quick sort and Merge Sort
8. Implementation of Depth-First Search & Breadth-First Search of Graphs.
9. Finding all pairs of Shortest Path of a Graph.
10. Finding single source shortest path of a Graph

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) – Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Skills acquired from the course: Knowledge, Problem Solving and Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

WEB REFERENCES

Web resources from NDL Library, E-content from open source libraries

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Work on data structures.
CO: 2	Implement linked lists and their applications
CO: 3	Implement Tree Traversals
CO: 4	Handle various algorithms
CO: 5	Implement different sorting and searching algorithms

Generic / Discipline Specific Elective Course II

1. Graph Theory and its Applications

Course Code: U2R3CSDSE2:1	Credit: 3
Category: Discipline Specific Elective	Hrs/Week: 5, Total Inst. Hrs: 75
Nature of the Course: Skill Development	Marks: CIA: 25 + EXT: 75 = 100

COURSE OBJECTIVES

- Definition of Graph, sub graph their representations, degree and algebraic operations.
- Connected graphs, weighted graphs and shortest paths
- Trees: Characterizations, spanning tree, minimum spanning trees
- Eulerian and Hamiltonian graphs: Characterization, Necessary and sufficient conditions
- Special classes of graphs: Bipartite graphs, line graphs, chordal graphs.

UNIT-I: Introduction to Graphs

Hours: 15

Graph-mathematical definition- Introduction – sub graphs –Walks, paths, Circuits connectedness- Components- Euler Graphs- Hamiltonian paths and circuits-Trees- properties of Trees- Distance and centers in Tree- Rooted and Binary Trees.

UNIT-II: Connectivity and Planarity

Hours: 15

Introduction to circuits - cut set- properties of cut set- All cut sets –connectivity and separability – Network Flows - 1-Isomorphism - 2-Isomorphism- Combinatorial and Geometric graphs- Planar Graphs – Different representation of planar graph.

UNIT-III: Colouring and Directed Graph

Hours: 15

Basics of Colouring & Chromatic number – Chromatic partitioning – Graph Colouring – four colour Problem Chromatic polynomial - Matching – Covering - Directed graphs - Types of Directed Graphs – Diagraphs and binary relations – Directed paths- Euler Graph.

UNIT-IV: Matrix Representation in Graph

Hours: 15

Matrix representation of graphs, Sub graphs& Quotient Graphs, Transitive Closure digraph, Euler's Path & Circuit (only definitions and examples), spanning Trees of Connected Relations, Prim's Algorithm to construct Spanning Trees, Weighted Graphs, Minimal, Spanning Trees by Prim's Algorithm & Kruskal's Algorithm.

UNIT–V: Applications of Graph**Hours: 15**

Traveling Sales Person Problem with Directed and Un directed Graph - Graph with n vertices and k colours - Shortest path from one to many Cities with directed graph - Shortest Paths with Un directed Graphs - Connected Components.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) – Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Skills acquired from the course: Knowledge, Problem Solving and Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Text Books:

1. Narsingh Deo , “ Graph Theory with Application to Engineering and Computer Science” Prentice Hall of India 2010 (Reprint).
2. Rosen H “Discrete Mathematics and Its Application” McGraw Hill, 2007.

Reference Books:

1. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker.
2. Clark J and Holton DA “ First look at Graph Theory” Allied Publishers 1995.
3. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker.

E- Resources:

1. Web resources from NDL Library, E-content from open source libraries
2. <https://d3gt.com/>
3. <https://www.coursera.org/courses?query=graph%20theory>

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Apply the concepts of Graph, sub graph their representations, degree and algebraic operations.
CO: 2	Handle Connected graphs, weighted graphs and shortest paths
CO: 3	Practice on Trees: Characterizations, spanning tree, minimum spanning trees
CO: 4	Work with Eulerian and Hamiltonian graphs: Characterization, Necessary and sufficient conditions
CO: 5	Handle Special classes of graphs: Bipartite graphs, line graphs, chordal graphs.

Generic / Discipline Specific Elective Course II

2. Digital Computer Fundamentals

Course Code: U2R3CSDSE2:2	Credit: 3
Category: Discipline Specific Elective	Hrs/Week: 5, Total Inst. Hrs: 75
Nature of the Course: SkillDevelopment	Marks: CIA: 25 + EXT: 75 = 100

COURSE OBJECTIVES

- It aims to train the student to the basic concepts of Digital Computer Fundamentals
- To impart the in-depth knowledge of logic gates, Boolean algebra
- To provide them a deep learning experience about combinational circuits and sequential circuits.
- To give the students an understanding about Flip flops.
- To provide the students a realization about counters and different types of ROM

UNIT-I: Number systems and Codes Hours: 15

Number systems and Codes: Number System – Base Conversion – Binary Codes – Code Conversion. Digital Logic: Logic Gates – Truth Tables – Universal Gates.

UNIT-II: Boolean Algebra Hours: 15

Boolean Algebra: Laws and Theorems – SOP, POS Methods – Simplification of Boolean Functions – Using Theorems, K-Map, Prime– Implicant Method–Binary Arithmetic: Binary Addition – Subtraction – Various Representations of Binary Numbers – Arithmetic Building Blocks–Adder–Subtractor.

UNIT-III: Combinational Logic Hours: 15

Combinational Logic: Multiplexers – Demultiplexers – Decoders – Encoders –Code Converters– Parity Generators and Checkers.

UNIT-IV: Sequential Logic Hours: 15

Sequential Logic: RS, JK, D and T Flip-Flops – Master - Slave Flip-Flops. Registers: Shift Registers – Types of Shift Registers.

UNIT-V: Counters**Hours: 15**

Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up – Down Counters– Ring Counters. **Memory:** Basic Terms and Ideas –Types of ROMs –Types of RAMs.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) – Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Skills acquired from the course: Knowledge, Problem Solving and Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

RECOMMENDED BOOKS

1. V.Rajaraman and T.Radhakrishnan, Digital Computer Design, Prentice Hall of India, 2001
2. D.P.Leach and A.P.Malvino, Digital Principles and Applications–TMH–Fifth Edition–2002.
3. M.Moris Mano, Digital Logic and Computer Design, PHI, 2001.
4. T.C.Bartee, Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill, 1991.

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Identify the logic gates and their functionality.
CO: 2	Perform number conversions from one system to another system
CO: 3	Understand the functions of combinational circuits
CO: 4	Perform number conversions.
CO: 5	Perform Counter design and learn its operations.

Skill Enhancement Course – II (Offered to other Department)

1. Multimedia Systems

Course Code: U2R3CSSEC2:1	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst. Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25 + EXT: 75 = 100

COURSE OBJECTIVES:

- To understand the standards available for different audio, video and text applications.
- To learn various multimedia authoring systems in multimedia production team.

UNIT– I: Introduction to Multimedia

Hours: 6

Multimedia Definition - Use Of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.

UNIT–II: Images & Sound

Hours: 6

Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. **Sound:** The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats - Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

UNIT–III: Animation & Video

Hours: 6

Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. **Video:** Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.

UNIT–IV: Making Multimedia

Hours: 6

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems Needs- Multimedia Production Team.

UNIT–V: Planning and Costing**Hours: 6**

Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.

TEXTBOOK:

1. Peter Norton, "Introduction to Computers" – Tata McGraw-Hill.

REFERENCE BOOKS

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "Microsoft 2003", Tata McGraw-Hill.

COURSE OUTCOMES

	COURSE OUTCOMES
CO: 1	Communicate clearly and concisely, visually, verbally and in writing, using techniques appropriate for the intended audience.
CO: 2	Demonstrate knowledge of discipline-specific skills and vocabulary
CO: 3	Interpret the ethical, legal, and social impacts of various modes of media delivery
CO: 4	Participate as a team member to make collaborative decisions toward shared objectives with interpersonal skills
CO: 5	Construct a body of work that demonstrates visual intelligence, conceptual understanding, collaboration and technical facility at a professional entry level in media design and production

2. E-Commerce

Course Code: U2R3CSSEC2:2	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst. Hrs: 30
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES:

- To provide knowledge on Ecommerce technology, Business Models and M-Commerce.
- To explore the major issues associated with e-commerce-security, privacy, authentication, encryption and e-Payment.
- To educate about World Wide Web and E Marketing
- To teach the students about E-Security & Legal and Ethical Issues
- To educate them about Information systems for Mobile Commerce

UNIT I: **History of E-commerce and Indian Business Context** **Hours: 6**

E-Commerce –Emergence of the Internet –Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India –The Internet and India – E-transition Challenges for Indian Corporate.

Business Models for E-commerce: Business Model – E-business Models Based on the Relationship of Transaction Parties -E-business Models Based on the Relationship of Transaction Types.

UNIT II: **Enabling Technologies of the WWW & e-Marketing** **Hours: 6**

World Wide Web – Internet Client-Server Applications –Networks and Internets – Software Agents – Internet Standards and Specifications – ISP. -Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – E-branding.

UNIT III: **E-Security & Legal and Ethical Issues** **Hours: 6**

E-Security: Information system Security – Security on the Internet – E-business Risk Management Issues –Information Security Environment in India. Legal and Ethical Issues : Cybers talking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.

UNIT–IV: e-Payment Systems**Hours: 6**

Main Concerns in Internet Banking – Digital Payment Requirements – Digital Token-based e-payment Systems – Classification of New Payment Systems – Properties of Electronic Cash – Cheque Payment Systems on the Internet – Risk and e-Payment Systems – Designing e-payment Systems – Digital Signature – Online Financial Services in India - Online Stock Trading.

UNIT–V: Information systems for Mobile Commerce**Hours: 6**

Information systems for Mobile Commerce :What is Mobile Commerce?–Wireless Applications – Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies –Different Generations in Wireless Communication – Security Issues Pertaining to Cellular Technology. **Portals for E-Business:** Portals–Human Resource Management–Various HRIS Modules.

TEXT BOOK

1. Peter Norton, “Introduction to Computers” – Tata McGraw-Hill.

REFERENCE BOOKS

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw-Hill.

WEB REFERENCES

1. Web content from NDL / SWAYAM or open source web resources

COURSE OUTCOMES:

On completion of this course, students will

	COURSE OUTCOMES
CO: 1	Have a sound knowledge on Ecommerce technology, Business Models and M-Commerce.
CO: 2	Handle the major issues associated with e-commerce-security, privacy, authentication, encryption and e-Payment.
CO: 3	Be knowing World Wide Web and E Marketing
CO: 4	Have ample skills in E-Security & Legal and Ethical Issues
CO: 5	Be knowing about Information systems for Mobile Commerce

Skill Enhancement Course III

1. Advanced Excel

Course Code: U2R3CSSEC3:1	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst. Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25 + EXT: 75 = 100

COURSE OBJECTIVES

- To learn the advanced features of Excel.
- To impart the students an understanding about data validation through excel.
- To educate them about pivot tables of excel.
- To provide them an understanding about various functions and their use in excel.
- To summarize, analyze, explore, and present visualizations of data in the form of charts, graphs.

UNIT-I: Basics of Excel

Hours: 6

Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- Vlookup with Exact Match, Approximate Match- Nested Vlookup with Exact Match- Vlookup with Tables, Dynamic Ranges- Nested Vlookup with Exact Match- Using Vlookup to consolidate Data from Multiple Sheets.

UNIT-II: Data Validations

Hours: 6

Data Validations - Specifying a valid range of values - Specifying a list of valid values- Specifying custom validations based on formula - Working with Templates Designing the structure of a template- templates for standardization of worksheets - Sorting and Filtering Data - Sorting tables- multiple-level sorting- custom sorting- Filtering data for selected view - advanced filter options- Working with Reports Creating subtotals- Multiple-level subtotal.

UNIT-III: Pivot Table

Hours: 6

Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivot tables- external data sources- data consolidation feature to consolidate data- Show Value As % of Row, % of Column, Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers.

UNIT-IV: Functions**Hours: 6**

More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditional formatting option for rows, columns and cells- What-If Analysis - Goal Seek- Data Tables- Scenario Manager.

UNIT-V: Charts**Hours: 6**

Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Spark lines, Inline Charts, data Charts- Overview of all the new features.

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) – Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Skills acquired from the course: Knowledge, Problem Solving and Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

RECOMMENDED BOOK

1. Excel 2019 All-in-One for Dummies – 2018- Greg Harvey

REFERENCE BOOKS

1. Microsoft Excel 2019 Pivot Table Data Crunching-2019,Bill Jelen and Michael Alexander

WEB REFERENCE

1. Web resources from NDL Library, E-content from opensource libraries

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Handle large amounts of data
CO: 2	Aggregate numeric data and summarize into categories and subcategories
CO: 3	Filtering, sorting, and grouping data or subsets of data

CO: 4	Create pivot tables to consolidate data from multiple files
CO: 5	Presenting data in the form of charts and graphs

2. R Programming

Course Code: U2R3CSSEC3:2	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst. Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25 + EXT: 75 = 100

COURSE OBJECTIVES

- To understand and able to use basic programming concepts of R programming
- To automate data analysis, working collaboratively and openly on code
- To know how to generate dynamic documents
- To learn about Control structures, lists, factors and tables.
- To give them an understanding about Object Oriented programming in R programming

UNIT-I: INTRODUCTION Hours: 6

INTRODUCTION -Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT-II: CONTROL STRUCTURES AND VECTORS Hours: 6

CONTROL STRUCTURES AND VECTORS -Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

UNIT-III: LISTS Hours: 6

LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT-IV: FACTORS AND TABLES**Hours: 6**

FACTORS AND TABLES - Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R PROGRAMMING

UNIT-V: OBJECT-ORIENTED PROGRAMMING**Hours: 6**

OBJECT-ORIENTED PROGRAMMING - S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper) – Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)

Skills acquired from the course: Knowledge, Problem Solving and Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

RECOMMENDED BOOKS

1. Roger D. Peng,” R Programming for Data Science “, 2012
2. Norman Matloff,” The Art of R Programming- A Tour of Statistical Software Design”, 2011

REFERENCE BOOKS

1. Garrett Golemund, Hadley Wickham, ”Hands-On Programming with R: Write Your Own Functions and Simulations” , 1st Edition, 2014
2. Venables, W.N., and Ripley, “ S programming”, Springer, 2000.

WEB REFERENCE

1. Web resources from NDL Library, E-content from opensource libraries

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Understand the problem-solving approaches
CO: 2	Learn the basic programming constructs in R Programming
CO: 3	Decompose R Programming into functions
CO: 4	Use R Programming data structures -lists, tuples, and dictionaries.
CO: 5	Do input/output with files in R Programming.

SEMESTER - III

Course V – RELATIONAL DATABASE MANAGEMENT SYSTEM

Course Code: U3R3CSCC5	Credit: 5
Category: Core Course	Hrs/Week: 5, Total Inst. Hrs:75
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To analyze the difference between traditional file system and DBMS
- To enable learning about Relational database model
- Able to handle with different database languages
- Able to write queries mathematically
- To design database and normalize data

Unit – I INTRODUCTION

HOURS: 14

Database-System Applications- Purpose of Database Systems - View of Data -Database Languages - Relational Databases - Database Design -Object-Based and Semi structured Databases - Data Storage and Querying Transaction Management -Data Mining and Analysis - Database Architecture - Database Users and Administrators - History of Database Systems.

Unit – II RELATIONAL MODEL

HOURS: 16

Structure of Relational Databases - Fundamental Relational-Algebra Operations Additional Relational-Algebra Operations- Extended Relational-Algebra Operations - Null Values - Modification of the Database.

Unit – III SQL

HOURS: 15

Data Definition - Basic Structure of SQL Queries - Set Operation - Aggregate Functions - Null Values - Nested Sub queries – Complex Queries - Views -Modification of the Database - Joined Relations.

Unit – IV RELATIONAL LANGUAGES

HOURS: 15

The Tuple Relational Calculus - The Domain Relational Calculus - Query-by- Example. Database Design and the E-R Model: Overview of the Design Process - The Entity-Relationship Model - Constraints - Entity-Relationship Diagrams - Weak Entity Sets - Database Design for Banking Enterprise

Unit – V RELATIONAL DATABASE DESIGN

HOURS: 15

Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional- Dependency Theory -- Decomposition Using Multi-valued Dependencies-More Normal Forms - Database-Design Process.

Text Book:

1. Database System Concepts, Fifth edition, Abraham Silberschatz , Henry F. Korth, S.Sudarshan, McGraw-Hill-2005.
[Unit-1 (Chapters - 1); Unit-2 (Chapters – 2); Unit-3 (Chapters – 3); Unit-4 (Chapters – 5, 6.1 – 6.4, 6.6, 6.8); Unit-5 (Chapters – 7)]

Reference Books:

1. “An introduction to database systems”, Bipin C. Desai, Galgotia Publications Pvt Ltd,1991.
2. “An Introduction to Database Systems”, C.J.Date, Third Edition Addison Wesley 1983.
3. Michael Kifer, Arthur Bernstein, and Philip M. Lewis, “Database Systems: An Application Oriented Approach”, Complete Version (2nd Edition), Addison-Wesley Longman Publishing Co., 2005 ,ISBN:0321268458
4. “ Database System Implementation ”,Hector Garcia Molina, Jeffrey D Ullman and Jennifer Widom. Chennai: Person Publications, 2008, ISBN: 81-317-0413-0Singh, S K,” Database System Concepts, Design and Applications”, Delhi: Pearson Education, 2006. ISBN: 81-7758-567-3

Web Resources:

1. www.geeksforgeeks.org/rdbms-full-form
2. www.ibm.com/topics/relational-databases
3. www.codecademy.com/article/what-is-rdbms-sql

COURSE OUTCOMES:

On successful completion of the course students would be able to

	COURSE OUTCOMES
CO:1	Understanding difference between traditional file system and DBMS.
CO:2	Knowledge on Relational database model
CO:3	A better understanding of different database languages
CO:4	Ability to write queries mathematically
CO:5	Design and Analyze database and normalize data



Core Course VI - RDBMS PRACTICAL

Course Code: U3R3CSCC6P	Credit: 5
Category: Core Course	Hrs/Week: 5, Total Inst. Hrs: 75
Nature of the Course: Employability	Marks: CIA:40 + EXT: 60 = 100

COURSE OBJECTIVES

- To inculcate knowledge on RDBMS concepts and Programming with Oracle.
- To learn to use DDL commands
- To learn to use DML commands
- To learn to use SQL queries
- To learn to define and use cursors and procedures

[Front-end tool – Visual Basic]

1. Data Definition Language commands.
2. Data Manipulation commands
3. Sub Queries and JOIN
4. High level language extensions – PL/SQL
5. PL/SQL Packages
6. Use of Cursors
7. Procedures and Functions.
8. Oracle or SQL Server Triggers – Block Level – Form Level Triggers
9. Database Connectivity.
10. Working with Forms, Menus and Report Writers for an application project in any domain.

COURSE OUTCOMES

On successful completion of the course students would be able to

	COURSE OUTCOMES
CO:1	Achieve knowledge on RDBMS concepts and Programming with Oracle.
CO:2	Work on DDL and DML commands.
CO:3	Use queries and aggregate functions hands on.
CO:4	Analyze and use cursors, procedures and functions through programs.
CO:5	Connect databases with queries

Discipline Specific Elective – III

2. INTERNET PROGRAMMING

Course Code: U3R3CSDSE3:2	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 4, Total Inst.Hrs: 60
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To design web pages using various HTML tags
- To write programs in java scripts
- To develop forms using java scripts
- To create forms using controls such as list box, drop down list box
- To implement event handling methods

Unit-I STRUCTURING DOCUMENTS FOR THE WEB HOURS: 13

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. **Links and Navigation:** Basic Links, Creating Links, Advanced E- mail Links. Images, **Audio, and Video: Using Images** as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your webpages.

Unit-II: TABLES AND FRAMES HOURS: 11

Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. **Forms:** Introducing Forms, Form Controls, Sending Form Data to the Server. **Frames:** Introducing Frameset, Creating Links Between Frames, Setting a Default Target Frame, **Nested Framesets**.

Unit-III: CASCADING STYLE SHEETS HOURS: 12

Cascading Style Sheets: Introducing CSS – CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. **More Cascading Style Sheets:** Links, Lists, Tables, Outlines, Page Layout CSS.

Unit-IV: INTRODUCTION TO JAVASCRIPT HOURS: 11

JavaScript: How to Add Script to Your Pages, Variables and Data Types–Statements and Operators, **Control Structures, Conditional Statements**, Loop Statements–Functions- Message box, Dialog Boxes, **Alert Boxes, Confirm Boxes, Prompt Boxes**.

Unit-V: WORKING WITH JAVASCRIPT HOURS: 13

Working with JavaScript: Practical Tips for Writing Scripts, **JavaScript Objects** -Events, **Event Handlers**, **Forms – Validations**, Form Enhancements, JavaScript Libraries.

TextBook:

1. JonDuckett, Beginning HTML, XHTML,CSS and Javascript, Wiley Publishing

Reference Books :

1. Chris Bates, “Web Programming”,Wiley Publishing 3d Edition.
2. M. Srinivasan,“WebTechnology:TheoryandPractice”,PearsonPublication

WEB REFERENCES

1. <https://www.tutorialspoint.com/html/index.htm>
2. <https://www.tutorialspoint.com/javascript/index.htm>
3. <https://www.w3schools.com/css/>
4. <https://docs.oracle.com/javaee/5/tutorial/doc/bnafe.html>

COURSE OUTCOMES

Upon completion of the course the students would be able to:

	COURSE OUTCOMES
CO:1	Design a complete HTML document
CO:2	Develop programs in java scripts using all the constructs
CO:3	Develop forms using java scripts with the entire set of I/O controls
CO:4	Experiment with animated pages using dynamic effects
CO:5	Make use of Java scripts for real time applications

Skill Enhancement Course - IV

1. PHP PROGRAMMING

Course Code: U3R3CSSEC4:1	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES:

- To study about the nature of PHP
- To know about control constructs and arrays
- To get knowledge about arrays and function handling in PHP
- To gain an understanding about reading data through web pages with PHP
- To understand database connectivity in PHP.

Unit- I INTRODUCTION TO PHP

HOURS: 6

Introduction- Creating the first PHP page-Printing some Text- More echo power-Adding commands to PHP code-working with variables-Storing data in variables-Creating Constants. Operators and flow controls: Working with the assignment operator-Incrementing and decrementing values-The PHP string operator- The bitwise operator- The execution operator.

Unit- II CONTROL CONSTRUCTS AND ARRAYS

HOURS: 6

Using the If statement-PHP comparison operators-PHP logical operators-The ternary Operator-The Switch statement-Using for loops- Using while loops- Using do-while loops- Using for each loops-Building yourself some arrays-modifying the data in Arrays-Handling Arrays with loops-Extracting data from arrays-sorting Arrays-handling multi dimensional arrays.

Unit- III FUNCTIONS AND READING DATA

HOURS: 6

Creating functions in PHP-passing functions some data-passing arrays to functions-Using default arguments-Returning data from functions – Accessing global data-PHP conditional functions-Nesting functions-Reading data in web pages: Handling text fields, check boxes, buttons.

Unit- IV OOP AND ADVANCED OOP

HOURS: 6

Creating Classes-Creating objects-setting access to properties and methods-Using constructor to initialize objects-Using destructors-Basing one class on another with Inheritance. Advanced OOP: Creating static methods- Creating abstract classes- Creating interfaces.

Unit- V: WORKING WITH DATABASES**HOURS: 6**

Working with Databases: what is database? Creating a My SQL Database-Accessing a database in PHP- Connecting to the database Server- Connecting to the database-Reading the Table-Displaying the table data-Closing the connection.

TEXT BOOK:

“ Complete Reference PHP” by Steven Holzner,McGraw Hill, Education,(India),2008.

CHAPTERS:

Unit I-1,2 Unit II-2,3 Unit III-4,5 Unit IV-7,8 Unit V -10.

REFERENCE BOOKS

1. The Joy of PHP Programming: A Beginner's Guide By Alan Forbes
2. Murach's PHP and MySQL By Joel Murach and Ray Harris,

WEB RESOURCES

1. www.w3schools.com/php/
2. www.javatpoint.com/php-tutorial
3. www.codecademy.com/learn/paths/php-skill

COURSE OUTCOMES

On successful completion of the course students would be able to

	COURSE OUTCOMES
CO: 1	Study about the nature of PHP.
CO: 2	A deep learning about control constructs and arrays in PHP.
CO: 3	Knowledge about arrays and function handling in PHP.
CO: 4	Understanding about reading data through web pages with PHP.
CO: 5	Comprehend database connectivity in PHP.

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2. VISUAL PROGRAMMING

Course Code: U3R3CSSEC4:2	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To inculcate knowledge on Programming and Project Development using Visual Basic.
- To learn the fundamentals of VB such as data types and control structures
- To improve knowledge about standard controls of VB
- To learn about the advanced controls of VB
- To inculcate knowledge about the Data controls of VB

Unit – I INTRODUCTION TO VISUAL BASIC

HOURS: 5

Introduction – VB editor – Features of VB – Integrated Development Environment (IDE) features - customizing the IDE - Anatomy of a form - Working with form properties - setting form's properties - Introducing form events & form methods.

Unit – II VARIABLES, DATA TYPES AND ARRAYS

HOURS: 7

Variables in Visual Basic: Declaring variables - Data types - Null value, Error value, Empty value - The scope of a variable - Module level variables - constants - Creating your own constants - scope of a constant - converting data types - arrays -declaring arrays - fixed size arrays - dynamic arrays -preserve keyword -REDIM

Unit – III CONTROL STRUCTURES

HOURS: 6

Writing code in Visual Basic: The anatomy of a procedure - subroutine and functions - language constructs: for, next, the while loop, select case, Exit statement, with structure.

Unit – IV STANDARD CONTROLS

HOURS: 6

Selecting & Using controls: Introducing to standard controls - label control - Text box– Command buttons - option buttons -check boxes -frame controls -list boxes - combo boxes - Image objects - picture boxes -Timer - scroll bars.

Unit – V ADVANCED CONTROLS AND DATA CONTROL

HOURS: 6

Advanced controls: File system controls - Rich textbox control - Menu Editor – Introduction to Data bases – Working with Data Controls

Text Book:

1. Mohammed. Azam, Programming with Visual Basic 6.0- VIKAS publishing House Pvt. Ltd.,ISBN: 9788125909323, 812590932X

Reference Books:

1. McGrath, Mike,” Visual Basic in Easy Steps”,3rded, New York: Tata Mcgraw-Hill, 2011. ISBN: 978-0-07-107718-7
2. Halvorson, Michael,” Microsoft Visual Basic 2008 Step By Step, New Delhi: PHI Learning Private Limited, 2008. ISBN: 978-81-203-3458-8.
3. Krishnan.N,” Visual Basic 6.0 in 30 Days “;N Krishnan and N Saravanan. Chennai: Scitech Publication Pvt Ltd, 2006.
4. Steven Holzner,”Visual Basic 6 Programming Black Book”, Dreamtech Press; 1 edition (2000), ISBN-13: 978-8177220537
5. Bryan Newsome , “Beginning Visual Basic” 2015 1st Edition, Kindle Edition, ISBN: 1119092116.

Web Resources:

1. www.tutorialspoint.com/vb.net/vb.net_tutorial.pdf
2. [vb03.fm\(fesb.hr\)](http://vb03.fm(fesb.hr))
3. www.geeksforgeeks.org/introduction-to-visual-programming-language/

COURSE OUTCOMES

After finishing the course, the students would be able to

	COURSE OUTCOMES
CO: 1	Have knowledge on Programming and Project Development using Visual Basic and Interpret and report obtaining results
CO: 2	Know about features and properties of VB
CO: 3	Efficiently handle data types and control structures
CO: 4	Achieve knowledge about standard controls of VB and distinguish and compose events and methods.
CO: 5	Handle the advanced controls and Data controls of VB



SEMESTER - IV

Course VII – **JAVA PROGRAMMING**

Course Code: U4R3CSCC7	Credit: 5
Category: Core Course	Hrs/Week: 6, Total Inst. Hrs: 90
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To provide an introduction to Object Oriented programming (OOP) using the Java programming language
- To be able to program in JAVA classes and methods.
- To understand and construct simple applets.
- To design and develop GUI applications using Abstract Windowing Toolkit (AWT)
- To know the basics of JDBC concepts

Unit – I OOPS AND JAVA

HOURS: 17

Introduction to **Object Oriented Programming** – Character set – tokens – constants – variables – operators and expressions – library methods – strings – I/O statements - control statements – if , switch, while, do, for statements- **Arrays and Methods**: One dimensional Array – two dimensional array – methods – method overloading – recursion.

Unit – II CLASSES, OBJECTS AND EXCEPTION HANDLING

HOURS: 19

Classes and Objects – general form of a Class – Objects – Constructors – constructors overloading – this keyword – **finalize()** method - Static methods - **Inheritance and polymorphism**: Inheriting the variables and methods in a class – **Exception handling**: Default, user- defined exception – try, catch, throw statements.

Unit – III INTERFACE, PACKAGE AND MULTITHREADING

HOURS: 19

Interfaces and Packages: structure, implementation of an interface - **Packages** –placing the classes in a package - import statement- the java. Lang package : the System, Object, Class, Math, and String classes and their methods– **Multi Threading**: Life cycle of a thread-creating and running threads - **methods in the thread class**.

Unit – IV APPLETS AND AWT

HOURS: 17

Applets: **Life cycle** - The Applet class - Development and execution - Abstract Windowing Toolkit: events – Listeners – Labels, Button, Checkbox, Radio button, Choice controls – **Layouts**: **FlowLayout**, **GridLayout** and **BorderLayout**.

Unit – V IO STREAMS AND DATABASE CONNECTIVITY

HOURS: 18

IO Streams: InputStream and OutputStream classes - Reader and Writer classes - DataInputStream, DataOutputStreams - **Database Connectivity**: Establishing a connection-creating, entering, updating data into the tables.

Text Book:

1. C.Muthu , “Programming with java” , Second Edition, Tata Mcgraw Hill Education Private Limited, 9788182091993

**Unit-1 (Chapters - 1, 2,3,4); Unit-2 (Chapters – 5,6,12); Unit-3 (Chapters – 7,13,16);
Unit-4 (Chapters – 8,9); Unit-5 (Chapters – 14,18)**

Reference Books:

1. "Complete Reference", 'Patrick Naughton and Herbert Schildt, 3rd Edition,Tata McGraw Hill Publishing Company Ltd., 1999.
2. “Java Fundamentals – A Comprehensive Introduction” – Herbert Schildt , Dale Skrien, McGraw Hill Education; 1st edition (1 July 2017), ISBN-13: 978-1259006593

Web Resources:

1. <https://www.programiz.com/java-programming>
2. <https://www.geeksforgeeks.org/java/>
3. <https://www.w3schools.com/java/>

COURSE OUTCOMES:

On successful completion of the course students would be able to

	COURSE OUTCOMES
CO: 1	Have knowledge on Programming and Project Development using JAVA classes and methods.
CO: 2	Use and manipulate several core data structures.
CO: 3	Construct simple JAVA user interfaces.
CO: 4	Understand and construct simple applets.
CO: 5	Design and develop GUI applications using Abstract Windowing Toolkit (AWT)



Course VIII– **JAVA PROGRAMMING PRACTICAL**

Course Code: U4R3CSCC8P	Credit: 5
Category: Core Course	Hrs/Week: 5, Total Inst. Hrs: 75
Nature of the Course: Employability	Marks: CIA: 40+ EXT: 60 = 100

COURSE OBJECTIVES

- To impart an improved learning of JAVA through programming
- To invoke the knowledge classes and objects by practice and understanding
- To make the students better understand the OOP concepts
- To improve understanding of threads
- To inculcate practical experience of applets.

Develop Java Program to

1. Sort the given numbers using arrays.
2. Implement the **FIND and REPLACE operations** in the given multiple text.
3. Implement a calculator to perform basic arithmetic Operations.
4. Find the area of a rectangle using constructor
5. Find the student's percentage and grade using command line arguments.
6. Draw circle or triangle or square using **polymorphism and inheritance**.
7. Implement **multiple inheritance concepts in java using interface**, you can choose your own example of a company or education institution or a general concept which requires the use of interface to solve a particular problems.
8. Create threads and assign priorities to them
9. An applet to play multiple audio clips using **Multi-Threading**.
10. Create a window with three check boxes called red, green and blue. The applet should change the colors according to the selection.

COURSE OUTCOMES

On successful completion of the course students would be able to

	COURSE OUTCOMES
CO: 1	Knowledge achievement through JAVA programming
CO: 2	Analysis and understanding of classes and objects by practice
CO: 3	Understanding the oops concepts
CO: 4	Practice and analyze how to create and use threads
CO: 5	Knowledge about applets through practice

Discipline Specific Course– IV

2. INTERNET PROGRAMMING PRACTICAL

Course Code: U4R3CSDSE4:2P	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 3, Total Inst. Hrs: 45
Nature of the Course: Skill Development	Marks: CIA: 40+ EXT: 60 = 100

COURSE OBJECTIVES

- To design web pages using various HTML tags
 - To write a program in java scripts
 - To develop forms using java scripts
 - To create forms using controls such as list box, drop down list box
 - To implement event handling methods
1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form.
 2. Create a **HTML form** that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.
 3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to **Evaluates the expression** and Displays the result.
 4. Create a page with dynamic effects. Write the code to include layers and basic animation.
 5. Write a JavaScript code **to find the sum of N natural Numbers**. (Use user- defined function)
 6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
 7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
 8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
 9. Create a **form consists of a two Multiple choice lists and one single choice list**
 - (a) The first multiple choice list, displays the Major dishes available
 - (b) The second multiple choice list, displays the Starters available.
 - (c) The single choice list, displays the Soft drinks available.
 10. Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. **Use the on Mouse Over and on Mouse Out event handlers.**

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Create a form using HTML tags
CO: 2	Create programs in java scripts using all the constructs
CO: 3	Develop forms using java scripts with the entire set of I/O controls
CO: 4	Construct animated pages with dynamic effects
CO: 5	Design Java scripts for real time applications

Skill Enhancement Course - V

1. INFORMATION SECURITY

Course Code: U4R3CSSEC5:1	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

Unit –I INTRODUCTION

HOURS: 6

History, What Is Information Security? Critical Characteristics Of Information, NSTISSC Security Model, Components of An Information System , Securing The Components, Balancing Security and Access, The SDLC, The Security SDLC

Unit - II SECURITY INVESTIGATION

HOURS: 6

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues- An Overview Of Computer Security - Access Control Matrix, Policy-Security Policies, Confidentiality Policies, Integrity Policies And Hybrid Policies.

Unit -III SECURITY ANALYSIS

HOURS: 6

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk-Systems: Access Control Mechanisms, Information Flow and Confinement Problem

Unit - IV LOGICAL DESIGN

HOURS: 6

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, Visa International Security Model, Design of Security Architecture, Planning for Continuity

Unit -V PHYSICAL DESIGN

HOURS: 6

Security Technology, Ids, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

Text Book:

1. Michael E Whitman and Herbert J Mattord, —Principles of Information Security, Vikas Publishing House, New Delhi, 2003

References:

1. Micki Krause, Harold F. Tipton, —Handbook of Information Security Management, Vol 1- 3 CRC Press LLC, 2004.

2. Stuart McClure, Joel Scrambray, George Kurtz, —Hacking Exposed II, Tata McGraw-Hill, 2003
3. Matt Bishop, —Computer Security Art and Science II, Pearson/PHI, 2002.

Web Resources:

1. <https://www.geeksforgeeks.org/what-is-information-security/>
2. <https://www.cisco.com/c/en/us/products/security/what-is-information-security-infosec.html>
3. <https://www.microsoft.com/en-in/security/business/security-101/what-is-information-security-infosec>

COURSE OUTCOMES

After finishing the course, the students will be able to

	COURSE OUTCOMES
CO:1	Discuss the basics of information security
CO:2	Illustrate the legal, ethical and professional issues in information security
CO:3	Demonstrate the aspects of risk management.
CO:4	Become aware of various standards in the Information Security System
CO:5	Design and implementation of Security Techniques.



2. J2EE

Course Code: U4R3CSSEC5:2	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To learn the evolution of the J2EE architecture from two – tier to Multi-tier.
- To explore J2EE standard common services.
- To understand about java beans
- To gain a good understanding about Bluetooth technology
- To understand J2EE design patterns and best practices.

Unit – I THE JAVA 2 PLATFORM ENTERPRISE EDITION HOURS: 5

An introduction to J2EE: J2EE Architecture - J2EE applications - J2EE technologies - J2EE SDK Tools - J2EE security

Unit –II CREATING AND DEPLOYING AN ENTERPRISE BEAN HOURS: 7

An introduction to Enterprise Beans: the advantages of EJB – the Architecture of EJB – creating an EJB – Deploying an EJB – coding the client – executing the client.

Unit – III XML HOURS: 5

An introduction to XML: the advantages of XML – creating an XML document – document type definition – XML name spaces – XML schemas.

Unit– IV TYPES OF ENTERPRISE BEANS HOURS: 7

Enterprise Beans - The life cycle of a session bean – the modes of managing the states of session beans – comparing two stateful beans – coding the home interface – coding the remote interface – coding the helper classes – entity beans – the transaction.

Unit – V AN INTRODUCTION TO THE BLUETOOTH TECHNOLOGY HOURS: 6

An Introduction to Bluetooth – the Bluetooth SIG – the Bluetooth architecture – the L2CAP – the RFCOMM protocol - the SDP – security in Bluetooth – Establishing a connection – Bluetooth and other technologies.

Text Book:

1. Pallavi Jain and Shadab Siddiqui with NIIT “J2EE Professional projects”
[Unit-1 (Chapter – 7); Unit-2 (Chapter – 8); Unit-3 (Chapter– 9);Unit-4 (Chapter – 10);
Unit-5 (Chapter – 35)]

Reference Book:

1. Michael C.Daconta, Kevin T.Smith, Donald Avondolio, W.ClayRichardson,”More Java / J2EE Pitfalls “, Wiley dreamlech India Pvt.Ltd.

Web Resources:

1. <https://www.oracle.com/java/technologies/appmodel.html>
2. <https://www.javatpoint.com/java-ee>
3. <https://www.educba.com/what-is-j2ee/>

COURSE OUTCOMES

After finishing the course, the students will be able to

	COURSE OUTCOMES
CO:1	Provide a sound foundation to the students on the concepts
CO:2	Understand J2EE design patterns and best practices.
CO:3	Have a sound foundation on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.
CO:4	Work on EJB
CO:5	Implement J2EE Applications, Database connection using JDBC API, Servlets, Java Server Pages.



Skill Enhancement Course - VI

1. SOFT SKILLS

Course Code: U4R3CSSEC6:1	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst. Hrs: 30
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To educate the core values of soft skills
- To improve the communicative skill of the students
- To enhance the students' leadership qualities
- To sharpen their presentation skills
- To make them ready to face interviews

Unit – I ATTITUDE AND TIME MANAGEMENT HOURS: 6

Attitude and altitude – Lateral thinking – Time is Money

Unit – II LEADERSHIP AND TEAM SPIRT HOURS: 6

Leadership – Team building – Group dynamics

Unit – III COMMUNICATION HOURS: 6

Inter personal skills – Business communication in English – Business correspondence

Unit – IV PRESENTATION HOURS: 6

Presentation skills

Unit – V INTERVIEWS AND INTERNET HOURS: 6

Interviews – Internet for job seekers

Text Book:

1. Success through soft skills by Prof. G.Ravindran, Dr.S.P.B.Elango and Dr.L.Arockiam
[Unit–I : Chapters 1,2,3; Unit –II: Chapters 4,5,11; Unit –III: Chapters 6,7,9; Unit –IV: Chapter 8; Unit –V: Chapters 10,12]

Reference Books:

1. “Soft skills and personality development – A hand book of employability skills” by K.Anthonysamy, Joseph Chandra, Vijay Nicole Imprints Pvt.Ltd.,Chennai,2012
2. ‘Soft skills for success’ by GRK Murthy, Viva books Pvt.Ltd.,Newdelhi,2016
3. “Soft skills-Know yourself and know the world” by Dr.K.Alex, S Chand & Company Ltd.,2010.

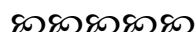
Web Resources:

1. https://www.tutorialspoint.com/soft_skill_tutorials.htm
2. <https://www.goskills.com/Soft-Skills>
3. <https://www.geeksforgeeks.org/introduction-to-soft-skills/>

COURSE OUTCOMES:

After studying this course the students would be able to

	COURSE OUTCOMES
CO: 1	Gain good inter personal skills which improves their personality
CO: 2	Present them well in groups
CO: 3	Have enhanced leadership qualities
CO: 4	Achieve appreciable presentation skills
CO: 5	Ready to face interviews



2. EMOTIONAL INTELLIGENCE AND SOCIAL SKILLS

Course Code: U4R3CSSEC6:2	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2 , Total Inst.Hrs: 30
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To make students learn by themselves to deal with life.
- To learn to set and examine one's goals.
- To impart knowledge on identifying and sorting out conflicts.
- To learn dealing with relationships in family and friends
- To understand society, and leading a mutually enriching relationship with nature.

Unit - I: SUCCESS HOURS: 5

What is success? – Obstacles to success – Overcoming obstacles – Reasons for failure - Success tips – God- the center for success.

Unit - II: MOTIVATION HOURS: 5

What is motivation? – Types of motivation – The four stages from motivation to demotivation – Demotivating factors – Motivators.

Unit - III: SELF ESTEEM HOURS: 6

Meaning – Advantages of high self-esteem – Characters based on self-esteem – Causes of low self-esteem – Building confidence – Steps to build a positive self-esteem.

Unit -IV: SUB CONSCIOUS MIND AND HABITS HOURS: 6

Sub conscious mind and habits - how do we form habits – Forming positive habits – 21-day formula to form positive habits.

Unit - V: VALUES AND VISION 4 HOURS: 8

How do we judge our value system? – How does our value system change? – Character is priceless – Two types of sufferings in life – Commitments – Ethics – Ethics and Legality – Purpose of life – Winning versus Weakness – Changing values – Today's values – Old values are not obsolete – Vision – God – the totality of all values.

Text Book:

You can win – Shiv Khera – 2014 reprinted in 2021, Bloomsbury India.

[Unit -1 – chapters 3,4; Unit -2 – chapters 6; Unit -3 – chapters 7,8; Unit -4 – chapters 11; Unit - – chapters 13

Web Resources:

1. <https://www.mindtools.com/ab4u682/emotional-intelligence>
2. <https://www.skillsyouneed.com/ips/social-skills-emotional-intelligence.html>
3. <https://www.positiveaction.net/blog/social-and-emotional-intelligence>

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO:1	Inherit the basic and intrinsic value of life.
CO:2	Achieve goals and live a meaningful life.
CO:3	Develop positive characters to shape their personality.
CO:4	Grow with proper habits and also can know the ethics of life.
CO:5	Ready to face new challenges.



SEMESTER - V

Core Course IX – DATA COMMUNICATION AND NETWORKS

Course Code: U5R3CSCC9	Credit: 5
Category: Core Course	Hrs/Week: 6, Total Inst.Hrs:90
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To explain the importance of data communication and the internet
- To explain how communication works in data networks through OSI Model.
- To explain the role of protocols in networking
- To understand the Transmission media
- To learn about Switching and internetworking

Unit – I INTRODUCTION

HOURS: 17

Need to study data communications –Data communications - Networks – Protocols and Standards – Standards organizations - Line configuration Topology – Transmission Mode – Categories of networks – Internet works.

Unit – II THE OSI MODEL

HOURS: 18

The Model – Functions of the layers – TCP/IP Protocol suite – Signals : Analog and Digital – Periodic and Aperiodic Signals – Analog Signals – Time and Frequency Domains – Composite signals - Digital Signals.

Unit – III TRANSMISSION MEDIA

HOURS: 19

Guided Media – Unguided Media – Transmission Impairment – Multiplexing : Many to One / One to many - FDM – TDM - WDM. Error Detection and Correction – Types of errors – Detection – Vertical Redundancy Check(VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) Check sum – Error Correction.

Unit – IV SWITCHING

HOURS: 18

Switching – Circuit Switching: Space division switches – Time division switches – TDM Bus – Space and Time Division switching combinations - PSTN – Packet Switching – Message Switching- X.25 Layers: Physical Layer – Frame Layer – Packet Layer – PLP Packets.

Unit –V NETWORKING AND INTERNETWORKING DEVICES

HOURS: 18

Repeaters – Bridges: Types of Bridges – Bridges Connecting different LANs – Routers– Gateways - Routing Algorithms: – Distance Vector Routing: Sharing Information – Routing table– Link State Routing: Information Sharing – the Dijkstra Algorithm.

Text Book:

1. “Data Communications and Networking” – Behrouz A. Forouzan Second Edition, Tata McGraw Hill Edition, 2003
[Unit-1(Chapters – 1,2); Unit-2(Chapters – 3,4); Unit-3(Chapters – 7:7.1,7.2,7.3, chapter 8:8.1,8.2,8.3,8.4,8.5. chapter 9) ;Unit – 4 (Chapter 14,Chapter 17 :17.1); Unit-5 (Chapter - 21)]

Reference Books:

1. “Introduction to Data communication and Networking” – Wayne Tomasi – first edition – 2017, Pearson Publication, ISBN-13: 978-8131709306
2. “Introduction to Data Communication Networks” – Sanjay Sharma, S.K. Kataria & Sons publications; Reprint 2013 edition, ISBN-13: 978-9350142103

Web Resources:

1. <https://www.javatpoint.com/computer-network-tutorial>
2. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
3. <https://www.scaler.com/topics/computer-network/>

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Describe the components of a data communication system.
CO: 2	Identify key considerations in selecting various transmission media in networks.
CO: 3	Describe the various error detection and correction schemes.
CO: 4	Analyze the features and functions of multiplexing and modulation
CO: 5	Identify role of networking devices.



Core Course X – SOFTWARE ENGINEERING

Course Code: U5R3CSCC10	Credit: 4
Category: Core Course	Hrs/Week: 6, Total Inst. Hrs: 90
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To define software engineering and explain its importance.
- To discuss the concepts of software products and software processes.
- To solve specific problems alone or in teams.
- To manage a project from beginning to end.
- To work independently as well as in teams.

Unit –I INTRODUCTION TO SOFTWARE ENGINEERING HOURS: 18

Introduction to Software Engineering: Definitions - Size Factors - Quality and Productivity Factors - Managerial Issues - Planning a Software Project: Defining the Problem - Goals and Requirements - Solution Strategy - **Planning the Development Process:** Various Models - Planning an Organizational Structure -Planning Activities.

Unit –II SOFTWARE COST ESTIMATION HOURS: 18

Software cost estimation: Introduction - Software Cost Factors - Software Cost Estimation Techniques - Stating Level estimation - Estimating Software Maintenance Costs Software Requirements Definition - Software Requirements Specification - Specification Techniques - Languages and Processors for Requirements.

Unit –III SOFTWARE DESIGN AND IMPLEMENTATION HOURS: 18

Software design - Design concepts - Modules and Modularization Criteria -Design Notations - Design Techniques - Design Considerations - Real Time and Distributed System Design-Test Plans-Milestones, Walkthroughs and Inspections-Design Guidelines. **Implementation Issues:** Structure Loading Techniques-Coding Style-Standards and Guidelines- Documentation Guidelines.

Unit –IV MODERNPROGRAMMINGLANGUAGEFEATURES HOURS: 18

Modern programming Language Features-Type Checking – Separate Compilation - User Defined Data Types - Data Abstraction - Scoping Rules –Exception Handling-Currency Mechanism-Verification and Validation Techniques-Quality Assurance-States Analysis-Symbolic Excretion.

Unit – V TESTING AND MAINTENANCE HOURS : 18

Unit - Testing and Debugging - System Testing - Formal Verification Software Maintenance - Maintainability - Managerial Aspect Of Software Maintenance -Configuration Management-Source Code Metrics-Other Maintenance Tools And Techniques.

Text Book:

2. Richard E. Fairly – “Software Engineering Concepts”, Tata McGraw Hill Publication, 1997 edition. [Unit-1 (Chapters - 1); Unit-2 (Chapters – 2); Unit-3 (Chapters – 3,4); Unit-4 (Chapters – 5, 6); Unit-5 (Chapters – 8)]

Reference book:

5. Roger S.Pressman – “Software Engineering APractitioner“s Approach”, 5th edition, McGraw Hill, 2001.

Web Resources:

1. <https://www.javatpoint.com/software-engineering>
2. <https://www.scaler.com/topics/software-engineering/>
3. https://www.tutorialspoint.com/software_engineering/index.htm

Course Outcomes:

After finishing the course, the students would be able to

	COURSE OUTCOMES
CO: 1	Define software engineering and explain its importance.
CO: 2	Solve specific problems alone or in teams.
CO: 3	Handle the concepts of software products.
CO: 4	Manage a project from beginning to end.
CO: 5	Handle verification and validation techniques efficiently.



Core Course XI – DOT NET

Course Code: U5R3CSCC11	Credit: 4
Category: Core Course	Hrs/Week: 6, Total Inst. Hrs: 90
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To gain knowledge on .net platform
- To understand the programming basics of VB and C# in Dot Net
- To train the concepts of distributed application development.
- To analyze and use validation controls of Dot Net
- To give understanding about Web Service development and Dot Net remoting

Unit – I DOT NET PLATFORM

HOURS: 17

What is ASP.Net? – Writing the first ASP.Net page - ASP.Net basics: ASP.Net page structure – View state – Working with directives - ASP.Net languages.

Unit – II VB AND C# PROGRAMMING BASICS

HOURS: 19

Programming basics: Control events and subroutines – Page events – Variables and variable declaration – Arrays – Functions – Operators – Conditional logic – Loops – Object oriented programming concepts: Objects and classes - Properties – Methods – Classes – Constructors – Scope – Events – Inheritance – Objects in .Net – Namespace – Using code behind files.

Unit – III CONSTRUCTING ASP.NET WEB PAGES

HOURS: 17

Web forms – Html server controls – Web server controls – Web user controls – Master pages - Cascading Style Sheets.

Unit – IV BUILDING WEB APPLICATIONS & VALIDATION CONTROLS

HOURS: 19

Visual web developer – Core web application features – Debugging and Error handling. Using the Validation controls: Required Field Validator – Compare Validator – Range Validator-Validation Summary – Regular Expression Validator – Custom Validator.

Unit – V ADO.NET , DATALIST AND GRIDVIEW

HOURS: 18

Introducing ADO.Net – ADO.net and Data List - ADO.net and Grid View - ADO.net and Details View.

Textbook:

1. Build your own ASP.Net website using VB and C# by Cristian Darie ,Wyatt Barnett and Tim Posey, 4th Edition.

[Unit –1: chapters -1,2; Unit –2: chapter – 3; Unit –3: chapter – 4; Unit –4: chapters – 5,6; Unit –5: chapters – 9,10,11]

Reference books:

1. Programming with C#.Net by J.G.R.Sathiaseelan and N. Sasikala Devi, PHI, 2009.
2. The Complete Reference ASP.Net by Matthew MacDonald, McGraw Hill Education Pvt. Ltd. ,Indian Edition,2002
3. ASP.Net Bible by Mridula Parihareet al.,WILEY dreamtech India Pvt. Ltd., Reprint 2002.

Web Resources:

1. <https://dotnet.microsoft.com/en-us/learn>
2. <https://www.javatpoint.com/net-framework>
3. <https://www.w3schools.com/asp/default.ASP>

COURSE OUTCOMES

On successful completion of the course students would be able to

	COURSE OUTCOMES
CO: 1	Gaining of knowledge about Dot Net platform
CO: 2	Build interactive and data-driven websites successfully.
CO: 3	Handling exceptions, and perform validation of data.
CO: 4	Better understanding of the programming basics of VB and C# in Dot Net
CO: 5	Train the concepts of distributed application development.

Core Course XII – DOT NET PRACTICAL

Course Code: U5R3CSCC12P	Credit: 4
Category: Core Course	Hrs/Week: 4, Total Inst. Hrs: 60
Nature of the Course: Employability	Marks: CIA: 40+ EXT: 60 = 100

COURSE OBJECTIVES

- To gain knowledge on Dot Net platform
 - To understand the programming basics of VB and C# in Dot Net
 - To train the concepts of distributed application development.
 - To analyze and use validation controls of Dot Net
 - To give understanding about Web Service development and Dot Net remoting
1. Create a VB .Net program for Employee details to read and display the data using constructors and member functions.
 2. Create a VB.Net program to handle user defined Exceptions.
 3. Create an application in VB .Net for File Menu with Menu items New, Open, Save, Print and Exit & Edit Menu with Menu items Cut, Copy, Paste, Find and Undo.
 4. Design a website using web form to show the current date and time when a user clicks the button.
 5. Create a dot net application that validates the entries in the e mail registration form.
 6. Develop a Dot net program that connects the MS Access database list view.
 7. Create an application in VB .Net for student information database and perform the following operations: i. Addition ii. Deletion iii. Updation iv. Viewing
 8. Develop a Company portal using Dot net
 9. Develop a Job portal using Dot net
 10. Design a website for your college and its department details.

COURSE OUTCOMES:

On successful completion of the course students would be able to ☐

	COURSE OUTCOMES
CO: 1	Gaining of knowledge about Dot Net platform
CO: 2	Build interactive and data-driven websites successfully.
CO: 3	Handling exceptions, and perform validation of data.
CO: 4	Better understanding of the programming basics of VB and C# in Dot Net
CO: 5	To train the concepts of distributed application development.

Discipline Specific Elective Course - V

1. OPERATING SYSTEM

Course Code: U5R3CSDSE5:1	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 4, Total Inst. Hrs: 60
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To understand the underlying principles, techniques and approaches which constitute a coherent body of knowledge in operating system
- To understand the design issues associated with operating system
- To acquire the knowledge of various memory management techniques.
- To master various process management concepts including scheduling, synchronization and deadlocks.
- To learn different types of operating systems along with concept of file systems.

Unit – I INTRODUCTION TO OPERATING SYSTEMS HOURS: 11

Evolution of operating systems - Functions – Different views of OS – Batch processing, Multiprocessing, Time sharing OS – I / O programming concepts – Interrupt Structure & processing

Unit – II MEMORY MANAGEMENT HOURS: 13

Memory Management – Single Contiguous Allocation- Partitioned Allocation – Relocatable Partitions allocations – Paged and Demand paged Memory Management – Segmented Memory Management – Segmented and Demand paged Memory Management – overlay Techniques - Swapping

Unit – III PROCESSOR MANAGEMENT HOURS: 12

Processor Management – Job Scheduling – Process Scheduling – Functions and Policies – Evolution of Round Robin Multi-programming Performance – Process Synchronization – Wait and Signal mechanisms – Semaphores P & V Operations – Deadlock – Banker's Algorithm.

Unit – IV DEVICE MANAGEMENT HOURS: 12

Device Management – Techniques for Device Management – I/O Traffic Controller, I/O Scheduler, I/O Device Handlers – Spooling.

Unit – V FILE MANAGEMENT HOURS: 12

Simple File System, General Model of a File System, Physical and Logical File System. Case Studies: MSDOS, UNIX.

Text Book:

1.Operating Systems – E. Madnick& John J.Donavan, Tata McGraw Hill Publishing Co., Limited.

[Unit-1 (Chapters – 1, 2); Unit-2 (Chapter – 3); Unit-3 (Chapter – 4); Unit-4 (Chapter – 5); Unit-5 (Chapter – 6)]

Reference Books:

1. System Programming and Operating Systems – D.M. Dhamdhare, Tata McGraw Hill Publishing Co., Limited.
2. Singh, Neetu, "Operating System", New Delhi: Global Vision Publishing House, 2012. ISBN: 978-81-8220-362-4
3. Mohan, Cgandra I, "Operating System", New Delhi: PHI Learning Private Limited, 2013. ISBN: 978-81-203-4726-7
4. Sridhar, V, "Operating System", Chennai: Vijay Nicole Imprints Pvt Ltd, 2014. ISBN: 978-81-8209-378-2
5. Josuttis, Nicolai M, "SOA in Practice the Art of Distributed System Design. Mumbai: Shroff Publishers & Distributors, 2010. ISBN: 978-81-7366-369-3

Web Resources:

1. <https://www.scaler.com/topics/operating-system/>
2. <https://www.studytonight.com/operating-system/>
3. <https://www.guru99.com/os-tutorial.html>

COURSE OUTCOMES

After completion of this course, the students would be able to

	COURSE OUTCOMES
CO: 1	Learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system.
CO: 2	Provide students knowledge of memory management and deadlock handling algorithms.
CO: 3	Implement various algorithms required for management, scheduling, allocation and communication used in operating system.
CO: 4	Understand the design issues associated with operating system
CO: 5	Learn different types of operating systems along with concept of file systems.



2. MOBILE AD-HOC NETWORKS

Course Code: U5R3CSDSE5:2	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 4, Total Inst.Hrs: 60
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To make students understand the concepts Mobile Ad hoc Networks and its characteristics.
- To learn MAC and Network protocols.
- To impart knowledge on End to End delivery in MANET.
- To make the students learn various types of routing in MANET
- To know the designing of MANET and security.

Unit - I INTRODUCTION

HOURS: 11

Introduction to **ad-hoc networks** – definition, characteristics features, applications. Characteristics of wireless channel, **ad-hoc mobility models**: indoor and outdoor models.

Unit- II MEDIUM ACCESS PROTOCOLS

HOURS: 13

MAC Protocols: Design issues, goals and classification. Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. **IEEE standards**: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

Unit -III NETWORK PROTOCOLS

HOURS: 13

Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, **Multicast routing algorithms**, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, **QoS aware routing**.

Unit - IV END – END DELIVERY AND SECURITY

HOURS: 11

Transport Layer: Issues in designing – Transport layer classification, adhoc transport protocols. Security issues in **Ad hoc networks: issues and challenges**, network security attacks, secure routing protocols.

Unit – V CROSS LAYER DESIGN

HOURS: 12

Cross layer Design: Need for cross layer design, **cross layer optimization**, parameter optimization techniques, cross layer cautionary perspective. Integration of Ad hoc with **Mobile IP networks**.

Text Books:

1. C. Siva Ram Murthy and B. S. Manoj, Ad hoc Wireless Networks Architecture and Protocols, 2nd edition, Pearson Edition, 2007.
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000.

References:

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, Mobile ad-hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of ad-hoc wireless networks, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies “ A Survey of Mobility Models for Ad-hoc Network”
4. Research, “Wireless Commun, and Mobile Comp.. Special Issue on Mobile Ad-hoc Networking Research, Trends and Applications, Vol. 2, no. 5, 2002, pp. 483 – 502.
5. A survey of integrating IP mobility protocols and Mobile Ad-hoc networks, Fekri M. bduljalil and Shrikant K. Bodhe, IEEE communication Survey and tutorials, no: 12007.

Web Resources:

1. <https://www.geeksforgeeks.org/introduction-of-mobile-ad-hoc-network-manet/>
2. <https://www.tutorialspoint.com/introduction-of-mobile-ad-hoc-network-manet>
3. <https://geekflare.com/mobile-ad-hoc-network/>

COURSE OUTCOMES

After completion of this course, the students would be able to

	COURSE OUTCOMES
CO:1	Learn the concepts Mobile Ad hoc Networks and its characteristics.
CO:2	Understand the functioning of MAC and Network protocols.
CO:3	Learn various types of routing in MANET
CO:4	Gain knowledge on End to End delivery in MANET
CO:5	Know the designing of MANET and security.



Discipline Specific Elective Course - VI

1. HTML AND WEB DESIGN

Course Code: U5R3CSDSE6:1	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 4, Total Inst. Hrs: 60
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To know about internet
- To develop an ability to design and implement static and dynamic websites
- To understand HTML and design webpages using it
- To learn about HTML Frames
- To design web page through coding using HTML and DHTML.

Unit – I INTRODUCTION TO INTERNET

HOURS: 12

Computers in Business – Networking – E-Mail – Resource Sharing – WWW – Usenet – Telnet – Bulletin Board Service – Wide Area Information Service. Internet Technologies: Modem – Internet addressing – Physical Connections – Telephone Lines. Internet Browsers: Internet Explorer – Netscape Navigator.

Unit – II INTRODUCTION TO HTML

HOURS: 13

Designing a home page – History of HTML – HTML generations – HTML document – Anchor Tag – Hyper Links – Sample HTML documents. Head and Body Sections: Header section – Title – Prologue – Links – Colorful web Page – Comment lines.

Unit – III DESIGNING THE BODY SECTION

HOURS: 13

Header printing – Aligning the heading – Horizontal rule – Paragraph – Tab Settings – Images and Pictures – Embedding PNG format images. Ordered and Unordered Lists: Lists – Unordered Lists – Heading in a list – Ordered Lists – Nested Lists. Table Handling: Table creation in HTML – Width of the Table and cells – Cells – Spanning Multiple Rows / Columns – Coloring cells – Column specification.

Unit – IV DHTML AND STYLE SHEETS

HOURS: 11

Designing Styles – Elements of Styles – Linking a style sheet to an HTML Document – Inline Styles – External Style Sheets – Internal Style Sheets – Multiple Styles.

Unit – V FRAMES

HOURS: 11

Frame definition – Frameset definition – Nested Framesets. Web Page designing and forms.

Textbook:

3. “World Wide Web Design with HTML”, C Xavier, TMH, 2000.
[Unit-1 (Chapters - 1, 2, 3); Unit-2 (Chapters – 4, 5); Unit-3 (Chapters – 6, 7, 8);Unit-4 (Chapter – 9); Unit-5 (Chapters – 10, 11)]

Reference Books:

1. Web Design in a Nutshell” – Jennifer Niederst – O’Reilly first Edition – Shroff Publishers and Distributors Pvt. Ltd.

Web Resources:

1. <https://www.w3schools.com/html/>
2. <https://www.tutorialspoint.com/html/index.htm>
3. <https://html.com/>

COURSE OUTCOMES

After completing this course, the students would be able to

	COURSE OUTCOMES
CO:1	Understand the basics of internet
CO:2	Know HTML and DHTML as scripting languages
CO:3	Design web applications using HTML and DHTML.
CO:4	Efficiently handle HTML frames.
CO:5	Have a good grounding of web applications, internet tools and other web services.



2. WEB SERVICES

Course Code: U5R3CSDSE6:2	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 4, Total Inst. Hrs: 60
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To learn the architecture of web services
- To understand about XML
- To know about SOAP protocol
- To analyze and interpret about WSDL
- To know about the concepts of UDDI and RPC

Unit– I INTRODUCTION TO WEB SERVICES

HOURS: 11

Introduction: Services – Web Services – web services application opportunities – emergence of web service: Server – Side Architecture and web services.

Unit – II WEB SERVICES APPLICATION SCENARIO

HOURS: 12

Web services Application scenario: Web services Hype and the Industry – web services and the Industry acceptance – Extensible Markup language: History of Markup languages – what is XML?

Unit –III XML AND SOAP

HOURS: 13

Validation of XML Data – Advanced XML – Document constraining – simple object access protocol: Background – what is SOAP? – SOAP interaction – SOAP modeling – SOAP Encoding – SOAP Binding.

Unit–IV WEB SERVICES DESCRIPTION LANGUAGE

HOURS: 13

Web services Description language: What is WSDL – web service Invocation and WSDL – web services description details – service description through WSDL Registries: Universal description, discovery and integration: What is UDDI –UDDI nomenclature.

Unit–V UDDI

HOURS: 11

Core UDDI – service publication – service discovery – remote procedure call and messaging: synchronous web services – asynchronous web services – remote procedure call or messaging.

Text Book:

1. Web services: An Introduction by B.V. Kumar and S.V. Subrahmanya, Tata McGraw Hill publications,2007.

Reference Books

1. Sandeep Chatterjee, James Webber, “Developing Enterprise web services”, Pearson Education, 2004.
2. Frank. P. Coyle, XML, Web Services and The Data Revolution, Pearson Education, 2002.

Web References

1. <https://www.tutorialspoint.com/webservices/index.htm>
2. <https://www.javatpoint.com/web-services-tutorial>
3. <https://www.javatpoint.com/java-web-services-tutorial>

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO:1	Explain the architecture of web services
CO:2	Experiment with XML
CO:3	Understand and apply SOAP protocol in real time applications
CO:4	Interpret on WSDL
CO:5	Demonstrate the concepts of UDDI and RPC

SEMESTER - VI

Core Course XIII – MICROPROCESSOR AND ITS APPLICATIONS

Course Code: U6R3CSCC13	Credit:4
Category: Core Course	Hrs/Week: 6, Total Inst.Hrs:90
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES:

- To understand the architecture of 8 bit microprocessor
- To understand the techniques for faster execution of instructions and improve the speed of operations
- To apply programming techniques in designing simple assembly language programs
- To know about peripheral and interfacing devices.
- To know about the applications of microprocessor

Unit – I INTRODUCTION TO MICROPROCESSORS HOURS: 17

Evaluation of Microprocessors – Single Chip Microcomputer Microprocessor Applications – Programming Digital Computers – Memory – Buses – Memory addressing capacity and CPU – Microcomputers – Processor Architecture – Intel 8085 –Instruction Cycle – Timing diagram.

Unit – II INTEL 8085 HOURS: 17

Instruction set of Intel 8085 – Instruction and Data Formats – Addressing Modes – Status flags – Intel 8085 Instructions – Programming of Microprocessors – Assembly language – Assemblers – Stacks and Subroutines – MACRO – Microprogramming.

Unit – III EXAMPLES OF ASSEMBLY LANGUAGE PROGRAMS HOURS: 19

Assembly language Programming – Simple examples – Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array – Arranging a series of numbers – Sum of a series of Numbers – Multiplication – Division – Multibyte Addition and Subtraction.

Unit – IV PERIPHERAL DEVICES AND THEIR INTERFACING HOURS: 19

Peripheral Devices and Interfacing – Address Space Partitioning – Memory and I/O Interfacing – Data transfer schemes – Interrupts of Intel 8085 – Interfacing memory and I/O devices – I/O ports – Programmable peripheral Interface –Programmable Counter / Interval Timer – A/D Converter and D/A Converter.

Unit –V MICROPROCESSOR APPLICATIONS HOURS: 18

Microprocessor Applications – Delay Subroutines – Interfacing of 7 Segment Displays – Frequency measurement – Temperature measurement and Control – Water Level Indicator – Microprocessor based Traffic Control.

Text Book:

1. Fundamentals of Microprocessors and Microcomputers – Badri Ram – Fourth Revised and Enlarged Edition – Dhanpat Rai and Sons – 1993.
[Unit-1 (Chapters - 1, 3); Unit-2 (Chapters – 4, 5); Unit-3 (Chapter – 6); Unit-4 (Chapter – 7); Unit-5 (Chapter – 8)]

Reference Books:

1. “Microprocessor 8085 and Its Interfacing” – Mathur, Prentice Hall India Learning Private Limited; 2 edition (2011), ISBN-13: 978-8120343900
2. “Microprocessor Architecture, Programming and Applications with the 8085” – Romesh S.Gaonkar – Penram International Publishing, Sixth Edition – 2013, ISBN-13: 978-8187972884
3. “Microprocessors: Theory and Applications” – Rafiquzzaman, Pearson Education India; First edition 2016, ISBN-13: 978-9332577497

Web Resources:

1. <https://www.javatpoint.com/microprocessor-applications>
2. <https://www.tutorialspoint.com/microprocessor/index.htm>
3. <https://www.geeksforgeeks.org/introduction-of-microprocessor/>

COURSE OUTCOMES:

After successful completion of the course, students would be able

	COURSE OUTCOMES
CO:1	Have knowledge on the architecture of 8085.
CO:2	Analyze instruction set and addressing modes of 8085.
CO:3	Gain hands on experience in doing experiments on microprocessor(8085).
CO:4	Illustrate how the different peripherals are interfaced with microprocessor.
CO:5	Apply various types of microprocessors for real time problems.



Core Course XIV– MICROPROCESSOR AND ITS APPLICATIONS PRACTICAL

Course Code: U6R3CSCC14P	Credit:4
Category: Core Course	Hrs/Week: 6, Total Inst. Hrs:90
Nature of the Course: Skill Development	Marks: CIA: 40+ EXT: 60 = 100

COURSE OBJECTIVES

- To provide hands on experience with assembly language programming
 - To develop the simple programs by making use of 8085 instruction set
 - To familiarize the students with interfacing of various peripheral devices with 8085
 - To execute programs using subroutines on 8085 microprocessor
 - To understand the applications of microprocessor
1. Execute simple programs in assembly language using Intel 8085 microprocessor kit :
 - a) 8-bit addition,
 - b) Separating out a hexadecimal digit,
 - c) Disassembly of a word,
 - d) Sum of series of data,
 - e) Data transfer
 2. Execute programs for display and for solving problems using subroutines on 8085 processor:
 - a) Display of names,
 - b) Table of squares,
 - c) Length of a string,
 - d) Converting ASCII to decimal,
 - e) ASCII to decimal using subroutines,
 3. Applications of Microprocessor:
 - a) Matrix display using 8255.
 - b) D/A & A/D converters using discrete component modules.
 - c) Traffic signal.

COURSE OUTCOMES

After completing the course the students would be able to

	COURSE OUTCOMES
CO:1	Expertise assembly language programming.
CO:2	Write programs to run on 8085 microprocessor based systems.
CO:3	Program on the peripheral devices with 8085.
CO:4	Execute programs using subroutines on 8085 microprocessor.
CO:5	Use applications of microprocessor for real time situations.

Core Course XV– SOFTWARE APPLICATION PROJECT

Course Code: U6R3CSCC15PW	Credit: 4
Category: Core Course	Hrs/Week: 6, Total Inst.Hrs: 90
Nature of the Course: Employability	Marks: 100

COURSE OBJECTIVES:

- To Identify and define the problem statement, gather and analyze system requirements
- To design and conduct experiments, as well as to analyze and interpret data.
- To identify, formulate, and solve problems.
- To analyze, design, verify, validate, implement, apply, and maintain software systems.
- To understand different phases of SDLC.

COURSE OUTCOMES

After completing this course, students will be able to

	COURSE OUTCOMES
CO:1	Develop a functional application based on the software design
CO:2	Apply coding, debugging and testing tools to enhance the quality of the software
CO:3	Construct new software system based on the theory and practice gained through this exercise
CO:4	Prepare the proper documentation of software projects following the standard guidelines
CO:5	Learn technical report and oral presentation skills



Discipline Specific Elective Course - VII

1. DATA SCIENCE

Course Code: U6R3CSDSE7:1	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 3, Total Inst.Hrs:45
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To understand the uses of data science
- To define Research goals and create project charters
- To handle large data set with the help of Machine Learning
- To store and process data using NoSQL
- To understand Visualization Techniques

Unit-I INTRODUCTION

HOURS: 8

Data Science in a big data world: Benefits and uses of data science and big data – Facets of data – the data science process the big data ecosystem and data science.

Unit-II DATA SCIENCE PROCESS

HOURS: 9

The data science process: Overview of data science process – Defining research goals and creating a project charter – Retrieving data – cleansing, integrating and transforming data – Exploratory data analysis – build the models presenting findings and building applications on top of them.

Unit-III MACHINE LEARNING

HOURS: 10

Machine learning: Introduction to machine learning – the modeling process – types of machine learning – semi-supervised learning – Handling large data on a single computer: The problems you face when handling large data general technique for handling large volumes of data – general programming tips for dealing with large data sets.

Unit-IV FIRST STEP IN BIG DATA & NoSQL

HOURS: 9

First steps in big data: Distributing data storage and processing with frame works – join the NoSQL movement: Introduction to NoSQL – the rise of graph databases

Unit-V TEXT MINING & DATA VISUALIZATION

HOURS: 9

Text Mining and Data Analytics: Text Mining in the real world and its techniques. **Data visualization to the end user:** data visualization options – cross filter, the JavaScript MapReduce library – Creating an interactive dashboard with dc.js dashboard development tools.

Text Book:

1. Introducing Data Science – Big data machine learning and more using python tools – Davy Cielen Arno D. B. Meysman Mohamed Ali – 2015 by manning publications Co.

Reference Books:

1. HANDS ON INTRODUCTION TO DATA SCIENCE by Chirag Shah - Cambridge University Press Publication - April 2020
2. Data Science from Scratch 2e: First Principles with Python Paperback – Shroff/O'Reilly Publication - April 2019

Web Resources:

1. <https://www.w3schools.com/datascience/>
2. <https://www.javatpoint.com/data-science>
3. <https://intellipaat.com/blog/tutorial/data-science-tutorial/>

COURSE OUTCOMES

After completing this course, students will be able to

	COURSE OUTCOMES
CO:1	Understand the statistical foundations of data science.
CO:2	Apply pre-processing techniques over raw data so as to enable further analysis.
CO:3	Identify machine learning algorithms for predictions and classification.
CO:4	Executing statistical analyses with NoSQL.
CO:5	Integrate machine learning libraries and mathematical and statistical tools with modern technologies like map reduce



2. LINUX AND SHELL PROGRAMMING

Course Code: U6R3CSDSE7:2	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 3, Total Inst. Hrs: 45
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To understand the LINUX Architecture, File systems and use of VI editor.
- To understand Shell Programming and to write shell scripts.
- To know text processing and handle text filtering tools.
- To understand and analyze interactive scripts and file handling.
- To have knowledge in Automating decision.

Unit – I INTRODUCTION

HOURS: 9

Introduction to Linux: operating system and Linux– History of Linux and Unix – Linux overview – Linux Distributions – VI editors.

Unit – II SHELL PROGRAMMING

HOURS: 9

Shell – comparison of Shells–working in the shell – Learning Basic Commands– Compiler and interpreter differences– various directories– Drilling deep into process management, job control and Automation.

Unit – III TEXT PROCESSING

HOURS: 9

Text processing–Text filtering Tools–working with commands – Logical operators - local variables and its scope- working with arrays.

Unit – IV TRICKS WITH SHELL SCRIPTING

HOURS: 9

Tricks with shell scripting – Interactive shell scripts –The here document and << operator-sort command – WC command – file handling – Debugging.

Unit – IV AUTOMATING DECISION

HOURS: 9

Automating Decision – Making in scripts–Automating repetitive tasks- working with Functions

Text Books:

1. The Complete Reference LINUX- Richard L.Petersen, McGraw Hill,
2. LINUX shell scripting by Ganesh Naik, Packt Publishing Ltd.,

Web Resources:

1. <https://www.geeksforgeeks.org/introduction-linux-shell-shell-scripting/>
2. <https://www.freecodecamp.org/news/bash-scripting-tutorial-linux-shell-script-and-command-line-for-beginners/>
3. https://www.tutorialspoint.com/unix/shell_scripting.htm

COURSE OUTCOMES

After completing this course, students will be able to

	COURSE OUTCOMES
CO:1	Explain multi user LINUX and its basic features
CO:2	Interpret Shell basics, and shell environments for Designing and developing shell programming.
CO:3	Develop programming using arrays and basic data structure .
CO:4	Design and develop File I/O and LINUX Processes.
CO:5	Handle script writing.

Discipline Specific Elective Course - VIII

1. COMPUTER GRAPHICS AND MULTIMEDIA

Course Code: U6R3CSDSE8:1	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 5, Total Inst. Hrs: 75
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To understand about graphics system
- To learn about output primitives
- To learn to write programs using geometrical transformations.
- To create interactive graphics applications.
- To know about the multimedia tools

Unit –I OVERVIEW OF GRAPHICS SYSTEMS

HOURS: 14

Overview of graphics systems: Video display devices – Raster-scan systems – Random-scan systems – Graphics monitors and workstation – Input devices – Hard-copy devices – Graphics software.

Unit –II OUTPUT PRIMITIVES

HOURS: 17

Output primitives: Points and lines – Line-drawing algorithms – DDA algorithm Bresenham's line algorithm – Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes – Bundled attributes.

Unit –III TWO-DIMENSIONAL GEOMETRIC TRANSFORMATIONS

HOURS: 15

Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Other transformations.

Unit –IV MULTIMEDIA IN USE

HOURS: 15

Multimedia in Use : Introducing Multimedia for Today and Tomorrow – What is Multimedia – using Multimedia: Applications, Benefits and Problems – Technology : System Components – Multimedia Platforms.

Unit –V TECHNOLOGY

HOURS: 14

Technology: Development Tools – Image – Audio – Video.

Text Books:

1. Computer Graphics C Version Second Edition, Donald Hearn and M.Pauline Baker, Pearson Education, 2006.
2. Multimedia in Practice : Technology and Practice. Judith Jeffcoate, Pearson Education, 2007.

Reference Books:

1. William M. Neuman, Robert R. Sprout, “Principles of interactive Computer Graphics”, McGraw Hill International Edition.
2. Buford J. F Koegel, Multimedia Systems, Twelfth Indian Reprint, Pearson Education

Web Resources:

1. <https://www.javatpoint.com/computer-graphics-tutorial>
2. https://www.tutorialspoint.com/computer_graphics/index.htm
3. <https://www.geeksforgeeks.org/computer-graphics-2/>

COURSE OUTCOMES

After finishing the course, the students would be able to

	COURSE OUTCOMES
CO:1	Understand about graphics system
CO:2	Have Knowledge on output primitives and Various Algorithm to construct them
CO:3	Write programs using geometrical transformations.
CO:4	Create interactive graphics applications.
CO:5	Understand various multimedia tools

2. FUNDAMENTALS OF MACHINE LEARNING

Course Code: U6R3CSDSE8:2	Credit: 3
Category: Discipline Specific Course	Hrs/Week: 5, Total Inst.Hrs: 75
Nature of the Course: Employability	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To describe and apply machine learning algorithms including decision trees Naive Bayes and logistic regression
- To understand the formulation of well-specified machine learning problems
- To apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
- To learn how to perform supervised and reinforcement learning, with images and temporal sequences
- To explain and apply machine learning concepts such as regularization, overfitting, and smoothing to design efficient machine learning models.

Unit – I INTRODUCTION

HOURS: 14

Introduction : A Taste of Machine Learning : Applications – Data – Problems - Probability Theory - Random Variables - Distributions - Mean and Variance – **Marginalization** - Independence - Conditioning, and Bayes Rule - Basic Algorithms - **Naive Bayes** - Nearest Neighbor Estimators - A Simple Classifier - Perceptron – **K-Mean**.

Unit – II DENSITY ESTIMATION

HOURS: 17

Density Estimation: Limit Theorems - Fundamental Laws - The Characteristic Function - Tail Bounds - An Example. **Parzen Windows** - **Discrete Density Estimation** - Smoothing Kernel - **Parameter Estimation** - Silverman's Rule - Watson- Nadaraya - Estimator - **Exponential Families** : Basics -examples.

Unit – III OPTIMIZATION

HOURS: 15

Optimization: Preliminaries - Convex Sets - Convex Functions - Subgradients - Strongly Convex Functions - Convex Functions with Lipschitz Continuous Gradient -Fenchel Duality - **Bregman Divergence** - **Unconstrained Smooth Convex Minimization:** Minimizing a One-Dimensional Convex Function - Coordinate Descent - **Gradient Descent** - Mirror Descent - Conjugate Gradient - Higher Order Methods - **Bundle Methods**.

Unit – IV CONDITIONAL DENSITIES

HOURS: 15

Conditional Densities: Logistic Regression - Regression - **Conditionally Normal Models** - Posterior Distribution - Heteroscedastic Estimation **Multiclass Classification** : Conditionally Multinomial Models - **CRF** - Linear Chain CRFs - Higher Order CRFs - Kernelized CRFs - Optimization Strategies - Getting Started - Optimization Algorithms - Handling Higher order CRFs - **Hidden Markov Models 1** - Further Reading – Optimization.

Kernels and Function Spaces: The Basics - Examples - Kernels - Feature Maps - The Kernel Trick - Examples of Kernels - Algorithms - **Kernel Perceptron** - Trivial Classifier - Kernel Principal Component Analysis - Reproducing Kernel Hilbert Spaces - **Hilbert Spaces** - Theoretical Properties - **Regularization** - Banach Spaces - Properties - Norms and Convex Sets.

Text Book:

1. Introduction to machine learning - Alex Smola and S.V.N. Vishwanathan – Cambridge University press.

Reference Book:

Machine learning for absolute beginners – Oliver Theobald-Second Edition-2017

Web Resources:

1. <https://www.geeksforgeeks.org/introduction-machine-learning>
2. <https://www.digitalocean.com/community/tutorials/an-introduction-to-machine-learning>
3. <https://www.researchgate.net/publication/332922660> An Introduction to Machine Learning

COURSE OUTCOMES

After finishing the course, the students would be able to

	COURSE OUTCOMES
CO:1	Apply structured thinking to unstructured problems.
CO:2	Understand a very broad collection of machine learning algorithms and problems
CO:3	Understand different types of machine learning and map problems to different classes of machine learning algorithms.
CO:4	map the data points to a higher dimensional space
CO:5	Reduce the dimensionality of large data sets. Using Principal Component Analysis



Skill Enhancement Course - VI

1. INDUSTRY 4.0

Course Code: U6R3CSSEC7:1	Credit: 2
Category: Skill Enhancement Course	Hrs/Week:2, Total Inst. Hrs:30
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To have knowledge on Industry 4.0
- To know digital transformation
- To understand Industry 4.0 tools such as Artificial Intelligence, Big Data and Data Analytics, Internet of Things
- To enable more intelligent decision-making and customization in manufacturing and supply chain operations.
- To encourage sustainable growth in social, environment, and economy

Unit – I INDUSTRY 4.0

HOURS: 5

Need – Reason for Adopting Industry 4.0 – Definition – Goals and Design Principles – Technologies of Industries 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things – Cyber Security – Cloud – Augmented Reality

Unit - II ARTIFICIAL INTELLIGENCE

HOURS: 6

Artificial Intelligence: Artificial Intelligence(AI)- What & Why - History of AI- Foundation of AI –The AI – environment -Societal Influences of AI – Application Domains and Tools – Associated Technologies of AI- Future Prospects of AI- Challenges of AI

Unit – III BIG DATA AND IoT

HOURS: 7

Big Data: Evolution – Data Evolution – Data : Terminologies – Big Data Definitions – Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages – Big Data Components : Big Data Characteristics – Big Data Processing Frameworks – Big Date Applications -Big Data Tools – Big Data Domain Stack : Big Data in Data Science – Big Data in IoT – Big Data in Machine Learning – Big Data in Databases – Big Data use cases – Learning Platforms ; Internet of Things (IoT): Introduction to IoT – Architecture of IoT – Technologies for IoT – Developing IoT Applications – Applications of IoT – Security in IoT

Unit – IV APPLICATIONS AND TOOLS OF INDUSTRY 4.0

HOURS: 6

Applications of IoT- Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportations and Logistics – Impact of Industry 4.0 on Society: Impact on Business,

Government, People. **Tools for Artificial Intelligence**, Big Data and Data Analytics, **Virtual Reality** ,
Augmented Reality, IoT, Robotics

Unit – V JOBS 2030

HOURS: 6

Industry 4.0 – Education 4.0 – Curriculum 4.0 - Faculty 4.0 – **Skills required for Future** – Tools
for Education – Artificial Intelligence Jobs in 2030 – Jobs 2030 – **Framework for aligning Education
with Industry 4.0**

Text Book:

1. P. Kaliraj, T. Devi , Higher Education for Industry 4.0 and Transformation to Education
5.0,2022

Reference Book:

1. Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, APRESS .

Web Resources:

1. <https://stefanini.com/en/insights/news/industry-4-a-complete-guide>
2. <https://www.emnify.com/blog/industry-4-0>
3. <https://www.ibm.com/topics/industry-4-0>

COURSE OUTCOMES

After finishing the course, the students would be able to

	COURSE OUTCOMES
CO:1	Understand the drivers and enablers of Industry 4.0
CO:2	Appreciate the smartness in Smart Factories, Smart cities, smart products and smart services
CO:3	Able to outline the various systems used in manufacturing plant and their role in an Industry 4.0 world.
CO:4	Appreciate the power of Cloud Computing in a networked economy.
CO:5	Understand the opportunities, challenges brought about by Industry 4.0 and how organizations and individuals should prepare to reap the benefits.



2. MOBILE APPLICATION DEVELOPMENT

Course Code: U6R3CSSEC7:2	Credit: 2
Category: Skill Enhancement Course	Hrs/Week: 2, Total Inst.Hrs: 30
Nature of the Course: Skill Development	Marks: CIA: 25+ EXT: 75 = 100

COURSE OBJECTIVES

- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development
- To inculcate working knowledge of Android Studio development tool
- To study managing Application resources
- To know how to use Common Android APIs

UNIT–I : Introduction to Android

HOURS: 12

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

UNIT– II : Android Application Design Essentials

HOURS: 12

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT– III : Android User Interface Design Essentials

HOURS: 12

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

UNIT– IV : Testing Android applications

HOURS: 12

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

UNIT– V : Using Common Android APIs

HOURS: 12

Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOK

1. T1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, First Edition.

WEB REFERENCES

1. <https://www.tutorialspoint.com/android/index.htm>
2. https://www.tutorialspoint.com/android/android_ui_design.htm
3. <https://www.softwaretestinghelp.com/android-app-testing/>

COURSE OUTCOMES

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

	COURSE OUTCOMES
CO: 1	Identify various concepts of mobile programming that make it unique from programming for other platforms
CO: 2	Interpret mobile applications on their design pros and cons
CO: 3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
CO: 4	Experiment with mobile applications for the Android operating system that use basic and advanced phone features
CO: 5	Make use of applications to the Android marketplace for distribution