

VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN

ELAYAMPALAYAM, TIRUCHENGODE (Tk.), NAMAKKAL (Dt.).

[AN ISO 9001 : 2015 CERTIFIED INSTITUTIONS]

Affiliated to Periyar University, Approved by AICTE &

Re-Accredited with 'A+' Grade by NAAC,

Recognized under section 2(f) & 12(B) of UGC Act, 1956)

ELAYAMPALAYAM, TIRUCHENGODE (Tk.), NAMAKKAL (Dt.)



PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

B.Sc. INFORMATION TECHNOLOGY

SYLLABUS & REGULATIONS

FOR CANDIDATES ADMITTED FROM 2023-24 ONWARDS
UNDER AUTONOMOUS & OBE PATTERN

VIVEKANANDHA EDUCATIONAL INSTITUTIONS
Angammal Educational Trust
Elayampalayam, Tiruchengode (Tk.), Namakkal (Dt.)

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)

B.Sc (INFORMATION TECHNOLOGY)
(Candidates admitted from 2023-2024 onwards)

REGULATIONS

I. SCOPE OF THE PROGRAMME

Bachelor of Information Technology can be considered to be one of the most prominent UG level programs in our country. This program mainly deals with the development of computer applications for the purpose of updating computer programming languages. B.Sc.[IT] also aims at creating strong knowledge of theoretical Information Technology subjects who can be employed in software development and testing units of industries. The course has a time period of 3 years with 6 semesters.

II. SALIENT FEATURES

- Regular conduct of guest lectures and seminars
- Campus recruitment
- Provides facilities such as Internet Access and In-House Library
- Provides Career Guidance for Post Graduate Courses like M.Sc, and the Certifications in programming languages
- Conduct of Personality Development Program
- Visiting Faculties from Industries

III. OBJECTIVES OF THE PROGRAMME

The Course Objective of the B.Sc. Information Technology program is to provide advanced and in-depth knowledge of Information Technology and its applications to enable students pursue a professional career in Information and Communication Technology in related industry, business and research. The course designed to impart professional knowledge and practical skills to the students.

IV. ELIGIBILITY FOR ADMISSION

A Candidates seeking admission to the first year Degree course (B.Sc. Information Technology) shall be required to have passed Higher Secondary Examination with Mathematics or Business

Mathematics or Computer Science or Computer Applications or Computer Technology or Statistics (Academic Stream or Vocational Stream) as one of the subject under Higher Secondary Board of Examination, conducted by the Government of Tamilnadu or an examination accepted as equivalent thereto by the syndicate, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the B.Sc. Information Technology Degree Examination of Periyar University after a course of study of three academic years.

V. DURATION OF THE PROGRAMME

- The course shall extend over a period of three academic years consisting of six semesters. Each academic year will be divided into two semesters. The First semester will consist of the period from July to November and the Second semester from December to April.
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women with the approval of Periyar University.

VI. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously and the Internal

ASSESSMENT MARKS FOR THEORY PAPERS WILL BE AS UNDER:

1	Average of Two Tests	-	05
2	Model Exam	-	10
3	Assignment	-	05
4	Attendance	-	05
			25
To			-
			25

ASSESSMENT MARKS FOR PRACTICAL PAPERS WILL BE AS UNDER:

1	Model Exam	-	20
2	Observation Note	-	10
3	Attendance	-	10
			40
To			-
			40

PASSING MINIMUM - EXTERNAL

THEORY	In the End Semester Examinations, the passing minimum shall be 40% out of 75 Marks. (30 Marks)
PRACTICAL / MINI PROJECT	In the End Semester Examinations, the passing minimum shall be 40% out of 60 Marks. (24 Marks)

VII. ELIGIBILITY FOR EXAMINATION

A candidate will be permitted to appear for the University Examination only on learning 75 % of attendance and only when her conduct has been satisfactory. It shall be open to grant exemption to a candidate for valid reasons subject to conditions prescribed.

DISTRIBUTION OF MARKS FOR ATTENDANCE:

ATTENDANCE PERCENTAGE	MARKS	
	THEORY	PRACTICAL
75-80	1	2
81-85	2	4
86-90	3	6
91-95	4	8
96-100	5	10

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the Examination of Core Courses (Main & Allied Subjects) & Securing Marks.

- a) 75 % and above shall be declared to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
- b) 60% and above but below 75 % shall be declared to have passed the Examinations in First Class..
- c) 50% & above but below 60% shall be declared to have passed the examinations in Second Class.
- d) All the remaining successful candidates shall be declared to have passed the examinations in Third Class.
- e) Candidates who pass all the examinations prescribed for the course at the First appearance itself and within a period of three Consecutive Academic years from the year of admission only will be eligible for University Rank.

IX. ELIGIBILITY FOR AWARD OF THE DEGREE

A candidate shall be eligible for the award of the Degree only if she has undergone the above Degree for a period of not less than Three Academic years comprising of six semesters and passed the Examinations prescribed and fulfilled such conditions has have been prescribed therefore.

X. PROCEDURE IN THE EVENT OF FAILURE

If a candidate fails in a particular subject, she may reappear for the university examination in the concerned subject in subsequent semesters and shall pass the examination.

XI. COMMENCEMENT OF THESE REGULATIONS

These regulations shall take effect from the academic year 2023-2024 (i.e.,) for the students who are to be admitted to the First year of the course during the Academic year 2023-24 and thereafter.

XII. TRANSITORY PROVISIONS

Candidates who were admitted to the UG course of study before 2021-2022 shall be permitted to appear for the examinations under those regulations for the period of Three years i.e., upto and inclusive of the Examinations of 2023-2024. Thereafter, they will be permitted to appear for the examinations only under the regulations then in force.

EVALUATION OF EXTERNAL EXAMINATIONS (EE)

<u>QUESTION PAPER PATTERN – Theory</u>	
Time duration: 3 Hours	
Max. Marks: 75	
PART- A: (10 x 1= 10)	Answer all the Questions Two Questions from each Unit
PART- B: (5x 7 = 35)	Answer all the questions One Question from each Unit (Either or Type)
PART- C: (3 x 10 = 30)	Answer any THREE of the questions One Question from each Unit (3 Out of 5)
IN THE END SEMESTER EXAMINATIONS, THE PASSING MINIMUM SHALL BE 40% OUT OF 75 MARKS. (30 MARKS)	

<u>QUESTION PAPER PATTERN – Practical</u>	
Time duration: 3 Hours	
Max. Marks: 60	
1. One compulsory question from the given list of objectives	30 Marks
2. One either/or type question from the given list of objectives	30 Marks
IN THE END SEMESTER EXAMINATIONS, THE PASSING MINIMUM SHALL BE 40% OUT OF 60 MARKS. (24 MARKS)	

B.Sc IT CURRICULUM FOR ACADEMIC YEAR 2023 – 2024**COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER AUTONOMOUS,
CBCS & OBE PATTERN****FOR THE CANDIDATES ADMITTED FROM THE YEAR 2023 – 2024****SEMESTER: I & II**

SEM	PART	COURSE CODE	COURSE TITLE	Credits	Hours	MARKS		
						CIA	EE	TOT
I	I	23U1LT01	Language	3	6	25	75	100
	II	23U1LF01	English	3	4	25	75	100
	III	23U1ITC01	C Programming	5	5	25	75	100
	III	23U1ITCP01	C Programming Lab	3	5	40	60	100
	III	23U1ITC02	Software Engineering	3	4	25	75	100
	IV	23U1ITS01	Foundation Course(FC) - Problem Solving Techniques	2	2	25	75	100
	IV	23U1ENAC01	Ability Enhancement Compulsory Course(AECC 1) Soft Skill-1	2	2	25	75	100
	IV	23U1VE01	Value Education - Health, Human Values and Yoga	2	2	25	75	100
	Total				23	30	215	585
II	I	23U2LT02	Language	3	6	25	75	100
	II	23U2LF02	English	3	4	25	75	100
	III	23U2ITC03	Java Programming	4	5	25	75	100
	III	23U2ITCP02	Java Programming Lab	3	5	40	60	100
	III	23U2ITC04	Digital Logic Fundamentals	4	4	25	75	100
	IV	23U3EVS01	Environmental Studies	2	2	25	75	100
	IV	23U2ITS02	Skill Enhancement Course - SEC-2 (Generic) – Discrete Mathematical Structures	2	2	25	75	100
	IV	23U2ENAC02	Ability Enhancement Compulsory Course(AECC 2) Soft Skill-2	2	2	25	75	100
	Total				23	30	215	585

SEMESTER: III & IV

SEM	Part	Course Code	COURSE TITLE	Credits	Hours	MARKS		
						CIA	EE	TOT
III	I	23U3LT03	Language	3	6	25	75	100
	II	23U3LF03	English	3	4	25	75	100
	III	23U3ITC05	Web Application Development	4	5	25	75	100
	III	23U3ITCP03	Web Application Development Lab	4	5	40	60	100
	III	23U3ITC06	Data Structures and Algorithms	4	4	25	75	100
	IV	23U3ITS03	Skill Enhancement Course - SEC 3 -(Entrepreneurial Based) – R Programming Lab	2	2	40	60	100
	IV	23U3ENAC03	Ability Enhancement Compulsory Course(AECC 3) Soft Skill-3	1	2	25	75	100
	IV		Skill Enhancement Course- SEC-2 (Non Major Elective)	2	2	25	75	100
	Total				23	30	230	570
IV	I	23U4LT04	Language	3	6	25	75	100
	II	23U4LF04	English	3	4	25	75	100
	III	23U4ITC07	Industry Module- Python Programming	4	4	25	75	100
	III	23U4ITC08	Operating Systems	4	4	25	75	100
	III	23U4ITCP04	Python Programming-Lab	3	4	40	60	100
	IV	23U4ITS04	Skill Enhancement Course - SEC-4 Internet of Things	2	2	25	75	100
	IV	23U4ITS05	Skill Enhancement Course - SEC-5 Cloud Computing	2	2	25	75	100
	IV	23U4ENAC04	Ability Enhancement Compulsory Course(AECC 4) Soft Skill-4	2	2	25	75	100
	IV		Skill Enhancement Course- SEC-2 (Non Major Elective)	2	2	25	75	100
	Total				25	30	240	660

SEMESTER: V & VI

SEM	Part	COURSE CODE	COURSE TITLE	Credits	Hours	MARKS		
						CIA	EE	TOT
V	III	23U5ITC09	Computer Networks	4	5	25	75	100
	III	23U5ITC10	Database Management System	4	5	25	75	100
	III	23U5ITCP05	Database Management System Lab	3	5	40	60	100
	III	23U5ITDE01	Elective Course – (Generic / Discipline Specific) – Information Security	3	4	25	75	100
	III	23U5ITDE02	Elective Course – (Generic / Discipline Specific) – Data Mining and Warehousing	3	5	25	75	100
	III	23U5ITPR01	Project with Viva voce	4	4	40	60	100
	IV	23U5ITS06	Skill Enhancement Course - SEC-6 PHP Programming	2	2	25	75	100
	IV	23U5ITIN01	Internship / Industrial Training (Carried out in II Year Summer vacation) (30 hours)	2	-	-	-	-
	Total				25	30	205	495
VI	III	23U6ITC11	Machine Learning	4	5	25	75	100
	III	23U6ITC12	Android Programming	4	5	25	75	100
	III	23U6ITCP06	Android Programming Lab	3	5	40	60	100
	III	23U6ITDE03	Elective Course – (Generic / Discipline Specific) – Data Analytics	4	5	25	75	100
	III	23U6ITDE04	Elective Course – (Generic / Discipline Specific) – Fuzzy Logic	3	6	25	75	100
	IV	23U6ITS07	Professional Competency Skill Enhancement Course SE7- Network Security	2	4	25	75	100
	IV	23U6ITC13	Extension Activity	1	-	-	-	-
	Total				21	30	165	435
Grand Total				147	174	1230	3270	4500

CONTENTS

1. Suggestive Topics in Core Components

1	C Programming
2	Practical: C Programming
3	Digital Computer Fundamentals
4	Practical: Digital Computer Fundamentals
5	Data Structure and Algorithms
6	Practical: Data Structure and Algorithms
7	Object Oriented Programming in C++
8	Practical: C++ Programming
9	Microprocessor and Microcontroller
10	Practical: Microprocessor and Microcontroller
11	Database Management Systems
12	System Programming
13	SBS: Office Automation
14	Web Application Development
15	Practical: Web Application Development
16	Computer Graphics
17	PHP Programming
18	Practical: PHP Programming
19	SBS: Quantitative Aptitude
20	Operating Systems
21	Java Programming
22	Practical: Java Programming
23	Computer Networks
24	Open Source Software Technologies
25	Practical: Open Source Software Technologies
26	SBS: Mobile Application Development
27	Python programming
28	Practical: Python Programming
29	Software Engineering
30	Unix Programming
31	Practical: Unix Programming
32	Internet of Things
33	Practical: Internet of Things

34	R Programming
35	Practical: R Programming
36	Web Application and Development
37	SBS: Distributed Computing
38	Advanced Excel
39	.NET Programming
40	Practical: .NET Programming
41	Practical: Advanced Excel
42	Markup and Scripting Languages
43	Practical: Markup and Scripting Languages
44	Big Data Analytics
Group 2 - Suggestive Elective Courses (Discipline-centric)	
45	Computing Intelligence
46	Cyber Forensics
47	Discrete Structure
48	Multimedia Systems
49	Software Testing
50	Data Mining and Warehousing
51	Virtual Reality
52	Biometrics
53	E-Commerce
54	Network Security
55	System Administration and Maintenance
56	ERP
57	Cryptography
58	Cyber security
59	Information Security
60	Robotics
61	Natural Language Processing
62	Simulation and Modeling
63	Pattern Recognition
64	Compiler Design
65	Fuzzy Logic
66	Artificial Neural Networks
67	Quantum Computing

68	Grid Computing
69	Parallel Algorithm
70	Agile Project Management
71	Problem Solving Techniques
72	Cloud Computing
73	Database Concepts
74	Grid Computing
75	Artificial Intelligence
76	Image Processing
77	Introduction to Data Science
78	Human Computer Interaction
79	Mobile Adhoc Network

Programme outcomes (PO) for B.Sc Information Technology

- Scientific aptitude will be developed in Students
- Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the science & humanities stream.
- Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship
- Students will possess basic subject knowledge required for higher studies, professional and applied courses
- Students will be aware of and able to develop solution oriented approach towards various Social and Environmental issues.
- Ability to acquire in-depth knowledge of several branches of Mathematics and aligned areas . This Programme helps learners in building a solid foundation for higher studies in Mathematics
- The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modeling and solving real life problems.
- Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.
- To recognize patterns and to identify essential and relevant aspects of problems.
- Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.
- Mould the students into responsible citizens in a rapidly changing interdependent society.

The above expectations generally can be pooled into 6 broad categories and can be modified according to institutional requirements:

PO1: Knowledge

PO2: Problem Analysis

PO3: Design / Development of Solutions

PO4: Conduct investigations of complex problems

PO5: Modern tool usage

PO6: Applying to society

Programme Specific Outcomes of B.Sc Degree programme in Information Technology

- PSO1** Demonstrate and apply basic knowledge of information technology to the scientific issues and problems being faced in society and the industry.
- PSO2** Analyze critical problems and provide computer-based solutions by applying appropriate tools and technology.
- PSO3** Design and develop solutions to problems in the areas related to web page design, Mobile App development, cloud computing, IOT and data analytics of varying complexity.

2. Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations.

FIRST YEAR –SEMESTER- I

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U1ITC01	C Programming	Core - III	5	0	0	I	5	25	75	100
Learning Objectives										
<ol style="list-style-type: none"> To learn and understand the basics program structure of C. To learn the programming principles of the looping and the statements. To understand the functions used in arrays and string functions. To recall the methods of structures and union to implement in arrays. To study the definition of pointers and the initializing the pointers. 										
To analyze the file to accessing different methods.										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Remember the program structure of C with its syntax and semantics									
CO2[K2]	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)									
CO3[K3]	Apply the programming principles learnt in real-time problems									
CO4[K4]	Analyze the various methods of solving a problem and choose the best method									
CO5[K5]	Code, debug and test the programs with appropriate test cases									
UNIT	Contents									
I	Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables-Assignment statement, declaring a variable as constant, as volatile. Operators and Expressions - Managing Input and Output Operations.									
II	Decision Making and Branching: Decision making with If, simple IF, IF ELSE, nested IF ELSE , ELSE IF ladder, switch, GOTO statement. Decision Making and Looping: While, Do-While, For, Jumps in loops.									
III	Arrays: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays. Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions.									
IV	Structures and Unions: Defining, giving values to members, initialization and comparison of structure variables, arrays of structure, arrays within structures, structures within structures, structures and functions, unions. Preprocessors: Macro substitution, file inclusion.									
V	File Management in C: Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.									

Textbooks	
1	E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.
2	Yashavant, Kanetkar. Let us C, BPB Publications, 2021.
Reference Books	
1.	Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2.	Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998.
3.	Schildt, Herbert. "C The Complete Reference." (2021).
Web Resources	
1.	https://www.geeksforgeeks.org/c-programming-language
2.	https://www.w3schools.in/C
3.	https://www.tutorialspoint.com/cprogramming
4.	https://www.geeksforgeeks.org/c-programming-language

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	2	2	3	2	2	3
CO 4	3	3	3	3	3	2
CO 5	3	3	3	3	2	3
Weightage of course contributed to each PSO	14	14	15	14	13	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U1ITCP01	C Programming Lab	Core III	0	0	5	I	3	40	60	100

Course Objectives:

1. To understand the basic syntax, data types and operators in C.
2. To learn the concepts of decision making statements.
3. Analyze the concepts of Arrays, Functions and Strings.
4. Describing the structure of pointers using different fields.
5. To evaluate the program for the pointers and files used in the list.

Course Outcomes	
On completion of this course, students will	
CO1[K2]	Remember and understand how to write programs using the basic syntax and semantics in C
CO2[K3]	Apply the concepts of functions, macros, arrays, structures, pointers and files in programs to solve problems
CO3[K3]	Analyze and understand programs written in C language
CO4[K4]	Evaluate the program execution flow with test cases and apply debugging
CO5[K5]	Design algorithms and write programs in C language for the given problems.

LAB EXERCISES:

UNIT I: Variables, Data types, Constants and Operators

1. Evaluation of expression ex: $((x+y)^2 * (x+z))/w$
2. Temperature conversion problem (Fahrenheit to Celsius)
3. Program to convert days to months and days (Ex: 364 days = 12 months and 4 days)
4. Solution of quadratic equation
5. Salesman salary (Given: Basic Salary, Bonus for every item sold, commission on the total monthly sales)

UNIT II: Decision making Statements

6. Maximum of three numbers
7. Calculate Square root of five numbers (using goto statement)
8. Pay-Bill Calculation for different levels of employee (Switch statement)
9. Fibonacci series
10. Floyds Triangle
11. Pascal's Triangle

Unit III: Arrays, Functions and Strings

12. Prime numbers in an array
13. Sorting data (Ascending and Descending)
14. Matrix Addition and Subtraction
15. Matrix Multiplication
16. Function with no arguments and no return values
17. Function that convert lower case letters to upper case
18. Factorial using recursion.
19. Perform String Operations using Switch Case.

Unit IV : Structures and Macros

20. Structure that describes a Hotel (name, address, grade, avg room rent, number of rooms)
Perform some operations (list of hotels of a given grade etc.)
21. Using Pointers in Structures.
22. Cricket team details using Union.
23. Write a macro that calculates the max and min of two numbers
24. Nested macro to calculate Cube of a number.

Unit V : Pointers and Files

25. Evaluation of Pointer expressions
26. Function to exchange two pointer values
27. Creation, insertion and deletion in a linked list
28. Program to read a file and print the data.
29. Program to receive a file name and a line of text as command line arguments and write the text to the file
30. Program to copy the content of one file to another file.

PRESCRIBED TEXT BOOKS:

1. E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.
2. RemmaThareja, Programming in C, second edition, Oxford university press

BOOKS FOR REFERENCE:

1. Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2. Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998.
3. Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications, 2021

WEB REFERENCE:

1. <https://www.tutorialspoint.com/cprogramming>
2. <https://www.javatpoint.com/c-programming-language-tutorial>
3. <https://www.w3schools.in/category/c-tutorial>

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	2	3
CO 3	3	3	3	2	3	3
CO 4	3	2	3	2	3	2
CO 5	3	3	3	3	2	3
Weightage of course contributed to each PSO	15	14	15	13	13	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U1ITC02	Software Engineering	Core III	4	0	0	I	3	25	75	100
Learning Objectives										
<p>1. Knowledge of basic SW engineering methods and practices, and their appropriate application, describes.</p> <p>2. A basic understanding of software engineering layered technology and process framework, including waterfall and evolutionary models.</p> <p>3. Understanding of software requirements and the SRS documents, data models, object models, context models, and behavioral models.</p> <p>4. Understanding implementation difficulties including modularity, coding standards, static analysis, and reviews.</p> <p>5. Understanding software evolution, version management, quality control, and software quality.</p>										
Course Outcomes										
CO	On completion of this course, students will									
CO1[K1]	Gain basic knowledge of analysis and design of systems.									
CO2[K2]	Ability to apply software engineering principles and techniques.									
CO3[K3]	Model a reliable and cost-effective software system.									
CO4[K5]	Ability to design an effective model of the system.									
CO5[K6]	Perform Testing at various levels and produce an efficient system.									
UNIT	Contents									
I	<p>Introduction: The software engineering discipline, programs vs. software products, why study software engineering, the emergence of software engineering, Notable changes in software development practices, computer systems engineering.</p> <p>Software Life Cycle Models: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.</p>									
II	<p>Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS)</p> <p>Software Design: Good software design, cohesion, and coupling, neat arrangement, software design approaches, object-oriented vs function-oriented design.</p>									
III	<p>Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.</p> <p>User-Interface design: Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.</p>									
IV	Coding and Testing: Coding; code review; testing; testing in the large vs testing in									

	the small; unit testing; black-box testing; white-box testing; debugging; program analysis tools; integration testing; system testing; some general issues associated with testing. Software Reliability and Quality Management: Software reliability; statistical testing; software quality; software quality management system; SEI capability maturity model; personal software process.
V	Computer Aided Software Engineering: CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment. Software Maintenance: Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost.

Textbooks

1	Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018.
2	Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
3	Ian Sommerville, Software Engineering, Tenth Edition, Pearson.

Reference Books

1.	Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997.
2.	James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.
3.	A. Khan, A. Agrawal, Software Engineering, Narosa.

Web Resources

1.	Software Engineering Tutorial (tutorialspoint.com)
2.	Software Engineering: What It is, Definition, Tutorial - javatpoint
3.	Software Engineering - GeeksforGeeks Software Engineering - GeeksforGeeks

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	2	2	2	2	2
CO 2	2	3	3	3	2	2
CO 3	3	2	3	3	2	2
CO 4	3	2	3	2	2	2
CO 5	2	2	2	3	3	2
Weightage of course contributed to each PSO	13	11	13	13	11	10

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U1ITS01	PROBLEM SOLVING TECHNIQUES	FC	2	0	0	I	2	25	75	100
Learning Objectives										
<ul style="list-style-type: none"> To understand the importance of algorithms and programs, and to know of the basic problem solving strategies. To learn efficient strategies and algorithms to solve standard problems, thus laying a firm foundation for designing algorithmic solutions to problems. 										
Course Outcomes										
CO	On completion of this course, students will									
CO1[K1]	Understanding basic systematic approach to problem solving.									
CO2[K2]	Learn the approach and algorithms to solve specific fundamental problems.									
CO3[K3]	Studying the efficient approach to solve specific factoring-related problems.									
CO4[K4]	To know the efficient array-related techniques to solve specific problems.									
CO5[K5]	Understand the efficient methods to solve specific problems related to text processing and how recursion works.									
UNIT	Contents									
I	Introduction: Notion of algorithms and programs – Requirements for solving problems by computer – The problem-solving aspect: Problem definition phase, Getting started on a problem, The use of specific examples, Similarities among problems, Working backwards from the solution – General problem-solving strategies - Problem solving using top-down design – Implementation of algorithms – The concept of Recursion.									
II	Fundamental Algorithms: Exchanging the values of two variables – Counting - Summation of a set of numbers - Factorial computation - Sine function computation - Fibonacci Series generation - Reversing the digits of an integer – Base Conversion.									
III	Factoring Methods: Finding the square root of a number – The smallest divisor of an integer – Greatest common divisor of two integers - Generating prime numbers – Computing the prime factors of an integer – Generation of pseudo-random numbers - Raising a number to a large power – Computing the n th Fibonacci number.									
IV	Array Techniques: Array order reversal – Array counting or histogramming – Finding the maximum number in a set - Removal of duplicates from an ordered array - Partitioning an array – Finding the k^{th} smallest element – Longest monotone subsequence.									
V	Text Processing and Pattern Searching: Text line length adjustment – Left and right justification of text – Keyword searching in text – Text line editing – Linear pattern search. Recursive algorithms: Towers of Hanoi – Permutation generation.									
Textbooks										

1	R. G. Dromey, <i>How to Solve it by Computer</i> , Pearson India, 2007.
Reference Books	
1	Wiley's TCS National Qualifier Test Study Guide by Wiley Editorial Paperback.
2	George Polya, Jeremy Kilpatrick, <i>The Stanford Mathematics Problem Book: With Hints and Solutions</i> , Dover Publications, 2009 (Kindle Edition 2013).
3	Greg W. Scragg, <i>Problem Solving with Computers</i> , Jones & Bartlett 1st edition, 1996.
Web Resources	
1.	www.coursera.org/learn/computational-thinking-problem-solving
2.	http://www.campusrecruitment.co.in/download.html
3.	https://onlinecourses.nptel.ac.in/noc21_hs02/preview
4.	https://www.itcareerlab.org/2017/04/20/10-episode-11-preparing-job-interview/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	1	2	3	2	3
CO 2	3	1	2	1	3	1
CO 3	1	3	1	2	3	2
CO 4	2	3	3	1	3	2
CO 5	3	2	2	3	1	3
Weightage of course contributed to each PSO	11	10	10	10	6	6

S-Strong-3 M-Medium-2 L-Low-1

FIRST YEAR –SEMESTER- II

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U2ITC03	Java Programming	Core -III	5	0	0	II	4	25	75	100
Learning Objectives										
<ul style="list-style-type: none"> To provide fundamental knowledge of object-oriented programming. To equip the student with programming knowledge in Core Java from the basics up. To enable the students to use AWT controls, Event Handling and Swing for GUI. 										
Course Outcomes									Programme Outcomes	
CO	On completion of this course, students will									
CO1[K2]	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.									
CO2[K3]	Implement inheritance, Packages, Method and classes of Core Java. Understand and implement the exception Handling in core java.									
CO3[K4]	Implement multi-threading ,Synchronous, asynchronous programming and I/O Streams of Core Java									
CO4[K5]	Implement interfaces using AWT and Event handling.									
CO5[K6]	Understand and use the components of Swing to create GUI.									
UNIT	Contents									
I	Introduction: Review of Object Oriented concepts – History of Java – Java buzzwords – JVM architecture – Data types - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.									
II	Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition-Access Protection –Importing Packages. Interfaces: Definition - Implementation–Extending Interfaces. Exception Handling: try - catch - throw - throws – finally – Built-in exceptions - Creating own Exception classes.									
III	Multithreaded Programming: Thread Class - Runnable interface –Synchronization– Using synchronized methods–Using synchronized statement- Inter thread Communication –Deadlock. I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.									
IV	AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Color - Fonts and layout managers. Event Handling: Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes.									

V	Swing: Introduction to Swing - Hierarchy of swing components. Containers - Top level containers - JFrame - JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel, JTextField - JTextArea - JList - JComboBox - JScrollPane.
Textbooks	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010. Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999. Head First Java, O’Rielly Publications.
Reference Books	
1.	Java 2 Core Language Little Black Book by Alain Trottier,2002.
2.	Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010.
Web Resources	
1.	Java Basics: www.tutorialspoint.com/java/index.html www.w3schools.com/java https://www.geeksforgeeks.org/java-tutorial/
2.	AWT: www.javatpoint.com/java-awt www.javatpoint.com/awt-program-in-java https://www.geeksforgeeks.org/java-tutorial/
3.	Swing: www.javatpoint.com/java-swing www.tutorialspoint.com/swing/index.htm https://www.geeksforgeeks.org/introduction-to-java-swing/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	3	2	2	3
CO 2	3	1	3	2	3	1
CO 3	2	3	1	2	2	3
CO 4	1	3	3	1	3	2
CO 5	3	2	2	3	1	3
Weightage of course contributed to each PSO	10	11	12	10	11	12

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U2ITCP02	Java Programming Lab	Core III Practical	0	0	5	0	3	40	60	100

Objectives

- To gain practical expertise in coding Core Java programs
- To become proficient in the use of AWT, Event Handling and Swing.

Course Outcomes	
CO	On completion of this course, students will
CO1[K3]	Code, debug and execute the Java problems
CO2[K3]	Implement multi-threading and exception-handling.
CO3[K4]	Implement File Handling.
CO4[K5]	Demonstrate Event Handling and Implement Synchronous and Asynchronous programming.
CO5[K6]	Create GUI using Swing and AWT and apply event handling.

LIST OF PROGRAMS

1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?
2. Write a Java program to multiply two given matrices.
3. Write a Java program that displays the number of characters, lines and words in a text?
4. Write a program to do String Manipulation using Character Array and perform the following string operations:
 - a. String length
 - b. Concatenating two strings
5. Write a program to perform the following string operations using String class:
 - a. String Concatenation
 - b. Search a substring
6. Write a program to perform string operations using String Bufferclass:
 - a. Length of a string
 - b. Reverse a string
7. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
8. Write a program to demonstrate the use following exceptions.
 - a. Arithmetic Exception
 - b. Array Index Out of Bound Exception

9. Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes?
10. Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.
11. Write a Java program that handles all mouse events and shows the event name at the centre of the window when a mouse event is fired. (Use adapter classes).
12. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	3	2	1	3
CO 2	3	3	1	2	1	2
CO 3	2	1	2	1	2	1
CO 4	1	1	3	2	1	3
CO 5	2	2	3	3	1	2
Weightage of course contributed to each PSO	9	9	12	10	6	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U2ITC04	Digital Logic Fundamentals	Core III	4	0	0	II	4	25	75	100
Learning Objectives										
1.To understand the basic number systems 2. Get the knowledge of basic logic gates 3. To gain the knowledge on sequential circuits 4. Understand combinatorial circuits 5. To apply in design of circuits										
Course Outcomes										
CO	On completion of this course, students will									
CO1[K1]	Understand the fundamental concepts and techniques of digital logic.									
CO2[K1]	Apply arithmetic operations in number system and various methods to implement simplification of Boolean functions.									
CO3[K2]	Analyze the design of various combinational and sequential circuits.									
CO4[K4]	Ability to identify requirements for a design application using logic gates, combinational and sequential circuits.									
CO5[K6]	Build a digital circuit using the design procedure.									
UNIT	Contents									
I	Binary Systems: Digital Computers and Digital Systems-Binary Numbers-Number base Conversion-Octal and Hexa decimal numbers-Complements-Binary codes-Binary logic.									
II	Boolean Algebra and Logic gates: Basic definitions-Axiomatic definition of Boolean algebra -Basic theorems and properties of Boolean algebra-Digital logic gates. Simplification of Boolean function: The Map method-Upto five variables.									
III	Combinational logic: Introduction-Design procedure-Adders-Subtractors. Combinational logic with MSI and LSI: Decoders-Multiplexers.									
IV	Sequential logic: Introduction-Flip-Flops-Trigging of Flip-Flops-Design of Counters. Registers, Counters and the memory unit: Introduction-Registers-Shift registers- ripple counters-Synchronous counters.									
V	Processor Logic Design: Design of Arithmetic logic unit-Status register-Design of Accumulator.									

Textbooks	
1	Logic and computer design fundamentals, M.M.Mano, 5 th Edition, 2016, PHI
2	T.C.Bartee-1997, <u>Computer Architecture and logic design</u> , International Edition, Mc Graw Hill.
3	F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI, 2006.
Reference Books	
1	John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, 2002.
2	Charles H.Roth. Fundamentals of Logic Design, Thomson Learning, 2003.
Web Resources	
1.	www.asic-Worl.com/digital/tutorial.html
2.	https://course.ie.cuhk.edu.hk/~ieg2810/.../Lab_tutorial1_08.pdf
3.	https://www.electronics-tutorials.ws/logic/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	3	3	3	3	3
CO 2	3	3	1	3	3	3
CO 3	1	3	3	1	3	3
CO 4	3	3	1	3	1	1
CO 5	3	3	3	3	3	3
Weightage of course contributed to each PSO	12	15	11	13	13	13

S-Strong-3 M-Medium-2 L-Low-1

SECOND YEAR –SEMESTER- III

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U3ITC05	Web Application Development	Core-III	5	0	0	III	4	25	75	100
Learning Objectives										
<p>1. To learn the basic web concepts and to create rich internet applications that use the most recent client-side Programming technologies.</p> <p>2.To learn the basics of HTML, DHTML, XML, CSS, JavaScript AJAX.</p>										
Course Outcomes										
CO	On completion of this course, students will									
CO1[K2]	Develop and publish Web pages using Hypertext Markup Language(HTML).									
CO2[K3]	Optimize page styles and layout with Cascading Style Sheets(CSS).									
CO3[K4]	Analyze and apply the role of languages to create a capstone									
CO4[K4]	Develop websites using client-side web programmings languages like HTML, DHTML, CSS, XML, JavaScript, and AJAX.									
CO5[K6]	Create web applications using forms and validation of form fields									
UNIT	Contents									
I	HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line breaks. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment- links-tables-frames									
II	Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with HTML forms textbox, password, list box, combo box, text area, tools for building web page front page.									
III	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.									
IV	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									
V	Ajax: Introduction, advantages &disadvantages, Purpose of it, ajax based web application, alternatives of ajax. Java Script & AJAX: Introduction to array operators, making statements-date & time-mathematics- strings-Event handling-form properties. AJAX. Introduction to jQuery and AngularJS.									

Textbooks	
1	Pankaj Sharma, “Web Technology”, Sk Kataria & Sons Bangalore 2011.(UNIT I, II, III &IV).
2	Achyut S Godbole & Atul Kahate, “Web Technologies”, 2002, 2nd Edition. (UNIT V:AJAX).
Reference Books	
1.	Laura Lemay, Rafe Colburn , Jennifer Kyrnin, “Mastering HTML, CSS & Javascript Web Publishing”,2016.
2.	DT Editorial Services (Author), “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Paperback 2016, 2ndEdition.
3.	Purewal, Semmy. Learning Web App Development: Build Quickly with Proven JavaScript Techniques. " O'Reilly Media, Inc.", 2014.
Web Resources	
1.	https://www.w3schools.com/whatis/default.asp
2.	https://www.edureka.co/blog/web-development-tutorial/
3.	https://www.tutorialspoint.com/website_development/index.htm

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	1	3	1	3	2
CO 2	3	2	3	2	3	1
CO 3	2	3	1	3	2	1
CO 4	2	3	3	3	2	1
CO 5	3	3	3	2	2	1
Weightage of course contributed to each PSO	13	12	13	11	12	6

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U3ITCP03	Web Application Development Lab	Core-III	0	0	5	III	4	40	60	100

Learning Objectives

1. Learn web page implementation using basic and advanced HTML.
2. Understand the difference between Basic CSS and Advanced CSS
3. Learn Scripting languages to interact with the server.
4. Learn Forms on the web page and form validation using client-side scripting.
5. Learn web page development using XML and AJAX

Course Outcomes

CO	On completion of this course, students will
CO1[K1]	Study and Implement Web Pages using Basic and Advanced HTML.
CO2[K1]	Differentiate between functionalities of Basic CSS and Advanced CSS
CO3[K2]	Implement basic JavaScript.
CO4[K3]	Develop program using basic functions in Javascript and XHTML
CO5[K4]	Create web applications using forms and validation of form fields

LIST OF PROGRAMS

1. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
2. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.
3. Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays "TEXT-SHRINKING" in BLUE color. Then the font size decreases to 5pt.
4. Develop and demonstrate an HTML5 file that includes JavaScript script that uses functions for the following problems: a. Parameter: A string b. Output: The position in the string of the left-most vowel c. Parameter: A number d. Output: The number with its digits in the reverse order
5. Design an XML document to store information about a student in an engineering college affiliated with VTU. The information must include USN, Name, and Name of the College, Branch, Year of Joining, and email id. Makeup sample data for 3 students. Create a CSS style sheet and use it to display the document.
6. Change the Content of the webpage using AJAX. Perform Different Operations using JQUERY Selectors.
7. Create an XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in the MySQL table. Retrieve and display the data based on Name.

PRESCRIBED TEXTBOOKS:

1. Pankaj Sharma, "Web Technology", Sk Kataria & Sons Bangalore 2011.
2. Achyut S Godbole & Atul Kahate, "Web Technologies", 2002, 2nd Edition.

BOOKS FOR REFERENCE:

1. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, "Mastering HTML, CSS & Javascript Web Publishing", 2016.
2. DT Editorial Services (Author), "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)", Paperback 2016, 2nd Edition.
3. Purewal, Semmy. Learning Web App Development: Build Quickly with Proven JavaScript Techniques. " O'Reilly Media, Inc.", 2014.

WEB REFERENCE:

<https://www.w3schools.com/whatis/default.asp>

<https://www.edureka.co/blog/web-development-tutorial/>

https://www.tutorialspoint.com/website_development/index.htm

Mapping with Programme Outcomes:

Map course outcomes for each course with programme outcomes (PO) in the 3-point scale of Strong, Medium, and Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	3	2	3	2
CO 2	2	2	3	2	3	1
CO 3	3	3	3	2	2	2
CO 4	3	2	2	3	3	2
CO 5	2	3	2	2	2	3
Weightage of course contributed to each PSO	13	12	13	11	13	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U3ITC06	Data Structures and Algorithms	Core -III	4	0	0	III	4	25	75	100
Learning Objectives										
<ol style="list-style-type: none"> Enumerate the purpose of usage of data structures and algorithms describe usage of both linear and non linear data structures organization Learn the data structures and algorithm implementation Conceptualize the representation of data structures Conceive and critically assess the given algorithm methodologies. 										
Course Outcomes										
CO	On completion of this course, students will									
CO1[K2]	Understand the concepts of Data structures and simple linear data structures.									
CO2[K2]	Acquire the skills on the stack data structure, its implementation and application.									
CO3[K3]	Use the appropriate data structure in context of solution of given problem and demonstrate a familiarity with major data structures.									
CO4[K5]	Explore the basic concepts of algorithms.									
CO5[K6]	Analyze the various algorithmic design paradigms like Dynamic Programming, Backtracking, Branch and Bound.									
UNIT	Contents									
I	INTRODUCTION TO DATA STRUCTURES: Data Structures: Definition- Time & Space Complexity, Arrays: Representation of arrays, Applications of arrays, sparse matrix and its representation, Linear list: Singly linked list implementation, insertion, deletion and searching operations on linear list Circular linked list: implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists- Dynamic Storage management.									
II	STACKS: Operations, array and linked representations of stack, stack applications, infix to postfix conversion, postfix expression evaluation, recursion implementation.									
III	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 .									
IV	INTRODUCTION TO ALGORITHMS: 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.									

V	DYNAMIC PROGRAMMING, BACKTRACKING & BRANCH & BOUND dynamic programming: General method, Multistage Graphs, All pairs shortest path, Single source shortest path. Backtracking: General method, 8 Queens, Graph coloring, Hamiltonian cycle. Branch & Bound: General method, Travelling salesperson problem.
Textbooks	
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.
3	Seymour Lipschutz ,”Data Structures with C”, First Edition, Schaum’s outline series in computers, Tata McGraw Hill.
Reference Books	
1.	Krishnamoorthy and G.IndiraniKumaravel, Data Structures using C, Tata McGrawHill – 2008.
2.	K.Sharma, Data Structures using C , Pearson Education India,2011.
Web Resources	
1	https://www.programiz.com/
2	https://www.geeksforgeeks.org/
3	https://www.w3schools.in/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	3	3	2	3	3
CO 2	2	3	2	2	2	3
CO 3	2	2	3	2	2	3
CO 4	2	2	3	2	2	2
CO 5	3	3	3	3	2	3
Weightage of course contributed to each PSO	11	13	14	11	11	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U3ITS03	R Programming– Lab	SEC-IV	0	0	2	0	2	40	60	100

Course Objectives:

- Acquire programming skills in core 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

Course Outcomes	
CO	On completion of this course, students will
CO1[K1]	Familiarize with the constructs and running of R programs
CO2[K2]	Apply control structures of R for several suitable problems
CO3[K3]	Demonstrate the working of various data structures supported by R
CO4[K4]	Understand the role of R in data handling and visualization
CO5[K5]	Recognize the type of problem and solve it using R

Lab Exercises:

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, DataFrames)
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.

PRESCRIBED TEXT :

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

BOOKS FOR REFERENCE :

1. Garrett Golemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations" , 1st Edition, 2014
2. Venables ,W.N.,andRipley,"S programming", Springer, 2000.
3. Tilman M. Davies,"The Book of R: A First Course in Programming and Statistics", 1st. Edition, 2015

WEB REFERENCE:

<https://www.javatpoint.com/r-tutorial>

<https://www.w3schools.com/r/>

<https://www.tutorialspoint.com/r/index.htm>

B.Sc IT –SEMESTER- IV

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U4ITC07	Python Programming	Core - III	4	0	0	IV	4	25	75	100
Learning Objectives										
<ul style="list-style-type: none"> • Describe the core syntax and semantics of Python programming language. • Discover the need for working with the strings and functions. • Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. • Understand the usage of packages and Dictionaries 										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Overview and execute simple Python programs									
CO2[K2]	Basic programming concepts in Python									
CO3[K3]	Apply various functional strategies for Python-based solutions to real world problems									
CO4[K4]	Designing Python data structures using lists, tuples, and dictionaries.									
CO5[K5]	Performing input/output operations with files in Python.									
UNIT	Contents									
I	Introduction: Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output- Control Structures: Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection.									
II	Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, using ranges.									
III	Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions.									
IV	Objects and their use: Software Objects - Turtle Graphics – Turtle attributes- Text Files: Opening, reading and writing text files- String Processing - Exception Handling.									
V	Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc.									
Textbooks										
1	Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.									
2	Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition									
3	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016									
Reference Books										

1.	Python: The Complete Reference Paperback Edition 2018 by Martin C. Brown
2.	John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1590282410
Web Resources	
1.	https://www.tutorialspoint.com/python/index.htm
2.	https://www.w3schools.com/python/
3.	https://www.geeksforgeeks.org/python-programming-language/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	3	2	1	3
CO 2	3	3	1	2	1	2
CO 3	2	1	2	1	2	1
CO 4	1	1	3	2	1	3
CO 5	2	2	3	3	1	2
Weightage of course contributed to each PSO	9	9	12	10	6	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U4ITC08	Operating Systems	Core -III	4	0	0	0	4	25	75	100
Learning Objectives										
<ul style="list-style-type: none"> Understanding the design of the Operating System Imparting knowledge on CPU scheduling, Process and Memory Management. To code specialized programs for managing overall resources and operations of the computer. 										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management									
CO2[K2]	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores.									
CO3[K3]	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.									
CO4[K4]	Have complete knowledge of Scheduling Algorithms and its types.									
CO5[K5]	Understand memory organization and management									
UNIT	Contents									
I	<p>Introduction: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation.</p> <p>Process concepts: definition of process, process states-Life cycle of a process, process management- process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication-signals, message passing.</p>									
II	<p>Asynchronous concurrent processes: Mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson’s algorithm, software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores.</p> <p>Concurrent programming: monitors, message passing</p>									
III	<p>Deadlock and indefinite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra’s Banker’s algorithm, deadlock detection, deadlock recovery</p>									
IV	<p>Job and processor scheduling: Scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling</p>									
V	<p>Real Memory organization and Management: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping</p> <p>Virtual Memory organization: virtual memory basic concepts, multilevel storage organization, block mapping, paging basic concepts, segmentation, paging/segmentation systems. Virtual Memory Management: Demand Paging, Page replacement strategies</p>									
Textbooks										
1	H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011.									

Reference Books	
1.	William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
2.	A. Silberschatz, and P.B. Galvin., Operating Systems Concepts, Ninth Edition, John Wiley & Sons(ASIA) Pte Ltd., 2012.
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	2	3	1	1	2	1
CO 2	1	2	1	1	3	1
CO 3	1	2	1	1	3	1
CO 4	1	1	1	2	2	2
CO 5	1	1	3	2	1	2
Weightage of course contributed to each PSO	6	9	7	7	11	7

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U4ITC04	Python Programming Lab	Core -III	0	0	4	IV	3	40	60	100
Learning Objectives										
<ul style="list-style-type: none"> Describe the core syntax and semantics of Python programming language. Discover the need for working with the strings and functions. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. Understand the usage of packages and Dictionaries. 										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Overview and execute simple Python programs									
CO2[K2]	Basic programming concepts in Python									
CO3[K3]	Apply various functional strategies for Python-based solutions to real world problems									
CO4[K4]	Designing Python data structures using lists, tuples, dictionaries.									
CO5[K5]	Performing input/output operations with files in Python.									
UNIT	LIST OF EXERCISES:									
	<ol style="list-style-type: none"> Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria: Grade A: Percentage ≥ 80 Grade B: Percentage ≥ 70 and < 80 Grade C: Percentage ≥ 60 and < 70 Grade D: Percentage ≥ 40 and < 60 Grade E: Percentage < 40 Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user. Write a Python script that prints prime numbers less than 20. Program to find factorial of the given number using recursive function. Write a Python program to count the number of even and odd numbers from array of N numbers. Write a Python class to reverse a string word by word. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3) Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance). Write a Python program to construct the following pattern, using a nested loop * ** *** **** ***** ***** **** *** ** * Read a file content and copy only the contents at odd lines into a new file. Write a Python program for Towers of Hanoi using recursion Create a menu driven Python program with a dictionary for words and their meanings. 									
Textbooks										

1	Charles Dierbach, “Introduction to Computer Science using Python - A computational Problem solving Focus”, Wiley India Edition, 2015.
2	Mark Lutz, “Learning Python Powerful Object Oriented Programming”, O’reilly Media 2018, 5th Edition
3	Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016
Reference Books	
1.	Python: The Complete Reference Paperback Edition 2018 by Martin C. Brown
2.	John Zelle, “Python Programming: An Introduction to Computer Science”, Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1590282410

Web Resources	
1.	https://www.tutorialspoint.com/python/index.htm
2.	https://www.w3schools.com/python/
3.	https://www.geeksforgeeks.org/python-programming-language/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	3	2	1	3
CO 2	3	3	1	2	1	2
CO 3	2	1	2	1	2	1
CO 4	1	1	3	2	1	3
CO 5	2	2	3	3	1	2
Weightage of course contributed to each PSO	9	9	12	10	6	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U4ITS04	Skill Enhancement Course –Internet of Things	SEC-IV	2	0	0	0	2	25	75	100
Learning Objectives										
To understand the basic perspective of IoT, architecture of IoT, design consideration methodology, the applications of IoT and the security features of IoT.										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Understand the Key components, basics of Devices, Gateways and Data Management in IoT.									
CO2[K2]	Acquire knowledge on IoT applications in different domains and analyze their performance									
CO3[K3]	Understand methodology and building blocks of Internet of Things and characteristics.									
CO4[K4]	Compare the various models and Architecture of Internet of Things									
CO5[K5]	Apply the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis									
UNIT	Contents									
I	IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.									
II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.									
III	IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views									
IV	IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.									
V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security.									
Textbooks										
1	Vijay Madisetti and ArshdeepBahga, “Internet of Things: (A Hands-on Approach)”, Universities Press (INDIA) Private Limited 2015, 1st Edition.									
2	WaltenegusDargie, ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice” 4..CunoPfister, “Getting Started with the Internet of Things”, O’Reilly Media 2011									
3	Samuel Greengard, The Internet of Things, The MIT press Essential Knowledge series, 2015.									
Reference Books										
1.	Michael Miller, “The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and									

	Smart Cities Are Changing the World”, kindle version.
2.	Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, Apress Publications 2013, 1st Edition.
Web Resources	
1.	https://www.javatpoint.com/iot-internet-of-things
2.	https://data-flair.training/blogs/iot-tutorial/
3.	https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	3	2	3	2	3
CO 2	3	1	3	1	3	1
CO 3	2	3	1	2	3	2
CO 4	1	3	3	1	3	2
CO 5	3	2	2	3	1	3
Weightage of course contributed to each PSO	10	12	11	10	12	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U4ITS05	Skill Enhancement Course – Cloud Computing	SEC-IV	2	0	0	0	2	25	75	100
Learning Objectives										
<ul style="list-style-type: none"> To impart fundamental concepts of Cloud Computing. To impart a working knowledge of the various cloud service types and their uses and pitfalls. To enable the students to know the common features and differences in the service offerings of the three major Cloud Computing service providers, namely Amazon, Microsoft and Google. To provide know-how of the various aspects of application design, benchmarking and security on the Cloud. 										
Course Outcome										
On completion of this course, students will										
CO1[K1]	To understand the fundamental concepts, various models and services involved in Cloud Computing. and have knowledge on Virtualization.									
CO2[K2]	To understand the concepts of various cloud services and their implementation in the Amazon, Microsoft and Google cloud computing platforms.									
CO3[K3]	To gain knowledge about designing cloud applications, deployment and data storage services in the cloud.									
CO4[K4]	To understand the concepts involved in benchmarking and security on the Cloud.									
CO5[K5]	To understand the use case in which the cloud is used in multidisciplinary domains.									
UNIT	Contents									
I	<p>Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications.</p> <p>Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – MapReduce – Identity and Access Management – Service Level Agreements – Billing.</p>									
II	<p>Cloud Services</p> <p>Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines</p> <p>Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage</p> <p>Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service</p> <p>Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services</p> <p>Content Delivery Services: Amazon CloudFront - Windows Azure Content Delivery Network</p> <p>Analytics Services: Amazon Elastic MapReduce - Google MapReduce Service - Google BigQuery - Windows Azure HDInsight</p> <p>Deployment and Management Services: Amazon Elastic Beanstack - Amazon CloudFormation</p> <p>Identity and Access Management Services: Amazon Identity and Access Management - Windows Azure Active Directory</p> <p>Open Source Private Cloud Software: CloudStack – Eucalyptus – OpenStack.</p>									

III	Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).
IV	Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data at rest, securing data in motion – Key Management – Auditing.
V	Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.
Textbooks	
1	Arshdeep Bahga, Vijay Madiseti, <i>Cloud Computing – A Hands On Approach</i> , Universities Press (India) Pvt. Ltd., 2018.
2	Anthony T Velte, Toby J Velte, Robert Elsenpeter, <i>Cloud Computing: A Practical Approach</i> , Tata McGraw-Hill, 2013.
3	Barrie Sosinsky, <i>Cloud Computing Bible</i> , Wiley India Pvt. Ltd., 2013.
Reference Books	
1.	David Crookes, <i>Cloud Computing in Easy Steps</i> , Tata McGraw Hill, 2012.
2.	Dr. Kumar Saurabh, <i>Cloud Computing</i> , Wiley India, Second Edition 2012.
Web Resources	
1.	www.eduonix.com/courses/Software-Development/Learn-Cloud-Computing-from-Scratch-for-Beginners
2.	www.udemy.com/course/introduction-to-cloud-computing
3.	explore.skillbuilder.aws/learn/public/learning_plan/view/82/cloud-foundations-learning-plan

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	1	2	1	1	1	2
CO 2	3	3	1	2	1	2
CO 3	1	2	3	3	2	1
CO 4	3	2	2	3	3	2
CO 5	3	1	3	2	2	3
Weightage of course contributed to each PSO	11	10	10	11	9	10

S-Strong-3 M-Medium-2 L-Low-1

B.Sc IT –SEMESTER- V & VI

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5ITC09	Computer Networks	Core -III	5	0	0	V	4	25	75	100
Learning Objectives										
To understand the concept of Data communication and Computer network and to gain knowledge on Routing algorithms, inter networking devices and Security over Network communication.										
Course Outcome										
On completion of this course, students will										
CO1[K1]	To Understand the fundamentals of Computer Network architecture, OSI and TCP/IP reference models and familiarize with the various networks and physical level communication.									
CO2[K2]	To gain knowledge on Transmission, Telephone systems and Satellite communications. To learn the components to build, detect and correct the Data layer.									
CO3[K3]	To impart the functions and protocols of Elementary data link layer protocols.									
CO4[K4]	To analyze the characteristics of Network layer and the various Routing and Congestion control algorithms and internet protocols.									
CO5[K5]	To understand network security and define various protocols and their services such as FTP, HTTP, Telnet, DNS									
UNIT	Contents									
I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media									
II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.									
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.									
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.									
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography.									
Textbooks										
1	A. S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2008.									
2	B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition, 2017.									

3	F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008.
Reference Books	
1.	D. Bertsekas and R. Gallager, “Data Networks”, 2nd Edition, PHI, 2008.
2.	Lamarca, “Communication Networks”, Tata McGraw- Hill, 2002
Web Resources	
1.	https://www.javatpoint.com/computer-network-tutorial
2.	https://onlinecourses.nptel.ac.in/noc20_cs23/preview

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	M	L	L	L	M
CO 2	L	S	L	M	L	M
CO 3	S	L	M	M	S	S
CO 4	M	L	S	L	S	M
CO 5	M	L	M	S	S	M
Weightage of course contributed to each PSO	9	8	9	9	11	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5ITC10	Database Management System	Core -III	5	0	0	V	4	25	75	100
Learning Objectives										
To enable the students to learn the basics of data base systems,relational model of data and normal forms, design simple Database models ,write queries using SQL, and simple programs in PL/SQL.										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.									
CO2[K2]	Define and understand the integrity constraints, Relational Data Model, Entity-Relationship Model.									
CO3[K3]	Design database schema using normalization and Structured Query Language.									
CO4[K4]	Classify the different functionsand join operations and handling multiple tables.									
CO5[K5]	Develop simple programs in PL/SQL using various constructs, Cursors and Exceptions.									
UNIT	Contents									
I	Database Concepts: Database Systems - Data vs Information - Introducing the database - File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction.									
II	Design Concepts: Relational database model - logical view of data-keys -Integrity rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram.									
III	Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. roduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.									
IV	Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function									
V	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation –									

	Arithmetic operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.
Textbooks	
1	Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016
3	Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication ,VI Edition.
Reference Books	
1.	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition
2.	Albert Lulushi, "Developing ORACLE FORMS Applications", Prentice Hall ,1997
Web Resources	
1.	www.sqltutorials.com
2.	https://www.mysql.com/
3.	https://www.w3schools.in/dbms/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S
Weightage of course contributed to each PSO	11	13	14	11	11	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5ITCP05	Database Management System Lab	Core -III	5	0	0	V	3	40	60	100
Learning Objectives										
Students can learn various SQL and PL/SQL commands, cursor and various application programs.										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.									
CO2[K2]	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.									
CO3[K3]	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).									
CO4[K4]	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.									
CO5[K5]	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions									
Lab Programs	List of Exercises:									
	<p><i>I. SQL</i></p> <ol style="list-style-type: none"> 1. DDL COMMANDS 2. DML COMMANDS 3. TCL COMMANDS <p><i>II. PL/SQL</i></p> <ol style="list-style-type: none"> 4. FIBONACCI SERIES 5. FACTORIAL 6. STRING REVERSE 7. SUM OF SERIES 8. TRIGGER <p><i>III. CURSOR</i></p> <ol style="list-style-type: none"> 9. STUDENT MARK ANALYSIS USING CURSOR <p><i>IV. APPLICATION</i></p>									

	10. LIBRARY MANAGEMENT SYSTEM 11. STUDENT MARK ANALYSIS
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	M	L	L	L	M
CO 2	L	S	L	M	L	M
CO 3	S	L	M	M	S	S
CO 4	M	L	S	L	S	M
CO 5	M	L	M	S	S	M
Weightage of course contributed to each PSO	9	8	9	9	11	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5ITDE01	Information Security	Elective-I	4	0	0	V	3	25	75	100
Learning Objectives										
<ul style="list-style-type: none"> To know the objectives of information security Understand the importance and application of each of confidentiality, integrity, authentication and availability Understand various cryptographic algorithms Understand the basic categories of threats to computers and network 										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Understand network security threats, security services, and countermeasures									
CO2[K2]	Understand vulnerability analysis of network security									
CO3[K3]	Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.									
CO4[K4]	Gain hands-on experience with programming and simulation techniques for security protocols.									
CO5[K5]	Apply methods for authentication, access control, intrusion detection and prevention.									
UNIT	Contents									
I	Introduction to Information Security : Security mindset, Computer Security Concepts (CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware, program analysis and mechanisms.									
II	The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense. Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption									
III	Symmetric and Asymmetric Cryptographic Techniques : DES, AES, RSA algorithms .Authentication and Digital Signatures : Use of Cryptography for authentication, Secure Hash function, Key management – Kerberos.									
IV	Program Security : Non malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels. File protection Mechanisms, User Authentication Designing Trusted O.S: Security polices, models of security, trusted O.S design, Assurance in trusted O.S. Implementation examples.									
V	Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security. Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.									
Textbooks										
1	Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education.									
2	Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition, William Stallings, Pearson.									
3	Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.									

Reference Books	
1.	1. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2"d Edition.
2.	Information Security, Principles and Practice: Mark Stamp, Wiley India.
3.	Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH.
Web Resources	
1.	https://www.geeksforgeeks.org/what-is-information-security/
2.	https://www.imperva.com/learn/data-security/information-security-infosec/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	S	M	S	M	S
CO 2	S	L	S	L	S	L
CO 3	M	S	L	M	S	M
CO 4	L	S	S	L	S	M
CO 5	S	M	M	S	L	S
Weightage of course contributed to each PSO	10	12	11	10	12	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5ITDE02	Data Mining and Warehousing	Elective-I	5	0	0	V	3	25	75	100
Learning Objectives										
Learning Objectives: (for teachers: what they have to do in the class/lab/field)										
<ul style="list-style-type: none"> • To provide the knowledge on Data Mining and Warehousing concepts and techniques. • To study the basic concepts of cluster analysis. • To study a set of typical clustering methodologies, algorithms, and applications. 										
Course Outcome										
On completion of this course, students will										
CO1[K1]	To understand the basic concepts and the functionality of the various data mining and data warehousing component									
CO2[K2]	To know the concepts of Data mining system architectures									
CO3[K3]	To analyze the principles of association rules									
CO4[K4]	To get analytical idea on Classification and prediction methods.									
CO5[K5]	To Gain knowledge on Cluster analysis and its methods.									
UNIT	Contents									
I	Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction.									
II	Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures									
III	Mining Association Rules: Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses									
IV	Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy.									
V	Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods-Density Based Methods – GRID Based Method – Model based Clustering Method.									

Textbooks	
1	Han and M. Kamber, “Data Mining Concepts and Techniques”, 2001, HarcourtIndia Pvt. Ltd, New Delhi.
Reference Books	
1.	K.P. Soman, Shyam Diwakar, V. Ajay “Insight into Data Mining Theory and Practice “, Prentice Hall of India Pvt. Ltd, New Delhi.
2.	Parteek Bhatia, ‘Data Mining and Data Warehousing: Principles and Practical Techniques’, Cambridge University Press, 2019.
Web Resources	
Web resources from NDL Library, E-content from open-source libraries	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	S	M	S	M	S
CO 2	S	L	S	L	S	L
CO 3	M	S	L	M	S	M
CO 4	L	S	S	L	S	M
CO 5	S	M	M	S	L	S
Weightage of course contributed to each PSO	10	12	11	10	12	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5ITPR01	Project with Viva voce	III	0	0	4	V	4	40	60	100
Project Work Pattern										
<p>FIRST REVIEW: (20 Marks)</p> <ol style="list-style-type: none"> 1. Project Title 2. Project Platform (Language / Package Selected) 3. Confirmation Letter (from Company / Industry) 4. Details of Internal Guide with Designation & Qualification (in the company / Industry) 5. Presentation <p>SECOND REVIEW: (20 Marks)</p> <ol style="list-style-type: none"> 1. Work Observation 2. Modules in Project (Design Screens Sample) 3. DFD / ERD / System Flow Diagram (Whichever Applicable) 4. Estimated Time of Completion 5. Completed Work in the form of Percentage Analysis 6. PowerPoint Presentation. <p>FINAL REVIEW: (60 Marks)</p> <ol style="list-style-type: none"> 1. Documentation 2. Screens Shots 3. DFD / ERD / System Flow Diagram (Whichever Applicable) 4. Final Project Report (with executable format including complete source code) <p style="text-align: center;">The Passing minimum shall be 40% out of 60 marks (24 Marks)</p>										

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U5ITS06	PHP Programming	SEC -IV	2	0	0	V	2	25	75	100
Learning Objectives										
<ul style="list-style-type: none"> Learning Objectives: (for teachers: what they have to do in the class/lab/field) The objective of this course is to teach the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory. 										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Analyze the behaviour of basic quantum algorithms.									
CO2[K2]	Implement simple quantum algorithms and information channels in the quantum circuit model.									
CO3[K3]	Simulate a simple quantum error-correcting code.									
CO4[K4]	Prove basic facts about quantum information channels.									
CO5[K5]	To Gain knowledge on Cluster analysis and its methods.									
UNIT	Contents									
I	Introduction to PHP -Basic Knowledge of websites -Introduction of Dynamic Website -Introduction to PHP -Scope of PHP -XAMPP and WAMP Installation- PHP Programming Basics -Syntax of PHP -Embedding PHP in HTML -Embedding HTML in PHP .									
II	Introduction to PHP Variable -Understanding Data Types -Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement -Switch() Statements -Using the while() Loop -Using the for() Loop .									
III	PHP Functions -PHP Functions -Creating an Array -Modifying Array Elements - Processing Arrays with Loops -Grouping Form Selections with Arrays -Using Array Functions -Using Predefined PHP Functions -Creating User-Defined Functions									
IV	PHP Advanced Concepts -Reading and Writing Files -Reading Data from a File - Managing Sessions and Using Session Variables -Destroying a Session -Storing Data in Cookies -Setting Cookies .									
V	OOPS Using PHP -OOPS Concept-Class, Object, Abstractions, Encapsulation, Inheritance, Polymorphism -Creating Classes and Object in PHP-Cookies and Session Management-Working with forms and system file - Error Handling- Model View Controller – AJAX.									
Textbooks										
1	Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.									
Reference Books										
1.	The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes.									
Web Resources										
Web resources from NDL Library, E-content from open-source libraries										

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	S	M	S	M	S
CO 2	S	M	S	L	S	L
CO 3	M	S	L	M	S	L
CO 4	L	S	S	L	S	M
CO 5	S	M	L	S	L	S
Weightage of course contributed to each PSO	10	13	10	10	12	10

S-Strong-3 M-Medium-2 L-Low-1

Semester – VI

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	Exter nal	Total
23U6ITC11	Machine Learning	Core -III	5	0	0	VI	4	25	75	100
Learning Objectives										
The primary objective of the course is to understand Supervised Learning and Unsupervised Learning. Gain knowledge on Data Representation and Model Evaluation.										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Understand the concept of machine learning and the tools used in python and to explore different supervised learning techniques.									
CO2[K2]	Understand Supervised and Unsupervised Algorithms and different kinds of preprocessing and scaling methods.									
CO3[K3]	Analyze the data and represent data Engineering features, one hot encoding method, PCA.									
CO4[K4]	Perform training, testing and evaluation of the designed ML model.									
CO5[K5]	Develop a model for a given application									
UNIT	Contents									
I	Introduction: Why Machine Learning? - Why Python? - Scikit-learn - Essential Libraries and Tools. Supervised Learning: Classification and Regression.									
II	Supervised Machine Learning Algorithms : K-Nearest Neighbors – Decision Trees. Unsupervised Learning and Preprocessing: Types of Unsupervised Learning - Preprocessing and Scaling: Different kinds of preprocessing.									
III	Dimensionality Reduction, Feature Extraction and Manifold Learning: Principal Component Analysis – Clustering : K-Means – Agglomerative - DBSCAN. Representing Data and Engineering Features: Categorical Variables: One hot encoding – Numbers can encode categorical.									
IV	Automatic Feature Selection: Univariate statistics – Model based feature selection – Iterative feature selection. Model Evaluation: Cross-Validation: Cross validation in scikit-learn – Stratified k-fold cross validation and other strategies. Grid Search: Simple Grid search.									
V	Evaluation Metrics and Scoring : Metrics for Binary Classification: Confusion Matrices. Algorithm Chains and Pipelines: Parameter Selection with Preprocessing - Building Pipelines - Using Pipelines in Grid Searches.									
Textbooks										
1	Sarah Guido and Andreas Müller, Introduction to Machine Learning with Python-A Guide for Data Scientists, O'Reilly Media, 2016.									
2	Vikram Kamath, Introduction to Machine Learning Using Python , March 2018.									
3	Sebastian Raschka, <i>“Python Machine Learning”</i> , First Edition, [PACKT], 2015.									
Reference Books										

1.	Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, Chapman & Hall/CRC, 2nd Edition, 2014.
2.	Kevin Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
3.	Tom M Mitchell, “Machine Learning”, McGraw Hill Education, 2013.
Web Resources	
1.	https://in.pycon.org/2011/static/files/talks/11/Introduction_To_ML_Partial_2.pdf
2.	https://machinelearningmastery.com/machine-learning-in-python-step-by-stp/
3.	http://www.r2d3.us/visual-intro-to-machine-learning-part-1/
4.	https://nptel.ac.in/courses/106106139

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	M	L	L	L	M
CO 2	M	S	L	M	L	M
CO 3	L	S	M	M	S	M
CO 4	M	L	S	M	S	L
CO 5	S	M	S	M	M	S
Weightage of course contributed to each PSO	9	11	10	9	10	10

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U6ITC12	Android Programming	Core-III	5	0	0	IV	4	25	75	100
Learning Objectives										
The objective is to help the student understands the working of Android OS practically and to develop Android user interfaces, deploy and maintain the Android Applications.										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Demonstrate the Understanding of fundamental of Android Programming									
CO2[K2]	Understanding the applications, activities and services on their design.									
CO3[K3]	Prototyping techniques to design and develop sophisticated mobile user interfaces.									
CO4[K4]	Program mobile applications for the Android operating system that use basic and advanced phone features.									
CO5[K5]	Explain and use deploys applications to the Android marketplace for distribution.									
UNIT	Contents									
I	Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Android Architecture, Android-Application Components, Building you First Android application, Android Resources (Manifest file).									
II	Android Applications: Android terminologies, Application Context, Android-Activities, Android-Services, Android Broadcast Receivers, Android Intents and types of objects/Filters, Android-Fragment, Manifest File and its common settings, Using Intent Filter, Permissions.									
III	Android User Interface Design: UI Controls, Designing User Interfaces with Layouts, Android-Event Handling, Drawing and Working with Animation. Android UI Design, UI Patters and UI Testing.									
IV	Android Advanced Concepts: Android Drag and drop, Location Based Services, Android Sending Email and SMS, Testing Android applications, Publishing Android application. Managing Application resources in a hierarchy, working with different types of resources.									
V	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.									
Textbooks										
1.	Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd edition. (2011).									
2.	Android Mobile Application Development, ISBN-978-81-940577-2-7 June 2019 by Dr.Babasaheb Ambedkar Open University.									
3.	Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps by Ian G. Clifton.									
Reference Books										
1.	Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd.									
2.	Android Application Development All in one for Dummies by Barry Burd, Edition: I.									
Web Resources										
1.	https://www.javatpoint.com/android-tutorial									
2.	https://www.w3schools.blog/android-tutorial									
3.	https://www.tutorialspoint.com/android/index.htm									

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	M	M	M	M	M	M
CO 2	M	S	L	M	S	M
CO 3	M	M	L	S	M	M
CO 4	M	S	M	S	S	S
CO 5	S	S	M	M	M	S
Weightage of course contributed to each PSO	11	13	8	8	12	12

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U6ITCP06	Android Programming Lab	Core -III	0	0	5	V	3	40	60	100
Learning Objectives										
Students can understand and Design and develop the useful Android application by using button, fragments, Intents, Menus and can design application with database .										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Build an application using Android development environment.									
CO2[K2]	Write simple programs and develop small applications using the concepts of UI design, layouts and preferences.									
CO3[K3]	Implementing the Animation concept.									
CO4[K4]	Develop applications with multiple activities using Intents, Fragments, Buttons and options menu.									
CO5[K5]	Develop Android applications using SQLite.									
Lab Programs	List of Exercises:									
<ol style="list-style-type: none"> 1. Development of Hello World Application. 2. Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button. 3. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout). 4. Android Program to Animate a Bitmap. 5. Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity. 6. Design an android application Send SMS using Intent. 7. Create an android application using Fragments. 8. Design an android application Using Radiobuttons. 9. Design an android application for menu. 10. Create a user registration application that stores the user details in a database table. 										
Web Resources										
1.	Web resources from NDL Library, E-content from open-source libraries									

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	M	L	L	L	M
CO 2	L	S	L	M	L	M
CO 3	S	L	M	M	S	S
CO 4	M	L	S	L	S	M
CO 5	M	L	M	S	S	M
Weightage of course contributed to each PSO	9	8	9	9	11	11

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23U6ITDE03	Data Analytics	Elective -III	5	0	0	VI	4	25	75	100
Learning Objectives										
1. Enumerate the types of data analytics models 2. describe usage and implementation of various classifiers 3. Learn the varied clustering techniques and sequence analysis 4. calculate analytics result performances and visualization methods 5. Generalize the model processing steps and procedures using NOSql										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Understand the big data tools and its analysis techniques.									
CO2[K2]	Analyze data by utilizing clustering and classification algorithms.									
CO3[K3]	Compare the different mining algorithms and recommendation systems for large volumes of data.									
CO4[K4]	Perform data analytics on data streams.									
CO5[K5]	Explore the NoSQL databases and management.									
UNIT	Contents									
I	INTRODUCTION TO BIG DATA : Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — MapReduce and YARN — Map Reduce Programming Model									
II	CLUSTERING AND CLASSIFICATION: Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions- Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes Theorem — Naïve Bayes Classifier.									
III	ASSOCIATION AND RECOMMENDATION SYSTEM: Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity — Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.									
IV	STREAM MEMORY: Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing, Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics									
V	NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION : NoSQL Databases : Schema-less Models?: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive — Sharding —Hbase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.									

Textbooks	
1.	Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
2.	David Loshin, “Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph”, Morgan Kaufmann / Elsevier Publishers, 2013.
3.	EMC Education Services, “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley publishers, 2015.
Reference Books	
1.	Bart Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited.
2.	Michael Minelli, Michele Chambers, 2013, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s Businesses, Wiley CIO.
Web Resources	
1.	https://www.w3schools.com/
2.	https://www.kaggle.com/
3.	https://tableau.com

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	M	S	S	M	S	S
CO 2	M	S	M	M	M	S
CO 3	M	M	S	M	M	S
CO 4	M	M	S	M	M	M
CO 5	S	S	S	S	M	S
Weightage of course contributed to each PSO	11	13	14	11	11	14

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	Exter	Total
23U6ITDE04	Fuzzy Logic	Core -VI	6	0	0	VI	3	25	75	100
Learning Objectives										
The objective of this course is to teach the fundamentals of fuzzy sets, relations and the various fuzzification and defuzzification methods										
Course Outcome										
On completion of this course, students will										
CO1[K1]	Develop the skill in basic understanding of Fuzzy sets, operation and Properties.									
CO2[K2]	Apply Cartesian product and composition on Fuzzy relations and use the tolerance and Equivalence relations									
CO3[K3]	Analyze various fuzzification methods and its association features.									
CO4[K4]	Evaluate defuzzification methods for real time applications									
CO5[K5]	Design and analyze the application of Fuzzy logic and its Relations									
UNIT	Contents									
I	Introduction to Fuzzy Logic- Fuzzy Sets- Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and Fuzzy Relations: Introduction-Cartesian Product of Relation-Classical Relations-Cardinality of Crisp Relation.									
II	Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations, Cardinality of Fuzzy Relations-Operations on Fuzzy Relations-Properties of Fuzzy Relations-Fuzzy Cartesian Product and Composition-Tolerance and Equivalence Relations ,Crisp Relation.									
III	Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.									
IV	Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule-Based System: Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.									
V	Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock-Braking System and Vehicle Speed-Estimation Using Fuzzy Logic.									
Textbooks										
1.	S. N. Sivanandam, S. Sumathi and S. N. Deepa-Introduction to Fuzzy Logic using MATLAB, Springer-Verlag Berlin Heidelberg 2007.									
2.	Guanrong Chen and Trung Tat Pham- Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems									
3.	Timothy J Ross , Fuzzy Logic with Engineering Applications									
Reference Books										
1.	Klir.G, Yuan B.B. Fuzzy sets and Fuzzy Logic Prentice Hall of India private limited, 1997.									

2.	Gen, M. and Cheng R. Genetic Algorithm and Engineering Design, John Wiley 1997.
Web Resources	
1.	https://onlinecourses.nptel.ac.in/noc20_ee03/preview
2.	https://odp.inflibnet.ac.in/index.php/module_details?course=noc:fuzzy%20logic%20and%20neural%20networks&source=swayam&subsource=NPTEL

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	L	M	L	L	L	M
CO 2	M	M	S	M	L	M
CO 3	S	M	L	M	L	S
CO 4	M	S	M	L	M	S
CO 5	S	M	L	S	M	M
Weightage of course contributed to each PSO	11	11	8	9	7	12

S-Strong-3 M-Medium-2 L-Low-1

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	Exter	Total
23U6ITS07	Network Security	Core -IV	4	0	0	VI	2	25	75	100

Learning Objectives

- To study the number theory used for network security.
- To understand the design concept of cryptography and authentication.
- To develop experiments on algorithm used for security.

Course Outcome

On completion of this course, students will

CO1[K1]	To familiarize on the model of network security, Encryption techniques
CO2[K2]	To understand the concept of Number Theory , theorems
CO3[K3]	To understand the design concept of cryptography and authentication
CO4[K4]	To develop experiments on algorithm used for security
CO5[K5]	To understand about virus and threats, firewalls, and implementation of Cryptography

UNIT

Contents

I	Model of network security – Security attacks, services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher PrinciplesDES – Strength of DES – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.
II	Number Theory – Prime number – Modular arithmetic – Euclid’s algorithm - Fermet’s and Euler’s theorem – Primality – Chinese remainder theorem – Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography.
III	Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS.
IV	Authentication applications – Kerberos – X.509 Authentication services - E- mail security – IP security - Web security.
V	Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

Textbooks

1.	William Stallings, “Cryptography & Network Security”, Pearson Education, Fourth Edition 2010.
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Reference Books

1.	Charlie Kaufman, Radia Perlman, Mike Speciner, “Network Security, Privatecommunication in public world”, PHI Second Edition, 2002.
2.	Bruce Schneier, Neils Ferguson, “Practical Cryptography”, Wiley DreamtechIndia Pvt Ltd, First Edition, 2003.
3.	Douglas R Simson “Cryptography – Theory and practice”, CRC Press, FirstEdition, 1995.

Web Resources	
1	https://www.javatpoint.com/computer-network-security
2	https://www.tutorialspoint.com/information_security_cyber_law/network_security.htm
3	https://www.geeksforgeeks.org/network-security/

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	S		M	S	L	L
CO 2	S	M	L			M
CO 3			S		M	
CO 4	S	M	M		S	
CO 5		M		S	M	L
Weightage of course contributed to each PSO	9	6	8	6	8	4

S-Strong-3 M-Medium-2 L-Low-1