



**MARUDHAR KESARI JAIN COLLEGE FOR WOMEN
(AUTONOMOUS)**

Vaniyambadi – 635 751

PG & Research Department of Computer Science

for

Undergraduate Programme

Bachelor of Science in Computer Science

From the Academic Year 2024-25

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1. Preamble

Bachelor of Computer Science is a 3 – Year Undergraduate programme spread over six semesters. The course is designed to achieve a high degree of technical skills in problem solving and application development. The course develops requisite professional skills and problem solving abilities for pursuing a successful career in software industry and forms the required basics for pursuing higher studies in Computer Science. The Bachelor of Science (B.Sc.) programme in Computer Science is established in the year 1994 is a 3 year Undergraduate programme spread over six semester.

PROGRAMME OUTCOMES (PO)

Programme	B.Sc. Computer Science
Programme Code	US03
Duration	3 years [UG]
Programme Outcomes	<p>PO1: Acquire knowledge in Computer Science to apply the knowledge in their day-to-day life for betterment of self and society.</p> <p>PO2: Develop critical, analytical thinking and problem-solving skills.</p> <p>PO3: Develop research related skills in defining the problem, formulate and test the hypothesis, analysis, interpret, and draw conclusion from data.</p> <p>PO4: Address and develop solutions for societal and environmental needs of local, regional and national development.</p> <p>PO5: Work independently and engage in life long learning and enduring proficient progress.</p> <p>PO6: Provoke employability and entrepreneurship among students along with ethics and communication skills.</p> <p>PO7: Understand the importance of ethical behavior in business contexts and be able to recognize and address ethical dilemmas they may encounter in their professional careers.</p> <p>PO8: Prepared for life long learning and professional development, including the ability to adapt to changes in technology, business practices, and economic conditions throughout their careers..</p>

<p>Programme Specific Outcomes:</p>	<p>PSO1:Computer Science for Real-World Problem Solving Demonstrate the ability to apply computer science principles, mathematical modeling, and computational techniques to analyze and solve complex real-world problems.</p> <p>PSO2: Ethical and Responsible Computing Exhibit professionalism and ethical responsibility in designing and developing computing solutions while ensuring compliance with cyber regulations, laws, and industry standards.</p> <p>PSO3: Innovation and Entrepreneurship in Technology Leverage creativity, innovation, and entrepreneurial skills to develop and implement technology-driven solutions for societal and business challenges.</p>
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Eligibility for Admission:

Candidate seeking admission to the first year of the UG Degree Course should have passed the Higher Secondary Course Examination (Academic or Vocational) conducted by the Govt. of Tamilnadu with Mathematics / Business Mathematics / Statistics / Computer Science as a subject or an Examination of any other University accepted as equivalent thereto by the Syndicate subject to such other conditions as may be prescribed. Such candidates shall be permitted to take the B.Sc. Degree Examination of this University after the completion of the Course of three Academic Years in this University / Colleges affiliated to this University and shall qualify for the B.Sc. Degree.

Methods of Evaluation and Assessment

Methods of Evaluation		
Internal Evaluation		25 Marks
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks
Methods of Assessment		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand / Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, observe, explain	
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, map knowledge	
Evaluate (K5)	Longer essay/Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or presentations	

Semester - I							Semester - II						
Code	Course Title	Hours Distribution				C	Code	Course Title	Hours Distribution				C
		L	T	P	S				L	T	P	S	
24UFTA11 /24UFUR11	Tamil – 1 / Urdu -1	4	1	0	0	3	24UFTA21/ 24UFUR21	Tamil – 2 / Urdu -2	4	1	0	0	3
24UFEN11	English - 1	4	1	0	0	3	24UFEN21	English - 2	4	1	0	0	3
24UCSC11	CC - 1 Programming in C	3	1	2	0	5	24UCSC21	CC - 3 Programming in C ++	3	1	2	0	5
24UCSC12P	CC - 2 (Practical) Programming in C Lab	0	0	4	0	3	24UCSC22P	CC - 4 (Practical) Programming in C ++ LAB	0	0	4	0	2
24UMAA14	EC - 1 AL Numerical Methods-I	3	1	0	0	3	24UMAA25	EC - 2 AL Numerical Methods-II	3	1	0	0	4
24UCSS11	SEC – 1 NME Office Automation	1	0	1	0	2	24UMAA25P	EC - 3 AL Numerical Methods-I & II Practicals	0	0	2	0	2
24UCSS12	SEC - 2 Internet and Web Development	1	0	1	0	2	24UCSS21	SEC - 3 PHP Programming	1	0	1	0	2
24UCSF11	FC - Digital Computer Fundamentals	1	1	0	0	2	24UAEC21	AEC – 1 Life Skills Through Yoga	1	1	0	0	2
					30	23						30	23
Semester - III							Semester - IV						
24UFTA31	Tamil - 3	4	1	0	0	3	24UFTA41	Tamil - 4	4	1	0	0	3
24UFEN31	English - 3	4	1	0	0	3	24UFEN41	English - 4	4	1	0	0	3
24UCSC31	CC - 5 Programming in Java	3	1	2	0	5	24UCSC41	CC - 7 Data Base Management System	3	1	2	0	5
24UCSC32P	CC - 6 Practical - III Programming in Java Lab	0	0	4	0	2	24UCSC42P	CC - 8 (Practical) Data Base Management System Lab	0	0	4	0	2
24UMAA32 24UPHA32	EC - 4 AL 1. Statistical Methods and its Applications – I 2. Microprocessor - 8085	2	1	1	0	4	24UMAA42 24UPHA43	EC - 6 AL 1. Statistical Methods and its Applications – II 2. Digital Electronics and Microcontroller	2	1	1	0	4
24UCSA31	EC - 5 GE Web Designing	2	0	0	0	2	24UMAA42P 24UPHA44P	EC - 7 AL (Practical) 1. Statistical Methods and it's Applications I & II – Lab 2. Microprocessor and Microcontroller Lab	1	0	1	0	2
24UCSS31P	SEC - 4 Web Designing Lab	1	0	1	0	2	24UCSS41	SEC - 5 Computer Networks	1	0	1	0	2
24UAEC31	AEC – 2 Human Values and Professional Ethics	1	1	0	0	2	24UAEC41	AEC – 3 Environmental Studies & Disaster Management	2	0	0	0	2
					30	23						30	23

Semester - V							Semester - VI							
24UCSC51	CC -9 Operating Systems	4	1	0	0	5	24UCSC61	CC - 13 Machine Learning	4	1	0	0	4	
24UCSC52P	CC - 10 (Practical) Operating Systems Lab	0	0	4	0	3	24UCSC62P	CC - 14 Practical Machine Learning Lab	0	0	5	0	3	
24UCSC53	CC - 11 Python Programming	2	1	1	0	4	24UCSC63P	CC - 15 - Project	0	0	0	5	4	
24UCSC54P	CC - 12 Python Programming Lab	0	0	3	0	2	24UCSE61	EC - 10 I) IOT and its Applications II) Robotics and its Applications	4	1	0	0	4	
24UCSE51	EC - 8 I) Data Science using R Programming II) Cryptography	4	1	0	0	4	24UCSE62							
24UCSE52							24UCSE63	4	1	0	0	4		
24UCSE53	EC - 9 I) Full Stack Development II) Software Project Management	4	1	0	0	4	24UCSE64						EC - 11 I) Cloud Computing II) Artificial Intelligence	4
24UCSE54							24UCSP61	PEC - 1 Power BI	1	1	0	0		
24UAEC51	AEC – 4 Gender Equality and Social Inclusion	2	-	-	-	2	24UCSL61						SLC - 1 I) Open Source Software Technologies	0
24UCSIN51	Internship	-	-	-	-	2								
24UCSIK51	IKS Exploring Game Design for Cultural Heritage	0	0	0	2	-								
						30								23
														141+2*

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or Nanmudalvan within the fifth semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

L-Lecture T-Tutorial P-Practical S-Seminar C-Credit

Students must complete at least one online course (MOOC) from platforms like SWAYAM, NPTEL, or Nanmudalvan within the fifth semester. Additionally, engaging in a specified Self-learning Course is mandatory to qualify for the degree, and successful participation will be acknowledged with an extra credit of 2*.

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC11	CC-1 Programming in C	Core	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	To programming basics and the fundamentals of C.										
LO2	To data types in C, Mathematical and logical operations, Using control statement and loops										
LO3	To arranging data in arrays with algorithm										
LO4	To learning the functions parameters Implementing										
LO5	To pointers and file operations										
Unit	Content										Hours
1	Introduction to Programming: Introduction to computers, Computer characteristics, Hardware vs software, Steps to develop a program, Software development life cycle, Structured programming, Types of programming languages, Introduction to c, Developing a c program, Console input and output functions, Error diagnostics, Debugging techniques.										18
2	Operators and Expressions: Identifiers and keywords, Data types, Constants, variables, Declarations, Expressions, Statements, Arithmetic operators, unary operators, Relational and logical operators, Assignment operators, conditional operator Branching, if- else statement, which statement, go to statement, Looping, while statement, do- while statement, for statement, nested control structures, break statement, continue statement.										18
3	Arrays and Strings: Defining an array, Processing an array, multidimensional arrays, Searching algorithm, Linear search, Sorting algorithm, Bubble sort algorithm, Strings, Defining a string, Initialization of strings, Reading and writing a string, Processing the strings.										18
4	Functions: Functions, Overview, Defining a function, Accessing a function, function prototypes, Passing arguments to a function, Passing arrays to functions, Recursion. Pointers and Structures: Fundamentals, Pointer declarations, Passing pointers to functions, Structure & Union										18
5	File system : Types of file, working with files, File Handling, file operation, sequential and Random Access Files. Standard I/O. Functions: fscanf(), fprintf(), fgets(), fputs(), Command Line Arguments.										18

CO	Course Outcomes
CO1	Understand basic Structure of the C-PROGRAMMING, declaration and usage of variable
CO2	Develop conditional and iterative statements to write C programs
CO3	Implement arrays and strings in your C program.
CO4	Apply code reusability with functions
CO5	Programs that use Pointers to access arrays, strings and functions.
Textbooks:	
1	Byron Gottfried, “Schaum's Outline of Programming with C”, 3rd edition, 2016, McGraw Hill Education (India), ISBN: 9780070145900
2	Let Us C: Authentic guide to C programming language - 19th Edition – 15 December 2022 by Yashavant Kanetkar
3	A Textbook of Basics of C Programming – 2020 - Vikash Kumar Gupta, ISBN: 978-93-87394-89-6
4	Programming in C KTU [EST 102] Paperback – 26 April 2022 by Vijitha Robinson (Kailas Sree Chandran
5	Byron Gottfried, “Schaum's Outline of Programming with C”, 3rd edition, 2016, McGraw Hill Education (India), ISBN: 9780070145900
Reference Books:	
1	C Programming Books for Beginners and Advanced By jasdeepbhatia December 26, 2023
2	C Programming Language, 2nd Edition by Brian W. Kernighan, Dennis Ritchie Released 1988
3	Programming in C ,Stephen G. Kochan, Third Edition
4	C Programming Books for Beginners and Advanced By jasdeepbhatia December 26, 2023
5	C Programming Language, 2nd Edition by Brian W. Kernighan, Dennis Ritchie Released 1988
Web resources:	
1	https://www.w3schools.com/c/
2	https://www.tpointtech.com/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	2	3	3	2	2	3	3
CO3	3	2	3	3	3	3	3	3	3	2	2
CO4	3	3	3	3	2	3	3	2	2	3	3
CO5	3	2	3	3	3	3	3	3	3	2	2
Total	15	12	15	15	13	15	15	13	13	12	12
Average	3	2.4	3	3	2.6	3	3	2.6	2.6	2.4	2.4

3 – Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC12P	CC-2 C Programming Lab	Core	0	0	4	0	3	4	25	75	100
Learning Objectives											
LO1	To introduce students to the basic knowledge of programming fundamentals of C language										
LO2	To impart writing skill of C programming to the students and solving problems.										
LO3	To impart the concepts like looping, array, functions, pointers, file, structure										
LO4	To impart the concepts like looping, array, functions, pointers, file, structure										
LO5	To impart the concepts like looping, array, functions, pointers, file, structure										
Unit	Content										Hours
	<ol style="list-style-type: none"> 1. Write a Program to calculate and display the volume of a CUBE having its height (h=10cm), width (w=12cm) and depth (8cm). 2. Write a program to take input of name, roll no and marks obtained by a student in 4 subjects of 100 marks each and display the name, roll no with percentage score secured. 3. Write a Program to perform the arithmetic expression using switch statement. 4. Write a program to generate all prime numbers up to nth number. 5. Program to print product of two matrices. 6. Program to concatenate two strings without using library functions. 7. Program to find factorial of a given number using function. 8. Find Square Root, numerical differentiation, numerical integration using functions and recursion. 9. Program to print the elements of array using pointers. 10. Implementation of Text Processing using Strings 										60

CO	Course Outcomes
CO1	Understand the logic for a given problem. Write the algorithm of a given problem.
CO2	Recognize and understand the syntax and construction of C programming code.
CO3	Learn the methods of iteration or looping and branching
CO4	Make use of different data-structures like arrays, pointers, structures and files
CO5	Write programs to print output on the screen as well as in the files.
Textbooks:	
1	Byron Gottfried, “Schaum's Outline of Programming with C”, 3rd edition, 2016, McGrawHill Education (India), ISBN: 9780070145900
2	Let Us C: Authentic guide to C programming language - 19th Edition – 15 December 2022 by Yashavant Kanetkar
3	A Textbook of Basics of C Programming – 2020 - Vikash Kumar Gupta, ISBN: 978-93-87394-89-6
4	Programming in C KTU [EST 102] Paperback – 26 April 2022 by Vijitha Robinson (Kailas Sree Chandran
5	Byron Gottfried, “Schaum's Outline of Programming with C”, 3rd edition, 2016, McGrawHill Education (India), ISBN: 9780070145900
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2	C Programming Language, 2nd Edition by Brian W. Kernighan, Dennis Ritchie Released March 1988
3	Programming in C ,Stephen G. Kochan, Third Edition
Web resources:	
1	https://www.w3schools.com/
2	https://www.tpointtech.com/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	2	3	3	2	2	3	3
CO3	3	2	3	3	3	3	3	3	3	2	2
CO4	3	3	3	3	2	3	3	2	2	3	3
CO5	3	2	3	3	3	3	3	3	3	2	2
Total	15	12	15	15	13	15	15	13	13	12	12
Average	3	2.4	3	3	2.6	3	3	2.6	2.6	2.4	2.4

3-Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSS11	SEC-1 Office Automation	SEC	1	0	1	0	2	2	25	75	100
Learning Objectives											
LO1	Understand basic computer hardware components and their functions, Differentiate between operating systems like DOS, UNIX, and Windows.										
LO2	Learn to open, save, and close documents, Master text editing, formatting, and document layout, and Use spell checker and printing features effectively.										
LO3	Navigate Excel for data entry, formatting, and basic analysis. Understand formulas, charts, and financial statement preparation.										
LO4	Learn about databases, sorting, indexing, and record retrieval Design and execute queries and reports using DBMS tools like MS Access.										
LO5	Create and deliver engaging presentations using PowerPoint. Understand slide types, adding objects, transitions, and animations										
Unit	Content										Hours
1	Introductory concepts: Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices : Monitor, Printer . Introduction to Operating Systems & it s features: DOS– UNIX–Windows. Introduction to Programming Languages.										6
2	Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing Preview, options, merge.										6
3	Spreadsheets: Excel– opening, entering text and data, formatting, navigating; Formulas–entering, handling and copying; Charts– creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.										6
4	Database Concepts: The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS–Access).										6
5	Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures– Slide transition– Animation effects, audio inclusion, timers.										6

CO	Course Outcomes
CO1	Possess the knowledge on the basics of computers and its components
CO2	Gain knowledge in Creating Documents, spreadsheets and presentations.
CO3	Demonstrate an understanding of different automation tools.
CO4	Learn the concepts of Database and implement the Query in Database.
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.
Textbooks:	
1	Peter Norton, “Introduction to Computers”–Tata McGraw - Hill.
2	Archana Kumar “Computer Basics with Office Automation” January 2019 Edition, Dream Tech Publication
3	“Computer Fundamentals & Office Automation “ Vishal Sharma, Vision Publications
4	Computer Fundamentals and Office Automation (English, Paperback, Dr. R. Deepalakshmi) Charulatha Publications Private Limited ,Edition 2019
Reference Books:	
1	Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGrawHill.
2	“Office Automation: Concepts and Tools” Springer-Verlag Berlin and Heidelberg 1985 edition
Web resources:	
1	https://www.udemy.com/course/office-automation-certificate-course/
2	https://www.javatpoint.com/automation-tools

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	3	2	3	3	2
CO2	3	2	2	3	3	3	2	2	3	3	3
CO3	3	2	2	3	3	3	2	2	3	3	3
CO4	3	2	2	3	3	3	3	2	2	2	3
CO5	3	2	2	3	3	3	2	2	3	3	2
Total	15	11	10	14	14	14	12	10	14	14	13
Average	3	2.1	2	2.8	2.8	2.8	2.2	2	2.8	2.8	2.6

3 -Strong, 2- Medium, 1- Low

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSS12	SEC-2 Internet and Web Development	SEC	1	0	1	0	2	2	25	75	100
Learning Objectives											
LO1	To introduce the fundamentals of Internet and internet connections, networking.										
LO2	To learning about internet technology and threats.										
LO3	To introduce the fundamentals of HTML, and the principles of web design.										
LO4	To learn how to apply CSS rules to HTML elements to control their appearance, such as color, size, font, spacing, and positioning.										
LO5	To construct basic websites using HTML and Cascading Style Sheets.										
Unit	Content										Hours
1	Introduction to Internet-How does internet works. -History of internet- Concept of WWW, Internet and WWW.Types of Internet connection (Dial Up connection, Direct Connection & Broad Band connection, VPN)- Internet vs Web, Web Servers, Webpage Addresses (URL's)-Use of the Internet and Benefits of Internet-Introduction to web technologies. Types of search engines-Difference between search engine and web browser.										6
2	Internet technology and threats : TCP/IP–internet technology and protocol. Packet switching technology, internet protocols: TCP/IP, router, internet addressing. Http protocol: request and response. Features of latest version of web. Introduction of internet threats: history of worms and virus - types of threats on internet. Issues of threats on internet. Protecting computer from virus firewall.										6
3	Introduction of HTML-HTML Basic Formatting Tags-Working with text organizing text in HTML Working with Links and URL. Creating tables working with Images. Working with Lists, Hyperlinks and frames. Working with Forms, Interactive Elements.										6
4	Introduction to CSS-Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, Overview and features of latest version of CSS. CSS lists,CSS tables.										6
5	Html & Css Exercises Practical sessions - To create login page - To create a hyperlink for web page navigation -Student table creation- student registration form-create a order and Un order list Create a dynamic navigation bar.										6

CO	Course Outcomes
CO1	The students will be able to understand the concepts basic of internet.
CO2	The students will be able to develop an understanding of internet technology and online threats.
CO3	To introduce the fundamentals of HTML, and the principles of web design.
CO4	The students will be able to apply CSS rules to HTML elements such as color, size, font, spacing, and positioning.
CO5	The students will be able to construct basic web page design using HTML & CSS.
Textbooks:	
1	HTML and CSS Quick Start Guide: The Simplified Beginners Guide to Developing a Strong Coding Foundation, Building Responsive Websites, and Mastering ... of Modern Web Design (Quick Start Guides) 2021 by David Durocher (Author).
2	TEXTBOOK OF WEB DESIGN WITH HTML & CSS (Paperback, Nishant Katiyar, Dr. Kapil Saxena, Dr. Rakesh Kumar Bhujade, Dr. Sachin Kamley), 2020.
3	Web Design With HTML & CSS : HTML & CSS Complete Beginner's Guide Paperback– 31 October 2021 by Prem Kumar (Author).
4	HTML and CSS Quick Start Guide: The Simplified Beginners Guide to Developing a Strong Coding Foundation, Building Responsive Websites, and Mastering ... of Modern Web Design (Quick Start Guides) 2021 by David Durocher (Author).
5	TEXTBOOK OF WEB DESIGN WITH HTML & CSS (Paperback, Nishant Katiyar, Dr. Kapil Saxena, Dr. Rakesh Kumar Bhujade, Dr. Sachin Kamley), 2020.
Reference Books:	
1	HTML & CSS: THE COMPLETE REFERENCE fifth edition by Thomas Powell (Author). 2017
2	Head First HTML and CSS by Elizabeth Robson and Eric Freeman published in 2012
Web resources:	
1	https://www.tutorialspoint.com/index.htm

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	2	3	3	2	2	2	2
CO3	3	3	3	3	3	2	2	2	3	3	3
CO4	3	3	3	3	3	2	2	2	3	3	3
CO5	3	3	3	3	3	2	2	3	3	3	2
Total	15	15	15	15	14	12	12	12	14	13	12
Average	3	3	3	3	2.8	2.4	2.4	2.4	2.8	2.6	2.4

1st YEAR: FIRST SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSF11	FC- Digital Computer Fundamentals	Foundation	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	To identify the logic gates and their functionality										
LO2	To perform number conversions from one system to another system										
LO3	To design basic electronic circuits (combinational circuits)										
LO4	To perform a comparative analysis of the components of different memory units										
LO5	To perform number conversions										
Unit	Content										Hours
1	Divisibility, lcm, hcf- numbers, decimals, fractions, powers- profit, loss -simple interest and compound interest -speed, distance,time.										6
2	Coding, Decoding, Series-missing number, odd one out, Cause and Effect, Blood relations										6
3	Number system and codes: decimal numbers, binary numbers, decimal to binary conversions, binary arithmetic, 1's and 2's complements of binary numbers, signed numbers, arithmetic operations with signed numbers, hexadecimal numbers, octal numbers, digital codes, error detection codes										6
4	Logic gates: the inverter, the and gate, the or gate, the nand gate, nor gate, the exclusive-or gate and exclusive-nor gate; boolean algebra and logic simplification – boolean operations and expressions, de morgan's theorems, the karnaugh map, sop minimizations.										6
5	Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, computing the prime factors of an integer, raising a number to a large power.										6

CO	Course Outcomes
CO1	Identify the logic gates and their functionality
CO2	Perform number conversions from one system to another system
CO3	Design basic electronic circuits (combinational circuits)
CO4	Perform a comparative analysis of the components of different memory units
CO5	Perform number conversions
Textbooks:	
1	R.G. Dromey, “How to Solve it by Computer”, Pearson Education India, 2008.
2	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 3rd Edition, The MIT Press Cambridge, Massachusetts London, England, 2008
3	Brain M. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2 nd edition, Princeton Hall Software Series, 2012
Reference Books:	
1	Steven S. Skiena, “The Algorithm Design Module”, 2nd Edition, Springer-Verlag London Limited, 2008
2	Donald E. Knuth, “The Art of Computer Programming”, Volume 1: Fundamental Algorithms, 3rd Edition, Addison Wesley Longman, 1997
3	Donald E. Knuth, “The Art of Computer Programming”, Volume 2: Semi numerical Algorithms, 3 rd Edition, Addison Wesley Longman, 1998
4	Greg Perry and Dean Miller, “C programming Absolute Beginner’s Guide”, 3rd edition, Pearson Education, Inc, 2014
Web resources:	
1	https://www.britannica.com/technology/digital-computer
2	https://www.studocu.com/row/document/university-of-engineering-and-technology-lahore/digital-logic-design/digital-computer-fundamentals-205/4374222
3	https://archive.org/details/digitalcomputerf0006bart

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	2	2
CO2	3	3	3	3	2	3	3	2	2	2	2
CO3	3	3	3	3	3	2	2	2	3	3	3
CO4	3	3	3	3	3	2	2	2	3	3	2
CO5	3	3	3	3	3	2	2	3	3	3	3
Total	15	15	15	15	14	12	12	12	14	13	12
Average	3	3	3	3	2.8	2.4	2.4	2.4	2.8	2.6	2.4

3 – Strong, 2- Medium, 1- Low

2nd YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC21	Programming in C++	Core	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	To be able to explain the difference between object-oriented programming and procedural programming.										
LO2	To be able to apply object-oriented techniques to solve bigger computing problems.										
LO3	To be able to program using C++ features such as composition of objects, operator overloading, inheritance and polymorphism, file I/O, etc.										
LO4	To be able to build C++ classes using appropriate encapsulation and design principles.										
LO5	To use File Handling and Standard Template Library (STL)										
Unit	Content										Hours
1	Introduction to Object Oriented Programming-Basic Concepts of OOP, Basic Elements of C++: Tokens, Keywords, Identifiers, Variables, Basic Data Types in C++, Operators in C++.Decision and Control Structures:if Statement, if-else Statement, switch Statement, while, do-while, for.										18
2	Functions in C++: The Main Function, Function Prototyping, Call by Reference, Call by Value,Inline Function, Function Overloading- Classes and Objects:Specifying a Class, Defining Member functions, Nesting of Member Functions, Static Data Member and Member Function, Friend Function.										18
3	Constructors and Destructors: Constructors, Default Constructor, Parameterized Constructor, Constructor Overloading, Copy Constructor, and Destructor.Operator Overloading: Defining Operator Overloading, Overloading Unary Operators and Overloading Binary Operators.										18
4	Inheritance: Introduction, Defining Derived Class, Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance.Virtual Functions:Virtual Function, Pure Virtual Functions.										18
5	Working with Files: Introduction, Classes for File Stream Operations, Opening and Closing a File, Detecting end-of-file, Sequential Input and Output Operations, Updating a File: Random Access, Error Handling During File Operations, Command Line Arguments.										18

CO	Course Outcomes
CO1	Be able to explain the difference between object-oriented programming and procedural programming.
CO2	Be able to program using C++ features such as composition of objects, operator overloading, inheritance and polymorphism, file I/O, etc.
CO3	Be able to build C++ classes using appropriate encapsulation and design principles.
CO4	Be able to apply object-oriented techniques to solve bigger computing problems.
CO5	Be able to implement and debug efficient C++ programs to solve complex problems.
Textbooks:	
1	E. Balagurusamy - Object-Oriented Programming with C++ - Tata McGraw Hill Publishing Company Limited, 4th Edition.
Reference Books:	
1	Bjarne Stroustrup - The C++ Programming Language, Addison-Wesley, 4th Edition, 2013.
2	Robert Lafore - Object-Oriented Programming in C++, Sams Publishing, 4th Edition, 2002.
Web resources:	
1	https://cplusplus.com/doc/tutorial/#google_vignette

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3								2		2
CO2	2								2		2
CO3	3	2							3		3
CO4	2	3	2						2	2	3
CO5	2	2	2	3					2	3	3
Total	12	7	4	3					11	5	13
Average	2.4	1.4	0.8	0.6					2.2	1.0	2.6

3 – Strong, 2- Medium, 1- Low

2nd YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSP22P	Programming in C++ Lab	Core Practical	0	0	4	0	2	4	25	75	100
Learning Objectives											
LO1	To students will practice using switch statements for decision-making based on user input.										
LO2	To the students will learn how to use pointers to manipulate variables directly in C++.										
LO3	To students will learn how to create multiple functions with the same name but different parameter types, improving code readability and usability.										
LO4	To students will learn about different types of inheritance in C++, enhancing their understanding of object-oriented programming (OOP) principles.										
LO5	To students will learn how to use iterators with std::vector, which is crucial for traversing and manipulating elements in C++ STL containers.										
Unit	Content										Hours
1	<ol style="list-style-type: none"> 1. Write a C++ program to demonstrate Class and Objects. 2. Write a C++ program to demonstrate function overloading. 3. Write a C++ program to demonstrate the Friend Functions. 4. Write a C++ program to demonstrate Parameterized Constructor, Copy Constructor and Destructor. 5. Write a program to demonstrate operator overloading for Unary operator. 6. Write a program to demonstrate operator overloading for Binary operator. 7. Write a C++ program to demonstrate: <ol style="list-style-type: none"> a) Single Inheritance • Multilevel Inheritance • Multiple Inheritance b) Hierarchical Inheritance. 8. Write a C++ program to demonstrate Virtual Functions. 9. Write a C++ program to perform Sequential I/O Operations on a file. 10. Write a C++ program to find the Biggest Number using Command Line Arguments. 										60

CO	Course Outcomes
CO1	Able to know concepts in operator overloading, function overloading & polymorphism.
CO2	Able to write, compile and debug programs in C++ language.
CO3	Design programs involving constructors, destructors.
CO4	Able to reuse of code using inheritance.
CO5	To implement the concept of files, templates and exceptions.
Textbooks:	
1	E. Balagurusamy - Object-Oriented Programming with C++ - Tata McGraw Hill Publishing Company Limited, 4th Edition.
Reference Books:	
1	Bjarne Stroustrup - The C++ Programming Language, Addison-Wesley, 4th Edition, 2013.
2	Robert Lafore - Object-Oriented Programming in C++, Sams Publishing, 4th Edition, 2002.
Web resources:	
1	https://cplusplus.com/doc/tutorial/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3								2		2
CO2	2								2		2
CO3	3	2							3		3
CO4	2	3	2						2	2	3
CO5	2	2	2	3					2	3	3
Total	12	7	4	3					11	5	13
Average	2.4	1.4	0.8	0.6					2.2	1.0	2.6

3 – Strong, 2- Medium, 1- Low

2nd YEAR: SECOND SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSS21	PHP Programming	SEC	1	0	1	0	2	2	25	75	100
Learning Objectives											
LO1	To learn how to take a static website and turn it into a dynamic website run from a database using PHP and MySQL.										
LO2	To analyze the basic structure of a PHP web application and be able to install and maintain the web server, compile, and run a simple web application										
LO3	To PHP can generate dynamic page content and can create, open, read, write, delete, and close files on the server.										
LO4	To understand the concepts of forms and files.										
LO5	To create dynamic Web sites using PHP and MySQL.										
Unit	Content										Hours
1	PHP : Introduction – installing & configuring PHP – Lexical structure – Basic syntax of PHP – programming in web environment - Common PHP Script Elements – Using Variables – Constants – Data types – Operators – Statements – Using Functions										6
2	Control structures: Decisions and Loop Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html, PHP If, Else and Else if, PHP Switch, PHP While Loops, PHP For Loops.										6
3	Strings: String constant-printing strings-accessing individual's characters-comparing strings- concatenating strings-manipulating & searching strings-regular expressions. Array: Associative array – identifying elements of an array – storing data in arrays – multidimensional arrays – extracting multiple values – arrays and variable conversion – traversing- sorting.										6
4	Advanced PHP : Introduction to advanced PHP concept – Working With Forms – Processing Forms –Form Validation –Files: File and Directory Handling – Including Files – File Access										6
5	PHP and SQL database: PHP and LDAP – PHP Connectivity – Sending and receiving emails – Retrieving data from MySQL – Manipulating data in MySQL using PHP										6

CO	Course Outcomes
CO1	Describe about the basic concepts of PHP
CO2	Explain control structures.
CO3	Understand the concept of arrays and strings.
CO4	Understand the concepts of forms and files.
CO5	Create dynamic Web sites using PHP and MySQL.
Textbooks:	
1	PHP, a beginner guide
2	PHP and MYSQL Web development, Luke welling, 2003
Reference Books:	
1	Web Programming, Chris Bates, Wiley India, New Delhi, Third Edition, Reprint 2011
2	MySQL Bible: Steve Suchring, John Wiley sons, Mumbai, First Edition 2002
3	Programming PHP, Rasmus Lerdorf and Levin Tatroe, O'Reilly Publications 2002, Mumbai
Web resources:	
1	https://www.tutorialspoint.com/php/index.htm

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	1	2	-	1	3	-
CO2	2	3	3	3	-	-	2	-	1	3	-
CO3	1	3	3	3	-	1	2	-	1	3	1
CO4	1	3	3	3	-	-	1	-	-	3	1
CO5	1	3	3	3	-	1	1	-	-	3	2
Total	8	15	15	15	0	3	8	0	3	15	4
Average	1.6	3	3	3	0	0.6	1.6	0	0.6	3	0.8

3 – Strong, 2- Medium, 1- Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC31	Programming in Java	CC-5	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	To provide fundamental knowledge of object-oriented programming										
LO2	To equip the student with programming knowledge in Core Java from the basics Inheritance and Packages.										
LO3	To enable students to understand the Multithreading concepts.										
LO4	To enable the students to use AWT controls, Event Handling and Swing for GUI.										
LO5	To equip the student to learn swing components										
Unit	Content										Hours
1	Introduction: Review of Object Oriented concepts – History of Java – Java buzz words – JVM architecture – Data types - Variables - Scope and life time of variables - arrays - operators – control statements - simple java program - constructors - methods – Static block - Static Data – Static Method String and String Buffer Classes										14
2	Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes – Packages: Definition- Access Protection –Importing Packages. Interfaces: Definition– Implementation – Extending Interfaces. Exception Handling: try – catch- throw - throws – finally – Built-in-exceptions										14
3	Multithreaded Programming: Thread Class - Runnable interface – Synchronization– Using synchronized methods– Using synchronized statement- Inter thread Communication. I/O Streams: Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling										14
4	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 - Handling Mouse and Keyboard Events - Adapter classes - Inner classes										14
5	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.										14

CO	Course Outcomes The students will be able to
CO1	Implement the basic constructs of Core Java.
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.
CO3	Implement multi-threading and I/O Streams of Core Java
CO4	Implement AWT and Event handling.
CO5	Use Swing to create GUI.
Textbooks:	
1	Herbert Schildt, Dr.Danny Coward, Java The Complete Reference thirteenth edition, Tata McGraw Hill, 2024
2	Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999
3	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition,2010.
Reference Books:	
1	Head First Java, O’Rielly Publications,
2	Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010
3	P.Rizwan Ahmed, Java Programming, 3rd Edition, Margham Publications, 2017
Web resources:	
1	https://javabeginnerstutorial.com/core-java-tutorial
2	http://docs.oracle.com/javase/tutorial/
3	https://www.coursera.org/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	3	2	2	1
CO4	3	2	3	3	3	2	3	3	2	2	1
CO5	3	3	3	2	3	3	3	3	3	3	3
Total	15	14	14	12	14	14	13	15	13	13	11
Average	3	2.8	2.8	2.4	2.8	2.8	2.6	3	2.6	2.6	2.2

3 – Strong, 2- Medium, 1- Low

2st YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC32P	Programming in Java Lab	CC-6	0	0	4	0	2	2	25	75	100
Learning Objectives											
LO1	To provide fundamental knowledge of object-oriented programming.										
LO2	To equip the student with programming knowledge in Core Java from the basics										
LO3	To enable the students to know about Event Handling.										
LO4	To enable the students to use String Concepts and AWT Controls.										
LO5	To equip the student with programming knowledge in to create GUI.										
List of Programs											Hours
<ol style="list-style-type: none"> 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. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated. 5. Write a program to do String Manipulation using Character Array and perform the following string operations: <ol style="list-style-type: none"> a. String length b. Finding a character at a particular position 6. Write a program to perform the following string operations using String class: <ol style="list-style-type: none"> a. String Concatenation b. Search a substring 7. Write a program to perform string operations using String Buffer class: <ol style="list-style-type: none"> a. Length of a string b. Reverse a string c. Delete a substring from the given string 											60

8. 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.

9. Write a threading program which uses the same method asynchronously to print the numbers 1 to 10 using Thread1 and to print 90 to 100 using Thread2.

10. Write a program to demonstrate the use of following exceptions.

- a. Arithmetic Exception
- b. Number Format Exception

11. 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.

12. Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.

13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).

14. Write a Java program that works has a simple calculator using grid layout to arrange button for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

15. Write a Java program that simulate a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button, an appropriate message with "stop" or "ready" or "go" should appear above the buttons in a selected color. Initially there is no message shown.

CO	Course Outcomes The students will be able to
CO1	Implement the basic constructs of core java
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.
CO3	Implement multi-threading and I/O Streams of Core Java
CO4	Implement AWT and Event handling.
CO5	Use Swing to create GUI.
Textbooks:	
1	Herbert Schildt, Dr.Danny Coward, Java The Complete Reference thirteenth edition, Tata McGraw Hill, 2024
2	Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999
3	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
Reference Books:	
1	Head First Java, O’Rielly Publications,
2	Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010.
Web resources:	
1	https://www.w3schools.com/java/
2	http://java.sun.com
3	http://www.afu.com/javafaq.html

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	3	2	2	1
CO4	3	2	3	3	3	2	3	3	2	2	1
CO5	3	3	3	2	3	3	3	3	3	3	3
Total	15	14	14	12	14	14	13	15	13	13	11
Average	3	2.8	2.8	2.4	2.8	2.8	2.6	3	2.6	2.6	2.2

3 – Strong, 2- Medium, 1- Low

2st YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UMAA32	Statistical Methods and It's Applications-I	EC-4 AL	2	1	1	0	4	4	25	75	100
Learning Objectives											
LO1	Scope and diagrammatic representation of data										
LO2	To know about Measures of Location										
LO3	To gain knowledge on Measures of Dispersion										
LO4	To understand the concept of Skewness										
LO5	To understand the relationship between variables and forecasting the future values										
Unit	Content										Hours
1	Introduction - Scope and Limitations of Statistical Methods –Classification of Data –Tabulation of Data- Diagrammatic and Graphical Representation of Data. Chapter:1,2,6 Pages:1-3,12-15,17,50-53,66-70,81-93,100-111										12
2	Measures of Location: Arithmetic Mean, Median, Mode, and their Properties. Chapter:9 Pages:124-173										12
3	Measures of Dispersion : Range, Quartile Deviation, Mean Deviation, Standard Deviation. Chapter: 10 Pages:244-267										12
4	Measures of Skewness: Karl Pearson's, Bowley's, and Kelly's and Coefficient of Skewness. Chapter: 11 Pages:338-355										12
5	Correlation: Karl Pearson– Spearman's Rank Correlation Chapter: 12 Pages:396-410,417-421										12

CO	Course Outcomes
CO1	Work on Diagrammatic representation of data.
CO2	Calculate the problems on Measures of location -Mean, Median, Mode
CO3	Calculate the problems on Measures of dispersion -Range, Quartile deviation, Standard deviation.
CO4	Work on Measures of Skewness.
CO5	Interpret Correlation coefficients.
Textbooks:	
1	Pillai R.S. N. and Bagavathi. V. (2005), Statistics, S. Chand & Company Ltd., New Delhi.
Reference Books:	
1	Gupta S.P. (2001), Statistical Methods, Sultan Chand & Sons, New Delhi.
2	Gupta. S.C. and Kapoor. V.K. Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi
3	Fundamental of Mathematical Statistics - S. C. Gupta & V. K. Kapoor – Sultan Chand
4	Sancheti D.C. and Kapoor. V.K (2005), Statistics (7th Edition), Sultan Chand & Sons, New Delhi.
5	Arora P. N, Comprehensive Statistical Methods, Sultan Chand & Sons, New Delhi
Web resources:	
1	https://nptel.ac.in/courses/111107105

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	3	2
CO2	3	3	3	3	3	2	3	3	3	3	3
CO3	3	3	2	3	2	3	2	3	2	3	2
CO4	2	3	3	3	3	3	3	3	3	3	3
CO5	2	2	3	3	3	3	2	2	3	3	2
Total	13	13	14	15	13	14	12	13	14	15	12
Average	2.6	2.6	2.8	3	2.6	2.8	2.4	2.6	2.8	3	2.4

3 – Strong, 2- Medium, 1- Low

2st YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UPHA32	Microprocessor-8085	Core	2	1	1	0	4	4	25	75	100
Learning Objectives											
LO1	To get the knowledge and basic details of microprocessor 8085										
LO2	To learn the different types of addressing modes and instructions.										
LO3	To write the simple assembly language programs for arithmetic operations and to learn about the instruction cycles										
LO4	To analyse the functions of I/O interfaces										
LO5	To expose the idea of pin function, working and interacting of peripheral devices with microprocessor										
Unit	Content										Hours
1	8085 Microprocessor: Evolution of Microprocessor-Applications of Microprocessors of Different Generations.– INTEL 8085 architecture – register organization –pin configuration of 8085.										12
2	Instructions & Addressing Modes: Data transfer/ copy Instructions-Arithmetic, Logical- Two examples each instructions-Branch instructions-Unconditional and conditional jump- Call and Return instructions-Stack and Stack related instructions- I/O and Machine control instructions- Addressing modes.										12
3	Assembly Language Programming –Programmes for addition (8-Bit), subtraction (8-Bit), multiplication (8- Bit), division (8- Bit) – largest and smallest number in an array.										12
4	I/O Interfaces: serial communication interface (8251-USART) – programmable peripheral interface (8255-PPI) - keyboard and display (8279), DMA controller (8237).										12
5	Peripheral Devices & Applications: Hand shake signals-Single Handshake I/O and Double Handshake I/O- Pin function and Block diagram and working of 8255-Pin function and Block diagram and working of 8279- LED Interface-Temperature Controller.										12

CO	Course Outcomes
CO1	Know the evolution of microprocessor, pin and architecture of 8085 microprocessor in detail
CO2	Describe different types of instructions like data transfer, arithmetic, logical and branching instructions with examples and it will be used for writing the assembly language programs.
CO3	Write assembly language programs for simple arithmetic operations and hence they can apply it for interfacing applications.
CO4	Learn the memory interface and peripheral interface devices.
CO5	The interface the peripheral device with microprocessor 8085 and they are able to write the programs for LED and Temperature control interface system.
Textbooks:	
1	Fundamental of Microprocessor - 8085 - Architecture, Programming and interfacing – V. Vijyendran, S. Viswanathan, Pvt. Ltd., 2003.
2	A. NagoorKani, 8085 Microprocessor and its Applications, Tata McGraw Hill, New Delhi, 2013.
Reference Books:	
1	R.S. Goankar , Microprocessor Architecture, Programming and Applications with the 8085, 3rdEdn. Prentice Hall,
2	B.Ram, Fundamentals of Microprocessors and Microcomputers,DhanpatRai Publications, New Delhi.
Web resources:	
1	https://www.tutorialspoint.com/microprocessor/microprocessor_8085_pin_configuration.htm
2	https://www.tutorialspoint.com/microprocessor/microprocessor_8085_instruction_set
3	http://www.psnacet.edu.in/courses/ECE/Microcontroller%20and%20Microprocessor/lecture4.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	3	2	2	1
CO4	3	2	3	3	3	2	3	3	2	2	1
CO5	3	3	3	2	3	3	3	3	3	3	3
Total	15	14	14	12	14	14	13	15	13	13	11
Average	3	2.8	2.8	2.4	2.8	2.8	2.6	3	2.6	2.6	2.2

3 – Strong, 2- Medium, 1- Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSA31	Web Designing	EC-5 GE	2	0	0	0	2	2	25	75	100
Learning Objectives											
LO1	To Understand the basics of HTML and its components										
LO2	To study about the Graphics in HTML										
LO3	To Understand and apply the concepts of XML and DHTML										
LO4	To Understand the concept of JavaScript										
LO5	To identify and understand the goals and objectives of the Ajax										
Unit	Content										Hours
1	HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment links-tables-frames										6
2	Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.										6
3	XML & DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your we pages-Grouping styles-extensible markup language (XML).										6
4	Dynamic HTML: Document object model (DCOM)- Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding. JavaScript: Client-side scripting, Develop JavaScript, Create simple JavaScript, variables, functions, conditions, loops and repetition.										6
5	Advance script, Java Script and objects, Java Script own objects, the DOM and web browser environments, forms and validations.										6

CO	Course Outcomes The Students will be able to
CO1	Develop working knowledge of HTML
CO2	Develop and publish Web pages using Hypertext Markup Language (HTML).
CO3	Optimize page styles and layout with CascadingStyle Sheets (CSS) and XML
CO4	Develop a java script
CO5	Design web application using Ajax.
Textbooks:	
1	Pankaj Sharma, “Web Technology”, Sk Kataria& Sons Bangalore 2011. .(UNIT I, II, III & IV).
2	Mike Mcgrath, “Java Script”, Dream Tech Press 2006, 1st Edition. . (UNIT V: JAVASCRIPT)
3	Achyut S Godbole & AtulKahate, “Web Technologies”, 2002, 2nd Edition.
Reference Books:	
1	Laura Lemay, RafeColburn , 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.
Web resources:	
1	https://onlinecourses.nptel.ac.in/ (NPTEL & MOOC courses titled Web Design and Development.)
2	https://www.geeksforgeeks.org

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	3	1	3	3	2	1
CO2	3	3	3	2	3	3	2	2	3	3	2
CO3	3	3	2	3	3	2	2	3	3	3	2
CO4	3	2	3	2	2	3	3	2	3	2	3
CO5	3	2	2	2	3	3	2	2	3	2	2
Total	15	12	13	11	12	14	10	12	15	12	10
Average	3	2.4	2.6	2.2	2.4	2.8	2	2.4	3	2.4	2

3 – Strong, 2- Medium, 1- Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSS31P	Web Designing Lab	SEC-4	1	0	1	0	2	2	25	75	100
Learning Objectives											
LO1	To Understand the basics of HTML and its components										
LO2	To study about the Graphics in HTML										
LO3	To Understand and apply the concepts of XML and DHTML										
LO4	To Understand the concept of Java Script										
LO5	To identify and understand the goals and objectives of the Ajax										
List of Programs										Hours	
<ol style="list-style-type: none"> 1. Define the basic Structure to create a simple hello world page using HTML. 2. Implement the Heading Element and insert image in HTML. 3. Write a program to create GIF animation and adding multimedia effects in HTML. 4. Write a program to implement Formatting text in HTML. 5. Write an XML file which will display the Book information which includes the following: <ul style="list-style-type: none"> • Title of the book, Author Name, ISBN number, Publisher name, Edition, Price 6. Write HTML for demonstration of cascading style-sheets. a. Embedded style-sheets. b. External style-sheets. c. Inline styles. 7. Write a program to implement Lists in HTML. 8. Develop a web page for creating session and cookies. 9. Write JavaScript to validate the following fields of the above registration page. <ul style="list-style-type: none"> • Name (Name should contains alphabets and the length should not be less than 6 characters). • Password (Password should not be less than 6 characters length). • E-mail id (should not contain any invalid and must follow the standard pattern (name@domain.com)) • Phone number (Phone number should contain 10 digits only). 10. Write a javascript program to validate USER LOGIN page 										30	

CO	Course Outcomes The Students will be able to
CO1	Develop working knowledge of HTML
CO2	Develop and publish Web pages using Hypertext Markup Language (HTML).
CO3	Optimize page styles and layout with Cascading Style Sheets (CSS) and XML.
CO4	Develop a java script
CO5	Design web application using Ajax.
Textbooks:	
1	Pankaj Sharma, “Web Technology”, Sk Kataria& Sons Bangalore 2011. .(UNIT I, II, III & IV).
2	Mike Mcgrath, “Java Script”, Dream Tech Press 2006, 1st Edition. . (UNIT V: JAVASCRIPT)
3	Achyut S Godbole & AtulKahate, “Web Technologies”, 2002, 2nd Edition.
Reference Books:	
1	Laura Lemay, RafeColburn , 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.
Web resources:	
1	https://onlinecourses.nptel.ac.in/ (NPTEL & MOOC courses titled Web Design and Development.)
2	https://www.geeksforgeeks.org

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	2	1	2	3	2	1
CO2	3	3	2	2	3	3	2	2	3	3	2
CO3	3	3	2	3	3	2	2	3	3	3	2
CO4	3	2	3	2	2	3	3	2	3	2	3
CO5	3	2	2	2	3	3	2	2	3	2	2
Total	15	12	10	11	12	13	10	11	15	12	10
Average	3	2.4	2	2.2	2.4	2.6	2	2.2	3	2.4	2

3 – Strong, 2- Medium, 1- Low

2nd YEAR: THIRD SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UAEC31	Human Values and Professional Ethics	AEC - 2	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	To make them know the concept of Values and their significance										
LO2	To sensitize them on the importance of family and social values in life.										
LO3	To identify and analyze the effects of mass media on youth and children.										
LO4	To apply constitutional and social justice principles to contemporary societal challenges										
LO5	To focus on professional ethics, which help citizens to discern desirable and undesirable actions.										
Unit	Content										Hours
1	Introduction to Value based Education Meaning and Classification - Characteristics, Components and Contents - Value crises in social life, economic life - need and importance of value education.										6
2	Harmony in the Family, Society and Nature: Family as a basic unit of human interaction and values in relationships - Affection, care, guidance, reverence, glory, gratitude, and love Harmony in society: Justice preservation - Production Work, - Exchange Storage Harmony in nature: Four orders in nature- The holistic perception of harmony inexistence.										6
3	Values and Mass Media Mass media: Meaning, functions and characteristics – Effects and Influence on youth and children Media Power – socio, cultural and political consequences of mass mediated culture - Consumerist culture – Globalization – New media- Prospects and challenges – Role of media in value building										6
4	Social Issues, and Social Justice Social issues : Cyber crime- -Dowry-Drug addiction-Domestic violence Untouchability- Female infanticide-Atrocities against women- How to tackle them. Social Justice: Definition and need – Factors responsible for social injustice: Caste and gender – Contributions of social reformers.										6

5	<p>Professional Ethics in Education Understanding about Professional Integrity - Respect - Equality – Privacy - Building-Trusting Relationships –concepts - Positive co-operation Dedication to work and duty – Commitment to the Profession - Respecting the competence of other professions- Taking initiative and Promoting the culture of openness - Depicting Loyalty towards Goals and objectives.</p>	6
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CO	Course Outcomes Students will be able to
CO1	Students will be recognize the need for value education in today’s world and its importance in shaping responsible, ethical, and compassionate citizens.
CO2	Students will gain the importance of family and social values in building a strong and ethical society
CO3	Students to evaluate the ethical and moral responsibilities of media in value-building and social development
CO4	Students will understand constitutional values, key social issues, and the need for social justice.
CO5	Students will develop a clear understanding of professional ethics in the field of education
Textbooks:	
1	Bhandari, R.S. (2003). <i>Value Education</i> . New Delhi: Abhishek Publications.
2	Ismal, Thamarasseri. (2013). <i>Value Education</i> . New Delhi: APH Publishing Corporation
3	R. R. Gaur, R. Sangal, and G. P. Bagaria – <i>A Foundation Course in Human Values and Professional Ethics</i> , Excel Books, 2019.
4	Textbook on The Knowledge System of Bhārata by Bhag Chand Chauhan,
5	Smarak Swain, S. (2011). <i>Social issues of India</i> . New Vishal publications
6	Sushil Kumar Saxena, Satish Mittal, 2012, <i>Sociology of Family</i> , Raj publications
Reference Books:	
1	Venkataiah, N. (2007). <i>Moral Education</i> . Delhi: APH Publishing Corporation
2	Venkataiah, N., and Sandhya, N. (2004). <i>Research in Value Education</i> . New Delhi: APH Publishing Corporation
3	Dhananjay, Joshi. (2006). <i>Value Education in Global Perspectives</i> . Delhi: Lotus Press.
Web resources:	
1	https://www.yourarticlelibrary.com/essay/value-education-definition-and-the-concept-of-value-education- with-example/
2	https://www.researchgate.net/publication/257197506_Students'_Families_and_Family_Val_ues
3	https://soaneemrana.org/onewebmedia/Professional%20Ethics%20and%20Human%20Va_lues%20b_y%20R.S%20NAAGARAZAN.pdf
4	https://www.msuniv.ac.in/images/academic/centre%20academic%20affairs/revised%20s_yllabus/2023-24-Batch/UG-Part-IV/PartIV_4sem.pdf

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3–Strong, 2–Medium, 1–Low

Mapping with Programme Specific Outcomes

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weight age	15	15	15	14	15
Weighted percentage Of Course Contribution to Pos	3.0	3.0	3.0	2.8	3.0

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC41	Database Management System	CC-7	3	1	2	0	5	6	25	75	100
Learning Objectives											
LO1	To enable the students to learn the data base Concepts and the relational model of data.										
LO2	To understand the concepts of Relational Database model and ER Diagram										
LO3	To learn and understand to write queries using SQL.										
LO4	To learn about SQL Operators and Virtual Tables										
LO5	To understood the concepts of SQL,NOSQL and MongoDB										
Unit	Content										Hours
1	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										16
2	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- The Extended Entity Relationship Model - Entity Clustering										18
3	Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.										18
4	Advanced SQL: 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 Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS. Virtual Tables: Creating a View - Updatable Views										18
5	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 – Trigger – Exceptions – Types of Exceptions. Why NoSql :The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, MongoDB: Create DB – Collection – Insert – Update – Delete										20

CO	Course Outcomes The Students will be able to
CO1	Understand the various basic concepts of Data Base Management System.
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity Relationship Model.
CO3	Create Database through SQL Queries & Normalization concepts .
CO4	Classify the different SQL Sub Queries ,SQL Operators and SQL functions
CO5	Learn to design Data base operations and implement using SQL, NoSQL and MongoDB programs.
Textbooks:	
1	Shio Kumar Singh , “Database Systems “,Pearson publications ,II Edition- Unit 1,2,3
2	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,“Database System Concepts”, McGraw Hill International Publication ,VI Edition – Unit 4,5
3	Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications,1st Edition ,2019.
4	Rajiv Chopra , “Database Management System (DBMS)A Practical Approach”Fifth Edition
Reference Books:	
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
Web resources:	
1	Web resources from NDL Library, E-content from open-source libraries
2	https://www.geeksforgeeks.org
3	https://www.w3schools.com/mongodb/mongodb_mongosh_create_database.php

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	3	2	2	1
CO4	3	2	3	3	3	2	3	3	2	2	1
CO5	3	3	3	2	3	3	3	3	3	3	3
Total	15	14	14	12	14	14	13	15	13	13	11
Average	3	2.8	2.8	2.4	2.8	2.8	2.6	3	2.6	2.6	2.2

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC42P	Database Management System Lab	CC-8	0	0	4	0	2	4	25	75	100
Learning Objectives											
LO1	To enable the students to learn the designing of data base systems, foundation on the relational model of data .										
LO2	To understood the concepts of data base management system, design simple Database models										
LO3	To learn and understand to write queries using SQL, PL/SQL.										
LO4	To enable the students to learn the basics of MongoDB										
LO5	To Design simple Database models										
List of Programs										Hours	
<p>I. SQL</p> <ol style="list-style-type: none"> 1. Create DDL commands of SQL for Employee details □ Create table □- Alter table -□ Drop Table 2. Develop a DML commands of SQL for Customer Online Service Insert □- Update □- Delete 3. Develop a TCL commands of SQL for Transaction details of employee <p>II. PL/SQL</p> <ol style="list-style-type: none"> 4. Write a PL/SQL program to generate the Fibonacci series up to n terms using a loop structure. 5. Write a PL/SQL function or procedure to compute the factorial of a given number using recursion or iteration. 6. Develop a PL/SQL program to reverse a given string without using built-in reverse functions. 7. Create a trigger in PL/SQL that performs a specific action (e.g., log changes, prevent deletion, auto-update timestamp). 8. Create Basic CRUD Operation for student Database collection using MongoDB <p>III. CURSOR</p> <ol style="list-style-type: none"> 9. Write a program using an explicit cursor to retrieve and analyze student marks from a table <ol style="list-style-type: none"> 1. Fetch each student's marks 2. Calculate total and average 3. Display result classification (e.g., pass/fail, grade) <p>IV. APPLICATION</p> <ol style="list-style-type: none"> 10. Design and develop a Mini Project for Library Management system. 										60	

CO	Course Outcomes The Students will be able to
CO1	Implement a SQL Commands and perform various Operations
CO2	Define the integrity constraints and Understand the basic concepts of Relational Data Model, Entity Relationship Model.
CO3	Learn PL/SQL Command ,Recursion and iteration
CO4	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, triggers ,Exceptions
CO5	Learn to design and develop the Scenario for Various UseCase
Textbooks:	
1	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,“Database System Concepts”, McGraw Hill International Publication ,VI Edition
2	Rajiv Chopra , “Database Management System (DBMS)A Practical Approach”Fifth Edition
3	Shio Kumar Singh , “Database Systems “,Pearson publications ,II Edition
Reference Books:	
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
Web resources:	
1	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	3	1	3	3	2	1
CO2	3	3	3	2	3	3	2	2	3	3	2
CO3	3	3	2	3	3	2	2	3	3	3	2
CO4	3	2	3	2	2	3	3	2	3	2	3
CO5	3	2	2	2	3	3	2	2	3	2	2
Total	15	12	13	11	12	14	10	12	15	12	10
Average	3	2.4	2.6	2.2	2.4	2.8	2	2.4	3	2.4	2

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UMAA42	Statistical Methods and Its Applications -II	EC-6 AL	2	1	1	0	4	4	25	75	100
Learning Objectives											
LO1	Understand basic concepts of regression, regression lines and curve fitting										
LO2	Knowledge related to Sample Space in probability										
LO3	Knowledge of standard discrete distributions										
LO4	Understand about Test of Significance										
LO5	Acquire knowledge about Analysis of variance (ANOVA)										
Unit	Content										Hours
1	Regression- Regression lines, Simple problems. Curve fitting by the methods of least squares $y = a + bx$, $y = a + bx + c x^2$, $y = ae^{bx}$ <i>Chapter: 9 Pages 9.1-9.9</i> <i>Chapter: 10 pages 10.1-10.10</i>										12
2	Sample Space -Events- Probability-Addition and Multiplication Theorem Conditional probability - Baye's Theorem – Applications <i>Chapter :18 pages 737-750</i>										12
3	Standard distributions: Binomial, Poisson and Normal distribution - Simple problems and fitting of Binomial and Poisson. <i>Chapter :19 pages 769 -790</i>										12
4	Test of Significance: Large sample test based on mean and standard deviation, small sample: 't'-test, Chi-square test <i>Chapter :20 pages 823 - 840, 847 - 854</i>										12
5	F-test, Analysis of Variance: One-way classification, Two-way classification and Applications. <i>Chapter: 26 pages 26.1-26.29</i>										12

CO	Course Outcomes The Students will be able to
CO1	Learn the basics of curve fitting methods
CO2	Basic knowledge of Sample Space in probability
CO3	Be familiar with the concept of standard distribution and fitting of distributions
CO4	Acquire knowledge about important inferential aspects like test of significance
CO5	Solve problems in applications of ANOVA
Textbooks:	
1	Dr.P.R.Vittal, Mathematical Statistics, Margham Publications, Chennai. (Unit – 1 & 5),2002
2	R.S.N.Pillai & Bagavathi (2012) Statistics :Theory and Practice, S.Chand & Company Ltd. New Delhi. (Unit- 2,3 & 4)
Reference Books:	
1	S.C.Gupta & V.K.Kapoor, Fundamental of Mathematical Statistics, Sultan Chand & Sons
2	Dr.S.P.Gupta, Statistical Methods, Sultan Chand & Sons.
3	V.K. Rohatgi, An Introduction to Probability Theory and Mathematical Statistics, 1984.
4	Dr.T.K.V. Iyengar, Dr.B.Krishna Gandhi, S.Ranganantham and Dr.M.V.S.S.N. Prasad Probability and Statistics, S.Chand and Co, 2020.
5	Prof S.G.Vekatachalapathy and Dr.H.Premraj, Statistical Methods, Margham Publications, 2018.
Web resources:	
1	https://stattrek.com/statistics/resources
2	e-books, tutorials on MOOC/SWAYAM courses on the subject
3	www.khanacademy.org/math/statistics-probability/random-variables-statslibrary
4	https://thisisstatistics.org/students/
5	https://oli.cmu.edu/courses/probability-statistics-open-free/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	3	2	3	3	3	3
CO2	3	3	2	2	3	2	3	3	3	2	2
CO3	3	3	2	3	2	3	2	3	3	2	3
CO4	3	2	3	2	3	2	3	3	2	3	2
CO5	3	2	2	2	3	2	3	2	2	2	3
Total	15	12	11	11	13	12	13	14	13	12	13
Average	3	2.4	2.2	2.2	2.6	2.4	2.6	2.8	2.6	2.4	2.6

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UPHA43	Digital Electronics and Microcontroller	EC-6 AL	2	1	1	0	4	4	25	75	100
Learning Objectives											
LO1	To learn all types of number systems, Boolean algebra and identities										
LO2	To understand the decoder and encoder circuits for addition and subtraction, flip- flops.										
LO3	To get the knowledge of counters and memory circuits										
LO4	To introduce 8051 architecture and instruction sets of microcontroller 8051										
LO5	To provide the knowledge of writing programme of 8051										
Unit	Content										Hours
1	Number Systems and Boolean Algebra: decimal, binary, octal, hexadecimal numbers systems and their conversions – codes: BCD, gray and excess-3 codes –code conversions –complements (1's, 2's,) –binary addition, binary subtraction using 1's & 2's complement methods – Boolean laws – De-Morgan's theorem –basic logic gates -universal logic gates (NAND & NOR)										12
2	Encoder and Decoder circuits: adders, half & full adder – subtractors, half & full subtractor –parallel binary adder – magnitude comparator Flip-flops: S-R Flip-flop , J-K Flip-flop, T and D type flip-flops.										10
3	Counters and Memory Circuits: asynchronous counters -mod-8, mod-10, synchronous - 4-bit & ring counter – general memory operations, ROM, RAM (static and dynamic), PROM, EPROM, EEPROM, EAROM.										11
4	Microcontroller Hardware: Introduction Pin-out 8051, Central Processing Unit (CPU), internal RAM, Internal ROM, Register set of 8051 – Memory organization of 8051 – Input/Output pins, Ports and Circuits – External data memory and program memory										12
5	Instruction Set and Assembly Language Programming: Instructions to Access external data memory, external ROM / program memory, PUSH and POP instructions, Data exchange instructions – Logical instructions: byte and bit level logical operations, Rotate– Arithmetic instructions: Flags, Incrementing and decrementing, Addition, Subtraction, Multiplication and division,– Jump and CALL instructions: Jump and Call program range, Jump, Call and subroutines.										15

CO	Course Outcomes The Students will be able to
CO1	Understand the number systems, Boolean algebra and identities
CO2	Analyse the encoder and decoder circuits for addition, subtraction and flip-flops.
CO3	Understand the functions of counters and memory circuits
CO4	Get knowledge of architecture and working of 8051 Microcontroller
CO5	Write simple assembly language programs for 8051 Microcontroller.
Textbooks:	
1	Dr Vijeyendran, "Digital electronics 3rd Edition S.Visvanathan Pvt, Ltd.
2	S.Salivahana& S. Arivazhagan-Digital circuits and design
3	B.Ram, Fundamentals of Microprocessors & Microcontrollers, DhanpatRai publications New Delhi (2016).
Reference Books:	
1	Herbert Taub and Donald Schilling. "Digital IntegratedElectronics" . McGraw Hill. 1985.
2	Douglas V. Hall, Microprocessors and Interfacing programming and Hardware, Tata Mc Graw Hill Publications (2008)
Web resources:	
1	http://www.circuitstoday.com/8051-microcontroller
2	https://www.elprocus.com/8051-assembly-language
3	http://www.psnacet.edu.in/courses/ECE/Microcontroller%20and%20Microprocess or/lecture4.pdf

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	3	2	2	1
CO4	3	2	3	3	3	2	3	3	2	2	1
CO5	3	3	3	2	3	3	3	3	3	3	3
Total	15	14	14	12	14	14	13	15	13	13	11
Average	3	2.8	2.8	2.4	2.8	2.8	2.6	3	2.6	2.6	2.2

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UMAA42P	Statistical methods and its applications - I & II Lab	EC-7 AL	1	0	1	0	2	2	25	75	100
Learning Objectives											
LO1	To understand the various type of Diagrams and Graphs.										
LO2	To acquire the knowledge on Measures of location, dispersion and Skewness.										
LO3	To understand the correlation between the variables and Regression analysis										
LO4	To understand the method of curve fitting and fitting of distribution										
LO5	To acquire the knowledge in test of significance of large sample, small sample and ANOVA										
List of Programs										Hours	
1. Diagrams and Graphs 2. Measures of Location 3. Measures of Dispersion 4. Skewness 5. Correlation 6. Regression 7. Curve Fitting: $y = a + bx$, $y = a + bx + c x^2$ 8. Fitting of distributions- Binomial, Poisson, Normal 9. Test of significance of small sample and large sample. 10. One-way, two-way classification using ANOVA										30	

CO	Course Outcomes The Students will be able to
CO1	Understand various type of Diagrams and Graphs.
CO2	Understand the concepts Measures of location, dispersion and Skewness
CO3	Understand correlation between the variables and Regression analysis
CO4	Understand the method of curve fitting and fitting of distribution
CO5	Test the significance of large sample, small sample and ANOVA
Textbooks:	
1	S.C. Gupta & V.K. Kapoor, Fundamental of Mathematical Statistics, Sultan Chand & Sons
2	R.S.N. Pillai & V. Bagavathi, Statistics: Theory and Practice, S. Chand & Company Ltd. New Delhi, 2012.
Reference Books:	
1	E.B. Mode, Elements of Statistics, Prentice Hall.
2	Dr.S.P. Gupta, Statistical Methods, Sultan Chand & Sons.
3	V.K. Rohatgi, An introduction to probability theory and mathematical statistics, 1984.
4	Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N Prasad, Probability and Statistics, S.Chand and Co, 2020.
5	Prof S.G. Vekatachalapathy and Dr.H. Premraj, Statistical Methods, Margham Publications, 2018.
Web resources:	
1	https://stattrek.com/statistics/resources
2	www.khanacademy.org/math/statistics-probability/random-variables-statslibrary

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3	2	3	3	3	3
CO2	3	3	2	3	3	3	2	3	2	3	3
CO3	3	2	2	3	2	2	2	3	2	2	2
CO4	2	3	3	3	2	3	2	3	3	3	3
CO5	3	2	2	3	3	2	2	3	2	2	2
Total	14	13	14	15	12	13	10	15	14	13	13
Avera	2.8	2.6	2.8	3	2.4	2.6	2	3	2.8	2.6	2.6

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UPHA43P	Microprocessor and Microcontroller Lab	EC-7 AL	0	0	2	0	2	2	25	75	100
Learning Objectives											
LO 1	To understand the working of Microprocessor										
LO 2	To use microprocessor in different applications										
LO 3	To Understand about the Verification of Basics Logic Gates										
LO 4	To Understand about the Half adder and Full adder concepts using Gates										
LO 5	To understand the working of Microcontroller and their applications										
Unit	Content										Hours
	<ol style="list-style-type: none"> 1. Microprocessor 8085-ALP for 8 bit addition and Subtraction 2. Microprocessor 8085-ALP for 8 bit Multiplication and Division 3. Microprocessor 8085- ALP Largest/Smallest Number in an array 4. Microprocessor 8085 – square (8 bit only) 5. Microprocessor 8085 – square root (8 bit only) 6. Verification of Basic Logic Gates: OR AND and NOT gates 7. Verification of NAND and NOR as universal building blocks 8. Verification of DeMorgan’s Laws. 9. Half adder and Full adder - using NAND gate. 10. Half subtractor and Full subtractor- using NAND gate. 11. RS, Clocked RS, and D Flip Flops using NAND gate. 12. Microcontroller 8051-ALP for 8 bit addition and Subtraction 13. Microcontroller 8051-ALP for 8 bit Multiplication and Division 14. Microcontroller 8051- ALP Largest/Smallest Number in an array 15. Ascending/ descending order - using microcontroller 8051 										30

CO	Course Outcomes Students will be able to
CO 1	Construct circuit and demonstrate the microprocessor programmes
CO 2	Build the microprocessor 8085 in 8 bit
CO 3	Understand gate-level design and abstraction.
CO 4	Construct and analyze Half and Full Adders/Subtractors.
CO 5	Construct circuit and demonstrate the microcontroller programmes.
Textbooks:	
1	Dr. Srinivasan, Practical Physics Book, Chand & Co
2	S.Salivahana& S. Arivazhagan-Digital circuits and design
3	B.Ram, Fundamentals of Microprocessors & Microcontrollers, Dhanpat Rai publications New Delhi (2016).
Reference Books:	
1	Herbert Taub and Donald Schilling. “Digital Integrated Electronics” . McGraw Hill. 1985.
2	Douglas V. Hall, Microprocessors and Interfacing programming and Hardware, Tata Mc Graw Hill Publications (2008)
Web Resources:	
1	http://www.circuitstoday.com/8051-microcontroller
2	https://www.elprocus.com/8051-assembly-language

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	3	2	2	1
CO4	3	2	3	3	3	2	3	3	2	2	1
CO5	3	3	3	2	3	3	3	3	3	3	3
Total	15	14	14	12	14	14	13	15	13	13	11
Average	3	2.8	2.8	2.4	2.8	2.8	2.6	3	2.6	2.6	2.2

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSS41	Computer Networks	SEC-5	1	0	1	0	2	2	25	75	100
Learning Objectives											
LO1	To learn the basic concepts of Data communication and Computer network										
LO2	To learn about wireless Transmission										
LO3	To learn about the data link layer and Multiple Access Protocols.										
LO4	To study about Network communication & Transport layer .										
LO5	To learn the concept of Network Security and Cryptography										
Unit	Content										Hours
1	Introduction: Computer Networks – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media.										6
2	Physical Layer: Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.										6
3	Data Link Layer: Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.										6
4	Network Layer: Design Issues - Routing Algorithms & Congestion Control Algorithms – IP Protocol – Transport Layer: Services & Elements– Internet Transport Protocols (ITP) UDP & TCP – Application Layer: Electronic Mail.										6
5	Network Security: Cryptography – Symmetric-Key Algorithms – Public-Key Algorithms – Digital Signatures – Management of Public Keys – Communication Security – Authentication Protocols–E-Mail Security – Web Security.										6

CO	Course Outcomes The Students will be able to
CO1	Understand the basics of Computer Network architecture, OSI and TCP/IP reference
CO2	Gain knowledge on Telephone systems using wireless network
CO3	Access the Different Network Layers and Protocols
CO4	Analyze the characteristics of Routing and Congestion control algorithms
CO5	Explore Communication Security threats and Authentication problems
Textbooks:	
1	A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.
Reference Books:	
1	B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017
2	F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008
3	D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, PHI, 2008.
4	Lamarca, "Communication Networks", Tata McGraw- Hill, 2002
Web resources:	
1	https://en.wikipedia.org/wiki/Computer_network
2	https://citationsy.com/styles/computer-networks

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	2	3	2	2	1
CO4	3	2	3	3	3	2	3	3	2	2	1
CO5	3	3	3	2	3	3	3	3	3	3	3
Total	15	14	14	12	14	14	13	15	13	13	11
Average	3	2.8	2.8	2.4	2.8	2.8	2.6	3	2.6	2.6	2.2

3 – Strong, 2- Medium, 1- Low

2nd YEAR: FOURTH SEMESTER

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UAEC41	Environmental Studies and Disaster Management	AEC- 3	2	0	0	0	2	2	25	75	100
Learning Objectives											
LO1	To provide basic knowledge of Environmental Science and Sustainability										
LO2	To understand the Fundamentals of Disaster Management										
LO3	To create awareness about Natural Disaster and Management										
LO4	To familiarize students with Manmade Disaster and Management										
LO5	To promote community participation and technological applications in disaster risk reduction										
Unit	Content										Hours
1	Environmental Science and Sustainability Ecosystem: structure, types, and functions - Biodiversity: importance and conservation strategies - Environmental pollution: types (Air & Water), causes, effects, and control measures - Climate change and global warming										5
2	Fundamentals of Disaster Management Concepts: disaster, hazard, vulnerability, risk, resilience - Types of disasters: natural and man-made - Disaster management cycle: prevention, mitigation, preparedness, response, recovery.										5
3	Natural Disasters and Management Earthquakes, floods, Oil spill disaster, cyclones, Tsunami, droughts, landslides, Heat wave - Causes, consequences, and case studies - Community and government measures for preparedness and mitigation. Role of Government in Disaster Management – NDMA, SDMA & DDMA. Community Based Disaster Management										8
4	Man-Made Disasters and Management Industrial accidents, fires, chemical and nuclear hazards, Biological hazards, transport accidents - Impacts on society, economy, and environment - Disaster preparedness and management strategies - Case studies: Bhopal Gas Tragedy, Vizag Gas Leak, urban disasters.										7
5	Sustainable Development and Disaster Risk Reduction Principles of sustainable development and Sustainable Development Goals (SDGs) - Climate change and disaster interlinkages - Disaster risk reduction strategies: early warning systems, resilient infrastructure, policy framework. Role of technology, education, and media in environmental sustainability and disaster management										5

CO	Course Outcomes The Students will be able to
CO1	Describe the importance of ecosystems, biodiversity, and methods of controlling pollution.
CO2	Understand the basic concepts of disaster management, hazards, risks, and resilience.
CO3	Explain the causes, effects, and control measures of major natural disasters.
CO4	Identify different types of man-made disasters and suggest safety and preparedness
CO5	Recognize the role of sustainable development and disaster risk reduction strategies in
Textbooks:	
1	Government of India – Disaster Management Act, 2005
2	P.C. Mishra – Disaster Management and Mitigation
Reference Books:	
1	Erach Bharucha – Textbook of Environmental Studies
2	IGNOU Study Material – Disaster Management
Web resources:	
1	https://ndma.gov.in/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	3	3	3	3
CO2	3	3	3	3	3	2	3	3	3	3	2
CO3	3	3	3	3	3	2	3	3	3	3	2
CO4	3	2	3	3	3	2	3	3	3	3	2
CO5	3	2	3	3	3	2	3	3	3	3	2
Total	15	13	15	14	15	10	14	15	15	15	11
Average	3	2.6	3	2.8	3	2	2.8	3	3	3	2.2

3 – Strong, 2- Medium, 1- Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC51	Operating Systems	CC-9	4	1	0	0	5	5	25	75	100
Learning Objectives											
LO1	Understand OS concepts, structures, services, and process management basics.										
LO2	To Explore CPU scheduling algorithms and process synchronization mechanisms.										
LO3	To Learn deadlock handling methods and memory management techniques.										
LO4	Describe virtual memory concepts and file system structures and implementations.										
LO5	Understand computer system architecture and mass storage management techniques.										
Unit	Content									Hours	
1	Introduction: Operating system Concepts – Types of Operating Systems- Operating system Services-Processes: Process Concept-Process State –PCB- Process Scheduling – Operations on processes – Cooperating processes. Interrupts-Interrupts Processing.									15	
2	CPU Scheduling: Basic concepts – Scheduling criteria – Scheduling algorithms: First Come First Served Scheduling – Shortest Job First Scheduling – Priority Scheduling – Round Robin Scheduling. Process Synchronization: Background – The Critical-Section Problem – Semaphores.									15	
3	Deadlocks: System model – Deadlock Characterization – Methods for handling Deadlocks - Deadlock prevention– Deadlock avoidance, Deadlock detection – Recovery from deadlock. Memory Management: Background – Swapping – Contiguous memory Allocation– Segmentation-Paging (Basic method, Protection)									15	
4	Virtual Memory: Background – Demand paging- Page replacement. File-System Interface: Directory structure: single Level Directory – Two Level Directory – Tree Structured Directories. File-System Implementation: Directory implementation – Allocation methods (Contiguous, Linked and Indexed Allocation methods)									15	
5	Mass Storage Structure: Overview of mass Storage structure- Mass-Storage Structure: Disk structure – Disk scheduling, Disk management, Swap space management-RAID Structure.									15	

CO	Course Outcomes The students will be able to
CO1	Explain operating system components, services, and process scheduling concepts.
CO2	Apply scheduling algorithms and synchronization techniques to solve process issues.
CO3	Analyze deadlock situations and implement memory management strategies.
CO4	Evaluate virtual memory techniques and design file system structures.
CO5	Explain system structures and apply disk scheduling and storage management methods.
Textbooks:	
1	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. (2018). Operating System Concepts, Windows XP Update, 11 th Edition. Wiley India (P.) Ltd.
2	William Stallings. (2012). Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India.
Reference Books:	
1	Andrew S. Tanenbaum, Herbert Bos. (2014). <i>Modern Operating Systems</i> , Fourth Edition, Pearson Education
2	H. M. Deitel, P. J. Deitel, D. R. Choffnes. (2015). <i>Operating Systems</i> , Third Edition, Pearson Education
3	Andrew S. Tanenbaum, Albert S. Woodhull. (2006). <i>Operating Systems: Design and Implementation</i> , Third Edition, Pearson Education
4	D. M. Dhamdhare. (2011). <i>Operating Systems: A Concept-Based Approach</i> , Third Edition, McGraw-Hill Education (India).
5	Achyut S. Godbole. (2017). <i>Operating Systems</i> , Third Edition, McGraw-Hill Education (India).
Web resources:	
1	https://alison.com/tag/operating-systems
2	https://www.tutorialspoint.com/operating_system/index.htm
3	https://nptel.ac.in/courses/106106144
4	https://www.geeksforgeeks.org/blogs/operating-systems/

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	2	3	3	2
CO2	3	3	3	3	2	3	2	2	2	3	2
CO3	3	3	3	3	2	2	2	2	3	2	3
CO4	3	3	3	3	2	3	2	2	3	2	2
CO5	3	2	3	3	3	3	2	2	3	3	2
Total	15	14	15	15	13	14	10	10	14	13	11
Average	3	2.8	3	3	2.6	2.8	2	2	2.8	2.6	2.2

3 – Strong, 2- Medium, 1- Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC52P	Operating Systems Lab	CC-10 Practical	0	0	4	0	3	4	25	75	100
Learning Objectives											
LO1	Explain and demonstrate process management concepts										
LO2	Implement and analyze synchronization problems										
LO3	Apply deadlock handling techniques including Banker's algorithm and deadlock detection methods.										
LO4	Evaluate and simulate memory management techniques										
LO5	Demonstrate file allocation methods, disk scheduling algorithms, and RAID levels for efficient storage management.										
S.NO	Content	Hours									
1	Implement a program to display process IDs (PID) and parent process IDs (PPID).	60									
2	Write a program to demonstrate process states and process control operations.										
3	Implement the following CPU Scheduling algorithms a) FCFS b) SJF c) Round Robin d) Priority										
4	Write a program to solve the Producer-Consumer problem using Semaphores.										
5	Write a program to implement Banker's Algorithm for Deadlock Avoidance.										
6	Write a program to detect deadlock in a system.										
7	Implement Page Replacement Algorithms (FIFO, LRU, Optimal)										
8	Write a program to simulate File Allocation Methods (Linked, Indexed).										
9	Write a program to simulate different disk scheduling algorithms such as: 1. FCFS (First Come First Serve) 2. SSTF (Shortest Seek Time First) 3. SCAN (Elevator Algorithm)										
10	Write a program to simulate basic working of RAID levels (RAID 0, RAID 1, RAID 5). The program should: 1. For RAID 1: Show mirroring 2. For RAID 5: Implement simple parity calculation										

CO	Course Outcomes The Students will be able to
CO1	Implement programs using fork(), and analyze PID, PPID, and process states.
CO2	Apply FCFS, SJF, Priority, and Round Robin scheduling to compute waiting and turn around times.
CO3	Implement Producer–Consumer and critical section problems using semaphores/mutex.
CO4	Apply Banker’s Algorithm and deadlock detection methods in practical scenarios.
CO5	Implement memory allocation, paging, page replacement, and file allocation methods.
Textbooks:	
1	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. (2018). Operating System Concepts, Windows XP Update, 11 th Edition. Wiley India (P.) Ltd.
2	William Stallings. (2012). Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India.
Reference Books:	
1	Andrew S. Tanenbaum, Herbert Bos. (2014). <i>Modern Operating Systems</i> , Fourth Edition, Pearson Education
2	H. M. Deitel, P. J. Deitel, D. R. Choffnes. (2015). <i>Operating Systems</i> , Third Edition, Pearson Education
3	Andrew S. Tanenbaum, Albert S. Woodhull. (2006). <i>Operating Systems: Design and Implementation</i> , Third Edition, Pearson Education
4	D. M. Dhamdhare. (2011). <i>Operating Systems: A Concept-Based Approach</i> , Third Edition, McGraw-Hill Education (India).
5	Achyut S. Godbole. (2017). <i>Operating Systems</i> , Third Edition, McGraw-Hill Education (India).
Web resources:	
1	https://alison.com/tag/operating-systems
2	https://www.tutorialspoint.com/operating_system/index.htm
3	https://nptel.ac.in/courses/106106144
4	https://www.geeksforgeeks.org/blogs/operating-systems/

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	2	3	3	2
CO2	3	3	3	3	2	3	2	2	3	3	2
CO3	2	3	3	3	2	2	3	3	3	3	2
CO4	3	3	3	2	2	3	3	3	3	3	2
CO5	2	2	3	3	3	3	2	3	3	3	2
Total	13	14	15	14	13	14	12	13	15	15	10
Average	2.6	2.8	3	2.8	2.6	2.8	2.4	2.6	3	3	2

3 – Strong, 2- Medium, 1- Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC53	Python programming	CC - 11	2	1	1	0	4	4	25	75	100
Learning Objectives											
LO1	To make students understand the concepts of Python programming.										
LO2	To apply the OOPs concept in PYTHON programming.										
LO3	To impart knowledge on Functions and Modules concepts										
LO4	To make the students learn List and Dictionaries in Python										
LO5	To know about the File handling concepts in Python										
Unit	Content										Hours
1	Basics of Python Programming: History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation-Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.										12
2	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.										12
3	Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.										12
4	Lists: Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.										12
5	Python File Handling: Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.										12

CO	Course Outcomes The Students will be able to
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.
CO3	Implementing the concept strings in various application, Significance of Modules Work with functions and Strings
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.
CO5	Understand File handling concept of reading and writing files using python code
Textbooks:	
1	ReemaThareja, “Python Programming using problem solving approach”, First Edition, 2017, Oxford University Press.
2	Dr. R. NageswaraRao, “Core Python Programming”, First Edition, 2017, Dream tech Publishers.
3	Allen Downey, ”Think Python: How to Think Like a Computer Scientist”, Third Edition, 2012
4	Allen B. Downey, ”Think Python: How to Think Like a Computer Scientist” (Third Edition, Grayscale Indian Edition). New Delhi: Shroff Publishers (O’Reilly imprint), 2024.
Reference Books:	
1	VamsiKurama, “Python Programming: A Modern Approach”, Pearson Education.
2	Mark Lutz, ”Learning Python”, Orielly. Fourth edition, 2009
3	Adam Stewarts, “Python Programming”. 2016
4	Fabio Nelli, “Python Data Analytics”, APress.
5	Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication.
Web resources:	
1	https://www.programiz.com/python-programming
2	https://www.guru99.com/python-tutorials.html
3	https://www.w3schools.com/python/python_intro.asp
4	https://nptel.ac.in/courses/106106145

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	2	3	3	2
CO2	3	3	3	3	2	3	2	2	3	3	2
CO3	3	3	3	3	2	2	2	2	3	3	2
CO4	3	3	3	3	2	3	2	2	3	3	2
CO5	3	2	3	3	3	3	2	2	3	3	2
Total	15	14	15	15	12	14	10	10	15	15	10
Average	3	2.8	3	3	2.4	2.8	2	2	3	3	2

3 – Strong, 2- Medium, 1- Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC54P	Python Programming Lab	CC-12 Practical	0	0	3	0	2	3	25	75	100
Learning Objectives											
LO1	To design and program the Python applications.										
LO2	To create loops and decision statements in Python.										
LO3	Explore to work with functions and pass arguments in Python.										
LO4	Learn to build and package Python modules for re-usability.										
LO5	To Create python program for read and write files										
S.NO	Content										Hours
1	Write a Python program to input two numbers and perform arithmetic, relational, and logical operations. Display all results clearly										45
2	Implement a Python program to input a student's marks and display the grade based on the following criteria: (≥90: A, 75–89: B, 50–74: C, <50: Fail)										
3	Implement a code to generate the multiplication table of a given number up to 10 using a loop.										
4	Write a program to display numbers from 1 to 20, skipping multiples of 3 using continue, and stopping the loop when the number reaches 15 using break										
5	Write a Python program to define a function that accepts a number and returns whether it is prime or not.										
6	Write a Python program to find the factorial of a number using recursion.										
7	Write a Python program to check whether a given string is a palindrome.										
8	Create a user-defined module that performs addition, subtraction, multiplication, and division. Write another program to import and use this module.										
9	Implement list,tuple and Dictionary that a college wants to manage student information efficiently using Python i) Use a list to store the names of students in a class. ii) Use a tuple to store fixed details of each student such as (Roll Number, Department). iii) Use a dictionary to store student marks where: Key → Student Name ,Value → Marks										
10	Write a Python program to create a file, write student details into it, and then read and display the contents.										

Course Outcomes	
The students will be able to	
CO1	Demonstrate the understanding of syntax and semantics of Python language
CO2	Identify the problem and solve using Python programming techniques.
CO3	Identify suitable programming constructs for problem solving.
CO4	Analyze various concepts of Python language to solve the problem in an efficient way.
CO5	Develop a Python program for a given problem and test for its correctness.
Textbooks:	
1	Core Python Programming by Wesley J. Chun, Second Edition, 2006
2	Reema Thareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
3	Dr. R. Nageswara Rao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.
4	Think Python: How to Think Like a Computer Scientist (Third Edition) ,Downey, Allen B. Think Python: How to Think Like a Computer Scientist (3rd ed., Grayscale Indian Edition). New Delhi: Shroff Publishers (O'Reilly imprint), 2024.
References	
1	Vamsi Kurama, "Python Programming: A Modern Approach", Pearson Education.
2	Mark Lutz, "Learning Python", O'Reilly. Fourth edition, 2009
Web Resources	
1	https://docs.python.org/3/tutorial/index.html
2	https://docs.python.org/3/tutorial/index.html

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	2	3	3	2
CO2	3	3	3	3	2	3	2	2	3	3	1
CO3	3	3	3	3	2	2	2	3	3	3	3
CO4	3	3	3	3	2	3	3	3	3	3	3
CO5	3	2	3	3	3	3	2	2	3	2	3
Total	15	14	15	15	12	14	11	12	15	14	12
Average	3	2.8	3	3	2.4	2.8	2.2	2.4	3	2.8	2.4

3 – Strong, 2- Medium, 1- Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE51	Data Science using R Programming	EC-8	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	To understand the problem solving approaches										
LO2	To learn the basic programming constructs in R Programming										
LO3	To learn the basic programming constructs in R Programming										
LO4	To use R Programming data structures - lists, tuples, and dictionaries.										
LO5	To do input/output with files in R Programming.										
Unit	Content										Hours
1	Getting Started with R interface - R Nuts and Bots - R objects, Numbers, Attributes, Creating Vectors, Mixing Objects, Explicit Corrections, Matrices, List, Factors, Missing values, Data Frames - Getting Data In and Out of R - Dates and Times - Managing Data Frames with the dplyr Package - Control structures- Functions- Scoping rules of R										15
2	VECTORS - Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations										15
3	LISTS - Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations										15
4	FACTORS AND TABLES - Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R Programming .										15
5	GRAPHICS: Creating Graphs,The Workhorse of R Base Graphics,Adding Lines,Starting a New Graph While Keeping the Old Ones, Adding Points, Adding a Legend, Adding Text, Pinpointing Locations - Customizing Graphs,Changing Character Sizes and Range of Axes Adding a Polygon, Smoothing Points - Saving Graphs to Files - Creating Three-Dimensional Plots.										15

CO	Course Outcomes The Students will be able to
CO1	Use R interface and work with objects like vectors, lists, matrices, factors, and data frames.
CO2	Create, modify, and analyze vectors and lists using indexing and logical operations.
CO3	Access and manipulate list components and values using different indexing techniques.
CO4	Write programs using control structures, functions, and apply statistical and mathematical operations.
CO5	Generate and customize graphs, including 2D and 3D plots, for data analysis.
Textbooks:	
1	Roger D. Peng, "R Programming for Data Science", 2016, (Unit-1)
2	Norman Matloff, "The Art of R Programming- A Tour of Statistical Software Design", 2011 (Unit - 2,3,4,5)
Reference Books:	
1	Garrett Golemund, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014
2	Venables, W.N., and Ripley, "S programming", Springer, 2000.
Web resources:	
1	https://www.simplilearn.com
2	https://onlinecourses.nptel.ac.in/noc19_ma33/preview

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	2	3	3	2
CO2	3	3	2	3	2	2	3	2	3	3	2
CO3	3	2	3	3	3	2	3	3	3	3	2
CO4	3	2	3	2	3	3	3	3	3	3	2
CO5	2	3	3	3	3	3	3	3	3	3	3
Total	14	13	14	14	14	13	14	13	15	15	10
Average	2.8	2.6	2.8	2.8	2.8	2.6	2.8	2.6	3	3	2

Strong-3 Medium-2 Low-1

Third Year : Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE52	Cryptography	EC-8	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	To understand the fundamentals of Cryptography										
LO2	To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.										
LO3	To understand the various key distribution and management schemes.										
LO4	To understand how to deploy encryption techniques to secure data in transit across data networks										
LO5	To design security applications in the field of Information technology										
Unit	Content									Hours	
1	Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.									15	
2	Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography									15	
3	Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES –RSA: The RSA algorithm.									15	
4	Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. Web Security: SecureSocketLayer and Transport Layer Security – Secure Electronic Transaction.									15	
5	Intruders - Intruders Detection - Password Management - Recommended reading and writing sites – Malicious software - Types of Malicious Software - Viruses - Worms - Distributed denial of Service attacks – Firewalls - Need,Characteristics,Types - Firewall Basing - Firewall Location and Configuration .									15	

CO	Course Outcomes The Student will be able to
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
CO2	Apply the different cryptography operations of symmetric cryptography algorithms
CO3	Apply the different cryptography operations of public key cryptography
CO4	Apply the various Authentication schemes to simulate different applications.
CO5	Understand various Security practices and System security standards
Textbooks:	
1	William Stallings, "Cryptography and Network Security Principles and Practices".
Reference Books:	
1	Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw-Hill, 2007.
2	AtulKahate, "Cryptography and Network Security", Second Edition, 2003, TMH.
3	M.V. Arun Kumar, "Network Security", 2011, First Edition, USP.
4	P.Rizwan Ahmed, Cryptography, Margham Publications, 2014
Web resources:	
1	https://www.tutorialspoint.com/cryptography/
2	https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography
3	https://nptel.ac.in/courses/106105162

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	2	3	2	2	2	2	2	3
CO2	3	3	2	2	3	3	3	2	2	3	3
CO3	3	3	2	3	3	2	2	3	2	2	3
CO4	3	2	3	2	2	3	2	2	2	2	3
CO5	3	2	2	2	3	3	3	2	2	2	3
Total	15	12	10	11	13	13	12	11	10	11	15
Average	3	2.4	2.0	2.2	2.6	2.6	2.4	2.2	2.0	2.2	3

3 – Strong, 2- Medium, 1- Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE53	Full Stack Development	EC-9	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	Learn web development basics, MERN stack, and JavaScript.										
LO2	To Work with Node.js, npm, and server creation.										
LO3	Understand MongoDB, CRUD operations, and Mongoose.										
LO4	To Use Express.js for routing, middleware, and APIs.										
LO5	Build frontend applications using React components and hooks.										
Unit	Content										Hours
1	Understanding Web Development – Client–Server Architecture – User, Browser, Web Server, Backend Services – HTTP/HTTPS – MVC Architecture – Introduction to Full Stack Development – Overview of MERN Stack – Basics of JavaScript (ES6+) – Introduction to Asynchronous Programming (Promises, Async/Await).										15
2	Introduction to Node.js – Installation and Setup – Node.js Modules – Node Package Manager (npm) – File System (Basic I/O) – Creating Simple Node.js Applications – Events and Event Loop (overview) – Creating Basic HTTP Server – Handling Requests and Responses.										15
3	Introduction to NoSQL and MongoDB – MongoDB Atlas Setup – Database, Collections, Documents – Basic CRUD Operations – Introduction to Mongoose – Schema and Model – Connecting MongoDB with Node.js – Simple Database Applications.										15
4	Introduction to Express.js – Setting up Express Application – Routing (GET, POST, PUT, DELETE) – Middleware (basic concept) – Handling Request and Response – Building Simple REST APIs – Connecting Express with MongoDB.										15
5	Introduction to React – Creating React Applications – Components – Props and State – React Hooks (useState, useEffect) – Handling Forms – Fetching Data from APIs – Basic Routing (React Router) – Integration with Backend APIs										15

CO	Course Outcomes The Students will be able to
CO1	Explain full stack concepts and implement asynchronous programming using JavaScript.
CO2	Develop basic server-side applications using Node.js and handle HTTP requests/responses.
CO3	Build database-driven applications by integrating MongoDB with Node.js.
CO4	Develop RESTful APIs and connect Express applications with MongoDB.
CO5	Develop dynamic front-end applications and integrate them with backend services.
Textbooks:	
1	Alex Banks & Eve Porcello, Learning React, 3rd Edition, O'Reilly, 2023.
2	Ethan Brown, Web Development with Node and Express, O'Reilly Media, Second Edition, 2019.
Reference Books:	
1	Mario Casciaro & Luciano Mammino, <i>Node.js Design Patterns</i> , 3rd Edition, Packt, 2020.
2	Kristina Chodorow & Shannon Bradshaw, <i>MongoDB: The Definitive Guide</i> , 3rd Edition, O'Reilly, 2019.
3	Vasan Subramanian, <i>Pro MERN Stack</i> , Apress, 2019.
4	David Flanagan, <i>JavaScript: The Definitive Guide</i> , 7th Edition, O'Reilly, 2020.
Web resources:	
1	https://nodejs.org/en/docs
2	https://expressjs.com/
3	https://developer.mozilla.org/en-US/docs/Web/JavaScript
4	https://www.mongodb.com/docs/

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	2	2	2	2	1	1
CO2	3	3	3	2	3	2	2	2	3	2	2
CO3	3	3	3	2	3	2	2	2	3	3	2
CO4	3	3	3	2	3	2	2	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	13	10	14	11	11	11	14	12	10
Average	3	2.8	2.6	2	2.8	2.2	2.2	2.2	2.8	2.4	2

3 – Strong, 2- Medium, 1- Low

Third Year : Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE54	Software Project Management	EC-9	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	To define and highlight importance of software project management.										
LO2	To formulate and define the software management metrics & strategy in managing projects										
LO3	To familiarize in Software Project planning										
LO4	Understand to apply software testing techniques in commercial environment										
LO5	To define and highlight importance of Quality requirements										
Unit	Content										Hours
1	Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.										15
2	Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project -Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.										15
3	Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.										15
4	Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.										15
5	Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study										15

CO	Course Outcomes The Students will be able to
CO1	Knowledge gained to train software project managers
CO2	Apply software project management methodologies.
CO3	Able to create comprehensive project plans
CO4	Evaluate and mitigate risks associated with software development process
CO5	Understand the principles and concepts of project management
Textbooks:	
1	Software Project Management, 6th Edition, Bob Hughes, Mike Cotterel, Rajib Mall, McGraw-Hill, 2018
2	Robert T. Futrell, Donald F. Shafer, Linda I. Safer, “Quality Software Project management”, Pearson Education Asia 2002.
Reference Books:	
1	PankajJalote, “Software Project Management in Practice”, Addison Wesley 2002.
2	Hughes, “Software Project Management”, Tata McGraw Hill 2004, 3rd Edition.
Web resources:	
1	https://www.geeksforgeeks.org/software-engineering/software-engineering-software-project-management-spm/
2	https://onlinecourses.nptel.ac.in/noc19_cs70/preview

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	2	2	2	2	2	3
CO2	3	3	2	2	3	3	3	2	2	3	3
CO3	3	3	2	3	3	2	2	3	2	3	3
CO4	3	2	3	2	2	3	2	3	3	2	3
CO5	3	2	2	2	3	3	3	3	2	2	3
Total	15	12	11	11	14	13	12	13	11	12	15
Average	3	2.4	2.2	2.2	2.8	2.6	2.4	2.6	2.2	2.4	3

3 – Strong, 2- Medium, 1- Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UAEC51	GENDER EQUALITY AND SOCIAL INCLUSION	AEC	2	-	-	-	2	2	25	75	100
Learning Objectives											
LO1	To understand the introduction to Gender and Social Inclusion										
LO2	To acquire knowledge on Gender inequality in society										
LO3	To equip Social Exclusion and Marginalized Group										
LO4	To understand Legal Frameworks and Policies										
LO5	To assimilate knowledge about Strategies for Promoting Equality and Inclusion										
Unit	Content									Hours	
1	Introduction to Gender and Social Inclusion: Concepts Gender-Gender roles, stereotypes, and socialization - Meaning and importance of social inclusion- Intersectionality (gender, caste, class, disability, etc.) - Historical perspectives on gender inequality.									6	
2	Gender Inequality in Society: Forms of gender discrimination (education, health, employment) - Gender-based violence and its types - Wage gap and economic inequality - Representation of gender in media and culture - Case studies on gender inequality (local and global).									6	
3	Social Exclusion and Marginalized Groups: Understanding social exclusion - Marginalized communities (women, LGBTQ+ individuals, persons with disabilities, minorities) - Barriers to inclusion (social, economic, political) - Role of culture, tradition, and norms in exclusion - Impact of exclusion on development.									6	
4	Legal Frameworks and Policies: National and international laws promoting gender equality - Human rights perspective on inclusion - Government policies and welfare programs - Role of institutions (NGOs, UN, civil society).									6	
5	Strategies for Promoting Equality and Inclusion: Gender mainstreaming and inclusive development - Education and awareness programs - Role of media and technology - Empowerment approaches (economic, social, political) - Community participation and leadership - Measuring progress (indicators like SDGs)									6	
									Total	30	

CO	Course Outcomes
CO1	Understand the introduction to Gender and Social Inclusion
CO2	Acquire knowledge on Gender inequality in society
CO3	Equip the knowledge on Social Exclusion and Marginalized Group
CO4	Understand Legal Frameworks and Policies towards gender Equality
CO5	Gain knowledge about Strategies for Promoting Equality and Inclusion
Textbooks:	
1	Development as Freedom, Amartya Sen, Publisher: Oxford University Press (1999).
Reference Books:	
1	Gender Trouble: Feminism and the Subversion of Identity, 2 nd Edition (1999 revised edition) Publisher: Routledge, London & New York.
2	David E. Newton, Gender Inequality: A Reference Handbook, Bloomsbury Academic, 2019.
3	Gender Inequality: A Reference Handbook, by David E. Newton ABC-CLIO, 2019.
Web resources:	
1	GESI-Traning-Module.pdf
2	Gender Equality_and_Social_Inclusion WV.pdf
3	integrity-action-gesi-strategy-version-2.pdf
4	Major Marginalized Groups: A Closer Look - Urban Studies
5	UNOPS GESI Mainstreaming in Projects Strategy (Final)

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	2	2	3	2	3	2	3	3	2	2	2
CO2	2	2	2	2	2	2	2	2	2	2	2
CO3	2	3	3	2	3	2	3	3	2	2	2
CO4	2	2	2	2	2	2	2	2	3	2	2
CO5	3	3	3	2	3	2	3	3	3	2	2
TOTAL	11	12	13	10	13	10	13	13	12	10	10
AVERAGE	2.2	2.4	2.6	2	2.6	2	2.6	2.6	2.4	2	2

3– Strong,2-Medium, 1-Low

Third Year- Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSIN51	Internship		-	-	-	-	2	-	25	75	100
Learning Objectives											
LO1	Understand professional work ethics, performance, and adaptability in a work environment.										
LO2	Understand organizational and time management skills required in professional settings.										
LO3	Understand interpersonal relationships and teamwork in an organization.										
LO4	Understand documentation and presentation of internship work.										
LO5	Exercise computational thinking over the entire software life cycle										

Internship / Industrial Training:

The students to undergo 2 weeks of Internship / Industrial Training in the Industry

Sno	Area of Work	Maximum Marks
1	a) Work Related performance – Work Attitude/ Academic preparation/ problem solving ability/ Adaptability / Overall Attendance / Progress towards learning goals	10
	b) Organizational skills – Time management skills / Planning skills/ communication skills	20
	c) Relationship with others – Willingness to cooperate with co-works/ Ability to work with supervisor / Acceptance of constructive comments / Ability to take direction	20
2	Internship Report / Viva Voce Examination	25
	Total	75

* CIA Marks =25 marks (Internship Review 1, Review2 and Review 3)

CO	Course Outcomes The students will be able to
CO1	Demonstrate effective work attitude, problem-solving ability, and progress toward learning goals.
CO2	Apply planning, communication, and time management skills in completing assigned tasks.
CO3	Exhibit teamwork, cooperation, and ability to accept feedback and guidance.
CO4	Prepare and present internship reports effectively and perform well in viva voce examination.
CO5	Apply best practices of IT industries by working in the Product or service domain.

Guidelines for internship

- Internship should be of 2 weeks duration.
- A student is expected to find internship by himself or herself. However, the institution should assist their students in getting internship in good organizations.
- The home institution cannot be taken as the place of internship.
- Internship can be on any topic covered in the syllabus mentioned in the syllabus, not restricted to the specialization.
- Internship can be done, in one of the following, but not restricted to, types of organizations:
 - o Software development firms
 - o Hardware/ manufacturing firms
 - o Any small scale industries, service providers like banks
 - o Clinics/ NGOs/professional institutions like that of CA, Advocate etc
 - o Civic Depts like Ward office/post office/police station/ punchayat.

Guidelines for making Internship Report

A student is expected to make a report based on the internship he or she has done in an organization.

It should contain the following:

Certificate: A certificate in the prescribed Performa (given in appendix 1) from the organization where the internship done.

Evaluation form: The form filled by the supervisor or to whom the intern was reporting, in the prescribed Performa (given in appendix 2).

Title: A suitable title giving the idea about what work the student has performed during the internship.

Description of the organization: A small description of 1 to 2 pages on the organization where the student has interned

Description about the activities done by the section where the intern has worked: A description of 2 to 4 pages about the section or cell of the organization where the intern actually worked. This

should give an idea about the type of activity a new employee is expected to do in that section of the organization.

Description of work allotted and actually done by the intern: A detailed description of the work allotted and actual work performed by the intern during the internship period. Intern may give a weekly report of the work by him or her if needed. It shall be of around 7 to 10 pages.

Self assessment: A self assessment by the intern on what he or she has learnt during the internship period. It shall contain both technical as well as inter personal skills learned in the process. It shall be of around 2 to 3 pages.

The internship report may be around 20 to 30 pages and this needs to be submitted to the external examiner at the time of examination.

Appendix 1

(Proforma for the certificate for internship in official letter head)

This is to certify that Mr / Ms _____ of
College/Institution worked as an intern as part of her BCA course in Computer
Applications. The particulars of internship are given below:

Internship starting date:

Internship ending date:

Actual number of days worked:

Tentative number of hours worked: Hours

Broad area of work: _____

A small description of work done by the intern during the period:

Signature:

Name:

Designation:

Contact number:

Email:

(Seal of the organization)

Appendix 2

(Proforma for the Evaluation of the intern by the supervisor/to whom the intern was reporting in the organization)

Professional Evaluation of intern

Name of intern:

College/institution:

[Note: Give a score in the 1-5 scale by putting √ in the respective cells]

SNo	Particular	Excellent	Very Good	Good	Moderate	Satisfactory
1	Attendance					
2	Punctuality					
3	Adaptability					
4	Ability to shoulder responsibility					
5	Ability to work in a team					
6	Written and oral communication skills					
7	Problem solving skills					
8	Ability to grasp new concepts					
9	Ability to complete task					
10	Quality of work done					

Comments:

Signature:

Name:

Designation:

Contact number:

Email:

(Seal of the organization)

Third Year : Fifth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSIK51	Exploring Game Design for Cultural Heritage	IKS	0	0	0	2	-	2	25	75	100
Learning Objectives											
LO1	To Learn about the Game Design and Development										
LO2	To know how to integrate Indian Culture into Game										
LO3	To Explore and Develop 2D or 3D environment in Indian Culture										
LO4	To get knowledge in Testing and Development in games										
LO5	To create a Prototype for Gaming Techniques										
Unit	Content										Hours
1	Introduction to Game Design and Development - Game Design Fundamentals - Key concepts game mechanics, storylines, player interaction, and aesthetics - Introduction to game engines (Unity, Godot, Unreal Engine): Choosing the right tool for your project. The Game Development Process - Game Genres and Their Application to Cultural Narratives - Exploring different game genres: action, adventure, puzzle, RPG										6
2	Integrating Indian Culture into Game Design: Storytelling in Games - integrate Indian mythology, history, and folklore into compelling game narratives - Designing interactive storylines - Creating playable characters inspired by mythological figures (e.g., warrior avatars, gods, or sages) - Designing NPCs (non-playable characters) to represent cultural heroes, historical figures, or deities.										6
3	Game Development Tools and Techniques: Introduction to Unity, Godot, or Unreal Engine - Setting up your game engine - Building basic 2D or 3D environments based on Indian cultural themes - Art and Audio for Cultural Representation - Designing textures, models, and animations inspired by Indian visual art.										6
4	Testing and Deployment: Debugging and testing games - Exporting Games for PC ,Console,and Mobile Platforms-Publishing on app stores and gaming platforms.										6
5	Prototyping and Playtesting: Prototyping and Iteration -Creating a simple game prototype that incorporates Indian cultural elements. Polishing the Prototype - Final touches: UI/UX design, animations, sound, and improving gameplay flow										6

CO	Course Outcomes
CO1	Understand the fundamentals of game design and development.
CO2	Create interactive digital experiences that integrate aspects of Indian culture.
CO3	Develop a simple game prototype using game engines like Unity or Godot.
CO4	Exploring the games in mobile Platforms
CO5	Explore the role of video games in UI/UX Design,animations
Textbooks:	
1	The Art of Game Design: A Book of Lenses by Jesse Schell, 3 rd Edition ,2019
2	Rules of Play : Game Design Fundamentals by Katie Salen and Eric Zimmerman,2004
Reference Books:	
1	Indian Mythology: A Captivating Guide to the Myths of India by M. K. Ghosh,2020
2	The Penguin History of Early India: From the Origins to AD 1300 by Romila Thapar,2002
Web resources:	
1	https://gamedesigning.org/learn/character-design/
2	https://learn.unity.com/
3	https://www.interaction-design.org/literature/topics/ui-design

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	2	2	3	3	3	3	3
CO4	3	3	3	3	2	3	3	2	3	3	3
CO5	3	2	3	3	3	3	3	2	3	3	3
Total	15	14	15	15	12	14	15	13	15	15	15
Average	3	2.8	3	3	2.4	2.8	3	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

Third Year : Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC61	Machine Learning	CC- 13	4	1	0	0	4	5	75	25	100
Learning Objectives											
LO1	Understand fundamentals of AI, Machine Learning, and basic supervised/unsupervised models.										
LO2	Understand neural networks, backpropagation, and genetic algorithms.										
LO3	To Learn about Bayesian learning, probabilistic models, and hypothesis evaluation.										
LO4	To Explore instance-based learning methods and function approximation techniques.										
LO5	Understand advanced learning techniques including recommendation systems and reinforcement learning.										
Unit	Content									Hours	
1	Introduction Machine Learning - Machine Learning Concepts. Supervised and unsupervised learning, parametric vs nonparametric models, parametric models for classification and regression- Linear Regression, Logistic Regression, Naïve Bayes classifier, simple non-parametric classifier-K-nearest neighbour, support vector machines									15	
2	Neural networks and genetic algorithms : Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.									15	
3	Bayesian and computational learning Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.									15	
4	Instant based learning K- Nearest Neighbour Learning, Distance- Weighted NEAREST NEIGHBOUR Algorithm, Remarks on K- NEAREST NEIGHBOUR Algorithm. A Note on Terminology – Locally weighted Regression – Radial Basis Functions – Case Based Learning.									15	
5	Advanced learning Recommendation systems – opinion mining, sentiment analysis. Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning									15	

CO	Course Outcomes The Students will be able to
CO1	Apply classification and regression algorithms like Linear Regression, Logistic Regression, Naïve Bayes, KNN, and SVM.
CO2	Implement neural network models and apply genetic algorithms for optimization problems.
CO3	Apply Bayesian techniques and learning models for decision making and prediction.
CO4	Implement KNN, locally weighted regression, and radial basis function methods.
CO5	Apply rule-based learning, sentiment analysis, and reinforcement learning algorithms.
Textbooks:	
1	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning-Pearson Education , Limited,2025.
2	Tom M. Mitchell, — Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
3	Machine Learning: A Probabilistic Perspective, MIT Press,2012.
Reference Books:	
1	EthemAlpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2	Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3	Pattern Recognition and Machine Learning – Christopher Bishop
4	Deep Learning – Goodfellow, Bengio, Courville
Web resources:	
1	https://nptel.ac.in/courses/106106139
2	https://nptel.ac.in/courses/106105152

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	2	3	3	3	3	3	2	3	3	3
CO3	3	3	2	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	14	14	15	15	15	15	14	14	15	15
Average	3	2.8	2.8	3	3	3	3	2.8	2.8	3	3

3 – Strong, 2- Medium, 1- Low

Third Year : Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC62P	Machine Learning Lab	CC-14 Practical	0	0	5	0	3	5	75	25	100
Learning Objectives											
LO1	To understand core concepts and models in machine learning.										
LO2	To analyze the nature of problems that can be solved using machine learning techniques.										
LO3	To design and implement suitable machine learning techniques for a given application.										
LO4	To apply distance based learning models										
LO5	To implement and evaluate rule based and tree based models										
S.NO	Content										Hours
1	Design Logistic Regression for binary classification.										75
2	Implement K-Nearest Neighbour (KNN) classifier										
3	Implement Backpropagation algorithm (basic demonstration)										
4	Write a simple Genetic Algorithm for optimization (e.g., function maximization)										
5	Implement Bayes Theorem using a real dataset										
6	Implement Expectation-Maximization (EM) Algorithm (basic clustering example).										
7	Implement Locally Weighted Regression (LWR)										
8	Develop Radial Basis Function (RBF) Network										
9	Construct Sequential Covering Algorithm (rule learning)										
10	Implement a simple chatbot using rule-based learning										

CO	Course Outcomes The Students will be able to
CO1	Apply Logistic Regression and KNN for classification problems..
CO2	Demonstrate the Backpropagation algorithm for neural networks.
CO3	Use Genetic Algorithms for solving optimization problems.
CO4	Apply Bayes Theorem and EM algorithm for probabilistic analysis and clustering.
CO5	Develop rule-based models and a simple chatbot.
Textbooks:	
1	Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning-Pearson Education , Limited,2025.
2	Tom M. Mitchell, — Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
3	Machine Learning: A Probabilistic Perspective, MIT Press,2012.
Reference Books:	
1	EthemAlpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2	Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3	Pattern Recognition and Machine Learning – Christopher Bishop
4	Deep Learning – Goodfellow, Bengio, Courville
Web resources:	
1	https://nptel.ac.in/courses/106106202
2	https://sklearn.org/stable/supervised_learning.html?utm_source=chatgpt.com#google_vignette
3	https://www.mygreatlearning.com/blog/perceptron-learning-algorithm/
4	https://www.geeksforgeeks.org/data-science/bayes-theorem-in-machine-learning/

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	3	3	3	3	3
CO2	3	3	3	2	2	3	3	3	3	2	2
CO3	2	2	1	3	3	3	2	2	1	3	3
CO4	3	3	3	3	3	2	3	3	3	3	3
CO5	3	3	3	3	3	2	3	3	3	3	3
Total	14	14	13	14	14	12	14	14	13	14	14
Average	2.8	2.8	2.6	2.8	2.8	2.4	2.8	2.8	2.6	2.8	2.8

3 – Strong, 2- Medium, 1- Low

Third Year : Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSC63P	Project	CC-15	0	0	0	5	4	5	25	75	100
Learning Objectives											
LO1	Advance from an intellectually curious student to a creator/maker and an industry professional										
LO2	Apply verbal and written communication skills to explain technical problem solving techniques and solutions to an increasingly diverse and global audience										
LO3	Collaborate within and across disciplinary boundaries to solve problems										
LO4	Apply mathematical and/or statistical methods to facilitate problem solving.										
LO5	Exercise computational thinking over the entire software life cycle										
	Content										Hours
	<p>1. The Candidates have to undergo a Minimum of 150 Hours of Project Work during the Course of Study either in an IT Industry / Public or Private Sector Organization / Research Institutes / Institution itself.</p> <p>2. The Candidates need to identify and analyze real world problems on the selected project domain.</p> <p>3. During the course of study, the Candidates need to Develop, Design, Test, etc., the Applications as per the directions by the Guide.</p> <p>4. Then the Candidates have to prepare and submit the manuscript of the Project Work as a Report as per the requirements of the Institution / Department for Evaluation.</p> <p>5. The submission of the Project Report will be done at the end of the Semester for Presentation and Viva-Voce during the Practical Examinations of the Semester. The Passing Minimum for Project Work is 50%.</p> <p>7. If the Candidate fails to score 50% in the Project Work, the Candidate has to improve it during the next attempt.</p> <p>8. A Faculty Member from the Department will act as a Guide to Supervise and Monitor the progress of the Candidates during the course of Project Work.</p> <p>9. The Faculty Member will act as the Internal Examiner during the course of Project Work as well as at the time of conducting the Viva-Voce Examination.</p> <p>10. The Internal Marks for the Project Work will be awarded by the concerned Guide / Internal Examiner.</p> <p>11. The Internal and External Examiners shall both evaluate the Project Report, Presentation and conduct the Viva-Voce Examination.</p>										75

	INTERNAL MARKS AWARDED FOR THE PROJECT WORK 25 Marks	
	1. Review 0 – Title Selection of the Project 2. Review 1 – 5 Marks 3. Review 2 – 10 Marks 4. Review 3 – 10 Marks	
	EXTERNAL MARKS AWARDED FOR THE PROJECT WORK 75 Marks	
	1. Evaluation of the Project Report – 25 Marks 2. Presentation – 25 Marks 3. Viva-Voce Examination – 25 Marks	

CO	Course Outcomes The Students will be able to
CO1	Demonstrate leadership abilities and develop effective time management skills.
CO2	Identify and apply appropriate tools to solve specific problems.
CO3	Analyze and evaluate reports critically.
CO4	Collaborate effectively within a team and lead it to achieve outstanding results.
CO5	Assess and enhance individual skills for presenting and organizing projects.

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	15	15	15	15	15	15	15	15	15	15	15
Average	3	3	3	3	3	3	3	3	3	3	3

3 – Strong, 2- Medium, 1- Low

Third Year- Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE61	IOT and its Applications	EC-10	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	Understand the IOT Fundamentals, technologies, applications and research directions										
LO2	Understand M2M to Iot evolution, value chains and architectural principles										
LO3	Explain IoT reference models, functional views and architectural perspectives for deployment and operations.										
LO4	Apply IoT concepts to real-world applications such as smart industry, retail, oil & gas, eHealth.										
LO5	Evaluate IoT security, privacy, governance and Smart city applications.										
UNIT	Contents									Hours	
1	IoT and its 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.									15	
2	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.									15	
3	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									15	
4	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									15	
5	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									15	

Course Outcomes The student will be able to	
CO1	Use of Devices, Gateways and Data Management in IoT.
CO2	Design IoT applications in different domain and be able to analyze their performance
CO3	Implement basic IoT applications on embedded platform
CO4	To gain knowledge on Industry Internet of Things
CO5	To Learn about the privacy and Security issues in IoT
Textbooks:	
1	Vijay Madiseti and Arshdeep Bahga, “Internet of Things: (A Hands-on Approach)”, Universities Press (INDIA) Private Limited 2014, 1st Edition.
2	Ovidiu Vermesan and Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment” River Publishers, 978-87-93102-94-1, 2014
3	“From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Jan Ho Iler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017
Reference Books:	
1	Michael Miller, “The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World”.
2	Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, Apress Publications 2013, 1st Edition.
Web resources:	
1	https://onlinecourses.nptel.ac.in/noc20_cs66/preview
2	https://www.tutorialspoint.com/internet_of_things/index.htm

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	3	3	3	3
CO2	3	3	3	3	3	3	2	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	2	3	3	3	3	3	2	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3
Total	14	15	15	14	15	14	12	15	15	14	15
Average	2.8	3	3	2.8	3	2.8	2.4	3	3	2.8	3

3 – Strong, 2- Medium, 1- Low

Third Year : Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE62	Robotics and its Applications	EC-10	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	To understand the basic concepts and applications of robotics.										
LO2	To understand the fundamental principles of robot kinematics.										
LO3	To study different types of actuators used in robotic systems.										
LO4	To understand various sensors used in robotics and their characteristics.										
LO5	To understand basic manipulator kinematics and transformation methods.										
Unit	Content										Hours
1	Introduction: Introduction, brief history, components of robotics, classification, workspace, work - envelop, motion of robotic arm, end - effectors and its types, service robot and its application, Artificial Intelligence in Robotics.										13
2	Actuators and sensors : Types of actuators, stepper-DC servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers-strain gauge based force torque sensor proximity and distance measuring sensors Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, DH matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot Kinematics: Differential wheel mobile robot										17
3	Localization: Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.										15
4	Path Planning: Introduction, path planning - overview road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance-case studies Vision system: Robotic vision systems-image representation-object recognition-and categorization depth measurement- image data compression-visual inspection-software considerations										15
5	Application: Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space Applications-Industrial robots-artificial intelligence in robots-application of robots in material handling continuous arc welding-spot welding-spray painting assembly operation-cleaning-etc.										15

CO	Course Outcomes The Student will be able to
CO1	Describe the different physical forms of robot architectures.
CO2	Explain model simple manipulator and mobile robots.
CO3	Mathematically describe a kinematic robot system
CO4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.
CO5	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.
Textbooks:	
1	Fundamentals of Robotics by D.K. Pratihar, Narosa Publishing House, New-Delhi, 2017
2	SaeedB.Niku, Introduction to Robotics Analysis, Application, Pearson Education Asia, 2001
3	Richard D. Klafter, Thomas Achmielewski and Mickael Negin, Robotic Engineering and Integrated Approach, Prentice Hall India-Newdelhi-2001
Reference Books:	
1	Industrial robotic technology-programming and application by M.P. Groover et.al, McGrawhill 2008
2	Robotics technology and flexible automation by S.R. Deb, THH-2009
3	R. K. Mittal and I. J. Nagrath, Robotics and Control, TMH, 2003.
4	Davis, Poole, Alan Mackworth, Randy Cohen, Computational Intelligence, Oxford University Press, 1998.
5	Groover, M. P., Industrial Robotics, McGraw-Hill.
6	Craig, John J., Introduction to Robotics, Pearson.
Web resources:	
1	https://onlinecourses.nptel.ac.in/noc21_me76/preview
2	https://www.edx.org/learn/robotics
3	https://www.geeksforgeeks.org/software-engineering/robotics-introduction/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	2	3	3	3	3
CO2	3	3	3	3	3	2	3	3	3	3	2
CO3	3	3	3	3	3	2	3	3	3	3	2
CO4	3	2	3	3	3	3	3	3	3	3	2
CO5	3	2	3	3	3	3	3	3	3	3	2
Total	15	13	15	14	15	12	14	15	15	15	11
Average	3	2.6	3	2.8	3	2.4	2.8	3	3	3	2.2

3 – Strong, 2- Medium, 1- Low

Third Year : Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE63	Cloud Computing	EC-11	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	Learning fundamental concepts and Technologies of Cloud Computing.										
LO2	Learning various cloud service types and their uses and pitfalls.										
LO3	To learn about Cloud Architecture and Application design.										
LO4	To know the various aspects of application design, benchmarking and security on the cloud.										
LO5	To learn the various Case Studies in Cloud Computing.										
Unit	Content										Hours
1	<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>										15
2	<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 - Microsoft Assessment - Microsoft Planning Toolkit- IBM: Cloud Models - IBM Smart Cloud</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 Content Delivery Services: Amazon CloudFront - Windows Azure Content Delivery Network</p>										15
3	<p>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).</p>										15
4	<p>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.</p>										15

5	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.	15
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CO	Course Outcomes
CO1	Understand the fundamental concepts and Technologies in Cloud Computing.
CO2	Able to understand various cloud service types and their uses and pitfalls.
CO3	Able to understand Cloud Architecture and Application design.
CO4	Understand the various aspects of application design, benchmarking and security in the Cloud.
CO5	Understand various Case Studies in Cloud Computing.

Textbooks:

1	Arshdeep Bahga, Vijay Madiseti, Cloud Computing – A Hands On Approach, Universities Press (India) Pvt. Ltd., 2018
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Reference Books:

1	Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing: A Practical
2	Approach, Tata McGraw-Hill, 2013.
3	Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., 2013.
4	David Crookes, Cloud Computing in Easy Steps, Tata McGraw Hill, 2015.

Web resources:

1	https://onlinecourses.nptel.ac.in/noc26_cs55/preview
2	https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7

Mapping with Programme Outcomes and Programme Specific Outcomes

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	2	2	2	2	2	3
CO2	3	3	2	2	3	3	3	2	2	3	2
CO3	3	3	2	3	3	2	2	3	2	1	2
CO4	3	2	3	2	2	3	1	2	2	2	2
CO5	3	2	2	2	3	3	3	2	2	2	2
Total	15	12	10	11	12	13	11	11	10	10	11
Average	3.0	2.4	2.0	2.2	2.4	2.6	2.2	2.2	2.0	2.0	2.2

3 – Strong, 2- Medium, 1- Low

Third Year- Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSE64	Artificial Intelligence	EC- 11	4	1	0	0	4	5	25	75	100
Learning Objectives											
LO1	To learn various concepts of AI Techniques.										
LO2	To explore various Search Algorithm in AI.										
LO3	To enhance probabilistic reasoning and models in AI.										
LO4	To learn about Markov Decision Process.										
LO5	To learn various type of Reinforcement learning.										
Unit	Content										Hours
1	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.										15
2	Search Algorithms : Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.										15
3	Probabilistic Reasoning : Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.										15
4	Markov Decision process : MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.										15
5	Reinforcement Learning : Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning										15

Course Outcomes	
The students will be able to	
CO1	Understand and explain the fundamental concepts and techniques of Artificial Intelligence.
CO2	Analyze and apply various search algorithms used in AI problem-solving.
CO3	Understand and utilize probabilistic reasoning and models for decision-making under uncertainty.
CO4	Explain and apply the concept of Markov Decision Process in sequential decision problems.
CO5	Implement different types of reinforcement learning techniques for intelligent systems.
Textbooks:	
1	Deepak Khemani, Search Methods in Artificial Intelligence, Cambridge University Press, 2024.
2	Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach” , 3rd Edition, Prentice Hall,2010
3	Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill
Reference Books:	
1	Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House, Delhi.
2	SarojKaushik, “Artificial Intelligence”, Cengage Learning India, 2011
3	David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge University Press 2010
Web resources:	
1	https://github.com/dair-ai/ML-Course-Notes
2	https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html
3	https://onlinecourses.nptel.ac.in/noc25_cs88/preview

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	2	2	2	2	2	3
CO2	3	3	2	2	3	3	3	2	2	3	2
CO3	3	3	2	3	3	2	2	3	2	1	2
CO4	3	2	3	2	2	3	1	2	2	2	2
CO5	3	2	2	2	3	3	3	2	2	2	2
Total	15	12	10	11	12	13	11	11	10	10	11
Average	3	2.4	2	2.2	2.4	2.6	2.2	2.2	2	2	2.2

3 – Strong, 2- Medium, 1- Low

Third Year : Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSP61	Power BI	PEC-1	1	1	0	0	2	2	25	75	100
Learning Objectives											
LO1	To Learn a New too of Power BI Basics Functions										
LO2	To Learn about the power query and Data Modeling Techniques										
LO3	To explore knowledge on DAX Operations										
LO4	To know how to create a Dashboard										
LO5	To explore knowledge on integrating Power BI and Excel										
Unit	Content										Hours
1	Power BI Desktop Basics: Understanding the Power BI interface - Connecting to different data sources: Excel / CSV, SQL Server / Database, Web / PDF / SharePoint - Understanding fields, tables, and data types - Renaming, duplicating, and formatting tables/columns										6
2	Power Query (Data Transformation) - Introduction - Removing rows/columns, filtering data - Changing data types - Replacing errors or null values - Splitting and merging columns - Grouping and summarizing data - Merging Queries (Joins) - Appending Queries (Union) - Creating custom columns with M language (basic) Data Modeling: Creating relationships between tables - One-to-many, many-to-one relationships - Star schema vs Snowflake schema - Managing relationships view										6
3	DAX (Data Analysis Expressions): Calculated columns vs. Measures - Basic and advanced DAX functions: Aggregation, logical, text, and date functions - Time intelligence and filter functions. Data Visualization & Reporting: Creating interactive reports - Visual formatting, interactions, bookmarks, and tooltips - Drill-down and drill - through functionality.										6
4	Power BI Service (Cloud Operations): Publishing reports from Desktop to Service - Creating Dashboards, Apps, and Workspaces - Setting up data refreshing (Data Gateways) - Sharing reports and collaborating - Row -Level Security (RLS).										6
5	Integration & Automation: Power BI + Excel integration - Power BI + Power Automate (basic workflows) - Using Python or R scripts (optional) - Embedding Power BI reports on websites Applications: Sales performance dashboard - HR analytics (employee attrition)										6

CO	Course Outcomes The Students will be able to
CO1	Understand and explain the components, architecture, and functionalities of Power BI for business intelligence applications.
CO2	Connect, transform, and clean data from multiple sources using Power Query Editor.
CO3	Apply DAX functions to create calculated columns, measures, and perform advanced data analysis.
CO4	Create a Effective Dashboard and publish and share the reports
CO5	Develop interactive dashboards and reports, and publish, share, and manage them using Power BI Service.
Textbooks:	
1	Microsoft Power BI Complete Reference – Devin Knight, Brian Knight, Mitchell Pearson
Reference Books:	
1	Learn Power BI – Greg Deckler
2	Microsoft Power BI Cookbook – Brett Powell
Web resources:	
1	https://onlinecourses.swayam2.ac.in/e-learning/preview/imb25_mg221
2	https://www.geeksforgeeks.org/power-bi/power-bi-tutorial/

Mapping with Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	2	2	3	3	3	3	3
CO4	3	3	3	3	2	3	3	2	3	3	3
CO5	3	2	3	3	3	3	3	2	3	3	3
Total	15	14	15	15	12	14	15	13	15	15	15
Average	3	2.8	3	3	2.4	2.8	3	2.6	3	3	3

3 – Strong, 2- Medium, 1- Low

Third Year : Sixth Semester

Course Code	Course Name	Category	L	T	P	S	Credits	Hours	Marks		
									CIA	External	Total
24UCSL61	Open Source Software Technologies	SLC-1	0	0	0	3	2	3	75	25	100
Learning Objectives											
LO1	Able to Acquire and understand the basic concepts in Java,application of OOPS concepts.										
LO2	Acquire knowledge about operators and decision-making statements.										
LO3	To Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays										
LO4	Understand about the applications of OOPS concepts and analyze overriding and packages through java programs										
LO5	To Create window-based programming using applet and graphics programming										
Unit	Content										Hours
1	Open Source – open source vs. commercial software – What is Linux – Free Software – Where I can use Linux - Linux kernel – Linux distributions.										9
2	Introduction Linux Essential Commands – File System concept – Standard Files –The Linux Security Model – Introduction to Unix – Unix Components Unix Files – File Attributes and Permission – Standard I/O – Redirection – Pipes and Filters – Grep and Stream Editor										9
3	Introduction - Apache Explained – Starting, Stopping and Restarting Apache – Modifying the Default configuration – Securing Apache – Set user and Group										9
4	MySQL: Introduction to MySQL – The show databases and table – The USE command –Create Database and Tables – Describe Table – Select, Insert, Update and Delete statement database.										9
5	Introduction –PHP Form processing – Database Access with PHP – MySQL, MySQL Functions – Inserting Records – Selecting Records – Deleting Records – Update Records										9

CO	Course Outcomes The Student will be able to
CO1	Acquire and understand the basic concepts in Java,application of OOPS concepts.
CO2	Acquire knowledge about operators and decision-making statements.
CO3	Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays
CO4	Understand about the applications of OOPS concepts and analyze overriding and packages through java programs.
CO5	Create window-based programming using applet and graphics programming
Textbooks:	
1	James Lee and Brent Ware “Open Source Web Development with LAMP using LINUX, APACHE, MYSQL, PERL, AND PHP
2	LINUX, Apache, MySQL, Perl and PHP”, Dorling Kindersley (India) Pvt. Ltd, 2008
Reference Books:	
1	Eric Rosebrock, Eric Filson, “Setting up LAMP: Getting Linux, Apache, MySQL and PHP and orking together”, John Wiley and Sons, 2004.
2	Anthony Butcher , “Teach Yourself MySQL in 21 days”, 2nd Edition, Sams Publication.
3	Rich Bower, Daniel Lopez Ridreejo, Alian Liska , “Apache Administrator’s Handbook”, Sams Publication.
4	Tammy Fox, “RedHat Enterprise Linux 5 Administration Unleashed”, Sams Publication
5	Naramore Eligabette, Gerner Jason, Wrox Press, Wiley Dreamtech Press, “Beginning PHP5,Apache, MySQL Web Development”, 2005.
Web resources:	
1	https://www.geeksforgeeks.org/software-engineering/introduction-to-open-source-and-its-benefits/

Mapping with Programme Outcomes and Programme Specific Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	3	3	3	2	3
CO2	3	3	2	2	2	2	3	3	3	2	3
CO3	3	3	3	2	3	2	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	2	3	3	3	3	3	3	3	3	3
Total	15	13	13	12	13	12	15	15	15	13	15
Average	3	2.6	2.6	2.4	2.6	2.4	3	3	3	2.6	3

3 – Strong, 2- Medium, 1- Low