B.Sc. Computer Science

Syllabus

AFFILIATED COLLEGES

Program Code : 22K

2025 – 2026 and onwards

BHARATHIAR UNIVERSITY

(AStateUniversity, Accredited with “ A++” Grade by NAAC, Ranked 21st among Indian Universities by MHRD-NIRF)

Programme Educational Objectives (PEOs)	
The **B.Sc. Computer Science** programme describe accomplishments that graduates are Expected to attain within five to seven years after graduation	
PEO1	To enrich knowledge in core areas related to the field of computer science and mathematics.
PEO2	To provide opportunities for acquiring in-depth knowledge in Industry 4.0/5.0tools and techniques and there by design and implement software projects to meet customer’ s business objectives.
PEO3	To enable graduates to pursue higher education leading to Master and Research Degrees or have a successful career in industries associated with Computer Science or as entrepreneurs
PEO4	To enhance communicative skills and inculcate team spirit through professional activities, skills in handling complex problems in data analysis and research project to make them a better team player.
PEO5	To embed human values and professional ethics in the young minds and contribute towards nation building.
PEO9	To develop project

Programme Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Computer Science programme, the students are expected to	
PSO1	Impart the fundamental principles and methods of Computer Science to a wide Range of applications.
PSO2	Develop and deploy applications of varying complexity using the acquired knowledge in various Programming languages, data structures and algorithms, Database and networking skills.
PSO3	To investigate, analyze complex problems by the application of suitable mathematical and research tools, to design Information Technology products and Solutions
PSO4	To identify and utilize the state-of-the-art tools and techniques in the design and development of software products and solutions.
PSO5	Ability to identify, interpret, analyze and design solutions using appropriate algorithms of varying complexities in the field of information and Communication technology.

Programme Outcomes (POs)	
On successful completion of the B.Sc. **Computer Science** programme	
PO1	**Disciplinary knowledge:** Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design of computer based systems of varying complexity.
PO2	**Scientific reasoning/ Problem analysis**: Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science.
PO3	**Problem solving:** Able to provide software solutions for complex scientific and business related problems or processes that meet the specified need s with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
PO4	**Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development.
PO5	**Modern tool usage:** Use contemporary techniques, skills and tools necessary for integrated solutions.
PO6	**Ethics:** Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude.
PO7	**Cooperation /Team Work:** Function effectively as member or leader on multidisciplinary teams to accomplish a common objective.
PO8	**Communication Skills:** An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups.
PO9	**Self-directed and Life-long Learning:** Graduates will recognize the need for self-motivation to engage in life long learning to be in par with changing technology.
PO10	Enhance the research culture and uphold the scientific integrity and objectivity

BHARATHIAR UNIVERSITY::COIMBATORE 641046

B.Sc. Computer Science (CBCS PATTERN)

(*For the students admitted during the academic year **2025 – 2026 and onwards***)

Scheme of Examination

Part	Title of the Course	Hours /Week	Examination				Credits
			Duration In hours	Maximum Marks			
				CIA	CEE	Total	
	SEMESTER I						
I	Language-I	6	3	25	75	100	4
II	English-I	4	3	25	75	100	4
III	Core 1 : Computing Fundamentals and C Programming	5	3	25	75	100	4
III	Core 2 : Digital Computer Fundamentals	5	3	25	75	100	4
III	Core Lab 1 : Programming Lab-C	4	3	20	30	50	2
III	Allied 1 : Mathematical Structures for Computer Science	4	3	25	75	100	4
IV	Environmental Studies*	2	3	-	50	50	2
	Total	**30**		**145**	**455**	**600**	**24**
	SEMESTER II						
I	Language- II	6	3	25	75	100	4
II	English- II	4	3	25	25	50	2
	Naan Mudhalvan – Skill Course Effective English	2		25	25	50	2
III	Core 3 : Object Oriented Programming with Java	5	3	25	75	100	4
III	Core Lab 2: Programming Lab – Java	4	3	20	30	50	2
III	Core Lab 3 : Internet Basics	3	3	20	30	50	2
III	Allied 2 : Discrete Mathematics	4	3	25	75	100	4
IV	Value Education- Human Rights*	2	3	-	50	50	2
	Total	**30**		**165**	**385**	**550**	**22**
	SEMESTER III						
I	Language- III	6	3	25	75	100	4
II	English- III	4	3	25	75	100	4
III	Core 4: Data Structures	3	3	25	75	100	4
III	Core 5: Python Programming	3	3	25	75	100	4
III	Core Lab 4: Programming Lab – Python	3	3	20	30	50	2
III	Allied 3: Machine Learning	4	3	25	75	100	4
III	Skill Based Subject 1:Software Engineering And Software Project Management	3	3	30	45	75	2
IV	Naan Mudhalvan Course	2		25	25	50	2

IV	Health and Wellness**	1		100@	-	100	1
IV	Tamil**/Advanced Tamil* (OR) Non-Major Elective-I (Yoga for Human Excellence)* / Women's Rights*	1	3	-	50	50	1
	Total	**30**		**300**	**525**	**825**	**28**
	SEMESTER IV						
I	Language- IV	6	3	25	75	100	4
II	English - IV	4	3	25	75	100	4
III	Core 6: Operating Systems	3	3	25	75	100	4
III	Core 7: Linux and Shell Programming	3	3	25	75	100	4
III	Core Lab 5: Linux and Shell Programming Lab	3	3	20	30	50	2
III	Allied 4: Information Technology Service Management	4	3	25	75	100	4
III	Skill Based Subject 2 Lab: Software Project Management-Lab	3	3	20	30	50	2
IV	Naan Mudhalvan - Skill Course	2		25	25	50	2
IV	Tamil**/Advanced Tamil* (OR) Non-Major Elective-II (General Awareness*)	2	3	-	50	50	2
III	Internship Training (During the vacation of Fourth Semester)	-	-	-	-	-	-
	Total	**30**		**190**	**510**	**700**	**28**
	SEMESTER V						
III	Core 8 : RDBMS Programming	6	3	25	75	100	4
III	Core 9 : Cyber Security	6	3	25	75	100	4
III	Core 6 : Programming Lab - RDBMS	6	3	20	30	50	2
III	Elective - I Information Security / Computer Networks / Organizational Behavior	6	3	25	75	100	3
III	Skill Based Subject 3: Web Programming	4	3	30	45	75	2
IV	Naan Mudhalvan - Skill Course	2		25	25	50	2
III	Internship Training - Viva Voce Examination		3	30	45	75	3
	Total	**30**		**180**	**370**	**550**	**20**
	SEMESTER VI						
III	Core10: Graphics & Multimedia	5	3	25	75	100	4
III	Core11: Project Work Lab %%	5	3	25	75	100	4
III	Core Lab7: Programming Lab - Graphics & Multimedia	5	3	20	30	50	2
III	Elective- II: Network Security and Cryptography / Artificial Intelligence and Expert Systems / Web Technology	5	3	25	75	100	3

III	Elective– III: Data Mining /Open Source Software / Internet of Things (IoT)	5	3	25	75	100	3
III	Skill Based Subject 4 (Lab) : Web Programming Lab	3	3	20	30	50	2
IV	Naan Mudhalvan – Skill Course	2		25	25	50	2
V	Extension Activities**		-	50	-	50	2
	Total	30		215	385	600	22
	Grand Total			1195	2630	3825	144

- *No Continuous Internal Assessment (CIA), University Examinations Only.
- **No University Examinations, Continuous Internal Assessment (CIA) Only.

@Split for CIA Marks 100

PART	DESCRIPTION	MARKS
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
	TOTAL	100

First Semester

Course code		COMPUTING FUNDAMENTALS AND C PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core Paper : 1	5	0	0	4
Pre-requisite		Students should have basic Computer Knowledge	Syllabus Version	2025-26 onwards		

Course Objectives:

The main objectives of this course are to:

1. To impart knowledge about Computer fundamentals
2. To understand the concepts and techniques in C Programming
3. To equip and indulge themselves in problem solving using C

Expected Course Outcomes:

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

1	Learn about the Computer fundamentals and the Problem solving	K2
2	Understand the basic concepts of C Programming	K2
3	Describe the reason why different decision making and loop constructs are available for iteration in C	K3
4	demonstrate the concept of user defined Functions, Recursions, Scope and Lifetime of Variables, Structures and Unions	K4
5	Develop C programs using Pointers Arrays and file management	K3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	Fundamentals of Computers & Problem Solving in C	12 hours

Fundamentals of Computers : Introduction – History of Computers-Generations of Computers-Classification of Computers-Basic Anatomy of a Computer System-Input Devices-Processor-Output Devices-Memory Management – Types of Software-Overview of Operating System-Programming Languages-Translator Programs-Problem Solving Techniques-Overview of C.

Unit : 2	Overview of C	15 hours

Overview of C - introduction - Character set - C tokens - keyword & Identifiers - Constants -Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators – Arithmetic Expressions-Evaluation of expression- precedence of arithmetic operators – Type conversion in expression– operator precedence & associativity - Mathematical Functions - Reading & Writing a character - Formatted input and output.

Unit : 3	Decision Making, Looping and Arrays	15 hours

Decision Making and Branching: Introduction – if, if… .else, Nesting of if … else statements- elseif ladder – The switch statement, The ?: Operator – The goto Statement. Decision Making and Looping : introduction - The while statement- the do statement – the for statement-jumps in loops. Arrays– Character Arrays and Strings

Unit : 4	User – Defined Functions, Structures and Unions	15 hours
user - defined Functions : introduction – need and elements of user - defined Functions -Definition- Return Values and their types- Function Calls– Declarations– Category of		

Functions - Nesting of Functions -Recursion– Passing Arrays and Strings to Functions – The Scope, Visibility and Life time of Variables-Multifile Programs. Structures and Unions		
Unit : 5	**Pointers &File Management**	**15 hours**
Pointers : introduction -Understanding Pointers -Accessing the address of a variable Declaration and Initialization of pointer Variable – Accessing a variable through its pointer Chain of Pointers -Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers and Strings – Array of Pointers – Pointers as Function Arguments Functions returning Pointers – Pointers to Functions – Pointers and Structures. File Management in C.		
Unit : 6	**Contemporary Issues**	**3 hours**
Problem Solving through C Programming - Edureka		
	Total Lecture hours	**75 hours**

Text Book(s)

1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, SecondReprint2008

Reference Books

1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002.
2	Henry Mullish & Hubert L. Cooper: The Sprit of C, Jaico,1996.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	Introduction to Programming invC-NPTEL
2	Problem solving through Programming in C-SWAYAM
3	C for Everyone : Programming Fundamentals-Coursera

Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	S	L
CO3	S	M	S	M	M	L	S	L	S	L
CO3	S	S	S	M	M	M	S	M	S	M
CO4	S	S	S	M	S	M	S	M	S	M
CO5	S	S	S	M	M	M	S	M	S	M

*S - Strong; M - Medium; L - Low

Course code		DIGITAL COMPUTER FUNDAMENTALS	L	T	P	C
Core/Elective/Supportive		Core Paper : 2	5	0	-	4
Pre-requisite		Student should have basic computer knowledge	Syllabus Version		2025-26 onwards	

Course Objectives:

On successful completion of this subject the students should have Knowledge on

1. Tofamiliarizewithdifferentnumbersystemsanddigitalarithmetic&logiccircuits
2. To understand the concepts of Combinational Logic and Sequential Circuits
3. To impart the knowledge of buses, I/O devices, flipflops, Memory and bus structure.
4. To understand the concepts of memory hierarchy and memory organization
5. To understand the various types of microprocessor architecture

Expected Course Outcomes:

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

1	Learn the basic structure of number system methods like binary, octal and hexadecimal and understand the arithmetic and logical operations are performed by computers.	K3
2	Define the Functions to simplify the Boolean equations using logic gates.	K1
3	Understand various data transfer techniques in digital computer and control unit operations.	K2
4	Compare the Functions of the memory organization	K4
5	Analyze architectures and computational designs concepts related to architecture Organization and addressing modes	K4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	Number System and Gates	12 hours

Number System and Binary Codes : Decimal, Binary, Octal, Hexadecimal– Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Digital Logic: The Basic Gates– NOR, NAND, XOR Gates.

Unit : 2	Combinational Logic and Sequential Circuits	14 hours

Combinational Logic Circuits: Boolean algebra Demorgan's Theorems – Karnaugh map – Canonical form Construction and properties – Implicates – Don't care combinations - Product of sum, Sum of products, Simplifications.

Unit : 3	Arithmetic and Sequential Circuits	12 hours

Half adder, Full adder, Parallel binary adder, BCD adder, Half subtractor, Full subtractor, Parallel binary subtractor. Sequential circuits: Flip-Flops: RS, D, JK, and T – Shift Registers- Decoder- Encoder - Multiplexers – DE multiplexers – – Counters – Asynchronous Counter - synchronous Counter.

Unit : 4	Input – Output Organization	10 hours
Input – Output Organization: Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking – Priority Interrupt: Daisy-Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication.		
Unit : 5	**Memory** Organization	**6 hours**
Memory Organization: Memory Hierarchy – Main Memory- Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization. Virtual Memory: Address Space and Memory Space, Address Mapping Using Pages, Associative Memory, Page Table, Page Replacement.		
Unit : 6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars - webinars		
	Total Lecture hours	**56 hours**

Text Book(s)

1	Digital Electronics Circuits and Systems, V.K. Puri, TMH.
2	Computer System Architecture-M. Morris Mano, PHI.

Reference Books

1	Digital principles and applications, Albert Paul Malvino, Donald P Leach, TMH, 1996.
2	Computer Architecture, M. Carter, Schaum' s outline series, TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	https://nptel.ac.in/courses/106/103/106103068/
2	http://www.nptelvideos.in/2012/12/digital-computer-organization.html
3	http://brittunculi.com/foca/materials/FOCA-Chapters-01-07-review-handout.pdf

Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	M	M	L
CO3	S	M	S	M	M	S	M	M	M	L
CO3	S	S	S	M	S	S	S	M	M	M
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S - Strong; M - Medium; L - Low

Course code		PROGRAMMING LAB – C	L	T	P	C
Core/Elective/Supportive		Core Lab : 1	0	0	4	2
Pre-requisite		Students should have basic knowledge in C Programming and algorithms	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To practice the Basic concepts, Branching and Looping Statements and Strings in C Programming
2. To implement and gain knowledge in Arrays, Functions ,Structures, Pointers and File handling

Expected Course Outcomes:

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

1	Remember and Understand the logic for a given problem and to generate Prime numbers & Fibonacci Series **(Program-1,2,3)**	K1, K2
2	Apply the concepts to print the Magic square, Sorting the data, Strings, Recursive Functions and Pointers **(Program-4,5,6,8,10)**	K2, K3
3	Remember the logic used in counting the vowels in a sentence **(Program-7)**	K1
4	Apply and Analyze the concepts of Structures and File management **(Program-9,11,12)**	K3&K4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Programs	36 hours
1. Write a C programtofindthesum,average,standarddeviationforagivensetofnumbers.	
2. Write a C program to generate n prime numbers.	
3. Write a C program to generate Fibonacci series.	
4. Write a C program to print magic square of order n where n>3 and n is odd.	
5. Write a C program to sort the given set of numbers in ascending order.	
6. Write a C program to check whether the given string is a palindrome or not using Pointers .	
7. Write a C program to count the number of Vowels in the given sentence.	
8. Write a C program to find the factorial of a given number using recursive function.	
9. Write a C program to print the students Mark sheet assuming roll no, name, and marks in 5subjects in a structure. Create an array of structures and print the mark sheet in the university pattern.	
10.Write a function using Pointers to add two matrices and to return the resultant matrix to the Calling function.	
11.Write a C program which receives two filenames as arguments and check whether the file Contents are same or not. If same delete the second file	
12. Write a program which takes a file as command line argument and copy it to another file. At	

The end of the second file write the total i) no of chars ii)no. of words and iii)no. of lines.		
	Total Lecture hours	36 hours
Text Book(s)		
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, SecondReprint2008	

Reference Books	
1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson,2002.
2	Henry Mullish & Hubert L. Cooper:The Sprit of C,Jaico,1996.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	Introduction to Programming in C– NPTEL
2	Problem solving through Programming in C-SWAYAM
3	C for Everyone: Programming Fundamentals– Course
Course Designed By:	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	L	M	S	S	S	L
CO3	S	S	S	M	L	M	S	S	S	M
CO3	S	S	S	L	L	M	S	S	S	L
CO4	S	S	S	M	L	M	S	S	S	M

*S - Strong; M - Medium; L - Low

Second Semester

Course code		OBJECT ORIENTED PROGRAMMING WITH JAVA	L	T	P	C
Core/Elective/Supportive		Core : 3	5	0	0	4
Pre-requisite		The objective of the course is to train the students to acquire problem-solving skills through Object Oriented Programming	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To expose the students with the introduction to OOPs and advantages of Object Oriented Programming .
2. The concepts of OOPs make it easy to represent real world entities.
3. The course introduces the concepts of converting the real time problems into objects and methods and their interaction with one another to attain a solution.
4. Simultaneously it provides the syntax of Programming language Java for solving the real world problems.

Expected Course Outcomes:

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

1	The competence and the development of small to medium sized application Programs that demonstrate professionally acceptable coding	K1-K2
2	demonstrate the concept of Object Oriented Programming through Java	K2-K4
3	Apply the concept of Inheritance, Modularity, Concurrency, Exceptions handling And data persistence to develop java program	K3
4	Develop java programs for applets and graphics Programming	K3
5	Understand the fundamental concepts of AWT controls, layouts and events	K1-K2

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING	10 hours

Object-Oriented Paradigm– Basic concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object-Oriented Programming .Java Evolution: History – Features – How Java differs from C and C++ – Java and Internet – Java and www – Web Browsers. Overview of Java: simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine.

Unit : 2	BRANCHINGAND LOOPING	10 hours

Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching: if, if...else, nested if, switch, ? : Operator - Decision Making and Looping : while, do, for – Jumps in Loops -Labeled Loops – Classes, Objects and Methods.

Unit : 3	ARRAYS AND INTERFACES	12 hours

Arrays, Strings and Vectors – Interfaces: Multiple Inheritance– Packages: Putting Classes together– Multithreaded Programming .

Unit : 4	ERROR HANDLING	13 hours
Managing Errors and Exceptions– Applet Programming – Graphics Programming .		
Unit : 5	MANAGING INPUT/OUTPUT FILES IN JAVA	13 hours
Concepts of Streams-Stream Classes– Byte Stream classes– Character stream classes– Using streams– I/O Classes– File Class– I/O exceptions– Creation of files– Reading/Writing characters, Byte-Handling Primitive data Types – Random Access Files.		
Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars - webinars		
	Total Lecture hours	60 hours

Text Book(s)

1	Programming withJava– APrimer-E.Balagurusamy,5th Edition,TMH.
2	Herbert Schildt, J ava: The Complete Reference,McGrawHillEducation,OraclePress10thEdition, 2018
3	Programming withJava– APrimer-E.Balagurusamy,3rdEdition,TMH.

Reference Books

1	The Complete Reference Java2 -PatrickNaughton&HebertSchildt,3rdEdition,TMH
2	Programming withJava– JohnR.Hubbard,2ndEdition,TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	https://www.spoken-tutorial.org
2	https://www.tutorialspoint.com/cplusplus/index.htm
3	https://www.w3schools.com/cpp/

Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	M	M	M	L
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	M	M	M
CO4	S	S	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	M	M	S

*S - Strong; M - Medium; L - Low

Course code		PROGRAMMING LAB - JAVA	L	T	P	C
Core/Elective /Supportive		Core Lab : 2	0	0	4	2
Pre-requisite		Students should know about the OOPs concept and basic knowledge in java theory.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. The main objective of JAVA Programming Lab is to provide the students a strong foundation on Programming concepts and its applications through hands-on training.
2. To practice the Basic concepts, Branching and Looping Statements and Strings in C Programming
3. To implement and gain knowledge in Arrays, Functions ,Structures, Pointers and File handling

Expected Course Outcomes:

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

1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding	K1
2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and Looping	K2
3	Create data files and Design a page using AWT controls and Mouse Events in Java Programming Implement the concepts of code reusability and debugging.	K3
4	Develop applications using Strings, Interfaces and Packages and applets	K4
5	Construct Java programs using Multithreaded Programming and Exception Handling	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Programs	36 hours
1. Write a Java Program for Factorial of a number using command-line arguments.	
2. Write a Java Program to create a switch statement to print the day according to their equivalent number.	
3. Write a java program to sort the array integer elements in descending order.	
4. Write a Java program to implement method overloading.	
5. Write a Java program to implement method overriding.	
6. Write a Java program to implement Abstract class with an abstract method.	
7. Write a program to count the Characters, Digits and Special Characters from the given String.	
8. Write a Java program to implement Vector Operations.	
9. Write a Java Program to implement the concept of Multiple Inheritance using Interfaces	

10. Write a Java program to implement a Arithmetic and ArrayIndexOutOfBound Exception.	
11. Write a Java Program to create an user define Exception called PayOutOfBound and throw the Exception. 12. Write a Java Program to implement the concept of Multithreading with the use of any three multiplication tables and assign three different priorities to them.	
13. Write a Java Applet Program to draw several shapes using Paint method..	
14. Write a Java Program to draw circle, square, ellipse and rectangle at the mouse click positions.	
15. Write a Java Program which open an existing file and append text to that file.	
Text Book(s)	
1	Programming with Java– APrimer– E.Balagurusamy,5th Edition,TMH.
2	Herbert Schildt, Java: The Complete Reference,McGrawHillEducation,OraclePress10th Edition, 2018
3	Programming with Java– A Primer– E.Balagurusamy,3rd Edition,TMH.
Reference Books	
1	The Complete Reference Java2– PatrickNaughton&HebertSchildt,3rd Edition,TMH
2	Programming withJava– JohnR.Hubbard,2nd Edition,TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.w3resource.com/java-exercises/
2	https://www.udemy.com/ introduction -to-java-Programming /
Course Designed By:	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	M	M	M	L
CO2	S	S	S	S	S	S	S	M	M	M
CO3	S	S	S	S	S	S	S	M	M	M
CO4	S	S	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	M	M	S

*S - Strong; M - Medium; L - Low

Course code		INTERNET BASICS	L	T	P	C
Core/Elective /Supportive		Core Lab : 3	0	0	3	2
Pre-requisite		Knowledge of WINDOWS Operating Systems	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. Introduce the fundamentals of Internet and the Web Functions.
2. Impart knowledge and essential skills necessary to use the internet and its various components.
3. Find, evaluate, and use online information resources.
4. Use Google Apps for education effectively.

Expected Course Outcomes:

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

1	Internet and the Web concepts	K2
2	Explain the usage of internet concepts and analyze its components.	K2
3	Identify and apply the online information resources	K3
4	Inspect and utilize the appropriate Google Apps for education effectively	K3, K4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Programs	36 hours
1. Create an email account in Gmail. Using the account created compose a mail to invite other college students for your college fest, enclose the invitation as attachment and send the mail to at least 50 recipients. Use CC and BCC options accordingly	
2. Open your inbox in the Gmail account created, check the mail received from your peer from other college inviting you for his college fest, and download the invitation. Reply to the mail with a thank you note for the invite and forward the mail to other friends.	
3. Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume.	
4. Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated.	
5. Create a label and upload bulk contacts using import option in Google Contacts	
6. Create your own Google class room and invite all your friends through email id. Post study Material in Google class room using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials.	
7. Create and share a folder in Google Drive using ‘ share a link’ option and set the permission to access that folder by your friends only.	
8. Create one-page story in your mother tongue by using voice recognition facility of Google Docs.	
9. Create a registration form for your Department Seminar or Conference using Google Forms.	

10. Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.
11. Create a Google form with minimum 25 questions to conduct a quiz and generate a

Certificate after submission.	
12. Create a meet using Google Calendar and record the meet using Google Meet.	
13. Create a Google slides for a topic and share the same with your friends.	
14. Create template for a seminar certificate using Google Slides.	
15. Create a sheet to illustrates implement the mathematical calculations using Google Sheets.	
16. Create student' s internal mark statement and share the Google sheets via link.	
17. Create differenttypesofchartsforarangeinCIAmarkstatementusingGoogleSheets.	
18. Create a mark statement in Google Sheets and download it as PDF, .xls and .csv files	

Text Book(s)

1	Ian L amont, Google Drive & Docs in 30 Minutes,2nd Edition.
2	

Reference Books

1	SherryKinkophGunter,MyGoogleApps,2014.
2	
3	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	https://www.youtube.com/watch?v=NzPNk44tdIQ
2	https://www.youtube.com/watch?v=PKuBtQuFa-8
4	https://www.youtube.com/watch?v=hGER1hP58ZE

Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	S	L
CO2	S	M	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

*S - Strong; M - Medium; L - Low

Third Semester

Course code		DATA STRUCTURES	L	T	P	C
Core/Elective /Supportive		Core : 4	3	0	0	4
Pre-requisite		Basic understanding of Data storage, retrieval and algorithms.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To introduce the fundamental concept of data structures
2. To emphasize the importance of data structures in developing and implementing efficient algorithms.
3. Understand the need for Data Structures when building application
4. Ability to calculate and measure efficiency of code
5. Improve Programming logic skills.

Expected Course Outcomes:

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

1	Understand the basic concepts of data structures and algorithms	K1-K2
2	Construct and analyze of stack and queue operations with illustrations	K2-K4
3	Enhance the knowledge of Linked List and dynamic storage management.	K2-K3
4	demonstrate the concept of trees and its applications	K2-K3
5	Various sorting and searching algorithms for applications and understand the concept of file organizations	K1-K4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION	9 hours

Introduction of Algorithms, Analysing Algorithms. Arrays: Sparse Matrices-Representation of Arrays. Stacks and Queues. Fundamentals-Evaluation of Expression Infix to Postfix Conversion

Unit : 2	LINKED LIST	9 hours

Linked List: Singly Linked List-Polynomial Addition-Doubly Linked List and Dynamic– Storage Management – Garbage Collection and Compaction.

Unit : 3	TREES	9 hours

Basic Terminology- Binary Trees-Binary Tree Representations– Binary Trees-Traversal. Graphs: Terminology and Representations-Traversals-Shortest Paths.

Unit : 4	SYMBOLTABLE	8 hours

Symbol Tables: Static Tree Tables-Dynamic Tree Tables- Hash Tables: Hashing Functions -Overflow Handling.

Unit : 5	INTERNAL SORTING	8 hours
Insertion Sort- Quick Sort-2Way Merge Sort-Heap Sort.		
Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	45 hours

Text Book(s)

1	Ellis Horowitz, Sartaj Shani, Data Structures, Galgotia Publication.
2	Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran,ComputerAlgorithms, Galgotia Publication.
3	S. Lovelyn Rose, R. Venkatesan, Data Structures, Wiley IndiaPrivateLimited,2015,1st Edition

Reference Books

1	Jean-Paul, Tremblay& Paul G. Sorenson, An introduction to Data structures with Applications Tata Mc Graw Hill Company 2008, 2nd Edition.
2	Samanta. D, Classic Data Structure Prentice Hall of IndiaPvtLtd2007,9th Edition
3	Seymour Lipschutz, Data Structures McGraw Hill Publications,2014,1stEdition

Related Online Contents [MOOC,SWAYAM,NPTEL,Websitesetc.]

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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	S	M	M	M
CO2	S	S	S	M	M	M	M	M	M	M
CO3	S	S	S	M	S	M	M	M	S	S
CO4	S	S	S	M	S	S	S	S	M	M
CO5	S	S	S	M	M	S	S	M	M	S

*S - Strong; M - Medium; L - Low

Course code		PYTHON PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core : 5	3	0	0	4
Pre-requisite		The objective of the course is to train the students to acquire problem-solving skills through Object Oriented Programming	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To expose the students with the introduction to OOPs and advantages of Object Oriented Programming.
2. The concepts of OOPs make it easy to represent real world entities.
3. To introduce the fundamentals of Python Programming .
4. To teach about the concept of Functions, Lists, Tuples, Files and Directories.
5. To learn about dictionaries in python and to explores the object-oriented Programming ,Graphical Programming aspects of python with help of built in modules

Expected Course Outcomes:

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

1	Remembering the concept of operators, datatypes, Looping statements in Python Programming .	K1
2	Understanding the concepts of Input/Output operations in file..	K2
3	Applying the concept of Functions and exception handling	K3
4	Analyzing the structures of list, tuples and maintaining dictionaries	K4
5	demonstrate significant experience with python program development environment	K4-K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	BASICS OF PYTHON	7 hours

BASICS : Python - Variables - Executing Python from the Command Line - Editing Python Files -Python Reserved Words - Basic Syntax-Comments - Standard Data Types – Relational Operators – Logical Operators-BitWise Operators-Simple Input and Output.

Unit : 2	CONTROL STATEMENTS	9 hours

CONTROL STATEMENTS: Control Flow and Syntax - Indenting - if Statement - statements and expressions- string operations- Boolean Expressions -while Loop - break and continue - for Loop.LISTS:List-listslices-listmethods-listloop– mutability– aliasing-cloninglists-listparameters. TUPLES: Tuple assignment, tuple as return value -Sets – Dictionaries

Unit : 3	FUNCTIONS	9 hours

FUNCTIONS : Definition - Passing parameters to a Function - Built-in Functions - Variable Number of Arguments-Scope– Type conversion-Type coercion-Passing Functions to a Function-Mapping Functions in a Dictionary – Lambda - Modules - Standard Modules – sys – math – time -dir-help Function.

Unit : 4	ERROR HANDLING	9 hours
ERROR HANDLING: Run Time Errors - Exception Model - Exception Hierarchy - HandlingMultipleExceptions-DataStreams-AccessModesWriting-DatatoaFileReading-DataFroma File - Additional File Methods - Using Pipes as Data Streams - Handling IO Exceptions – Working with Directories.		
Unit : 5	**OBJECT ORIENTED FEATURES**	**9 hours**
OBJECT ORIENTED FEATURES: Classes Principles of Object Orientation - Creating Classes -InstanceMethods-FileOrganization-SpecialMethods-ClassVariables– Inheritance– Polymorphism - Type Identification - Simple Character Matches - Special Characters – Character Classes – Quantifiers - Dot Character - Greedy Matches – Grouping - Matching at Beginning or End-Match Objects – Substituting-Splitting a String – Compiling Regular Expressions.		
Unit : 6	**Contemporary Issues**	**2 hours**
Expert lectures, online seminars - webinars		
	Total Lecture hours	**45 hours**

Text Book(s)

1	Mark Summerfield, Programming in Python3:A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
2	Martin C. Brown, PYTHON: The Complete Reference,McGraw-Hill,2001
3	E. Balagurusamy(2017), " Problem Solving and Python Programming " ,McGraw-Hill, First Edition.

Reference Books

1	Allen B. Downey, " Think Python : How to Think Like a Computer Scientist" , 2nd edition, Updated for Python 3, Shroff/O' Reilly Publishers,2016
2	Guido van Rossum and Fred L. Drake Jr, An introduction to Python – Revised and updated forPython3.2, Network Theory Ltd., 2011
	Wesley J Chun,Core Python Applications Programming ‖ ,PrenticeHall,2012.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	www.spoken-tutorial.org
2	www.nptel.ac.in
3	

Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	L	S	M	M	M
CO2	S	S	S	M	S	L	S	M	M	M
CO3	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	M	S	M	M	S	M	M
CO5	S	S	S	M	S	M	S	S	M	M

*S - Strong; M - Medium; L - Low

Course code		PROGRAMMING LAB – PYTHON	L	T	P	C
Core/Elective/Supportive		Core Lab : 4	0	0	3	2
Pre-requisite		Knowledge in basic programming	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To build supervised learning models.
2. To explore the regression models.
3. To learn to compare the performance of different models
4. To understand to evaluate the performance of different models
5. To build an Artificial Neural Network programs

Expected Course Outcomes:

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

1	Develop supervised learning models	K1, K2
2	Develop regression models	K2
3	Compare and evaluate the performance of different models	K2, K3
4		
5		

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Programs	36 hours
1. Write a python program that displays the following information: Your name, Full address Mobile number, College name, Course subjects.	
2. Write recursive functions for the factorial of positive integer.	
3. Write a python program that writes a series of random numbers to a file from 1 to n and display.	
3. Write a python program to sort a given sequence: String, List and Tuple.	
4. Write a python program to make a simple calculator.	
5. Write a python program for Linear Search and Binary Search.	
6. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file	
7. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples	
8. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample	
9. Write a program to implement the naïve Bayesian classifier for a sample training datasets to read as a .CSV file. Compute the accuracy of the classifier, considering few test datasets	
10. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall	

	Total Lecture hours	36 hours

Text Book(s)	
1	Mark Summer field.— Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
2	Ethem Alpaydin,- Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.
3	
Reference Books	
1	Martin C. Brown,— PYTHON: The Complete Reference‖ , McGraw-Hill, 2001
2	Jason Bell,-Machine Learning– Hands on for Developers and Technical professionals, First Edition, Wiley, 2014.
3	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	S	S	M	M	L
CO3	S	S	S	L	S	M	S	M	M	L
CO3	S	S	S	M	S	M	S	M	M	L
CO4	S	S	S	M	S	M	S	S	M	S
CO5	S	S	S	M	S	S	S	S	M	S

*S - Strong; M - Medium; L - Low

Course code		MACHINE LEARNING	L	T	P	C
Core/Elective/Supportive		Allied : 3	4	0	0	4
Pre-requisite		To effectively learn machine learning, a solid foundation in mathematics, programming, and data handling is crucial.	Syllabus Version		2025-26 onwards	

Course Objectives:

1. Understanding of the fundamental issues and challenges of machine learning : data, model selection, model complexity, etc.
2. Understanding of the strengths and weaknesses of many popular machine learning approaches.
3. Explain about the concepts of computational learning theory and dimensionality reduction
4. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

Expected Course Outcomes:

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

1	Explain the basic concepts of machine learning	K1-K2
2	Construct supervised learning models.	K2-K4
3	Construct unsupervised learning algorithms.	K3
4	Evaluate and compare different models	K3
5		

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION TO MACHINE LEARNING	11 hours

Algorithmic models of learning, Learning classifiers, functions, relations, grammars, probabilistic models, value functions, behaviors and programs for experience. Bayesian, maximum some posterior, and minimum description length frameworks.

Unit : 2	ML-MODELS	11 hours

Parameter Estimation, sufficient statistics, decision trees, neural networks, support vector machines, Bayesian networks, bag of words classifiers, N-gram models; Markov and Hidden Markov models, probabilistic relational models, association rules, nearest neighbor classifiers, locally weighted regression, ensemble classifiers.

Unit : 3	COMPUTATIONAL LEARNING	12 hours

Computational Learning theory, mistake bound analysis, sample complexity analysis, VC dimension, Occam learning, accuracy and confidence boosting, Dimensionality reduction: Principal component Analysis (PCA), feature selection and visualization.		
Unit : 4	**UNSUPERVISED LEARNING**	**12 hours**
Unsupervised Learning: Clustering, mixture models, k-means clustering, hierarchical clustering, distributional clustering, Reinforcement learning; Learning from heterogeneous, distributed, data and knowledge.		
Unit : 5	**APPLICATIONS IN DATA MINING**	**12 hours**
Selected applications in data mining, automated knowledge acquisition, pattern recognition, program synthesis, text and language processing, internet-based information systems, human computer interaction, semantic web, and Bioinformatics and computational biology		
Unit : 6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars - webinars		
	Total Lecture hours	**60 hours**

Text Book(s)

1	Bishop, C.(2006). Pattern Recognition and Machine Learning. Berlin:Springer-Verlag.
2	
3	

Reference Books

1	Russel,S. And Norving,P. (2003). Artificial Intelligence : A Modern Approach. 2nd Edition, NewYork: Prentice-Hall.
2	Baldi,P., Frasconi,P., Smyth,P. (2002).Bioinformatics: A Machine Learning Approach. Cambridge, MA: MITPress.
3	Baldi,P., Frasconi,P., Smyth,P. (2003).Modeling the Internet and the Web- Probabilistic Methods and Algorithms. NewYork:Wiley.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2	https://onlinecourses.swayam2.ac.in/arp19_ap79/preview
3	

Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	L	S	M	M	M
CO2	S	S	S	M	S	L	S	M	M	M
CO3	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	M	S	M	M	S	M	M

CO5	S	S	S	M	S	M	S	S	M	M

*S - Strong; M - Medium; L - Low

Course code		SOFTWARE ENGINEERING AND SOFTWARE PROJECT MANAGEMENT	L	T	P	C
Core/Elective /Supportive		Skill Based Subject – 1	3	0	0	2
Pre-requisite		Basic knowledge on the Software Development Life Cycle.	Syllabus Version		2025-25 onwards	

Course Objectives:

The main objectives of this course are to:

1. To enhance the basic software engineering methods and practices.
2. To learn the techniques for developing software systems.
3. To understand the object oriented design.
4. To understand software testing approaches

Expected Course Outcomes:

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

1	Understand the basic concepts of software engineering	K1
2	Apply the software engineering models in developing software applications	K2-K3
3	Implement the object oriented design in various projects	K4
4	Knowledge on how to do a software project within-depth analysis.	K3
5	To inculcate knowledge on Software engineering concepts in turn gives a road map to design a new software project.	K1-K4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	SOFTWARE ENGINEERING	8 hours

Software Engineering: A Layered Technology – Software Process – Software Process Models – The Prototyping. Requirement Engineering– Software prototyping - elements of analysis model – Data modeling – Functional modeling and information flow.

Unit : 2	SOFTWAREDESIGN	8 hours

Software design and Software engineering – The Design process– Design principles– Design concepts– Effective modular design– Software Architecture

Unit : 3	SOFTWARE TESTING	9 hours

Software testing fundamentals– Test Case Design-White box testing– Basis path testing–
Control structure testing– Black box testing. Unit testing– Validation testing– System testing.

Unit : 4	SOFTWARECONFIGURATIONMANAGEMENT	9 hours

Software Configuration Management: Definitions and terminology – processes and activities. Software Quality assurance: Definitions– Quality control and Quality assurance – Organization of Structures. Risk Management: Risk Identification – quantification - Monitoring - Mitigation. Software requirements gathering: Steps to be followed – Outputs and Quality Records - Skill sets required– Challenges.

Unit : 5	ESTIMATION	9 hours

Estimation: What is Estimation? – When and Why? – Three phases of Estimation – Estimation methodology – Formal models of Size Estimation. Design and Development phases: Reusability -Technology choices – Standards – Portability - user interface issues – Testability - The Effect of Internet on Project Management.

Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	45 hours

Text Book(s)

1	Roger S. Pressman: Software engineering ,Tata McGrawHill,V Edition.
2	Gopalaswamy Ramesh, Managing Global Software Projects,Tata McGrawHill,NewDelhi,2002.
3	Programming with Java– APrimer-E.Balagurusamy,3rdEdition,TMH.

Reference Books

1	The Complete Reference Java2– Patrick Naughton & Hebert Schildt, 3rd Edition, TMH
2	Programming with Java– JohnR.Hubbard,2nd Edition, TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	S	M	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S - Strong; M - Medium; L - Low

Fourth Semester

Course code		OPERATING SYSTEMS	L	T	P	C
Core/Elective /Supportive		Core : 6	3	0	0	4
Pre-requisite		Students Should have the basic knowledge in computer.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. This course provides the overview of computer system and the operating system, the concept s of processes and processor management, concurrency and synchronization, memory management schemes, file system and secondary storage management, security and protection, etc.
2. The practice component will complement the theory component through Programming assignments illustrating the use and implementation of these concepts.
3. To have an in-depth understanding of process concepts, deadlock and memory management.
4. To provide an exposure to scheduling algorithms, devices and information management.

Expected Course Outcomes:

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

1	Know the program generation and program execution activities in detail	K1
2	Remember the basic concept s of operating system	K2
3	Understand the concept s like interrupts, deadlock, memory management and file management	K3
4	Analyze the need for scheduling algorithms and implement different algorithms used for representation, scheduling, and allocation in DOS and Linux operating system.	K1-K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION TO OPERATING SYSTEM	9 hours

introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems– Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs .

Unit : 2	PROCESS AND SCHEDULING	9 hours

Process concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication. Threads – Overview – Threading issues - CPU Scheduling – Basic concept s – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling.

Unit : 3	DEADLOCK	9 hours

The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks.

Unit : 4	STORAGE AND PAGING	8 hours
Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging. Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing.		

Unit : 5	FILE AND DISK STORAGE	8 hours
File concept – Access Methods – Directory Structure - File System Structure – Allocation Methods – Free-space Management - Disk Structure – Disk Scheduling – Disk Management – Case Study: The Linux System, Windows.		

Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars-webinars		

	Total Lecture hours	45 hours

Text Book(s)

1	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, " Operating System concept s", 10th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, April 2018.
2	H.M. Deitel, Operating Systems,2nd Edition,Perason,2003.

Reference Books

1	William Stallings, " Operating System", Prentice Hall of India, 4th Edition, 2003.
2	Pramod Chandra P. Bhatt – " An introduction to Operating Systems, concept s and Practice', PHI, 2003.
3	Ramez Elmasri, A.G.Carrick and David Levine, " Operating Systems-A Spiral approach", 2010.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	M	M	M	L
CO2	S	S	S	S	S	M	M	M	S	L
CO3	S	M	M	M	S	M	S	S	S	L
CO4	S	S	S	M	S	S	S	M	M	M
CO5	S	S	S	M	S	S	S	M	M	M

*S - Strong; M - Medium; L - Low

Course code		LINUX AND SHELL PROGRAMMING	L	T	P	C
Core/Elective /Supportive		Core : 7	3	0	0	3
Pre-requisite		Before starting the course students should have the basic knowledge about operating system and C Programming.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. Linux is a multi-user and multi-tasking operating system and after learning the concepts of an operating system
2. Student will be able to write simple shell Programming using Linux utilities, pipes and filters.
3. The File System, process management and memory management are discussed.
4. Various commands used by Linux shell is also discussed which makes the users to interact with each other.
5. Bourne shell Programming is dealt in depth which can be used to develop applications.

Expected Course Outcomes:

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

1	Describe the architecture and features of Linux Operating System and distinguish it From other Operating System .	K1
2	Develop Linux utilities to perform File processing, Directory handling, user Management and display system configuration	K2-K3
3	Develop shell scripts using pipes, redirection, filters and Pipes	K2
4	Apply and change the ownership and file permissions using advance Unix commands.	K3
5	Build Regular expression to perform pattern matching using utilities and implement shell scripts for real time applications.	K3-K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION	8 hours

introduction to LINUX Operating System : introduction -The LINUX Operating System .

Unit : 2	MANAGINGFILESANDDIRECTORIES	8 hours

Managing Files and Directories: introduction – Directory Commands in LINUX – File Commands in LINUX.

Unit : 3	VI EDITOR	9 hours

Creating files using the vi editor: Text editors– The vi editor. Managing Documents: Locating files in LINUX– Standard files – Redirection – Filters– Pipes.

Unit : 4	SECURING FILES	9 hours

Securing files in LINUX: File access permissions – viewing File access permissions – Changing File access permissions. Automating Tasks using Shell Scripts: introduction – Variables- Local and Global Shell variables – Command Substitution.

Unit : 5	CONDITIONALEXECUTIONINSHELLSCRIPTS	9 hours
Using Conditional Execution in Shell Scripts: Conditional Execution – The case… esac Construct. Managing repetitive tasks using Shell Scripts: Using Iteration in Shell Scripts– The while construct – until construct – for construct – break and continue commands – Simple Programs using Shell Scripts.		
Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars - webinars		
	Total Lecture hours	45 hours

Text Book(s)

1	Operating System LINUX,NIIT,PHI,2006,EasternEconomyEdition.
2	N.B. Venkateswarlu , introduction to Linux: Installation and Programming , BS Publications,2008, 1stEdition

Reference Books

1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi,Edition2008.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	http://spoken-tutorial.org/
2	https://www.tutorialspoint.com/linux/index.htm
3	

Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	M	M	M	L
CO2	S	S	S	M	S	M	M	M	M	L
CO3	S	S	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	M	S	S	S	M
CO5	S	S	S	S	S	S	S	S	S	S

*S - Strong; M - Medium; L - Low

Course code		PROGRAMMING LAB – LINUX AND SHELL PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core Lab : 5	0	0	3	2
Pre-requisite		Students should have the prior basic knowledge in operating system.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. Describe the architecture and features of Linux Operating System
2. To create programs in the Linux environment using Linux utilities and commands.
3. Student is given an introduction of Linux shell commands and they will be able to write own shell scripts.
4. Shell Programming is dealt in depth which can be used to develop applications.

Expected Course Outcomes:

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

1	Develop Linux utilities to perform File processing, Directory handling and user Management	K1, K2
2	Understand and develop shell scripts using pipes, redirection, filters, Pipes and Display system configuration	K2-K3
3	Develop simple shell scripts applicable to file access permission network administration	K3
4	Apply and change the ownership and file permissions using advance Unix commands.	K4-K5
5	Create shell scripts for real time applications.	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Programs	36 hours

1. Write a shell script to stimulate the file commands : rm, cp, cat, mv, cmp, wc, split, diff.
2. Write a shell script to show the following system configuration:
   a. Currently logged user and his log name
   b. Current shell, home directory, Operating System type, current Path setting, current working directory
   c. Show currently logged number of users, show all available shells
   d. Show CPU information like processor type, speed
   e. Show memory information
3. Write a shell script to implement the following: pipes, Redirection and tee commands.
4. Write a shell script for displaying current ate, user name, file listing and directories by getting user choice.
5. Write a shell script to implement the filter commands.
6. Write a shell script to remove the files which has file size as zero bytes.
7. Write a shell script to find the sum of the individual digits of a given number.
8. Write a shell script to find the greatest among the given set of numbers using command line arguments.

9. Write a shell script for palindrome checking.		
10. Write a shell script to print the multiplication table of the given argument using for loop.		
	Total Lecture hours	36 hours

Text Book(s)	
1	Operating System LINUX,NIIT,PHI,2006,EasternEconomyEdition.
2	N.B. Venkateswarlu , introduction to Linux: Installation and Programming , BS Publications,2008, 1st Edition

Reference Books	
1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata Mc Graw – Hill Publishing Company Limited, New Delhi, Edition2008.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websitesetc.]	
1	https://www.w3resource.com/linux-exercises/
2	http://spoken-tutorial.org/
3	

Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	M	M	M
CO3	S	S	S	M	S	M	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S – Strong; M – Medium; L – Low

Course code		INFORMATION TECHNOLOGY SERVICE MANAGEMENT	L	T	P	C
Core/Elective /Supportive		Allied : 4	4	0	0	4
Pre-requisite		Basic Knowledge in Information Technology	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. IT Service Management (ITSM) aims to optimize IT resources, enhance efficiency.
2. To improve the overall customer experience by aligning IT services with business objectives.
3. It involves managing IT infrastructure, services, and processes to deliver value to users, whether they are internal employees or external customers.
4. Key objectives include improving service quality, reducing costs, increasing customer satisfaction, and fostering a culture of continuous improvement

Expected Course Outcomes:

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

1	Understand the basics of ITSM and the ITIL framework and recognize its importance in managing IT services.	K1
2	Learn to align IT services with business goals and understand how to design IT services to meet availability, security, and performance requirements.	K2-K3
3	Understand how to manage IT service transitions smoothly and maintain operational excellence through proper incident, change, and problem management.	K2
4	Understand the concepts of continual improvement, be able to measure service performance, and apply improvement techniques effectively.	K3
5	Explore ITSM tools and technologies, understand how to implement ITSM in real-world scenarios, and identify current trends that are shaping the future of ITSM.	K3-K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION TO IT SERVICE MANAGEMENT AND ITIL	11 hours
Overview of IT Service Management (ITSM): Definition and importance of ITSM in organizations - History and evolution of ITSM - **ITIL Framework:** Key concepts of ITIL - ITIL lifecycle stages: Service Strategy, Service Design, Service Transition, Service Operation, Continual Service Improvement (CSI)- **Service Management as a Practice:** Service and service management definitions - Process and function distinction - Benefits of adopting ITSM practice		
Unit : 2	SERVICE STRATEGY AND DESIGN	11 hours
Service Strategy: Business relationship management - Financial management for IT services -Demand **management**, Service portfolio management - **Service Design:** Design coordination, Service catalog management - Service-level management (SLM) - Availability, Capacity, IT service continuity, and Information security management - **Service Design Principles:** Designing for performance and capacity - Designing for security and compliance - Creating and maintaining the service catalog.		
Unit : 3	SERVICE TRANSITION AND OPERATION	12 hours
Service Transition: Change management, Service asset and configuration management (SACM) - Release and deployment management, Knowledge management - Managing risks in service transition - **Service Operation:** Incident management, Problem management - Event management, Request fulfillment- Access management- **Operational Support and Analysis:** Continual improvement of IT operations - Managing the service desk and monitoring tools		
Unit : 4	CONTINUAL SERVICE IMPROVEMENT (CSI)	12 hours
Overview of Continual Service Improvement: The role of CSI in ITIL and ITSM - The CSI model: Plan, Do, Check, Act (PDCA) cycle - **Key Processes of CSI:** Service measurement, Metrics, and reporting - Service level improvement and **optimization** - Identifying areas for improvement and conducting gap analysis - **Implementing CSI:** Tools and techniques for continual improvement - Change implementation through monitoring and analysis		
Unit : 5	TOOLS, TECHNOLOGIES, AND IMPLEMENTATION OF ITSM	12 hours
Using Conditional Execution in Shell Scripts: Conditional Execution – The case… esac Construct. Managing repetitive tasks using Shell Scripts: Using Iteration in Shell Scripts– The while construct – until construct – for construct – break and continue commands – Simple Programs using Shell Scripts.		
Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars - webinars		
	Total Lecture hours	60 hours

Text Book(s)

1	ITIL Foundation : ITIL 4th Edition", AXELOS, 2020.
2	N.B. Venkateswarlu , introduction to Linux: Installation and Programming , BS Publications, 2008, 1st Edition

Reference Books	
1	Foundations of IT Service Management with ITIL, Author: Brady Orand, 2011
2	IT Service Management: A Guide for ITIL Foundation Exam Candidates Ernest Brewster, Richard Griffiths, 2015.
3	IT Service Management: Global Best Practices, Jan van Bon, 2016.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
2	
3	
Course Designed By:	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	M	M	M	L
CO2	S	S	S	M	S	M	M	M	M	L
CO3	S	S	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	M	S	S	S	M
CO5	S	S	S	S	S	S	S	S	S	S

*S - Strong; M - Medium; L - Low

Course code		LAB - SOFTWARE PROJECT MANAGEMENT	L	T	P	C
Core/Elective/Supportive		SKILL BASED SUBJECT 2 (LAB)	0	0	3	2
Pre-requisite		Basic knowledge in SDLC and managing of software projects	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To gain knowledge about how to develop project plan
2. To create requirement analysis and specification for software applications.
3. Student is given an introduction of various phases of software development life cycle models.
4. To analyze the steps are to be implemented using SDLC to develop applications.

Expected Course Outcomes:

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

1	Prepare a Project Plan with requirement analysis and specification.	K1, K2
2	Understand and develop cost estimation model for realtime applications.	K2-K3
3	Implement the concepts of checkpoints in design phase	K3
4	Analyze the Development phase of the database and text area of the applications.	K4-K5
5	Create SDLC for realtime applications.	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Programs	36 hours
1. Preparation of Project Management Plan.	
2. Using any of the CASE tools, Practice requirement analysis and specification for different firms.	
3. Case study of cost estimation models.	
4. Practice object oriented design principles for implementation.	
5. Practice function oriented design.	
6. Practice creating software documentation for the Analysis phase of software development lifecycle for a real time application.	
7. Practice creating software documentation for the Development phase of software Development life cycle for a realtime application.	
8. Practice creating software documentation for the Implementation phase of software development life cycle for a real time application.	
9. Practice creating software documentation for the Testing phase of software development lifecycle for a real time application.	
10. Simulate a tool for path testing principles.	
11. Simulate a tool for testing based on control structures.	
12. Simulate a tool that reflects blackbox testing concepts	
Total Lecture hours	36 hours

Text Book(s)

1	

Reference Books	
1	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	
2	
3	
Course Designed By:	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	S	S	S	M
CO3	S	S	S	S	S	M	S	S	S	M
CO3	S	S	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S - Strong; M - Medium; L - Low

Course code		INTERNSHIP TRAINING	L	T	P	C
Core/Elective/Supportive			0	0	0	3
Pre-requisite		Basic knowledge in SDLC and managing of software projects	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To gain knowledge in software development environment
2. To know about the managerial aspects of development are.
3. Student is given interns about the industry, the job and the company

INTERNSHIP TRAINING
(During the vacation of Fourth Semester and viva voce examination to be conducted during practical examinations of fifth semester)

1. The aim of the Internship Training is to acquire practical knowledge on the implementation of the programming concepts studied.
2. To observe orientation to the company, its structure, and its products/services.
3. Direct engagement with assigned tasks and projects under the supervision of a mentor.
4. **Reporting and Evaluation:** Regular submission of progress reports and feedback sessions.
5. **Final Report and Presentation:** Completion of a final report summarizing the internship experience and potentially a presentation to showcase their work.

Viva Voce

1. Viva-Voce will be conducted at the end of the Fifth semester by both Internal (Respective Guides) and External Examiners, after duly verifying the training report in the college, for a total of 75 marks [CIA : 30 Marks and CEE : 45 Marks]
2. External Mark Split up (45 marks) :
   - Internship Training Report 25 marks
   - Viva PPT Presentation 10 marks
   - Viva Voce 10 Marks

Fifth Semester

Course code		RDBMS PROGRAMMING	L	T	P	C
Core/Elective/ Supportive		Core : 8	6	0	0	4
Pre-requisite		Basic knowledge about the data, table and database in computers	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. The course describes the data, organizing the data in database, database administration.
2. To grasp the different issues involved in the design of a database system.
3. To study the physical and logical database designs and database modeling like relational, Hierarchical, network models, database security, integrity and normalization.
4. It also gives introduction to SQL language to retrieve the data from the database with suitable application development.
5. Provide strong foundation of database concepts and to introduce students to application development in DBMS.

Expected Course Outcomes:

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

1	Understand the basic concepts of Relational Data Model, Entity-Relationship Model and process of Normalization	K1-K2
2	UnderstandandconstructdatabaseusingStructuredQueryLanguage(SQL)in Oracle9i environment.	K1-K3
3	Learn basics of PL/SQL and develop programs using Cursors, Exceptions, Procedures and Functions .	K1-K4
4	Understand and use built-in Functions and enhance the knowledge of handling multiple tables	K1-K3
5	Attain a good practical skill of managing and retrieving of data using Data Manipulation Language(DML)	K2-K4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	DATABASE CONCEPTS	15 hours

Database concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams– De-normalization– Another Example of Normalization.

Unit : 2	ORACLE9i	15 hours

Oracle9*i*: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors &Help – Alternate Text Editors - SQL *Plus Worksheet - *i*SQL *Plus. Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying TableInformation– AlteringanExistingTable–

Dropping,Renaming,TruncatingTable– TableTypes – Spooling– Error codes.		
Unit : 3	**WORKING WITH TABLE**	**15 hours**
Working with Table: Data Management and Retrieval: DML– adding a new Row/Record– Customized Prompts– Updating and Deleting an Existing Rows/Records– retrieving Data from		

Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in Functions – Grouping Data. Multiple Tables: Joins and Set operations: Join– Set operations.		
Unit : 4	**PL/SQL**	**15 hours**
PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types– Other Data Types– Declaration– Assignment operation– Bind variables– Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures– Nested Blocks– SQL in PL/SQL– Data Manipulation– Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and Attributes – Cursor FOR loops – SELECT… FOR UPDATE – WHERE CURRENT OF clause – Cursorwith Parameters– Cursor Variables– Exceptions– Types of Exceptions.		
Unit : 5	**PL/SQL COMPOSITE DATA TYPES**	**12 hours**
PL/SQL Composite Data Types: Records– Tables– arrays. Named Blocks: Procedures– Functions – Packages – Triggers – Data Dictionary Views.		
Unit : 6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars - webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	Database Systems using Oracle, Nilesh Shah, 2nd edition, PHI.
2	E-Book : Diana Lorentz, “ Oracle® Database SQL Reference” , ORACLE, Dec 2005.
3	E-Book : Bill Pribyl, Steven Feuerstein, “ Oracle PL/SQL Programming ” ,O'Reilly Media, Inc., 6th Edition, February 2014.

Reference Books

1	Database Management Systems, Majumdar & Bhattacharya,2007,TMH.
2	Database Management Systems, GeraldV. Post,3rdedition,TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	http://www.digimat.in/nptel/courses/video/106105175/L01.html
2	https://www.tutorialspoint.com/oracle_sql/index.htm

Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	M	M	M	L
CO2	S	S	S	M	S	M	M	M	M	L
CO3	S	S	S	S	S	S	S	S	M	M
CO4	S	S	S	S	S	M	S	S	M	L
CO5	S	S	S	S	S	M	S	S	M	L

*S - Strong; M - Medium; L - Low

Course code		CYBER SECURITY	L	T	P	C
Core/Elective /Supportive		Core : 9	6	0	0	4
Pre-requisite		Basic knowledge in Internet and data crimes.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. Students should be able to understand.
2. The transformation between threat, risk, attack and vulnerability.
3. How threats materialize in to attacks.
4. To find information about threats, vulnerabilities and attacks.
5. To understand about the safeguards the confidentiality, integrity, and availability of information.

Expected Course Outcomes:

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

1	Understand the broad set of technical, social & Cyber Security.	K2
2	Understand the security design of operating system.	K3
3	Recognize & analyze the importance of Data mining & Big data concepts.	K1-K4
4	Implement the methods and techniques to develop projects.	K4
5	To improve the Problem-solving skills, Research, Innovation/creativity	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Unit : 1	INTRODUCTION TO CYBER SECURITY	15 hours

Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authenticat Access Control and Cryptography - Web– User Side - Browser Attacks - Web Att Targeting Users - Obtaining User or Website Data - Email Attacks

Unit : 2	SECURITY IN OPERATING SYSTEM & NETWORKS	15 hours

Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service

Unit : 3		15 hours

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems -Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

Unit : 4	PRIVACY IN CYBER SPACE	15 hours

Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining PrivacyontheWeb-EmailSecurity-PrivacyImpactsofEmergingTechnologies-Wherethe Field Is Headed.

Unit : 5	MANAGEMENT AND INCIDENTS	12 hours

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws - Cyber crime - Cyber Warfare and Home Land Security

Unit : 6	Contemporary Issues	3 hours
Expert lectures, online seminars - webinars		
	Total Lecture hours	75 hours

Text Book(s)

1	Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015
2	GeorgeK.Kostopoulous,CyberSpaceandCyberSecurity,CRCPress,2013.

Reference Books

1	Martti Lehto, Pekka Neittaanmäki, Cyber Security:Analytics,TechnologyandAutomation edited, SpringerInternationalPublishingSwitzerland2015
2	NelsonPhillipsandEnfingerSteuart,– ComputerForensicsandInvestigations¦,Cengage Learning,NewDelhi,2009

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	M	M	M	M	M	L
CO2	S	S	S	M	M	M	S	S	M	L
CO3	S	S	S	S	S	M	S	S	S	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S - Strong; M - Medium; L - Low

Course code		PROGRAMMING LAB – RDBMS	L	T	P	C
Core/Elective/Supportive		Core Lab : 6	0	0	6	2
Pre-requisite		Students should have the theoretical knowledge in Relational Database Management Concepts	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To introduce database system concepts
2. To learn SQL for data definition, manipulation and querying a database
3. To learn relational database design
1. To learn transaction concepts and serializability of schedules

Expected Course Outcomes:

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

1	Understand the concepts of database.	K2
2	Learn and apply the knowledge of database methods.	K3
3	Analyze queries in SQL to create, manipulate and query the database	K4
4	Evaluate the conceptual and normalization to design relational database.	K5
5	Create PL/SQL and develop programs using Cursors, Exceptions, Procedures and Functions	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Programs	60 hours
1. Implementation of DDL commands of SQL with suitable examples Create table, Alter table, Drop Table	
2. Implementation of DML commands of SQL with suitable examples Insert, Update, Delete	
3. Implementation of different types of function with suitable examples Number function, Aggregate Function, Character Function, Conversion Function, Date Function	
4. Implementation of different types of operators in SQL Arithmetic Operators, Logical Operators, Comparison Operator, Special Operator, Set Operation	
5. Implementation of different types of Joins Inner Join, Outer Join, Natural Join etc.	
6. Creating Database/Table Space Managing Users: Create User, Delete User Managing roles:-Grant, Revoke	
7. Create a table for Employee details with Employee Number as primary key and following fields: Name, Designation, Gender, Age, Date of Joining and Salary. Insert at least ten rows andperformvariousqueriesusinganyoneComparison,Logical,Set,SortingandGrouping operators.	
8. Write a PL/SQL to update the rate field by 20% more than the current rate in inventory table which has the following fields: Prono, ProName and Rate. After updating the table a new field (Alter) called for Number of item and place for values for the new field without using PL/SQL block.	
9. Write a PL/SQL program to implement the concept of Triggers	
10. Write a PL/SQL program to implement the concept Procedures.	
	Total Lecture hours 36 hours

Text Book(s)

1	E-Book :Bill Pribyl, Steven Feuerstein, " Oracle PL/SQLProgramming" , O' Reilly Media, Inc., 6th Edition, February 2014.
2	
3	
Reference Books	
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2	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	M	L	S	M	M	L
CO3	S	S	S	L	M	M	S	M	S	L
CO3	S	S	S	M	S	M	S	S	S	M
CO4	S	S	S	M	S	M	S	S	M	M
CO5	S	S	S	S	S	S	S	S	S	M

*S - Strong; M - Medium; L - Low

Course code		INFORMATION SECURITY	L	T	P	C
Core/Elective /Supportive		Elective : I	6	0	0	3
Pre-requisite			Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To understand the basics of computer security and cyber-crimes.
2. To familiarize the role of security in operations system and databases.
3. To know various types of viruses, attacks and threats in hardware, software and data security.

Expected Course Outcomes:

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

1	Remember the basics of computer security and its terminology	K1
2	Understand the various Attacks, Threats and Vulnerabilities in the system.	K2
3	Apply cyber security risk management policies in order to adequately protect critical information and assets.	K3
4	Analyze the needs of the Information security of data	K4
5	Evaluate the appropriate security technologies and policies to protect computers and digital information	K4-K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	SECURITY PROBLEM	15 hours

Is there Security Problem in Computing? : What does Security mean? – Attacks-The Meaning of Computer Security-Computer Criminals. Protection in general purpose operating systems: Protected Objects and Methods of Protection-Memory and Address Protection-Control of Access to General Objects- File Protection Mechanisms-User Authentication

Unit : 2	PROGRAM SECURITY	15 hours

Program Security: Secure Programs- Non malicious Program Errors – Viruses and other Malicious Code - Targeted Malicious Code - Controls against Program Threats.

Unit : 3	PROGRAM SECURITY	15 hours

Database and Data Mining Security: Introduction to Databases- Security Requirements - Reliability and Integrity - Multilevel Databases* – Proposals for Multilevel Security- Data Mining

Unit : 4	SECURITY IN NETWORKS	14 hours

Security in Networks: Network Concepts*-Threats in Networks-Firewalls-Intrusion Detection Systems. Web Security: Web Application (In) Security – Mobile Security: Rethinking Mobile Security.

Unit : 5	LEGAL PROTECTION	14 hours
Legal and Ethical Issues in Computer Security: Protecting Programs and Data- Information and the Law-Computer Crime- Ethical Issues in Computer Security		
Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars - webinars		
	Total Lecture hours	75 hours

Text Book(s)

1	Charles P Pfleeger and Shai Lawrence Pfleeger, (2007), " Security in Computing", Fourth Edition, Prentice Hall.
2	Dafydd Stuttard and Marcus Pinto, (2011), " The Web Application Hacker's Handbook: Finding and Exploting Security Flaws", 2nd Edition, Wiley.
3	Lawrence C. Miller, CIISP, " Mobile Security for Dummies", Palo Alto Networks Edition

Reference Books

1	Ross J. Anderson and Ross Anderson (2001), " Security Engineering: A Guide to Building Dependable Distributed Systems", Wiley.
2	Debby Russell and Sr.G.T.Gangemi (2006)," Computer Security Basics (Paperback)", Second Edition, O' Reilly Media.
3	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	M	L	M	S	S
CO2	S	S	S	L	S	M	L	M	S	S
CO3	S	S	S	L	S	M	L	M	S	S
CO4	S	S	S	L	S	M	L	M	S	S
CO5	S	S	S	L	S	M	L	M	S	S

*S - Strong; M - Medium; L - Low

Course code		COMPUTER NETWORKS	L	T	P	C
Core/Elective /Supportive		Elective : I	6	0	0	3
Pre-requisite		Students should have the knowledge on computer connectivity and connectivity peripherals.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To identify various components in a data communication system and understand state-of-the-artin network protocols, architectures and applications.
2. To enable students through the concepts of computer networks, different models and their involvement in each stage of network communication.
3. To educate the concept s of terminology and concept s of the OSI reference model and the TCP/IP reference model and protocols such as TCP,UDP and IP.
4. To be familiar with the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
5. Introduce the student to a network routing for IP networks and how a collision occurs and how to solve it and how a frame is created and character count of each frame.

Expected Course Outcomes:

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

1	Remember the organization of computer networks, factors influencing computernetworkdevelopmentandthereasonsforhavingvarietyofdifferentty pesofnetworks.	K1
2	UnderstandInternetstructureandcanseehowstandardproblemsaresolvedan d The use of cryptography and network security.	K2
3	Apply knowledge of different techniques of error detection and correction to detect And solve error bit during data transmission.	K3
4	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	K4
5	Knowledge about different computer networks, reference models and the Functions of each layer in the models	K2-K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Unit : 1	BASICS OF NETWORKS AND OSI MODEL	15 hours

Network Hardware: LAN - WAN - MAN - Wireless - Home Networks. Network Software: Protocol Hierarchies - Design Issues for the Layers - Connection-oriented and connectionless services - Service Primitives - The Relationship of services to Protocols. Reference Models: OSI Reference Model - TCP/IP reference Model- Comparison of OSI and TCP/IP-Critique of OSI and protocols - Critique of the TCP/IP Reference model.

Unit : 2	PHYSICALLAYER	15 hours

PHYSICAL LAYER - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – MicrowaveTransmission– InfraredandMillimeterWaves– LightWaves.Communication Satellites: Geostationary, Medium-EarthOrbit,LowEarth-orbitSatellites– SatellitesversusFiber.

Unit : 3	DATA-LINK LAYER	15 hours
DATA-LINK LAYER: Error Detection and correction – Elementary Data-link Protocols – Sliding Window Protocols. MEDIUM-ACCESS CONTROL SUB LAYER: Multiple Access Protocols – Ethernet– Wireless LANs – Broadband Wireless – Bluetooth.		
Unit : 4	**NETWORKLAYER**	**14 hours**
NETWORKLAYER: Routing algorithms– Congestion Control Algorithms. TRANSPORTLAYER: elements of Transport Protocols– Internet Transport Protocols: TCP.		
Unit : 5	**APPLICATIONLAYER**	**13 hours**
APPLICATION LAYER : DNS– E-mail. NETWORK SECURITY: Cryptography– Symmetric Key Algorithms – Public Key Algorithms– Digital Signatures.		
Unit : 6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars - webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	ComputerNetworks,AndrewS.Tanenbaum,4thedition,PHI.*(UNIT-I:1.2-1.4UNIT-II:2.2-2.4UNIT-III:4.2-4.6UNIT-IV:5.2,5.3,6.2,6.5 UNIT-V:7.1,7.2,8.1-8.4)*

Reference Books

1	DataCommunicationandNetworks,AchyutGodbole,2007,TMH.
2	Computer Networks: Protocols,Standards,and Interfaces,UylessBlack,2nded,PHI
3	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	L	S	M	L	M	S	S
CO2	S	M	S	L	S	M	L	M	S	S
CO3	S	M	S	L	S	M	L	M	S	S
CO4	S	M	S	L	S	M	L	M	S	S
CO5	S	M	S	L	S	M	L	M	S	S

*S - Strong; M - Medium; L - Low

Course code		ORGANIZATIONAL BEHAVIOUR	L	T	P	C
Core/Elective /Supportive		Elective : I	6	0	0	4
Pre-requisite		Basic knowledge in human behavior skills	Syllabus		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To help the students to develop cognizance of the importance of human behaviour.
2. To enable students to describe how people behave under different conditions and understand why people behave as they do.
3. To provide the students to analyses specific strategic human resources demands for future action.
4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behavior and improve results.

Expected Course Outcomes:

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

1	demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.	K1
2	Develop Managerial skills for Individual Behaviors.	K2
3	Analyze the complexities associated with management of the group behavior in the organization. Analyze how to manage the Stress during a job.	K3
4	Develop an Organizational Behaviour model for any type of Organization.	K3
5	Analyze the Common biases and eradication in Decision Making Process.	K4

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION	15 hours

introduction to Organizational Behavior– Related Disciplines– Theoretical Framework– Organizational Approaches – Modern Organizational Scenario: Impactof Globalization

Unit : 2	INDIVIDUAL BEHAVIOR	15 hours

Individual Behavior– Perception– Process– Changes-Personality and Attitudes– Job Satisfaction

Unit : 3	MOTIVATION	15 hours

Motivation: need s, Content and Process: Motivation: Content Theories-ghh– Process Theories–

Contemporary Theories– Motivation Applied– Job Design and Goal setting. Leadership– Background– Process-Styles – Activities – Skills

Unit : 4	GROUP	15 hours

Group Dynamics – The nature of Informal Organizations – Formal Groups – Interactive conflict: Interpersonal conflict– Inter-group behavior and conflict– Negotiation Skills: Going beyond Conflict management– Traditional Negotiation Approaches-Contemporary

negotiation skills.

Unit : 5	COMMUNICATION	12 hours
Communication– Role and background– Interpersonal communication– Informal communication-The Decision Making process– Participative Decision making techniques– Organization design – culture– Organization change and development		
Unit : 6	Contemporary Issues	3 hours
Expert lectures, online seminars - webinars		
	Total Lecture hours	75 hours

Text Book(s)	
1	Fred Luthans, Organizational Behavior, 9th Edition, McGraw Hill Irwin, 2002.
2	John W. Newstorm and KeithDavis,OrganizationalBehavior,10th Edition.

Reference Books	
1	Robbins, S.P.,&Judge,T.(2013).Organizationalbehavior (15thed.).Boston:Pearson.
2	Newstrom J.W.,&Davis,K.(2011).Humanbehavioratwork (12thed.). Tata Mc Graw Hill

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	M	S	L	S	S	S	M	M
CO2	L	L	S	M	L	M	S	M	S	S
CO3	L	M	S	L	L	M	S	M	S	S
CO4	L	L	M	L	M	M	S	M	S	S
CO5	L	M	S	L	L	M	S	M	S	S

*S - Strong; M - Medium; L - Low

Course code		WEB PROGRAMMING	L	T	P	C
Core/Elective /Supportive		Skill Based Subject : 3	4	0	0	2
Pre-requisite		Basic knowledge in programming skills	Syllabus		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To study fundamental concepts in web programming
2. The focus in this course is on the World Wide Web as a platform for interactive applications, content publishing and social services.
3. The development of web-based applications requires knowledge about the underlying technology and the formats and standards the web is based upon.
4. To discuss various web programming challenges and solutions using technologies

Expected Course Outcomes:

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

1	To Understand Internet Fundamentals and HTML	K2
2	To Understand CSS & JAVASCRIPT	K3
3	To Server Side Scripting - PHP	K3
4	To Understand Database Handling, Content Management System	K4
5		

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Unit : 1	INTERNET FUNDAMENTALS	12 hours

Internet - Internet Protocol Address - Domain Names - World Wide Web - Web Browsers - Web Servers - URL - MIME - HTTP

Unit : 2	HTML	12 hours

HTML- tags- attributes - table - form - frame - format tags- image tags - embedding multimedia

Unit : 3	CSS & JAVASCRIPT	12 hours

CSS - Java script - programming - event handling - data validation - dynamic documents - positioning elements, moving elements, element visibility, font and colour changing, dynamic content

Unit : 4	SERVER SIDE SCRIPTING - PHP	12 hours

Server Side Scripting - Advantages of PHP - Installation & Configuration - PHP language elements - Data Types - Variables - Constants - Operators - Expressions - Control Structures - Arrays - Functions - Form Handling - Session - Cookie - page redirection - file uploading - file handling

Unit : 5	DATABASE HANDLING AND CONTENT MANAGEMENT SYSTEM	10 hours
PHP Database Interface - Web Hosting - Content Management System - Case Study of CMS : Joomla - The content structure - Templates - Menu links - Components - Modules -Text editors - Permissions		
Unit : 6	Contemporary Issues	2 hours
Expert lectures, online seminars - webinars		
	Total Lecture hours	60 hours

Text Book(s)	
1	Programming the World Wide Web -Robert W.Sebesta (Pearson Education) (Second Edition)
2	Beginning Web Programming with HTML, XHTML, CSS & JavaScript - John Duckett (Wiley DreamTech)-Second Edition
3	PHP and MySQL Web Development - Welling - (Pearson Education)-Fourth Edition

Reference Books	
1	Sams teach Yourself PHP in 24 hours - Zandstra - (Pearson Education)-Third Edition
2	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	M	L	M	S	S
CO2	S	M	S	L	S	M	L	M	S	M
CO3	S	S	S	L	S	M	L	M	S	S
CO4	S	M	S	L	S	M	L	M	S	M
CO5	S	S	S	L	S	M	L	M	S	S

*S - Strong; M - Medium; L - Low

Sixth

Semester

Course code		GRAPHICS & MULTIMEDIA	L	T	P	C
Core/Elective /Supportive		Core : 10	5	0	0	4
Pre-requisite		Basic knowledge in 2D, 3D and multimedia file formats	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. Design and apply two dimensional graphics and transformations.
2. Design and apply three dimensional graphics and transformations.
3. Apply Illumination, color models and clipping techniques to graphics.
4. Understood Different types of Multimedia File Format.

Expected Course Outcomes:

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

1	Explain applications, principles, commonly used and techniques of computer graphics and algorithms for Line-Drawing, Circle-Generating and Ellipse-Generating.	K2
2	Students will get the concepts of 2Dand3D,Viewing,Curvesandsurfaces,Hidden Line/surface elimination techniques	K3
3	Studies concepts of Multimedia Systems, Text, Audio and Video tools	K3
4	Compressingaudioandvideousing MPEG-1andMPEG-2	K4
5	Creates Animation with special effects using algorithms	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	OUTPUT PRIMITIVES	15 hours

Output Primitives: Points and Lines – Line-Drawing algorithms – Loading frame Buffer – Line function– Circle-Generating algorithms– Ellipse-generating algorithms. Attributes of Output Primitives: Line Attributes – Curve attributes – Color and Grayscale Levels – Area-fill attributes – Character Attributes.

Unit : 2	2D GEOMETRICTRANS FORMATIONS	15 hours

2DGeometric Transformations: Basic Transformations– Matrix Representations– Composite Transformations– Other Transformations. 2D Viewing: The Viewing Pipeline– Viewing Co-Ordinate Reference Frame– Window-to-View port Co-ordinate Transformation-2D Viewing Functions – Clipping Operations.

Unit : 3	TEXT	15 hours

Text: Types of Text – Unicode Standard – Font – Insertion of Text – Text compression – File formats. Image: Image Types – Seeing Color – Color Models – Basic Steps for Image Processing – Scanner – Digital Camera – Interface Standards – Specification of Digital Images – CMS – DeviceIndependentColorModels– ImageProcessingsoftware– FileFormats– ImageOutputonMonitorand Printer.

Unit : 4	AUDIO	15 hours
Audio: introduction – Acoustics– Nature of Sound Waves– Fundamental Characteristics of Sound – Microphone – Amplifier – Loudspeaker – Audio Mixer – Digital Audio – Synthesizers – MIDI – Basics of Staff Notation – Sound Card – Audio Transmission – Audio File formats and CODECs – Audio Recording Systems – Audio and Multimedia – Voice Recognition and Response – Audio Processing Software.		

Unit : 5	VIDEO AND ANIMATION	12 hours
Video:AnalogVideoCamera– TransmissionofVideoSignals– VideoSignalFormats– Television Broadcasting Standards – PC Video – Video File Formats and CODECs– VideoEditing– VideoEditingSoftware.Animation:TypesofAnimation– ComputerAssistedAnimation – Creating Movement – Principles of Animation – Some Techniques of Animation – Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio – MPEG-1Video -MPEG-2Audio – MPEG-2 Video.		

Unit : 6	Contemporary Issues	3 hours
Expert lectures, online seminars - webinars		

	Total Lecture hours	75 hours

Text Book(s)

1	ComputerGraphics,DonaldHearn,M.PaulineBaker,2ndedition,PHI.(UNIT-I:3.1-3.6,4.1-4.5& UNIT-II: 5.1-5.4,6.1-6.5)
2	PrinciplesofMultimedia,RanjanParekh,2007,TMH.(UNITIII:4.1-4.7,5.1-5.16UNIT-IV: 7.1-7.3,7.8-7.14,7.18-7.20,7.22,7.24,7.26-28UNIT-V:9.5-9.10,9.13,9.15,10.10-10.13)

Reference Books

1	Computer Graphics, Amarendra N Sinha,Arun D Udai,TMH.
2	Multimedia:MakingitWork,TayVaughan,7thedition,TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1	

Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	S	M
CO2	S	S	S	M	S	M	M	M	S	M
CO3	S	M	M	M	S	M	M	M	S	M
CO4	S	S	S	M	S	M	M	M	S	M
CO5	S	S	S	M	S	M	S	S	S	M

*S - Strong; M - Medium; L - Low

Course code		PROJECT WORK LAB	L	T	P	C
Core/Elective/Supportive		Core : 11	0	0	5	4
Pre-requisite		Students should have the strong knowledge in any One of the Programming languages in this course.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical skill for solving the selected task.
3. To getconfidenceforimplementingthetaskandsolvingtherealtimeproblems.
4. Express technical and behavioral ideas and thought in oral settings.
5. Prepare and conduct oral presentations

Expected Course Outcomes:

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

1	Formulatearealworldproblemanddevelopitsrequirementsdevelopadesignsolutionforaset of requirements.	K3
2	Testandvalidatetheconformanceofthedevelopedprototypeagainsttheoriginalrequirementsoftheproblem.	K5
3	Workasaresponsiblememberandpossiblyaleaderofateamindevelopingsoftwaresolutions.	K3
4	Express technical ideas, strategies and methodologies in written form. Self-learn new tools, algorithms and techniques that contribute to the software solution of the project.	K1-K4
5	Generate alternative solutions, compare them and select the optimum one.	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

AIMOFTHEPROJECTWORK

1. The aim of the project work is to acquire practical knowledge on the implementation of the Programming concepts studied.
2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papersstudiedorimplementationofanyinnovativeideafocusingonapplicationoriented concepts.
3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.

Viva Voce

1. Viva-Voce will be conducted at the end of the year by both Internal (Respective

Guides) and External Examiners, after duly verifying the **Annexure Report** available in the College, for a total of100 marks at the last day of the practical session.

1. Out of 100 marks, 25 marks for CIA and 75 for CEE (50 evaluation of project report + 25 VivaVoce).

Project Report Format

PROJECTWORK

TITLEOFTHEDISSERTATION

Bonafide Work Done

by STUDENT NAME

REG.NO.

Dissertationsubmittedinpartialfulfillmentoftherequirementsfortheawardo
f

<Name of the Degree>

of Bharathiar University,Coimbatore-46.

College Logo

Signature of the Guide

Signature of the HOD

Submitted for the Viva-Voce Examination held on _____

Internal Examiner

External Examiner

Month- Year

CONTENTS

Proposed System

Features

3. System Design and Development

File Design

Input Design

Output Design

Database

Design

System Development

Description of Modules (Detailed explanation about the project work)

4. Testing and Implementation

5. Conclusion

Bibliography

Appendices

A. Data Flow Diagram

B. Table Structure

C. Sample Coding

D. Sample Input

E. Sample Output

Course Designed By:

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

*S - Strong; M - Medium; L - Low

Course code		PROGRAMMING LAB – GRAPHICS & MULTIMEDIA	L	T	P	C
Core/Elective/Supportive		Core Lab : 7	0	0	5	2
Pre-requisite		Students should have the basic knowledge on C and C++ to do computer graphics and multimedia applications.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To learn the basic principlesof2-dimensional computer graphics.
2. Provideanunderstandingofhowtoscanconvertthebasicgeometricalprimitives, how to transform the shapes to fit them as per the picture definition.
3. Provide an understanding of mapping from a world coordinates to device coordinates, clipping and projections.
4. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization and business applications.
5. To comprehend and analyse the fundamentals of animation, virtual reality, underlying technologies, principles and applications.

Expected Course Outcomes:

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

1	Understand the basic concepts of computer graphics.	K1
2	Design scan conversion problems using C and C++Programming .	K2
3	Apply clipping and filling techniques for modifying an object.	K3
4	Understand the concepts of different type of geometric transformation of objects in 2D.	K4
5	Understand and develop the practical implementation of modeling, rendering, Viewing of objects in 2D	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Programs	36 hours
Graphics	

1. Write a program to rotate an image.
2. Write a program to drop each word of a sentence one by one from the top.
3. Write a program to drop a line using DDA Algorithm.
4. Write a program to move a car with sound effect.
5. Write a program to bounce a ball and move it with sound effect.
6. Write a program to test whether a given pixel is inside or outside or on a polygon.

Multimedia

7. Create Sun Flower using Photoshop.
8. Animate Plane flying in the Clouds using Photoshop.
9. Create Plastic Surgery for the Nose using Photoshop.
10. Create See-through text using Photoshop.

11. Create a Web Page using Photoshop.		
12. Convert Black and White Photo to Color Photo using Photoshop.		
	Total Lecture hours	36 hours

Text Book(s)	
1	ComputerGraphics,DonaldHearn,M.PaulineBaker,2nd edition,PHI.
2	PrinciplesofMultimedia,RanjanParekh,2007,TMH.
Reference Books	
1	Computer Graphics, Amarendra N Sinha,Arun D Udai,TMH.
2	Multimedia:MakingitWork,TayVaughan,7th edition,TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	M	S	M	L	L	M	L
CO3	S	S	S	M	M	M	M	M	M	L
CO3	S	S	S	M	S	M	M	M	M	L
CO4	S	S	S	S	S	M	M	M	M	M
CO5	S	S	S	S	S	M	S	S	S	M

*S - Strong; M - Medium; L - Low

Course code		NETWORK SECURITY AND CRYPTOGRAPHY	L	T	P	C
Core/Elective /Supportive		Elective : II	5	0	0	3
Pre-requisite		Basic knowledge on security threats in networking	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To learn the need for network security and security approaches.
2. To inculcate the concept of transferring authentic data along the network with several methods and algorithms.
3. To enrich the knowledge on different types of Internet Security Protocols.

Expected Course Outcomes:

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

1	Remember the basic concept of Cryptography and various types of attacks.	K1
2	Understand about various types of protocols for Internet Security.	K2
3	Implement various algorithms for Cryptography	K3
4	Review Firewall and IP security	K4
5	To be familiar with network security threats and counter measure	K3-K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	SERVICE MECHANISM	15 hours

Service mechanism and attacks– The OSI security architecture– A model for network security–

Symmetric Ciphermodel– Substitutiontechniques– transpositiontechniques– simplifieddes– blockchipperprinciples– the strength of des – block chipper design principles and modes of operation.

Unit : 2	TYPES OF DES	12 hours

Tripledes-blowfish– RCSAdvancedSymmetricBlockCiphers– RC4streamCipherconfidentiallyusingsymmetricencryption– introduction to number theory– public– key cryptography and RSA.

Unit : 3	KEY MANAGEMENT	15 hours

Key management– Diffle Hellman key exchange– message authentication and hash function– hash algorithm– digital signature and authentication protocols– digital signature standard.

Unit : 4	AUTHENTICATION	15 hours

Authentication application– pretty good privacy– S/MIME– ip security– web security considerations– secure socket layer transport layer security– secure electronic transaction.

Unit : 5	INTRUDERS	15 hours

Intruders– intrusion detection– password management– viruses and related threats– virus Counter measures– firewall design principles– trusted systems

Unit : 6	Contemporary Issues	3 hours

Expert lectures, online seminars – webinars		
	Total Lecture hours	75 hours

Text Book(s)	
1	WilliamStallings,CryptographyandNetworkSecurityPrinciplesandPractices,Fourthedition, PHIEducation Asia
Reference Books	
1	AtulKahate,CryptographyandNetworkSecurity,2ndEdition,TMH.
2	BehrouzA.Forouzan,CryptographyandNetworkSecurity,TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	L	L	L	S	S
CO2	S	M	S	L	S	L	M	L	S	S
CO3	S	S	S	L	S	L	M	L	S	S
CO4	S	M	S	L	S	L	M	L	S	S
CO5	S	S	S	L	S	L	M	L	S	S

*S - Strong; M - Medium; L - Low

Course code		ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	L	T	P	C
Core/Elective /Supportive		Elective : II	5	0	0	3
Pre-requisite		Basic knowledge on knowledge representation, Reasoning and problem solving skills	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To understand the basic concepts of Artificial Intelligence and Identify the AI problems and domains.
2. To provides e arch techniques to solve the problems.
3. To represent and access the domain specific knowledge.
4. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems

Expected Course Outcomes:

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

1	Understand the nature of AI problems and task domains of AI.	K1
2	Apply the appropriate search procedures to solve the problems by using best algorithms.	K2
3	Analyze and select the suitable knowledge representation method.	K3
4	Manipulate the acquired knowledge and infer new knowledge.	K4
5	demonstrate the development of AI systems by encoding the knowledge.	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION	15 hours

introduction : AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.

Unit : 2	HEURISTIC SEARCH TECHNIQUES	12 hours

Heuristic Search techniques : Generate and Test– Hill Climbing– Best-Fist, Problem Reduction, Constraint Satisfaction, Means-end analysis.

Unit : 3	KNOWLEDGE REPRESENTATION	15 hours

Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations– Issues in Knowledge representations– Frame Problem.

Unit : 4	PREDICATE LOGIC	15 hours

Using Predicate Logic: Representing simple facts in logic– Representing Instance and Isa relationships– Computable Functions and predicates– Resolution– Natural deduction.

Unit : 5	REPRESENTING KNOWLEDGE USING RULES	15 hours

Representing knowledge using rules: Procedural Vs Declarative knowledge– Logic Programming

– Forward Vs Backward reasoning – Matching – Control knowledge Brief explanation of Expert

Systems-Definition-Characteristics-architecture-KnowledgeEngineering-Expert System Life Cycle-Knowledge Acquisition Strategies-Expert System Tools.

Unit : 6	Contemporary Issues	3 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	75 hours

Text Book(s)

1	Artificial Intelligence, ElaineRichandKelvinKnight,TMH,2ndEdn,1991
2	Artificial Intelligence A Modern Approach, Stuart Russell & Peter Norvig, 2nd Edition Perason.

Reference Books

1	Artificial Intelligence,GeorgeFLuger,4thEdition,Pearson,2002.
2	Foundations of Artificial Intelligent and Expert Systems, VS JanakiRaman, K Sarukesi, P Gopalakrishnan, Mac Millan India limited.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	L	L	L	S	S
CO2	S	S	S	L	S	L	L	L	S	S
CO3	S	S	S	L	S	L	L	L	S	S
CO4	S	S	S	L	S	L	L	L	S	S
CO5	S	S	S	L	S	L	L	L	S	S

*S - Strong; M - Medium; L - Low

Course code		WEB TECHNOLOGY	L	T	P	C
Core/Elective /Supportive		Elective : II	5	0	0	3
Pre-requisite		Basic knowledge in web server, browser and web application	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies.
1. Students will gain the skills and project-based experience needed for entry into web application and development careers
3. Understand best technologies for solving web client/server problems
4. Use Javascript for dynamic effects and to validate for min put entry
5. Analyze to use appropriate client-side or Server-side applications

Expected Course Outcomes:

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

1	Understand and analyse the TCP/IP basics.	K1
2	Understand Domain server name, FTP, TFTP, basics of WWW, web browser architecture.	K2
3	Knowledge of Microsoft and java technologies, dynamic webpages, DHTML, ASP And JSP.	K2-K3
4	Understanding active webpages, JavaApplet, Javabean, CORBA, RMIandEDI architecture	K2-K3
5	Knowledge on XML, XML parser, WAP	K4-K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	TCP/IP	15 hours

TCP/IP: TCP/IP Basics – Why IP address – Logical Address - TCP/IP Example- The concept of IP address – Basics of TCP – Features of TCP – Relationship between TCP and IP– Ports and Sockets – Active Open and Passive Open - TCP Connections – What makes TCP reliable? – TCPPacketformat-PersistentTCPconnections– UDP– DifferencesbetweenTCPand UDP.

Unit : 2	DNS	12 hours

DNS– E-mail– FTP– TFTP– History of WWW– Basics of WWW and Browsing- Local Information on the internet – HTML – Web Browser Architecture– Web Pages and Multimedia– Remote Login (TELNET).

Unit : 3	INTRODUCTION TO WEBTECHNOLOGY	15 hours

introduction to Web Technology: Web pages– Tiers– concept of a Tier– Comparison of Microsoft and Java Technologies – Web Pages – Static Web Pages – Plug-ins – Frames – Forms. Dynamic Web Pages: need – Magic of Dynamic Web Pages – Overview of Dynamic Web Page Technologies – Overview of DHTML – Common Gateway Interface – ASP – ASP Technology – ASP Example– Modern Trends in ASP– Java and JVM– Java Servlets– Java Server Pages.

Unit : 4	ACTIVE WEB PAGES	15 hours
Active Web Pages: Active Web Pages in better solution – Java Applets – Why are Active WebPages Powerful? – Lifecycle of Java Applets – ActiveX Controls – Java Beans. Middleware and Component-Based E- Commerce Architectures: CORBA– Java Remote Method Invocation– DCOM. EDI: Overview – Origins of EDI – Understanding of EDI – Data Exchange Standards – EDI Architecture– Significance of EDI– Financial EDI– EDI and internet.		
Unit : 5	**XML**	**15 hours**
XML: SGML– Basics of XML– XML Parsers – need for a standard. WAP: Limitations of Mobile devices – Emergence of WAP – WAP Architecture – WAP Stack – Concerns about WAP and its future– Alternatives to WAP.		
Unit : 6	**Contemporary Issues**	**3 hours**
Expert lectures, online seminars – webinars		
	Total Lecture hours	**75 hours**

Text Book(s)

1	Web Technologies: TCP/IP to Internet Applications Architectures – Achyut S Godbole&AtulKahate,2007,TMH.*(UNIT-I:3.1-3.5,4.1-4.12UNIT-II:5.1-5.4,6.1-6.7 UNITIII:8.1-8.1,9.1-9.13UNITIV:10.1-10.7,15.1-15.3,16.1-16.8UNIT-V:17.1-17.4,18.1-18.6)*

Reference Books

1	Internet and Web Technologies, Rajkamal,TMH.
2	TCP/IPProtocolSuite,BehrouzA.Forouzan,3rdedition,TMH.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	L	L	L	S	S
CO2	S	S	S	M	S	M	L	L	S	S
CO3	S	S	S	L	S	M	M	M	S	S
CO4	S	S	S	M	S	L	M	L	S	S
CO5	S	S	S	L	S	L	M	L	S	S

*S - Strong; M - Medium; L - Low

Course code		DATA MINING	L	T	P	C
Core/Elective /Supportive		Elective : III	5	0	0	3
Pre-requisite		Basic knowledge on data, database, and statistical Functions	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

2.To introduce the concept of data Mining as an important tool for enterprise data management and cutting edge technology for building competitive advantage.

2. Toenablestudentstoeffectivelyidentifysourcesofdataandprocessitfordatamining

3. Tomakestudentswellversedinalldataminingalgorithms,methodsofevaluation.

4. To Impart knowledge of tools used for data mining

5. To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.

Expected Course Outcomes:

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

1	Identifydataminingtoolsandtechniquesinbuildingintelligentmachines understand	K1-K2
2	Analyzevariousdataminingalgorithmsinapplyinginrealtimeapplications.	K2-K4
3	demonstrate the data mining algorithms to combinatorialoptimizationproblems	K2-K3
4	Illustratetheminingtechniqueslikeassociation,classificationandclusteringon Transactional databases.	K2-K3
5	Perform exploratoryanalysisofthe dat atobeusedformining.	K3-K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	BASIC DATAMINING TASKS	15 hours

Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery in Data Bases – Data Mining Issues – Data Mining Matrices – Social Implications of Data Mining – Data Mining from Data Base Perspective.

Unit : 2	DATAMINING TECHNIQUES	12 hours

Data Mining Techniques– a Statistical Perspective on datamining– Similarity Measures– Decision Trees– Neural Networks– Genetic Algorithms.

Unit : 3	CLASSIFICATION	15 hours

Classification: introduction – Statistical– BasedAlgorithms– DistanceBasedAlgorithms– DecisionTree– BasedAlgorithms– Neural Network Based Algorithms– Rule Based Algorithms– Combining
Techniques.

Unit : 4	CLUSTERING	15 hours

Clustering: introduction – Similarity and Distance Measures– Outliers– Hierarchical Algorithms.
Partitioned Algorithms.

Unit : 5	ASSOCIATION RULES	15 hours
Association Rules: introduction – Large Item Sets– Basic Algorithms– Parallel & Distributed		

Algorithms– ComparingApproaches– IncrementalRules– – MeasuringtheQualityofRules.		
Unit : 6	Contemporary Issues	3 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	75 hours

Text Book(s)

1	MargaretH.Dunbam,DataMiningIntroductoryandAdvancedTopics,PearsonEducation – 2003.
2	ArunK.Pujari,“ DataMiningTechniques” ,UniversitiesPress,2010.

Reference Books

1	JiaweiHan&MichelineKamber,DataMining concept s&Techniques,2001AcademicPress.
2	K.P.Soman,ShyamDiwakar,V.Ajay,“ InsightintoDataMining– TheoryandPractice” ,PrenticeHall ofIndia, 2009.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	M	S	L	L	M	S	S
CO2	M	S	S	M	S	M	M	L	S	M
CO3	M	S	S	L	M	L	M	M	S	S
CO4	M	M	M	M	M	M	L	L	S	S
CO5	M	S	S	L	S	L	M	M	S	M

*S - Strong; M - Medium; L - Low

Course code		OPEN SOURCE SOFTWARE	L	T	P	C
Core/Elective /Supportive		Elective : III	5	0	0	3
Pre-requisite		Basic understanding in scripting language and SQL	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To expose students to free open source software environment and introduce them to use open source packages.
2. Demonstrate different open source technology like Linux, PHP & MySQL with different packages.
3. To understand open source software practices and tools.
4. To use the open source software in Operating Systems, Programming and web framework in approaching real time applications.

Expected Course Outcomes:

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

1	Understand the significance of open source practices and guidelines.	K2
2	Manipulate open source databases based on user requirements	K3
3	Implement web Programming with PHP	K3
4	Integrate open source web frameworks in an application	K4
5	Write desktop and web applications with Python	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Unit : 1	INTRODUCTION TOOPENSOURCE	15 hours

Introduction to open sources – need of open sources – advantages of open sources – application of open sources. Open source operating systems: LINUX: introduction – general overview – Kernel mode and user mode– process– advanced concepts– scheduling– personalities– cloning– signals– development with Linux.

Unit : 2	MYSQL	12 hours

MySQL: introduction – setting up account– starting, terminating and writing your own SQL programs– record selection Technology– working with strings– Date and Time– sorting Query results– generating summary– working with metadata– using sequences– MySQL and Web.

Unit : 3	PHP	15 hours

PHP: introduction – Programming in web environment– variables-constants– data types– operators – statements – Functions – arrays – OOP – string manipulations and regular expression – file handling and data storage – PHP and SQL database – PHP and LDAP – PHP connectivity – sending and receiving E-mails – debugging and error handling– security– templates.

Unit : 4	PYTHON	15 hours

Syntax and style– Python objects– numbers– sequences– strings– lists and tuples– dictionaries – conditional loops– files– input and output– errors and exceptions– Functions – modules– classe sand OOP – execution environment.

Unit : 5	PERL	15 hours
Pert backgrounder– pert overview– pearl parsing rules– variables and data– statements and control structures– subroutines-packagesandmodules– workingwithfiles– datamanipulation.		
Unit : 6	Contemporary Issues	3 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	75 hours

Text Book(s)

1	TheLinuxKernelBook,RemyCard,EricandFrankMevel,WileyPublications2003.
2	MySQLBible,SteveSuchring,JohnWiley2002.

Reference Books

1	Programming PHP,RasmusLerdorfandLevinTatroe,O_ Reilly,2002
2	CorePythonProgramming ,WesleyJ.Chun,PrenticeHall,200
3	Perl:The Complete Reference,2ndEdn,MartinC.Brown,TMH,2009
4	MySQL:The Complete Reference,2ndEdn,VikramVaswani,TMH,2009
5	PHP:The Complete Reference,2nd Edn,SteveHolzner,TMH2009.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

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Course Designed By:

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	S	L	L	M	S	S
CO2	S	S	S	M	S	M	L	L	S	M
CO3	S	S	S	L	M	L	L	M	S	S
CO4	S	M	S	M	M	M	L	L	S	S
CO5	S	M	S	L	S	L	L	M	S	M

*S - Strong; M - Medium; L - Low

Course code		INTERNET OF THINGS (IOT)	L	T	P	C
Core/Elective /Supportive		Elective : III	5	0	0	3
Pre-requisite		Students should have the basic understanding of Logical circuits and hardware architecture.	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. To learn the concepts of IoT and its protocols.
2. To learn how to analysis the data in IoT.
3. To develop IoT infrastructure for popular applications.
4. To report about the IoT privacy, security and vulnerabilities solution.

Expected Course Outcomes:

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

1	To understand the fundamentals of Internet of Things.	K1
2	Toknowthebasicsofcommunicationprotocolsandthedesigningprinciplesof Web connectivity.	K2
3	To gain the knowledge of Internet connectivity principles	K2-K3
4	Designing and develop smart city in IoT	K2-K3
5	Analyzing and evaluate the data received through sensors in IOT.	K4-K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Unit : 1	INTRODUCTION	15 hours

Introduction - Definition & characteristics of IoT - physical design of IoT - logical design of IoT -IoT enabling Technologies - IoT levels & Deployment templates. Domain specific IoTs :Home Automation - cities - Environment - Energy - retail - logistics - Agriculture - Industry i Health and lifestyle.

Unit : 2	IOT and M2M	12 hours

IoTandM2M-Deference between Iot andM2M-SDN and NFV for Iot-IoT systems management- SNMP - YANG-NETOPEER

Unit : 3	IOT SPECIFICATION	15 hours

IoT platforms design Methodology- purpose and specification-process specification-Domain model specification-Information model specification-Service specification-IoT level specification- functional view specification-operational view specification- Device and component Integrators – Application Development.

Unit : 4	LOGICAL DESIGN USING PYTHON	15 hours

Logical design using python - Installing python - type conversions - control flow - Functions -modules - File handling - classes. IoT physical devices and End points, building blocks of IoT device-Raspberry Pi-Linux on Raspberry Pi -RaspberryPi interfaces.

Unit : 5	IOTANDCLOUDCOMPUTING	15 hours

IoT physical servers & cloud computing-WAMP-Xively cloud for IoT-python Web application framework -Amazon web services for IoT.

Unit : 6	Contemporary Issues	3 hours
Expert lectures, online seminars – webinars		
	Total Lecture hours	75 hours

Text Book(s)	
1	Internet of Things- A hands on Approach Authors:Arshdeep Bahga,Vijay Madisetti Publisher:Universitiespress.

Reference Books	
1	Internet of Things-Srinivasa K.G., SiddeshG. M.HanumanthaRajuR. Publisher: Cengage LearningIndiapvt. Ltd (2018)

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	M	S	L	L	M	S	S
CO2	S	S	S	M	S	M	M	L	S	M
CO3	S	S	S	L	M	L	M	M	S	S
CO4	M	M	S	M	S	M	L	L	S	S
CO5	S	S	S	L	S	L	M	M	S	M

*S - Strong; M - Medium; L - Low

Course code		LAB : WEB PROGRAMMING LAB	L	T	P	C
Core/Elective/Supportive		Skill Based Subject Lab: 4	0	0	3	2
Pre-requisite		Basic knowledge on web programming	Syllabus Version		2025-26 onwards	

Course Objectives:

The main objectives of this course are to:

1. Apply the knowledge to manage and to handle web site design and development to solve the real world problems.
2. Gain a reputed designation as good web designer and web developer ethically by applying advance web technologies.
3. Be successfully accepted in future's development scenario as an engineering graduate pursuit of lifelong learning.
4. Exhibit team spirit management & effective communication dealings.

Expected Course Outcomes:

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

1	Graduates will demonstrate an ability to identify formulate and solve the web based problems.	K1
2	Ability to apply conceptual skills of web site design and development.	K2
3	Graduate can participate and succeed in competitive examinations	K3
4	Graduate will show the understanding of impact of Computer engineering solutions on the society and also be aware of contemporary issues.	K4-K6
5		

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Programs

1. Create web pages to understand the various server controls
2. Create web pages to understand and use to validate user inputs.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use userd efined function)
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year
7. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
8. Write a program in PHP to change background color based on day of the week using if else if statements and using arrays .
9. Write a simple program in PHP for i) generating Prime number ii) generate Fibonacci series
10. Write a program in PHP to Validate Input
11. Write a PHP program to Create a simple webpage of a college
12. Write a PHP program to store current date-time in a COOKIE and display the ' Last visited on' date-time on the web page upon reopening of the same page.

Text Book(s)	
1	
Reference Books	
1	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
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Course Designed By:	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	S	M	S	M	M	M	S	S
CO3	S	S	M	M	S	M	M	L	S	M
CO3	S	S	S	S	M	L	M	M	S	S
CO4	M	M	M	M	M	M	L	L	S	S
CO5	M	S	S	L	S	L	M	M	S	M

*S - Strong; M - Medium; L - Low

Internship Training
(During the vacation of Fourth Semester and viva voce examination to be conducted along with fifth semester practical examination)

1. The aim of the Internship Training is to acquire practical knowledge on the implementation of the programming concepts studied.
2. To observe orientation to the company, its structure, and its products/services.
3. Direct engagement with assigned tasks and projects under the supervision of a mentor.
4. **Reporting and Evaluation:** Regular submission of progress reports and feedback sessions.
5. **Final Report and Presentation:** Completion of a final report summarizing the internship experience and potentially a presentation to showcase their work.

Viva Voce

1. Viva-Voce will be conducted at the end of the Fifth semester by both Internal (Respective Guides) and External Examiners, after duly verifying the training report in the college, for a total of 75 marks [CIA : 30 Marks and CEE : 45 Marks]

2. External Mark Split up (45 marks) :

Internship Training Report	25 marks
Viva PPT Presentation	10 marks
Viva Voce	10 Marks