



MCA

(MASTER OF COMPUTER APPLICATIONS)

CURRICULUM

2026 REGULATION

MASTER OF COMPUTER APPLICATIONS

(MCA)

2026 REGULATION

CURRICULUM

&

SYLLABUS

BRIDGE COURSE- 2026 SCHEME

COURSE CATEGORY	COURSE CODE	COURSE NAME	L	T	J	P	S	CREDIT / SEM.
B	A260101	Elementary Mathematics for Computer Science	5	0	0	0	5	NIL
B	A260102	Foundations of Computing and Digital Systems	5	0	0	0	5	
B	A260103	Programming Concepts using C	5	0	0	5	5	
B	A260104	Digital Productivity Tools	0	0	0	4	5	

2026 SCHEME

SEM	SLOT	COURSE CATEGORY	COURSE CODE	COURSE NAME	L	T	J	P	S	C	CREDIT / SEM.
I	A	PCT	A260201/MA100A	Mathematical and Statistical Foundations for Computing	2	1	0	0	3	3	24
	B	PCT	A260201/CA100B	Digital Design and Computer Architecture	2	1	0	0	3	3	
	C	PCT	A260201/CA100C	Software Engineering and Project Management	2	1	0	0	3	3	
	D	PCE	A260201/CA110D	Data Structures	2	1	0	3	3	5	
	E	PCE	A260201/CA110E	Problem Solving using Python	2	1	0	3	3	5	
	F	PCE	A260201/CA120F	Web Application Development	2	1	1	2	3	5	
	U	SEC	A260201/CA130U	Skill Enhancement Course I	0	0	0	1	0	0	
II	A	PCT	A260201/CA200A	Foundations of Cyber Security	2	1	0	0	3	3	25
	B	PCT	A260201/CA200B	Design and Analysis of Algorithm	2	1	0	0	3	3	
	C	PET	A260201/CA21*C	Programme Elective I	2	1	0	0	3	3	
	D	PCE	A260201/CA210D	Advanced Database Management Systems	2	1	1	2	3	5	
	E	PCE	A260201/CA210E	Object Oriented Programming using Java	2	1	1	2	3	5	
	F	PCE	A260201/CA220F	Machine Learning	2	1	0	3	3	5	
	W	SEC	A260201/CA200W	First NPTEL course						1	
III	A	PCT	A260201/CA300A	Computer Networks and Security	2	1	0	0	3	3	21
	B	PET	A260201/CA31*B	Programme Elective II	2	1	0	0	3	3	
	C	PET	A260201/CA32*C	Programme Elective III	2	1	0	0	3	3	
	D	PCE	A260201/CA310D	Mobile Application Development Lab	2	1	1	2	3	5	
	E	PCE	A260201/CA310E	Operating System	2	1	0	3	3	5	
	K	PCR	A260201/CA300K	Mini Project	0	0	4	0	4	2	
	U	SEC	A260201/CA330U	Skill Enhancement Course II	0	0	0	1	0	0	

IV	A	PCT	A260201/CA400A	Comprehensive Viva	0	0	0	0	3	3	20
	B	PRS	A260201/CA400B	Research Seminar	0	2	0	0	2	2	
	K	PCR	A260201/CA400K	Main Project	0	0	27	0	12	14	
	W	SEC	A260201/CA400W	Second NPTEL course						1	
Total Earned Credits											90
Mandatory Student Activities											1
MANDATORY TOTAL CREDITS FOR AWARD OF DEGREE											90+1=91
<i>(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work, C- Credit)</i> <i>(PCT- Programme Core Theory, PCE- Programme Core lab Embedded, PET- Programme Elective Theory, SEC- Skill Enhancement Course, PCR- Programme Core Project, PRS- Programme Research Seminar)</i>											

PROGRAMME ELECTIVE	SEMESTER	ELECTIVE BASKET(S)
Programme Elective I*	II	1. Technology Management 2. Artificial Intelligence and Data Science 3. Cyber Security and Forensics
Programme Elective II*	III	Same basket selected for Programme Elective I
Programme Elective III	III	Emerging Computing Technologies

* For Semester II – Programme Elective I, there are three elective baskets. A student shall choose any one basket in Semester II and continue with the same basket in Semester III for Programme Elective II. Only one course from a basket will be offered/active at a time.

Note:

1. Students shall select one elective basket for Programme Elective I during Semester II.
2. The same elective basket shall be continued for Programme Elective II in Semester III.
3. Programme Elective III shall be offered under the Emerging Computing Technologies basket.

2026 SCHEME

BRIDGE COURSE

COURSE CATEGORY	COURSE CODE	COURSE NAME	L	T	J	P	S	CREDIT / SEM.
B	A260101	Elementary Mathematics for Computer Science	5	0	0	0	5	NIL
B	A260102	Foundations of Computing and Digital Systems	5	0	0	0	5	
B	A260103	Programming Concepts using C	5	0	0	5	5	
B	A260104	Digital Productivity Tools	0	0	0	4	5	
<i>*Bridge Course: Every enrolled student shall undergo the prescribed Bridge Course of two weeks duration.</i>								
<i>*Successful completion of the Bridge Course shall be mandatory for registration to the First Semester End Semester Examination.</i>								

2026 SCHEME

SEMESTER 1

SEM	SLOT	COURSE CATEGORY	COURSE CODE	COURSE NAME	L	T	J	P	S	C
I	A	PCT	A260201/MA100A	Mathematical and Statistical Foundations for Computing	2	1	0	0	3	3
	B	PCT	A260201/CA100B	Digital Design and Computer Architecture	2	1	0	0	3	3
	C	PCT	A260201/CA100C	Software Engineering and Project Management	2	1	0	0	3	3
	D	PCE	A260201/CA110D	Data Structures	2	1	0	3	3	5
	E	PCE	A260201/CA110E	Problem Solving using Python	2	1	0	3	3	5
	F	PCB	A260201/CA120F	Web Application Development	2	1	1	2	3	5
	U	SEC	A260201/CA130U	Professional Software Development Practices	0	0	0	1	0	0
					12	6	1	9	18	24
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work, C- Credit) (PCT- Programme Core Theory, PCE- Programme Core lab Embedded, PET- Programme Elective Theory, SEC- Skill Enhancement Course, PCR- Programme Core Project, PRS- Programme Research Seminar)										

COURSE DESCRIPTION							
REGULATION	2026	L-T-J-P-S	2-1-0-0-3	VERSION	26/0	CREDITS	3
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
A260201/MA100A	MATHEMATICAL AND STATISTICAL FOUNDATIONS FOR COMPUTING	PCT
PRE-REQUISITE		
A basic knowledge in set theory, matrix algebra and statistics.		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S	90	C	CIA	ESE	Total	CIA	ESE	Total	
2	1	0	0	3			3	40	60	100	-	-	-
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Linear Algebra	Linear system of equations, Gauss elimination method, Determination of eigenvalues and eigenvectors, Diagonalization of matrix, Quadratic forms. [Text 1: Relevant topics from sections 7.3, 7.4, 7.5, 8.1, 8.4]	7
2	Graph Theory	Graph Terminology, Graph Models, Representing Graphs and Graph Isomorphism, Connectivity, Shortest-Path Problems, Planar Graphs. [Text 2: Relevant topics from sections 9.1 to 9.7]	8
3	Number Theory and Recurrence relations	Division Algorithm, GCD, Primes, Euclidean Algorithm, Congruences, Solutions of Linear Congruences, Chinese Remainder Theorem, Recurrence Relations. [Text 3: Relevant topics from sections 2.2 to 2.5, 4.1 to 4.4, Text 2: Relevant topics from sections 7.2]	8
4	Statistics	Measures of Central Tendency (Raw data, grouped data), Measures of dispersion, Skewness, Kurtosis, Bivariate data – Scatter Diagram, Linear correlation and regression, Principle of least squares, Curve fitting. [Text 4: Relevant topics from sections 2.4 to 2.9, 2.12, 2.13, 2.14, 2.16, 2.17, 10.1 to 10.4, 10.7, 11.1 to 11.3]	7

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Advanced Engineering Mathematics	Erwin Kreyszig	10th ed., Wiley
2	Discrete mathematics and its applications	Kenneth H. Rosen	McGraw-Hill, (8th Edition),
3	Elementary Number Theory	David M. Burton	McGraw-Hill, 7th Edition
4	Fundamentals of Mathematical Statistics	Gupta S.C and Kapoor V. K	Sultan Chand and Sons 11 th edition.

Reference			
Sl. No.	Title of Book	Author	Publication
1	Linear Algebra and its Applications	Gilbert Strang	S. Chand Company Ltd, 4 th edition

2	Discrete and Combinatorial Mathematics: An applied introduction	Ralph P Grimaldi	Pearson Education, 5 th Edition
3	Elementary Number Theory	David M. Burton	McGraw-Hill, 7 th Edition
4	Probability and Random Process	Veerarajan T	Tata McGraw-Hill, 3 rd edition

Web Resource	
1	NPTEL COURSE ON LINEAR ALGEBRA https://youtube.com/playlist?list=PLFW6lRTa1g80fZ1giRbqbe_XdXPdkkyqY&si=ng790dWbHs0eaNGU
2	NPTEL COURSE ON GRAPH THEORY https://youtube.com/playlist?list=PLEAYkSg4uSQ2fXcfrTGZdPuTmv98bnFY5&si=xLn5XiQqi5xtDuh
3	NPTEL COURSE ON NUMBER THEORY https://www.youtube.com/watch?v=u7cBLb0b7pk&list=PL0zRYVm0a65fuj_5fuj1BLcQNULrM4Irj
4	LECTURE ON THE TOPIC BIVARIATE DATA https://youtu.be/Ro5N7DcZ-cQ?si=3Ai39Z-p2K1u8CRl

COURSE DESCRIPTION							
REGULATION	2026	L-T-J-P-S	2-1-0-0-3	VERSION	26/0	CREDITS	3
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
A260201/CA100B	DIGITAL DESIGN AND COMPUTER ARCHITECTURE	PCT
Pre-Requisite		
Basic knowledge of computer fundamentals, binary number system and logic gates.		

TEACHING AND ASSESSMENT SCHEME									
Teaching Scheme / Week					Credit	Hours / Semester	Examination Scheme		
L	T	J	P	S	C		Theory		
							CIA	ESE	Total
2	1	0	0	3	3	90	40	60	100
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination									

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs:
1	Digital Logic Fundamentals	Boolean Algebra: Laws and Theorems, De Morgan's theorem, SOP, POS Simplification of Boolean Expressions: Algebraic method, Karnaugh map method	12
2	Digital Circuits	Combinational circuits: Adders-Half adder and full adder, Multiplexer, Demultiplexer, Encoder, Decoder Sequential Circuits: Flipflops, Registers- SISO, SIPO, PISO, PIPO	12
3	Functional Organization of Computer Systems	Input/Output Organization: I/O interface, Interrupts, DMA ALU: ALU operations, Status flags Control Unit: Hardwired, Microprogrammed control Memory: Memory hierarchy, Primary memory, Cache memory	12
4	Advanced Computer Architecture	Instruction Pipelining: Architecture, Stages, Hazards Parallel Processing: Concepts, Flynn's classification Interconnection Networks: Types Modern Processor Architecture: RISC, CISC, GPU, ARM architecture	12

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Digital Design and Computer Architecture	Sara Harris and David Harris	Elsevier, 1 st edition, 2021
2	Computer Organization and Design	Carl Hamacher, Vranesic, Zaky	5th Edition, McGraw Hill, 2002
3	Computer Organization and Architecture: Designing for Performance	William Stallings	Pearson Education, 11th Edition, 2022
4	Fundamentals of Digital Circuits	A Anand Kumar	PHI Learning, 4 th edition, 2016

Reference			
Sl. No.	Title of Book	Author	Publication
1	Digital Logic and Computer Design	M Morris Mano	Pearson, 1 st edition, 2004
2	Computer Architecture: A Quantitative Approach	John L Hennessy, David A Patterson	Morgan Kaufmann, 6 th edition, 2017

Web Resource	
1	https://www.geeksforgeeks.org/digital-logic/digital-electronics-logic-design-tutorials/
2	https://www.geeksforgeeks.org/computer-organization-architecture/computer-organization-and-architecture-tutorials/

COURSE DESCRIPTION							
REGULATION	2026	L-T-J-P-S	2-1-0-0-3	VERSION	26/0	CREDITS	3
<i>(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)</i>							

COURSE CODE	COURSE NAME	COURSE CATEGORY
A260201/CA100C	SOFTWARE ENGINEERING AND PROJECT MANAGEMENT	PCT
Pre-Requisite		
Basic understanding of programming concepts and the software development process.		

TEACHING AND ASSESSMENT SCHEME									
Teaching Scheme / Week					Credit	Hours / Semester	Examination Scheme		
L	T	J	P	S	C		Theory		
							CIA	ESE	Total
2	1	0	0	3	3	90	40	60	100
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination									

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Introduction to Software Engineering and Requirements Engineering	Software Engineering Fundamentals: Software, Software Engineering, Generic Process Framework Software Process Models: Waterfall, Incremental, Prototyping, Spiral, Agile model Requirements Engineering: Requirements Engineering Process, Software Requirements Specification (SRS)	12

2	Software Design, Quality and Testing	Software Design: Design concepts and Principles Software Quality: Quality concepts, Software Quality Assurance (SQA), Reviews Software Testing: Testing Strategy, Testing techniques Software Maintenance: Introduction, Types	12
3	Software Project Planning and Estimation	Software Project Management: Project Management Concepts, Life Cycle, Project Manager Project planning: Scope, Objectives, Milestones Project Estimation: Size, Cost, Effort Estimation Project scheduling: Activity sequencing and Scheduling	12
4	Project Monitoring, Risk and Configuration Management	Project Monitoring and Control, Risk Management Software Configuration Management (SCM): Activities of SCM, Version Control Using Git Continuous Integration and Continuous Delivery/Deployment (CI/CD): Concepts, pipeline stages Emerging Trends in Software Project Management: AI Assisted, Cloud based, Hybrid Agile Project Management	12

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Software Engineering: A Practitioner's Approach	Roger S. Pressman and Bruce R. Maxim	9th Edition, McGraw-Hill Education, 2019
2	Software Project Management	Bob Hughes, Mike Cotterell and Rajib Mall	5th Edition, PHI Learning Pvt. Ltd., 2018
3	Software Engineering	Ian Sommerville	10th Edition, Pearson Education, 2016

Reference			
Sl. No.	Title of Book	Author	Publication
1	Fundamentals of Software Engineering	Rajib Mall	5th Edition, PHI Learning Pvt. Ltd., 2018
2	Information Technology Project Management	Kathy Schwalbe	10th Edition, Cengage Learning, 2022
3	A Guide to the Project Management Body of Knowledge (PMBOK Guide)	Project Management Institute (PMI)	7th Edition, Project Management Institute, 2021

Web Resource	
1	Project Management Institute (PMI): https://www.pmi.org
2	The Scrum Guide: https://scrumguides.org
3	Git Documentation: https://git-scm.com/doc
4	Software Engineering Institute (SEI), Carnegie Mellon University – https://www.sei.cmu.edu

COURSE DESCRIPTION							
REGULATION	2026	L-T-J-P-S	2-1-0-3-3	VERSION	26/0	CREDITS	5
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
A260201/CA110D	DATA STRUCTURES	PCE
PRE-REQUISITE		
A solid understanding of basic data structures and fundamentals of programming in C		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S	150	C	CIA	ESE	Total	CIA	ESE	Total	
2	1	0	3	3		150	5	25	40	65	20	15	35
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Basic Data Structures	Basic Data Structures: - Arrays and its Operations, Stack, Queue and its Applications, Circular Queue, Linked List- Singly LL, DLL, CLL., Header Linked List, Linked Stack and Linked Queue, Introduction to Tree	12
2	Advanced tree structures	Advanced Tree Structures: - Balanced Binary Search trees, Red-Black trees- Properties of Red Black trees, Rotations, Insertion, Deletion. B-Trees- Basic operations on B-Trees – Insertion and Deletion, Introduction to Splay Trees and Suffix Trees.	12
3	Amortised Analysis and Advanced Heap structures	Amortised Analysis - Aggregate, Accounting and Potential Methods (using the examples Multipop Stack and Incrementing Binary Counter only). Advanced Heap Structures: - Mergeable Heaps and operations on Mergeable Heaps. Binomial Heaps, Binomial Heap operations and Analysis, Fibonacci Heaps, Fibonacci Heap operations and Analysis.	12
4	Advanced Graph Structures	Advanced Graph Structures: - Representation of graphs, Depth First and Breadth First Traversals, Topological Sorting, Strongly connected Components and Biconnected Components Minimum Cost Spanning Tree algorithms- Prim's Algorithm, Kruskal' Algorithm, Shortest Path Finding algorithms – Dijkstra's single source shortest paths algorithm.	10

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Introduction to Algorithms	Cormen T.H., Leiserson C.E, Rivest R.L. and Stein C	Prentice Hall India, New Delhi, 4 th edition, 2022
2	Classic Data structures	D.Samantha	Prentice Hall India, New Delhi, 2009

Reference			
Sl. No.	Title of Book	Author	Publication
1	Data Structures – a pseudocode approach with C	Richard F Gilberg, Behrouz A Forouzan	Thomson Learning, 2nd Edition, Cengage Learning C, 2005, ISBN-13: 9780534390808

2	Fundamentals of Data Structures In C	Ellis Horowitz and Sartaj Sahni	Orient Blackswan, 2008, ISBN: 9788173716058, 8173716056
3	Data Structures, Algorithms, and Applications in C++	Sahni S	Mc Graw Hill, 2000, ISBN-13: 978- 0072362268
4	Data Structures and Algorithms	Aho A.V., Hopcroft J.E., and Ullman J.D.	Pearson Education, New Delhi, 1983, ISBN 13: 9780201000238

Web Resource	
1	http://www.digimat.in/nptel/courses/video/106102064/L01.html
2	https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
3	https://www.programiz.com/dsa/stack
4	https://www.geeksforgeeks.org/queue-data-structure/
5	https://www.upgrad.com/blog/sorting-in-data-structure-with-examples/
6	https://www.javatpoint.com/hasing-in-data-structure
7	https://www.geeksforgeeks.org/applications-advantages-and-disadvantages-of-set/
8	https://www.tutorialspoint.com/time-and-space-complexity-in-data-structure
9	https://www.scholarhat.com/tutorial/datastructures/avl-tree-in-data-structures
10	https://www.javatpoint.com/daa-red-black-tree
11	https://www.baeldung.com/cs/b-tree-data-structure

LAB COMPONENT DESIGN				
Objectives	Topic	CO	Learning Domain Level (C)	Hrs
Implement array operations and solve array-based problems.	Array Operations – Traversal, Insertion, Deletion, Searching, Updating; Merge Two Sorted Arrays into a Third Array	CO1	A	3
Develop programs to implement stack and queue data structures.	Stack – Push, Pop, Peek; Applications – Expression Evaluation, Infix to Postfix Conversion; Queue – Enqueue, Dequeue, Circular Queue	CO1	A	4
Develop programs using singly linked lists for dynamic data management.	Singly Linked List – Creation, Traversal, Insertion, Deletion, Searching	CO1	A	3
Implement advanced linked list structures and their operations.	Doubly Linked List, Circular Linked List, and Header Linked List	CO1	A	2
Implement the basic operations of linked implementations of linear data structures.	Linked Stack – Push, Pop, Peek; Linked Queue – Enqueue, Dequeue	CO1	A	2
Implement the basic operations of Balanced Binary Search Trees.	Balanced Binary Search Trees – Construction, Searching, Insertion, and Deletion	CO2	A	2
Develop programs to implement Red-Black Tree operations while maintaining tree properties.	Red-Black Trees – Rotations, Insertion, Deletion, and Verification of Red-Black Properties	CO2	A	4
Implement the basic operations of B-Trees.	B-Trees – Insertion and Deletion	CO2	A	2
Develop programs to implement the basic operations of Binomial Heaps.	Binomial Heaps – Make-Heap, Insert, Minimum, Extract-Min, Union, Decrease-Key, and Delete	CO3	A	4
Develop programs to implement the basic operations of Fibonacci Heaps.	Fibonacci Heaps – Make-Heap, Insert, Minimum, Extract-Min, Union, Decrease-Key and Delete	CO3	A	4
To develop the ability to apply graph traversal, connectivity, spanning tree, and shortest path algorithms for efficient problem-solving in graphs.	Graph Traversal techniques (DFS and BFS) and Topological Sorting	CO4	A	2

Develop programs to represent graphs and implement graph traversal and ordering algorithms.	Graph Representation (Adjacency Matrix and Adjacency List), Depth First Search (DFS), Breadth First Search (BFS), and Topological Sorting	CO4	A	2
Develop programs to implement minimum spanning tree and shortest path algorithms.	Prim's Algorithm, Kruskal's Algorithm, and Dijkstra's Single Source Shortest Path Algorithm	CO4	A	2

COURSE DESCRIPTION

REGULATION	2026	L-T-J-P-S	2-1-0-3-3	VERSION	26/0	CREDITS	5
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
A260201/CA110E	PROBLEM SOLVING USING PYTHON	PCE
PRE-REQUISITE		
Basic computer knowledge and problem-solving skills. No prior programming experience required.		

TEACHING AND ASSESSMENT SCHEME

Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
L	T	J	P	S	150	C	Theory			Practical			Total
							CIA	ESE	Total	CIA	ESE	Total	
2	1	0	3	3	150	5	25	40	65	20	15	35	100
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)

Module	Title	Major Topics	Hrs
1	Python Fundamentals	Python basics: Identifiers, Keywords, Data types, Execution environment Operators: Types, Precedence, Associativity Expressions: Types, Expression evaluation Control structures: Decision making, Iterative statements, Nested Loops	10
2	Python Data Structures and Functions	Strings, lists, tuples, dictionaries: Creating and accessing, Operations Functions: Defining and calling functions, Parameters, Recursion, Modules and packages: Concept, Importing	11
3	File Processing and Exception Handling	File handling: Concepts, Modes, Operations Directory handling, Exception handling Regular expressions: Introduction, Pattern matching	10
4	Object Oriented Programming (OOP) using Python	Introduction, OOP concepts: Classes, objects, constructors, inheritance, polymorphism, encapsulation	11

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Problem Solving and Python Programming	S.A. Kulkarni	Yes Dee Publishing, 2nd edition, 2019
2	Introduction to Computing and Problem Solving with Python	Jeeva Jose & P. Sojan Lal	Khanna Publishers, 1st edition, 2016

Reference

Sl. No.	Title of Book	Author	Publication
1	Learning Python	Mark Lutz	O'Reilly Media, 6th edition, 2025

2	Think Python	Allen Downey	O'Reilly Media, 2nd edition, 2015
3	Python Crash Course	Eric Matthes	No Starch Press, 3rd edition, 2023

Web Resource / Virtual Lab			
1	https://pythontutor.com/		
2	https://docs.python.org/3/		
3	https://www.programiz.com/python-programming		

LAB COMPONENT DESIGN				
Objectives	Topic	COs	Learning Domain Level (C)	Hrs
To apply Python programming fundamentals, operators, expressions and control structures.	Programs using variables, operators, expressions, conditional and looping statements.	CO1	A	7
To develop Python programs using functions and built-in data structures.	Programs using strings, lists, tuples, dictionaries, functions, recursion and modules.	CO2	A	7
To apply file handling, exception handling, and regular expressions in Python applications.	Programs using file handling, exception handling and regular expressions.	CO3	A	7
To implement object-oriented Python programs using classes, inheritance, and polymorphism.	Programs using classes, objects, constructors, inheritance, polymorphism, and encapsulation.	CO4	A	7

COURSE DESCRIPTION							
REGULATION	2026	L-T-J-P-S	2-1-1-2-3	VERSION	26/0	CREDITS	5
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
A260201/CA110F	WEB APPLICATION DEVELOPMENT	PCE
PRE-REQUISITE		
Basic understanding of computer programming, internet and, database will be very helpful.		

TEACHING AND ASSESSMENT SCHEME													
Teaching Scheme / Week					Hours / Semester	Credit	Examination Scheme						
							Theory			Practical			Total
L	T	J	P	S	150	C	CIA	ESE	Total	CIA	ESE	Total	
2	1	1	2	3		150	5	25	40	65	20	15	35
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination													

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Web Page Design using HTML, CSS and JavaScript	Introduction to Web, Client/Server concepts, Components of Web Applications, Types of Web Content, HTTP request-response cycle, Dynamic web pages, Application Servers, Web Security, HTML formatting, Images, Hyperlinks, Lists, Tables, Frames, Forms. CSS syntax and structure, Inline/Internal/External CSS, Text formatting, Margins, Padding, Positioning using CSS.	14

		JavaScript fundamentals, Data types, Variables, Operators, Functions, Arrays, Event Handling, Form Handling and Validation.	
2	Dynamic Web Programming using Client-Side and Server-Side Scripting	Advanced JavaScript concepts, Dynamic content generation. PHP environment setup, PHP basics, Variables, Arrays, Operators, Control Structures, Functions, Reading web form data, Embedding PHP within HTML	8
3	Database Connectivity and Web Application Integration	Relational Database concepts, Tables, Keys, Indexes, SQL Commands (DDL and DML), Establishing database connectivity using PHP, Database interaction, Data storage, retrieval and processing	8
4	Web Application Development and Deployment	Web application development using HTML-JavaScript-PHP-MySQL. Front-end and back-end integration, Form processing and validation, Dynamic web application deployment, Micro Project	8

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works	Douglas E Comer	5th Edition, Chapman and Hall/CRC, 2018
2	Database System Concepts	Abraham Silberschatz, Henry F. Korth, S. Sudarshan	McGraw Hill Education ISBN: 9780078022159, 7th Edition (2019),

Reference			
Sl. No.	Title of Book	Author	Publication
1	JavaScript: The Definitive Guide	David Flanagan	7th Edition, O'Reilly Media, 2020
2	Internet and World Wide Web - How to Program	Harvey Deitel and Abbey Deitel	Fifth Edition, published in 2018, Pearson Education
3	PHP6 and MySQL 6 Bible	Steve Suehring, Tim Converse, and Joyce Park	Wiley India Pvt Ltd (2022)
4	PHP-The Complete Reference	Steven Holzner	McGraw Hill Education, Indian Edition (2017)
5	JavaScript: The Complete Reference	Thomas A Powell, Fritz Schneider	3rd Edition, Tata McGraw Hill, 2012

Web Resource / Virtual Lab	
1	http://php.net/manual/
2	https://pepa.holla.cz/wp-content/uploads/2016/08/JavaScript-The-Definitive-Guide-6th-Edition.pdf
3	http://index-of.es/PHP/PHP6%20and%20MySQL%20Bible.pdf
4	https://www.udemy.com/course/html5-fundamentals-for-beginners/
5	https://www.udemy.com/course/programming-in-javascript/
6	https://www.udemy.com/course/php-mysql-tutorial/

LAB COMPONENT DESIGN				
Objectives	Topic	CO	Learning Domain Level (C)	Hrs
To provide foundational knowledge of markup languages and their features for creating interactive and well-structured web pages.	Introduction to Web and HTML: Simple HTML file creation to demonstrate the use of different tags.	CO 1	A	1
	HTML Links and Tags: HTML file creation to link to different HTML pages that contain images, Lists, Tables, and also links within a page.	CO 1	A	2
	HTML Frames: HTML page creation with different types of frames	CO 1	A	1

	Introduction to CSS: HTML file creation by applying the different styles using inline, external & internal style sheets.	CO 1	A	1
	HTML Forms Creation: Registration form creation using HTML.	CO 1	A	1
To develop skills in client-side scripting for implementing validation and enhancing user interaction.	Introduction to JavaScript: HTML page creation to explain the use of various predefined functions in a string and math object in java script.	CO 1	A	2
	Client Side Scripting using JavaScript: Calendar generation using JavaScript code by getting the year from the user.	CO 1	A	1
	Registration form Validation using JavaScript HTML registration form creation and validation of the form using JavaScript code.	CO 1	A	2
	JavaScript Event Handling: HTML page creation to change the background color for every click of a button using JavaScript Event Handling.	CO 1	A	1
	JavaScript Event Handling: HTML page creation to display a new image and text when the mouse comes over the existing content in the page using JavaScript Event Handling.	CO 1	A	1
	JavaScript Script Application: HTML page creation to show an online exam using JavaScript.	CO 1	A	1
To impart practical experience in both client-side and server-side scripting for building functional web components.	Introduction to PHP: Registration form creation using PHP and performing necessary validations.	CO 2	A	2
	Server-Side Scripting using PHP: Electricity bill generation from user input based on a given tariff using PHP.	CO 2	A	2
	PHP Array Functions: PHP code building to store name of students in an array and display it using print_r function. Sort and display the same using asort & arsort functions.	CO 2	A	2
	PHP Array: PHP code generation to store names of Indian Cricket players in an array and display the same in HTML table.	CO 2	A	2
To enable students to design and integrate front-end web interfaces with back-end databases for dynamic data-driven applications.	Relational Database Design with MySQL: Tables, Attributes, Tuples, Primary keys, Foreign keys, Indexes, MySQL DDL, DML, DQL commands	CO 3	A	4
	PHP-MySQL Connectivity: PHP program development to connect to a MySQL database, retrieve data from a table, and show the details in a neat format.	CO 3	A	4
To train students in the development of complete web applications that demonstrate usability, scalability, and maintainability.	PHP Web Applications: Web applications development using HTML and PHP and deploy.	CO 4	C	3
	PHP and MySQL: PHP and MySQL program development to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and search function.	CO 4	C	3
	Web Application Development Micro Project: Design and develop a functional database-driven web application using HTML, CSS, JavaScript, PHP, and MySQL by applying collaborative software development practices in a team environment.	CO 4	C	6

COURSE DESCRIPTION							
REGULATION	2026	L-T-J-P-S	0-0-0-1-0	VERSION	26/0	CREDITS	Nil
(L- Lecture, T-Tutorial, J-Project, P-Practical, S-Self-learning & Team Work)							

COURSE CODE	COURSE NAME	COURSE CATEGORY
A260201/CA130U	PROFESSIONAL SOFTWARE DEVELOPMENT PRACTICES	SEC
Pre-Requisite		
Basic computer literacy		

TEACHING AND ASSESSMENT SCHEME									
Teaching Scheme / Week					Credit	Hours / Semester	Examination Scheme		
							Theory		
L	T	J	P	S	C		CIA	ESE	Total
0	0	0	1	1	-	12	50	-	50
L: Lecture (One unit is of one-hour duration), T: Tutorial (One unit is of one-hour duration), P: Practical (One unit is of one-hour duration), J: Project (One unit is of one-hour duration), S: Self-Learning & Team Work (One unit is of one-hour duration), CIA: Continuous Internal Assessment, ESE: End Semester Examination									

SYLLABUS (Major Topics)			
Module	Title	Major Topics	Hrs
1	Professional Coding Practices	Clean coding principles, coding standards, naming conventions, code organization, source code documentation , code formatting, DRY,KISS	4
2	Version Control and Collaborative Development	Git installation and configuration, Git commands (clone, add, commit, push, pull), branching and merging, resolving merge conflicts, GitHub repositories, pull requests, collaborative development, code review using GitHub.	4
3	Developer Productivity Tools	VS Code productivity features and extensions, Introduction to linters (SonarLint, ESLint concept), Code formatters (Prettier) , best practices for collaborative software development. Importance of technical documentation, Markdown basics	4

SUGGESTED LEARNING RESOURCES

Text Book			
Sl. No.	Title of Book	Author	Publication
1	Clean Code: A Handbook of Agile Software Craftsmanship	Robert C. Martin	Pearson, 2008
2	Pro Git (2nd Edition)	Scott Chacon & Ben Straub	Apress (free online)

Reference			
Sl. No.	Title of Book	Author	Publication
1	The Pragmatic Programmer: Your Journey to Mastery (20th Anniversary Edition)	David Thomas & Andrew Hunt	Addison-Wesley, 2019

Web Resource	
1	Git Documentation - https://git-scm.com/doc
2	GitHub Docs - https://docs.github.com
3	Visual Studio Code Documentation - https://code.visualstudio.com/docs
4	Postman Learning Center - https://learning.postman.com