PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

M. Sc. (COMPUTER SCIENCE)

SYLLABUS BOOK

AY 2025-26

INSTITUTE VISION
To emerge as an Institute of Excellence by imparting value-based education aided with Research, Innovation and Entrepreneurial skills.

INSTITUTE MISSION	
1.	To impart the holistic engineering education of highest quality & prepare socially responsible professionals with entrepreneurial skills.
2.	To prepare value-aided engineering professionals to meet up global industry requirements by imparting cutting edge professional education.
3.	To inculcate the attitude of research and innovation among the stake holders through experiential and project-based teaching-learning pedagogy.
4.	To acquire global talent pool by providing world class amenities for teaching, learning & research.

Graduates will demonstrate ability to:

PEO No	PROGRAMME EUCATIONAL OBJECTIVES
PEO 1	Solve real-world engineering problems, design and develop innovative and cost-effective solutions exhibiting engineering skills/fundamentals to cater needs of society.
PEO 2	Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting comprehensive competitiveness.
PEO 3	Exhibit professional ethics & values, effective communication, teamwork, multidisciplinary approach, and ability to relate engineering issues to broader societal framework.

PO No	PROGRAMME OUTCOMES
PO 1	Engineering knowledge: Apply knowledge of engineering fundamentals, science, mathematics & engineering specialization for the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate and analyze complex engineering problems leading to substantial conclusions using basic principles of mathematics, science and engineering.
PO 3	Design/development of solutions: Develop solutions for complex engineering problems and design system components or processes meeting specified needs having due consideration for the safety and societal & environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge & methods like design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid & viable conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools for prediction and modeling of complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply cognitive learning by the contextual knowledge to assess societal, health, safety, legal and cultural issues and following responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge & skill needed for sustainable development.
PO 8	Values & Ethics: Apply basic moral values & ethical principles and pledge to professional ethics/norms and responsibilities of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual/as a team member or as a leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need, do necessary preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO No	PROGRAMME SPECIFIC OUTCOMES (PSO) M. Sc. COMPUTER SCIENCE
PSO 1	Apply fundamental principles and methods of Computer Science to a wide range of applications. Design, correctly implement and document solutions to significant computational problems.
PSO 2	Analyse and formulate solutions to real world and socially relevant problems using Data Science and Machine Learning concepts.
PSO 3	Prepare technically competent employee, researcher, entrepreneur, excel in competitive exams, and boost passion for the higher studies.

Credit Guidelines (General)			
Component	**Hour/Week**	**Credit**	**Total Hours/Semester**
Theory	1	1	15
Practical	2	1	30
Tutorial	1	1	15
Note: In specific cases; extra credits can be granted for specific/important subjects.			

CO-PO Mapping Guidelines		
Mapping Level	**% age Mapping**	**Indicator**
0 / -	0	No Mapping
1	0-33	Low Level (Slightly Mapped)
2	33-66	Medium Level (Moderately Mapped)
3	>66	High Level (Strongly Mapped)

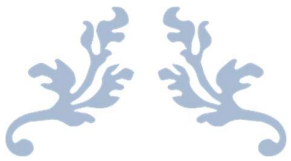
Syllabus Book

Master of Science
(Computer Science)

P P Savani University
School of Engineering

Effective From: 2025-26
Authored by: P P Savani University

CONTENT



FIRST YEAR M.SC.(CS)

P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING INSTITUTE OF COMPUTER SCIENCE & APPLICATION															
TEACHING & EXAMINATION SCHEME FOR M. Sc. (COMPUTER SCIENCE) PROGRAMME AY: 2025-26															
Sem	**Course Code**	**Course Title**	**Offered By**	**Teaching Scheme**					**Examination Scheme**						
				Contact Hours				**Credit**	**Theory**		**Practical**		**Tutorial**		**Total**
				Theory	**Practical**	**Tutorial**	**Total**		**CE**	**ESE**	**CE**	**ESE**	**CE**	**ESE**	
1	ICSH7010	Discrete Mathematics	SH	03	-	02	05	05	40	60	-	-	100	00	200
	ICCA7010	Programming Concepts	CA	03	02	-	05	04	40	60	40	60	-	-	200
	ICCS7010	Information Security & Applications	CS	03	02	-	05	04	40	60	40	60	-	-	200
	ICCA7020	Programming with Python	CA	03	02	-	05	04	40	60	40	60	-	-	200
	ICCS7020	Computer Architecture	CS	03	-	-	03	03	40	60	-	-	-	-	100
	CFLS7110	Professional & Academic Communication	CFLS	03	-	-	03	03	100	00	-	-	-	-	100
						Total	**26**	**23**							**1000**
2	ICCA7030	Python Web Development	CA	-	04	-	04	02	-	-	40	60	-	-	100
	ICCA7041	Java Web Technologies	CA	03	02	-	05	04	40	60	40	60	-	-	200
	ICCS7030	Advanced Cloud Computing	CS	02	02	-	04	03	40	60	40	60	-	-	200
	ICCA7050	Relational Data Engineering	CA	03	02	-	05	04	40	60	40	60	-	-	200
	ICCS7040	Software Quality & Assurance	CS	03	-	01	04	04	40	60	-	-	100	00	200
	ICCS7910	Project-I	CS	-	10	-	10	10	-	-	100	00	-	-	100
						Total	**32**	**27**							**1000**

P P Savani University
School of Engineering
Department of Science & Humanities

Course Code: ICSH7010
Course Name: Discrete Mathematics
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	--	02	05	40	60	--	--	100	--	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Extend concepts of set theory by the study of relation and lattice.
- Illustrate mathematical logic with various techniques of program verification.
- Apply knowledge of discrete mathematics for problem-solving skills necessary to succeed in the design and analysis of algorithms, database management, software engineering, and computer networks.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Set, Relation & Function** Sets, Set operations, Introduction of Relations, Relations of Sets, Types of Relations, Properties of Relations, Equivalence Relation, Partial Ordering, Hasse Diagram, GLB & LUB, Functions, Classification of functions, Types of functions	08	17
2.	**Introduction to Probability** Experiments, Counting Rules, Assigning Probabilities, Events and their Probabilities, Relationships of Probabilities, Conditional Probability, Bayes' Theorem	07	16
3.	**Matrix Algebra** Elementary Row and Column operations, Inverse of matrix, Rank of matrix, System of Linear Equations, Characteristic Equation, Eigen values and Eigen vector, Diagonalization, Cayley Hamilton Theorem.	08	17
Section II			
Module No.	Content	Hours	Weightage in %
1.	**Graph Theory** Graphs and Graph Models, Graph Terminology and Types of graphs, Representing graphs and Isomorphism, Connectivity, Euler and Hamilton Paths-Circuits, Applications of weighted graphs.	11	25
	Tree		

2.	Introduction to Trees, Rooted Tree, Properties of tree, Binary tree, Tree Traversal, Spanning Tree, DFS, BFS, Minimum Spanning Tree, Prim's Algorithm, Kruskal's Algorithm.	11	25
	TOTAL	45	100

List of Tutorial(s):

Sr. No.	Name of Tutorials	Hours
1.	Problems based on Set, Relation & Function-1	2
2.	Problems based on Set, Relation & Funciton-2	2
3.	Problems based on Set, Relation & Funciton-3	2
4.	Problems based on Introduction to Probability	4
5.	Problems based on Matrix Algebra-1	2
6.	Problems based on Matrix Algebra-2	4
7.	Problems based on Graph Theory-1	2
8.	Problems based on Graph Theory-2	2
9.	Problems based on Graph Theory-3	4
10.	Problems based on Tree-1	2
11.	Problems based on Tree-2	4
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Discrete Mathematics and its Applications	Kenneth Rosen	McGraw Hill, New York.
Thomas' Calculus	George B. Thomas, Maurice D. Weir and Joel Hass	Pearson

Reference Book(s):

Title	Author(s)	Publication
A Textbook of Discrete Mathematics	Dr. Swapan Kumar Sarkar	S. Chand & Company Ltd., New Delhi.
Discrete Mathematical Structure with Applications to Computer Science	J.P.Trembly, R. Manohar	Tata McGraw-Hill Publishing Company Ltd. New Delhi.
Graph Theory with Applications to Engineering and Computer Science	Narsingh Deo	PHI Learning Pvt. Ltd. New Delhi.

Web Material Link(s):

- https://onlinecourses.nptel.ac.in/noc25_cs26/preview?

- https://onlinecourses.nptel.ac.in/noc25_cs27/preview?

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests, each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the Course Coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of the performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 50 marks.
- Assignment consists of 20 marks.
- Internal viva consists of 30 marks.

Course Outcome(s):

After completion of the course, the students will be able to

ICSH7010	DISCRETE MATHEMATICS
CO 1	Summarize the concepts of set theory for understanding & fetching data from a database using query.
CO 2	Evaluate linear system using matrices and the knowledge of eigenvalues and eigenvectors for matrix diagonalization
CO 3	Classify the basic concepts of spanning tree algorithms namely DFS, BFS, prim's and kruskal's in the design of networks.
CO 4	Combine the design, foundational concepts of notations and results of graph theory used for better understanding of problems.

Mapping of CO with PO

ICSH7010	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	P010	PO11	PO12
CO 1	2	2	1	1								1
CO 2	3	3	1	1								3
CO 3	3	3	1	1								3
CO 4	3	3	1	1								3

Mapping of CO with PSO

ICSH7010	PSO1	PSO2	PSO3
CO 1	1	2	
CO 2	3	2	3
CO 3	2	2	
CO 4	3	1	2

Level of Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level

1.	Set, Relation & Function	1,2,4,6
2.	Introduction to Probability	2,3,5
3.	Matrix Algebra	1,2,3,4,5,6
4.	Graph Theory	1,2,3,5,6
5.	Tree	1,2,3,5,6

P P Savani University
School of Engineering
Institute of Computer Science and Application
Department of Computer Application

Course Code: ICCA7010
Course Name: Programming Concepts
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	--	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- understand the mechanisms that inspire and guide the design and implementation of Programming Languages
- understand the importance of object-oriented approach.
- develop expertise in creating robust applications using the Java Programming Language.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Procedural Programming Paradigm:** Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms, Programming Language Implementation – Compilation and Virtual Machines, programming environments. Algorithm & Flowchart basics Know about the basic fundamentals of Java programming. Acquire knowledge about the storage classes, arrays and structures pointers	08	15
2.	**Data Types Arrays Pointers Loops Concept** Data types: primitive, character, user defined, array, associative, record, union, Pointer and reference types, Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization. Sequence control with Expressions, Conditional Statements, Loops, Exception handling. Difference between OOP and Procedure Oriented Programming	03	10
3	**Object Oriented Programming** Classes, objects, Characteristics of OOP, Mutator and Accessor methods, defining your own classes, static fields and methods,		

	method parameters, object construction, polymorphism, final class and methods, casting abstract classes and, protected access, Object: Cosmic superclass, Object Wrappers and Autoboxing and Enumeration classes. Interface.	07	15
4.	**Java Programming** Introduction, Features of Java, Comparing Java and other languages, Java Development Kit, More Complex Programs, Java Source file structure, Prerequisites Java Language Fundamentals - The building Blocks of Java. Packages, Importing Packages, Java's Class Library	06	10
	Section II		
Module No.	Content	Hours	Weightage in %
1	**Multithreading and Exception Handling.** Multithreaded Programming - Multithreading Fundamentals, The Thread Class and Runnable Interface, creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization, , Exception Handling	06	15
2	**Input/ Output Streams**: reading writing bytes, combining IO steam filers, Text Input and Output: write text output, read text output, saving object in text format, character encoding, Reading and Writing, Working with Files: reading and writing files, creating files and directories, copying, moving and deleting files and getting file information	04	10
3	**JDBC** The Design of JDBC, JDBC Driver Types, SQL, JDBC Configuration: URL, driver jar files, starting the database, registering the driver class, connecting to the database, Working with JDBC Statements: executing SQL statement, managing connections, statements, resultsets, SQL exceptions, Query Execution: prepared statement.	04	10
4	**The SWING & Collection Framework** The Collection framework The collection class, Array list and Link list classes (maintaining the capacity and the link list class), SWING Framework ,Understanding Layout Managers – Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout, The Swing Packages, A Simple Swing Application, differentiate Swing & Applet,	07	15
	TOTAL	45	100%

List of Practical:

Sr. No	Name of Practical	Hours
1.	Working with practical concepts of procedural paradigm	04
2.	Implementation of basic concepts of java fundamentals – data types, classes, objects, operators, control & looping structures.	02
3.	Implementation of compile time polymorphism.	02
4.	Implementation of Inheritance.	02

5.	Implementation of runtime polymorphism (overriding & dynamic method dispatch).	02
6.	Implementation of user defined packages.	02
7.	Implementation of thread and different methods and mechanisms.	02
8.	Implementation of exception handling.	02
9.	Implementation of user defined exception handling.	02
10.	Implementation of various file operations using different streams, classes and methods.	02
11.	Implementation of database connectivity using JDBC.	04
12.	Implementation of various collection framework classes and utility.	02
13.	Implementation of SWING Framework	02
	TOTAL	**30**

Text Book (s):

Title	Author/s	Publication
The complete reference Java	Herbert Schildt	Mc Grow Hill

Reference Book (s):

Title	Author/s	Publication
The class of Java	Pravin Jain	Pearson Education
Core Java, Volume 1-Fundamental	Cay S. Horstmann and Gary Cornell	Pearson Education
Object Oriented Programming through Java	P. Radha Krishna	Universities Press
Object-Oriented Programming with Java: Essentials & Applications	Raj Kumar Buyya, S. ThamaraiSelvi, & Xing Chen Chu	Tata McGraw Hill

Web Material Link(s):

- https://onlinecourses.nptel.ac.in/noc22_cs47/preview
- https://inventwithpython.com/hacking/chapters

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of the performance of practical, which will be evaluated out of 10 marks per each practical and average of the entire practical will be converted to 20marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Examination.
- Viva/Oral performance consists of 30 marks during End Semester Examination.

Course Outcome(s):

ICCA7010	Programming Concepts
CO 1	Learn and acquire principles of object-oriented programming concepts and its application using java programming.
CO 2	Identify syntax, semantics, data types, conditional statements, control structures, and arrays and strings in java programming language.
CO 3	Explain building blocks of java environment, concept of polymorphism, inheritance, abstraction and interfaces and construct programs in java.
CO 4	Define and describe the role of packages and exception handling for access protection, name space management and reliability of code.
CO 5	Recognize multithreading for exploring concurrency and applets for basic graphical user interface in java.

Mapping of CO with PO

ICCA7010	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	1						1				1
CO 2	1	1	1									
CO 3	2	2	1									
CO 4	2	2	2									
CO 5	2	2	2					1				3

Mapping of CO with PSO

ICCA1010	PSO1	PSO2	PSO3
CO 1	1		
CO 2	3		
CO 3	2	2	
CO 4	3	2	
CO 5	3	2	

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Procedural Programming Paradigm:	1, 2
2	Data Types Arrays Pointers Loops Concept	1, 2, 3
3	Object Oriented Programming	2, 3,4
4	Java Programming	2, 5,6
5	Multithreading and Exception Handling	2,4,5
6	Input/ Output Streams	2,3,6
7	JDBC	2,3,4
8	The SWING & Collection Framework	3,5,6

P P Savani University
School of Engineering
Institute of Computer Science and Application
Department of Computer Science

Course Code: ICCS7010
Course Name: Information Security & Applications
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Learn fundamentals of cryptography and its application to network security.
- Understand network security threats, security services, and countermeasures.
- Understand vulnerability analysis of network security
- Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Information Security:** Information Security Understanding, Vulnerability, Security Goals, Security Services and mechanisms	04	10
2.	**Conventional Cryptographic Techniques:** Modular arithmetic, linear congruence, checking of primness, quadratic congruence, Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Steganography	08	20
3.	**Symmetric and Asymmetric Cryptographic Techniques:** Data Encryption Standards, Advanced Encryption standards, Electronic code book mode, CBC, Cipher feedback mode, AES, RSA algorithms	08	20
Section II			
Module No.	Content	Hours	Weightage in %
4.	**Message Authentication and Digital Signatures:**	07	15

	Use of Cryptography for authentication requirements, Message Authentication Code (MAC), Secure Hash function, Key management – Kerberos		
5.	**Program Security:** Non malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels	09	17
6.	**Security in Networks:** Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP, S/MIME	09	18
	TOTAL	45	100

List of Practical:

Sr. No	Name of Practical	Hours
1.	Implement Ceaser Cipher	1
2.	Implement Playfair Cipher with key entered by user.	2
3.	Implement polyalphabetic & Hill Cipher	2
4.	Implement Rail fence technique	2
5.	Implement Simple Columner Transposition technique	2
6.	Implement Simple RSA Algorithm with small numbers.	2
7.	Implement Simplified DES	2
8.	Make a study of one IDS (For ex. Snort)	2
	TOTAL	**15**

Text Book (s):

Title	Author/s	Publication
Security in Computing, Fourth Edition	Charles P. Pfleeger	Pearson Education

Reference Book (s):

Title	Author/s	Publication
Cryptography And Network Security Principles And Practice, Fourth or Fifth Edition	William Stallings	Pearson
Modern Cryptography: Theory and Practice	Wenbo Mao	Prentice Hall
Network Security Essentials: Applications and Standards	William Stallings.	Prentice Hall

Web Material Link(s):

- https://www.geeksforgeeks.org/network-security/

- https://archive.nptel.ac.in/courses/106/106/106106129/

Course Evaluation:
Theory:

- Continuous Evaluation consists of two tests of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during End Semester Exam.

Course Outcome(s):
After the completion of the course, the following course outcomes will be able to:

ICCS7010	INFORMATION SECURITY & APPLICATIONS
CO 1	Describe the concepts of www including browser and http protocol.
CO 2	List various html tags and use them to develop the user-friendly web pages.
CO 3	Define and describe css with its types and use them to provide the styles to the web pages using the html and css features with different layouts as per need of applications.
CO 4	Use the java script to develop the dynamic web pages.
CO 5	Implement the boot strap to develop the dynamic web pages.

Mapping of CO with PO

ICCS7010	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	1				1			1	1	1
CO 2	3		3	1			2				1	2
CO 3		1	2	1				2	2			
CO 4		2						1	2	1		
CO 5				1							1	

Mapping of CO with PSO

ICCS7010	PSO1	PSO2	PSO3
CO 1	3	2	1
CO 2	2	3	
CO 3		3	
CO 4			1
CO 5	1		3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply

4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to Information Security	1,2
2	Conventional Cryptographic Techniques	1,2,3
3	Symmetric and Asymmetric Cryptographic Techniques	2,3,5,6
4	Authentication and Digital Signatures	4,5,6
5	Program Security	1,2,4
6	Security in Networks	2,3,5

P P Savani University
School of Engineering
Institute of Computer Science and Application
Department of Computer Application

Course Code: ICCA7020
Course Name: Programming with Python
Prerequisite Course(s): -

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	00	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- To provide a strong foundation in Python programming concepts and practices.
- To equip students with the ability to design, develop, and deploy Python-based applications.
- To enhance problem-solving and analytical skills using Python for real-world applications.
- To introduce advanced programming techniques, including object-oriented programming, web frameworks, and data science libraries.
- To prepare students for careers in software development, data science, and machine learning.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction to Python Programming** Overview of Python: History, features, and applications. Setting up Python Environment: Installation, IDEs, and tools. Basic Syntax and Structure: Keywords, identifiers, comments, and indentation. Variables and Data Types: Numbers, strings, and Booleans. Operators and Expressions: Arithmetic, logical, comparison, bitwise, and assignment operators. Control Structures: Conditional statements (if, elif, else) and loops (for, while). Input and Output Handling: Using input(), print(), and formatting output.	07	15%
2.	**Data Structures and Algorithms in Python** Sequences: Lists, tuples, and ranges. Sets and Dictionaries: Creation, manipulation, and comprehension. Advanced Data Structures: Stacks, queues, and linked lists with implementation. Algorithms: Searching (linear and binary) and sorting (bubble, insertion, merge). Recursion: Basics and problem-solving techniques.	08	20%
3.	**Object-Oriented Programming (OOP) in Python** Classes and Objects: Defining and using classes and objects. Inheritance: Single, multiple, and multilevel inheritance. Polymorphism: Method overloading and overriding. Encapsulation: Access specifiers and data hiding. Abstraction: Interfaces and abstract classes. Exception Handling: try, except, finally, and custom exceptions. File Handling: Reading, writing, appending, and binary file operations. Serialization: Pickle and JSON libraries for data storage.	07	15%

Section II			
Module No.	Content	Hours	Weightage in %
4.	**Advanced Python Concepts** Advanced Python Concepts Iterators and Generators: Itertools module and generator expressions. Decorators: Function decorators and class decorators. Context Managers: Using 'with' statements and custom context managers. Lambda Functions: Anonymous functions and map-reduce. Regular Expressions: Pattern matching with re module. Multithreading and Multiprocessing: Thread synchronization and parallel processing.	07	20%
5.	**Database Programming and Web Development** Database Connectivity: SQLite and MySQL setup and connection. CRUD Operations: Insert, update, delete, and fetch. Web Frameworks: Flask and Django for web development. RESTful APIs: Creating APIs with Flask. Web Scraping: Data extraction using Beautiful Soup and requests library.	08	15%
6.	**Data Science and Machine Learning Basics** Data Manipulation: NumPy and Pandas for arrays and data frames. Data Visualization: Matplotlib and Seaborn for charts and plots. Machine Learning Basics: Introduction to supervised and unsupervised learning. Scikit-Learn: Implementation of classification and regression models. Tools and Platforms: Working with Jupyter Notebook and Google Colab.	06	15%
	TOTAL	45	100%

List of Practical:

Sr. No	Name of Practical	Hours
2.	Implement a program to sort a list using Bubble Sort and Merge Sort.	02
3.	Develop a Calculator Application with GUI using Tkinter.	04
5.	Implement Linked List operations (Insert, Delete, Search).	02
6.	Design a student database management system using SQLite.	02
7.	Develop a Python script for File Handling operations (read, write, append).	04
9.	Build a web scraper to extract data from a website.	04
10.	Implement a simple API in Flask for user authentication.	04
11.	Perform Data Analysis and Visualization using Pandas and Matplotlib.	02
12.	Develop a program for Text Classification using Scikit-Learn.	04
13.	Create a program that uses Multithreading to process files.	02
	TOTAL	30

Text Book (s):

Title	Author/s	Publication
Python Programming: An Introduction to Computer Science	John Zelle, Franklin, Beedle & Associates Inc.	Beedle & Associates Inc.

Reference Book (s):

Title	Author/s	Publication
Programming Python	Mark Lutz	O'Reilly Media
Python Crash Course	Eric Matthes	No Starch Press
Core Python Programming	Wesley J. Chun	Pearson Education

Web Material Link(s):

- https://docs.python.org/3/
- https://www.coursera.org/specializations/python
- https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of the performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/oral performance consists of 30 marks during the End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

ICCA7020	PROGRAMMING WITH PYTHON
CO 1	Understand fundamental concepts and syntax of Python programming.
CO 2	Implement efficient data structures and algorithms for solving problems.
CO 3	Design modular and reusable code using OOP principles.
CO 4	Develop applications leveraging databases, web frameworks, and APIs.
CO 5	Apply Python libraries for data analysis, visualization, and machine learning.

Mapping of CO with PO

ICCA7020	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	2	1	2		2				3		3
CO 2	3	3	3	3	1		1	2		3		3
CO 3	2				2					2		
CO 4	1				2		1		2	2		
CO 5	1	3	3	3								

Mapping of CO with PSO

ICCA7020	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	3	3	1
CO 3			3
CO 4			
CO 5		3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction to Python Programming	1,2,3
2	Data Structures and Algorithms in Python	2,3,6

3	Object-Oriented Programming (OOP) in Python	2,3,6
4	Advanced Python Concepts	3,6
5	Database Programming and Web Development	2,3,5,6
6	Data Science and Machine Learning Basics	6

P P Savani University
School of Engineering
Institute of Computer Science and Application
Department of Computer Application

Course Code: ICCS7020
Course Name: Computer Architecture
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	-	03	40	60	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- have a understanding of Digital systems and operation of a digital computer.
- learn different architectures &organizations of memory systems and processor organization
- understand the working principles of multiprocessor and parallel organization's as advanced computer architectures

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Fundamentals of Digital Logic and Data Representation** Boolean Algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps, Combinational Circuits: Adders, Multiplexers (Mux), De-Multiplexers (De-Mux), Sequential Circuits: Flip-Flops (SR, JK & D), Counters and Registers, Data Representation: Decimal, Binary, Octal, and Hexadecimal numbers; Binary Arithmetic and Error Detection Codes (Parity, Hamming Code).	10	20
2.	**Computer System** Comparison of Computer Organization & Architecture, Computer Components and Functions, Accessing Input/Output Devices, Interrupts and Interrupt Handling Mechanisms, Data Transfer Schemes - Programmed I/O, DMA Transfer, Data Transfer Schemes for Microprocessors, Bus Structures and Communication.	08	15
3.	**Memory System Organization** Memory Hierarchy, Primary Memory (RAM, ROM), Secondary Memory: Magnetic Tape, Magnetic Disk, Optical Disk, Magneto-Optical Disk; Concepts of Auxiliary, Associative, Cache, and Virtual Memory, External Memory: Magnetic Discs, Optical Memory, Flash Memories, RAID Levels and their Applications	06	15

Section II			
Module No.	Content	Hours	Weightage in %
4.	**Processor Organization** Instruction Formats, Instruction Sets, Addressing Modes, Addressing Modes Examples with Assembly Language [8085/8086 CPU], Processor Organization, Structure, and Function, Register Organization, Instruction Cycle, Instruction Pipelining, Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors: Design Issues; Control Unit Design: Hardwired vs Microprogrammed Control.	10	20
5.	**Fundamentals of Advanced Computer Architecture** Parallel Architecture: Classification of Parallel Systems, Flynn's Taxonomy, Array Processors, Clusters, and NUMA Computers, Multiprocessor Systems: Structure & Interconnection Networks; Multi-Core Computers: Introduction, Organization, and Performance; Pipeline and Vector Processors.	07	15
6.	**Case Study** Pentium 4 Processor Organization and Architecture, Comparative Analysis of Modern Processors (e.g., Intel Core, AMD Ryzen), Emerging Trends in Processor Design and Performance Enhancement	04	15
	TOTAL	45	100

Text Book (s):

Title	Author/s	Publication
Modern Digital Electronics	R.P. Jain	Tata McGraw Hill

Reference Book (s):

Title	Author/s	Publication
Computer Organization & Architecture	William Stallings	Pearson Education
Computer System Architecture	M. Morris Mano	Pearson Education.

Web Material Link(s):

- https://nptel.ac.in/courses/106/105/106105163/
- web.stanford.edu/class/ee282/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

ICCA7020	COMPUTER ARCHITECTURE
CO1	Understand the core concepts of digital logic design like number base representation, Boolean algebra etc.
CO2	Classify the various architectural concepts to optimize and enhance the classical von Neumann architecture into high performance computing hardware systems.
CO3	Understand the core concepts of digital logic design like number base representation, Boolean algebra etc.
CO4	Develop the ability to design combinational and sequential circuits.
CO 5	Identify, compare and assess issues related to memory, control and i/o functions.

Mapping of CO with PO

ICCA7020	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1									
CO 2	1	1	2	1								2
CO 3	2	1	1									
CO 4		1	1	1								
CO 5	1	2	2	1								1

Mapping of CO with PSO

ICCA7020	PSO1	PSO2	PSO3
CO 1	1	1	2
CO 2	1	2	2
CO 3	1		
CO 4	3	2	1
CO 5		1	2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Fundamentals of Digital Logic and Data Representation.	1,2,3,4,6
2	Computer System	1,2,3,4,6
3	Memory System Organization	1,2,3,4,6
4	Processor Organization	1,2,3,4,6
5	Fundamentals of Advanced Computer Architecture	1,2,3,4
6	Case Study	1,2,3

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Course Code: ICCA7030
Course Name: Python Web Development
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	04	-	02	-	-	40	60	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- To provide foundational knowledge of web technologies and frameworks
- To enable students to design responsive and user-friendly web interfaces to impart servlet technology for writing business logic
- To facilitate students to connect to databases using SQLite
-

List of Practical:

Sr. No	Name of Practical	Hours
1.	Create a simple web server using Python's Flask/Django framework.	02
2.	Design an HTML form and handle form data using Flask/Django.	04
3.	Develop dynamic web pages using Jinja2 templates in Flask.	04
4.	Implement a basic login and registration system using Python.	04
5.	Create a web application with CRUD operations using SQLite/MySQL in Flask/Django.	04
6.	Build and test a REST API for managing data using Flask/Django REST framework.	04
7.	Demonstrate session and cookie management in a Python-based web application.	04
8.	Create a web app that allows users to upload and manage files.	04
9.	Use Bootstrap to design a responsive web interface for a Python web application.	04
10.	Implement AJAX calls in a Python web app to fetch and display data dynamically.	04
11.	Build a basic chat application using Flask-SocketIO.	04
12.	Implement custom error pages and exception handling in a Python web application.	04
13.	Develop a Python web app to send emails using SMTP.	04
14.	Deploy a Flask/Django app on a cloud platform like AWS.	04
15.	Build a web application that integrates web scraping.	06

	TOTAL	**60**

Text Book (s):

Title	Author/s	Publication
Web Technologies	Uttam K Roy	Oxford University Press

Reference Book (s):

Title	Author/s	Publication
The Complete Reference PHP	Steven Holzner	TataMcGraw-Hill
Web Programming, building internet applications	ChrisBates2ndedition	WileyDremtech

Web Material Link(s):

- https://nptel.ac.in/courses/106105084

Course Evaluation:

Practical:

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/drawing/test consists of 30 marks during End Semester Exam.
- Viva/Oral performance consists of 30 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

ICCA7030	PYTHON WEB DEVELOPMENT
CO 1	Understand the core concepts of web application development and modern frameworks like Flask/Django.
CO 2	Design and create responsive, user-friendly web interfaces using HTML, CSS, and Bootstrap.
CO 3	Develop dynamic web applications with backend functionality, including database integration and user authentication.
CO 4	Implement REST APIs, AJAX, and session management for advanced web features.
CO 5	Deploy, test, and debug web applications on cloud platforms and ensure their performance and scalability.

Mapping of CO with PO

ICCA7030	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2										1	
CO 2	2	2	1	3	2		3				1	1
CO 3	3	2	3	3	3	3	3	2		2		3
CO 4												
CO 5		2	3	3	2	3	3	1				3

Mapping of CO with PSO

ICCA7030	PSO1	PSO2	PSO3

CO 1		1	
CO 2	3	3	3
CO 3	2		
CO 4			
CO 5	3	3	3

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

P P Savani University
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Institute of Computer Science and Application

Department of Computer Application

Course Code: ICCA7041
Course Name: Java Web Technologies
Prerequisite Course(s): ICCA7010

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Understand and Implement the Basics of Servlets and JSPs
- Develop Web Applications Using the MVC Architecture
- Leverage JSTL and Expression Language (EL) for Efficient Web Development
- Gain Practical Knowledge of the Spring Framework for Java Web Development

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Servlet API and Overview** Servlet Basics, Basic Servlet structure, Servlets Generating text/html content, Packaging Servlets, The servlet life-cycle. Handling Client Request Form Data, Reading Form Data from Servlets, Handling Client Request, Reading Request Headers, Understanding HTTP/1.1 Request Headers,Accessing the Standard CGI Variables Generating the Server Response, HTTP Status Codes, Specifying Status Codes, HTTP / 1.1 Status Codes, Using Redirections, HTTP Response Headers, Setting Response Headers from Servlets, Understanding HTTP / 1.1 Response Headers, Using Servlets to Generate JPEG Images Handling Cookies, Remembering Usernames and Passwords, Deleting Cookies, Sending and Receiving Cookies, Using Cookie Attributes, Differentiating Session Cookies from Persistent Cookies, Session Tracking, Need for Session Tracking, Session Tracking API.	08	15%
2.	**Listeners and Filters** Using ServletContextListener, HttpSessionListener, Understanding of all the other Listeners viz. ServletRequestListener, ServletContextAttributeListener, ServletRequestAttributeListener, HttpSessionAttributeListener Using Filters for pre and post processing of request.	09	20%

3.	**Java Server Pages Overview** JSP Basic Syntax, HTML Text, HTML comments, Java Tokens, Template Text, JSP Comment, JSPExpression, JSP Scriptlet, JSP Declaration, JSP Directives, JSP Action, JSP Expression Language Element, Custom Tag (Custom Action), Escaped Template Text, Using JSP Scripting Elements, Using Predefined Variables, XML syntax for Expressions, Scriptlets, Declarations and Directives, Using Scriptlets, Using Declarations, Using Page Directive, Using Standard Actions Tags – <jsp:plugin>, <jsp:forward>, <jsp:include>, Using JavaBeans in JSP pages – <jsp:useBean>, <jsp:getProperty>, <jsp:setProperty>, Sharing Beans, Use of Scopes and their Attributes	08	15%
Section II			
Module No.	Content	Hours	Weightage in %
4.	**MVC** Integrating Servlets and JSP in a Web Application (MVC Architecture for Web Applications), Implementing MVC with Request Dispatcher, Understanding Data Sharing Between Servlets and JSP, JSP Expression Language, Accessing Scoped Variables, Bean Properties, Collections and Implicit Objects Using EL, Using EL Operators	07	20%
5.	**Tag Library** Basics; Using JSTL – c:out, c:forEach, c:forTokens, c:if, c:choose, c:set, c:remove, c:import, c:url, c:param, c:redirect and c:catch Tags, REST architecture , REST APIs	06	15%
6.	**Introduction to Spring Framework** Simplifying Java Development Containing your beans. Surveying the Spring landscape. Wiring Beans. Automatically wiring beans. Wiring Beans with Java. Wiring Beans with XML. Importing and mixing configuration	07	15%
	TOTAL	45	100%

List of Practical:

Sr. No	Name of Practical	Hours
1.	Write a basic servlet to handle HTTP requests and generate HTML content (text/html).	02
2.	Design an HTML form to collect user information (e.g., name, email) and handle the form submission using a servlet.	04
3.	Create a simple login system where the user's session data is stored and accessed on subsequent requests.	04
4.	Implement functionality to set cookies (e.g., "user preferences") and retrieve them in the subsequent user requests. Include setting cookie expiry and deleting cookies.	04
5.	Create a servlet that redirects to another page after form submission, and specify appropriate HTTP status codes (e.g., 302 for redirection).	04
6.	Implement an application where a servlet handles the business logic (Model), and a JSP page is used to display data (View). Use RequestDispatcher for forwarding requests.	04

7.	Create a JSP page that dynamically generates content based on request parameters or session data, and includes scriptlets for embedded Java code.	02
8.	Create a JSP page that uses <c:forEach> to loop through a list and <c:if> for conditional logic. Also, display data using <c:out>.	04
9.	Create a basic Spring application that defines beans in an XML configuration file and demonstrates dependency injection.	02
10.	Create a Spring MVC application that includes a controller, a service layer, and a JSP page for displaying dynamic content. Integrate Spring's DispatcherServlet for handling requests.	02
	TOTAL	30

Text Book (s):

Title	Author/s	Publication
Core Servlets and JavaServer Pages Volume – 1	Marty Hall, Larry Brown	Pearson

Reference Book (s):

Title	Author/s	Publication
Web Technologies Black Book	dreamtech press	dreamtech press
Core Servlets and JavaServer Pages Volume – 2	Marty Hall, Larry Brown	Pearson
Core JSTL	David M Geary	Pearson
Spring in Action	Craig Walls	Manning Publications

Web Material Link(s):

- http://docs.oracle.com/javaee/6/tutorial/doc/bnafd.html
- https://onlinecourses.nptel.ac.in/noc22_cs47/preview
- https://onlinecourses.swayam2.ac.in/nou24_cs09/preview
- https://nptel.ac.in/courses/106105191

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Practical:

- Continuous Evaluation consists of the performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Exam.
- Viva/oral performance consists of 30 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

ICCA7041	JAVA WEB TECHNOLOGIES
CO 1	Understand and implemented real time client server architecture.
CO 2	Design web applications using a servlet, java server pages and jdbc.

CO 3	Examine advanced frameworks and discuss their business applications.
CO 4	Implementation and testing strategies in real time applications.
CO 5	Use advanced concepts related to web services, hibernate and ejb.

Mapping of CO with PO

ICCA7041	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	2	1	2				3				2
CO 2	1	3	3	3	3			2				2
CO 3	1			2	2				1		1	
CO 4	1		3						1			
CO 5	1	3		3							1	1

Mapping of CO with PSO

ICCA7041	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	2	3	
CO 3			2
CO 4			
CO 5	3	2	1

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Servlet API and Overview	1,2,3
2	Listeners and Filters	2,3,6
3	Java Server Pages Overview	2,3,6
4	MVC	3,6
5	Tag Library	2,3,6
6	Introduction to Spring Framework	6

P P Savani University
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Department of Computer Science

Course Code: ICCS7030
Course Name: Advanced Cloud Computing
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
02	02	-	03	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to
- Acquire a clear understanding and knowledge of virtualization technology.
- Explore the integration of cloud computing with Big Data and Artificial Intelligence.
- Develop cloud computing applications using Python and MongoDB.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Cloud Fundamentals** Introduction about cloud computing, Cloud deployment models, Cloud service models, Advantages of cloud computing, Limitations or Disadvantages of cloud computing, Seven step model of migration into a cloud.	05	10
2.	**Virtualization Technology and Types** VirtualBox-Installation and configuration, Containers vs. Virtual Machines, Docker architecture and components , Drawbacks of traditional data centers, Virtualization reference model, Impact of virtualization on resource planning, Principles of working of virtual machine, Server virtualization, Storage virtualization, Desktop virtualization, Application virtualization, Network virtualization, Working with OpenStack, Networking and storage in OpenStack, **Co**re AWS Services-EC2**, S**3, RDS, and IAM, AWS Lambda and serverless computing	10	20
3.	**Cloud Computing with Big Data** Introduction to BD, Characteristics of BD, Need for BD, Drivers for BD, BD in cloud computing: Advantages and Challenges, Core architecture of Hadoop.	08	20
Section II			

Module No.	Content	Hours	Weightage in %
4.	**Understanding Role of AI in Cloud Computing** Introduction to AI, How AI transformed cloud computing, Common applications of AI in cloud management, Benefits and challenges of AI in cloud computing management, AI's impact on IT cloud management.	07	20
5.	**Python in Cloud Computing** Introduction to python, Features of python for cloud computing, Python role's in cloud computing, Python framework and cloud services, Cloud automation and monitoring using python, Challenges and future trends., Cloud service models: IaaS, PaaS, SaaS, Cloud deployment models: Public, Private, Hybrid, Community	08	20
6.	**Cloud Databases** SQL vs NoSQL, Advantages of NoSQL, MongoDB commands, CRUD operations in MongoDB, Data aggregation in MongoDB, IUDS for RDBMS Vs. MongoDB, Connection to Python with MongoDB.	07	10
	TOTAL	45	100

List of Practical:

Sr. No	Name of Practical	Hours
1.	To study about cloud computing and virtualization technology.	04
2.	To understand working of AWS and security.	02
3.	AWS computer services.	02
4.	AWS storage services.	02
5.	Monitoring and Optimization with AWS.	04
6.	Automation in AWS cloud.	04
7.	Python for Serverless Applications on AWS	02
8.	Introduction to machine learning on AWS	02
9.	Perform MongoDB CRUD operations.	04
10.	Connection of MongoDB and Python.	04
	TOTAL	**30**

Text Book (s):

Title	Author/s	Publication
Cloud Computing Bible	Barrie Sosinsky	John Wiley & Sons

Reference Book (s):

Title	Author/s	Publication
Amazon Web Services for Dummies	Bernard Golden	Dummies
Python Essentials for AWS Cloud Developers	Serkan Sakinmaz	Packt Publishing
Cloud Computing With AI	D Shanthi	Scholars Press
Cloud Computing & Big Data: From the Basics to Practical Use Cases	M Sudheep Elayidom, Sarith Divakar M, Lija	Cengage Learning

	Mohan, Tanmay Kumar Pandey, Shubham Agrawal	
An Introduction to Cloud Databases	Vlad Vlasceanu, Wendy A. Neu, Andy Oram, Sam Alapati	O'Reilly Media, Inc.
MongoDB Complete Guide	Manu Sharma	BPB

Web Material Link(s):

- https://www.oracle.com/in/artificial-intelligence/ai-cloud-computing/
- https://cloud.google.com/learn/what-is-big-data?hl=en
- https://aws.amazon.com/
- https://cloud.google.com/python
- https://www.mongodb.com/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted out of 30 marks.
- Faculty Evaluation consists of 10 marks as per guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks Exam.

Practical:

- Continuous Evaluation Consist of Performance of Practical which will be evaluated out of 20 marks for each practical and average of the same will be converted to 20 marks.
- Internal Viva consists of 20 marks.
- Practical performance/quiz/test of 30 marks during End Semester Exam.
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

ICCS7030	Advanced Cloud Computing
CO 1	Gain a solid understanding of the fundamentals of cloud computing and virtualization technology.
CO 2	Explore the application of cloud computing in Big Data (BD) and Artificial Intelligence (AI).
CO 3	Learn to integrate Python with NoSQL databases such as MongoDB.
CO 4	Develop skills in automating and monitoring cloud environments using Python.
CO 5	Understand the key differences between SQL and NoSQL databases.

Mapping of CO with PO

ICCS7030	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1										2
CO 2	3	2										2
CO 3	2	3	3	1	1	1	1				2	2
CO 4	2	3	3	1	1						2	
CO 5		1	2	1	1						1	

Mapping of CO with PSO

ICCS7030	PSO1	PSO2	PSO3
CO 1	3		1
CO 2	3	2	1
CO 3		2	2
CO 4		2	2
CO 5	1		2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Cloud Fundamentals	1, 2
2	Virtualization Technology and Types	1, 2
3	Cloud Computing with Big Data	1, 2, 3
4	Understanding Role of AI in Cloud Computing	1, 2, 3
5	Python in Cloud Computing	1, 2, 3, 4, 5, 6
6	Cloud Databases	1, 2, 3, 4, 5, 6

P P Savani University
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Institute of Computer Science & Application
Department of Computer Application

Course Code: ICCA7050
Course Name: Relational Data Engineering
Prerequisite Course (s):---

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s)of the Course:
To help learners to

- understand the elementary conception of Database Management Systems.
- give students knowledge of how RDBMS is managed.
- prepare a theoretical as well as practical background of RDBMS.
- understand the concepts compulsory for designing, using and implementing database systems and applications.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in%
1.	**Basic concepts of DBMS** Basic Concepts: Data, Database, Database systems, Database Management Systems, Need, Applications & Description of Database Approach, DBMS users, Benefits of using DBMS approach, DBMS architecture – Schema, Instance, Types of Models, Concept of Independence, Types, Role & Importance of Database languages, Taxonomy & Categorization of DBMS.	06	15
2.	**Entity Relationship Diagram** ER diagram – Role & Importance in database design, entity types, entity sets, Types of Attributes, Keys & Entities, Designing & Mapping of Database considering ER diagram, Example of ER Diagram considering applications, Concept of EER diagram. **Database Design** Concept of Relational Schema, Functional Dependencies, Normalization - definitions of 1NF, 2NF and 3NF, Boyce-Codd Normal Forms (BCNF), Multi-valued Dependency and Fourth Normal Form.	10	20
3.	**Basic of SQL** Basics concepts of SQL – creation, alteration using DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Save point case	06	15

Section II			
Module No.	Content	Hours	Weightage in%
1.	**Fundamentals of PL/SQL** Introduction to PL/SQL - Benefits of PL/SQL, Creating PL/SQL Blocks Defining Variables and Datatype, Using Variables in PL/SQL - Recognizing PL/SQL Lexical Units, Recognizing Data Types, Using Scalar Data Types, Writing PL/SQL Executable Statements, Nested Blocks and Variable Scope, Program Structures to Control Execution Flow - Conditional Control: IF Statements, Conditional Control: CASE Statements, Iterative Control: Basic Loops, Iterative Control: WHILE and FOR Loops, Iterative Control: Nested Loops	06	15
2.	**Using & Managing PL/SQL Building Blocks** Using Cursors and Parameters, Introduction to Explicit Cursors, Using Explicit Cursor Attributes, Cursor FOR Loops, Cursors with Parameters, Using Cursors for UPDATE, Using Multiple Cursors, Using and Managing Procedures - Creating Procedures, Using Parameters in Procedures, Passing Parameters, Using and Managing Functions - Creating Functions, Using Functions in SQL Statements.	06	15
3.	**Database Triggers & Exception Handling** Using and Managing Triggers - Introduction To Triggers, Creating DML Triggers, Creating DML Triggers, Creating DDL and Database Event Triggers, Managing Triggers, Exception Handling - Handling Exceptions, Trapping Oracle Server Exceptions, Trapping User-Defined Exceptions, Recognizing the Scope of Exceptions.	05	10
4.	**Transaction Processing and Database backup and Recovery** Transaction concepts: Transaction execution and Problems, Transaction execution and control with SQL, Transaction properties, Transaction log, Concurrency control , Locking methods for concurrency control, Timestamp methods for concurrency control, Optimistic methods for concurrency control (Read phase, validation phase, Write phase), Deadlock handling - detection and resolution, Database backup and Recovery - Need of Database backup, Database backup techniques, Types of Database failures, Types of Database recovery (Forward recovery, backward recovery and Media recovery), Recovery techniques (Deferred Update, Immediate update, Shadow Paging, Checkpoints), Buffer management.	06	10
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Implement DDL Commands (Create, Alter, drop) Table: The Create Table Command, creating a table from a table (with data, without data, with all columns, with selected columns), Drop Table, Alter Table, Renaming Tables	02
2.	Implement DML Commands (Select, insert, update, delete)	02
3.	Implement Constraints: Defining integrity constraints using create table and the alter table command.	02
4.	Implement View, Index, Sequences, rowed, row num, Default Value Concept	02
5.	Implement Join (Inner Join, Equi Joins, Self-Join, Outer Joins)	02
6.	Implement subquery concepts	02

7.	Implement various set Operators	02
8.	Implement various single row functions: String functions, Numeric Functions, Date Functions, Date Conversion Functions	02
9.	Implement aggregate / group functions, having clause and Sorting Data, Handling Null values (IS NULL), Like Clause	02
10.	Implement Basic concepts of PL/SQL	02
11.	Implement Procedure, function, package	04
12.	Implement Triggers and Exception Handling	04
13.	Implement Transaction processing and control mechanism	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Fundamentals of Database Systems	Ramez Elmsari, Shamkant B Navathe	Pearson Education
SQL, PL/SQL the Programming Language of Oracle	Ivan Bayross	BPB Publications
Database System Concept	Silberscatz, Korth, Sudarshan	McGraw Hill

Reference Book(s):

Title	Author/s	Publication
Database Management Systems	Ramakrishnan, Gehrke	McGraw Hill
An Introduction to Database Systems	C J Date, A Kannan, S Swaminathan	Pearson Education
PHP and MySQL 24-Hour Trainer	Andrea Tarr	Wiley

Web Material Link:

- https://docs.oracle.com/en/database/index.html
- https://docs.oracle.com/database/121/SQLRF/toc.htm

Course Evaluation:

Theory

- Continuous Evaluation consists of two tests of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by Course Coordinator.
- End Semester Examination consists of 60 marks.

Practical

- Continuous Evaluation consists of the performance of practical, which will be evaluated out of 10 marks per each practical and average of the entire practical will be converted to 20marks.
- Internal viva consists of 20 marks.
- Practical performance/quiz/test consists of 30 marks during End Semester Examination. Viva/Oral performance consists of 30 marks during End Semester Examination.

Course Outcome(s):

ICCA7050	RELATIONAL DATA ENGINEERING
CO1	Understand different database models and query languages to manage the data for given real.
CO2	Recall the features of relational database and its modeling.
CO3	Produce a database using sql concepts.

CO4	Analyze and evaluate the query performance and design the optimum query solution.
CO 5	Understand different database models and query languages to manage the data for given real life application scenario.

Mapping of CO with PO

ICCA7050	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	2	1	3		1					
CO 2	2	1	1	1	2							
CO 3	2		1	1	2		1					
CO 4	2	1	1	1	3		1					
CO 5												

Mapping of CO with PSO

ICCA7050	PSO1	PSO2	PSO3
CO 1	2	2	3
CO 2	3	3	2
CO 3	3	3	3
CO 4	2	3	2
CO 5	2	3	2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Basic concepts of DBMS	1, 2
2	Entity Relationship Diagram	2, 4
3	Basic of SQL	3 ,4, 6
4	Fundamentals of PL/SQL	2, 5
5	Using & Managing PL/SQL Building Blocks	2, 3, 6
6	Database Triggers & Exception Handling	2, 3, 5
7	Transaction Processing and Database backup and Recovery	2, 4

P P Savani University
School of Engineering
Institute of Computer Science and Application
Department of Computer Science

Course Code: ICCS7040
Course Name: Software Quality & Assurance
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
03	-	01	04	40	60	-	-	100	00	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- Understand the core concepts and processes of software quality and assurance practices applied in software development.
- Describe and conceptualize the models and methodologies of software quality management, including the software development life cycle (SDLC) and agile practices.
- Familiarize with the frameworks and tools used in quality assurance and project management.

Course Content:

Section I			
Module No.	Content	Hours	Weightage in %
1.	**Introduction:** SDLC life cycle. Basic concept of Software Quality Assurance. Software Testing as a quality assurance technique. Testing and quality assurance in various types of software (Web application, Desktop Application and Mobile Application). Factors affecting Software Quality. Review techniques.	10	25
2.	**Software Quality Control:** Bug life cycle and Tracking system. Quality Assurance and Quality Control. SQA plan. Quality Control Process.	4	10
3.	**Tracking the Software Quality using Diagrams:** Pareto Diagram, Cause Effect Diagram, Scatter Diagram, Run chart.	8	15
Section II			
Module No.	Content	Hours	Weightage in %
4.	**Software Quality Management:** Quality improvement process. Statistical Quality Assurance. Software Reliability. Informal Review.	6	12

5.	**Quality Cost:** Quality Cost Measurement, role of Quality cost in decision making. Software Configuration management (Version control and Built Management). CMM model. CMMI	10	25
6.	**Quality Assurance Standards:** Software Metrics and Measurement, Agile Model, ISO 9001 Quality Standard. Six Sigma. DevOps Practices for Quality Improvement	7	13
	TOTAL	45	100

List of Tutorial:

Sr. No	Name of Tutorial	Hours
1.	Software Quality Attributes (Usability, Reliability, Maintainability, etc.)	1
2.	Software Quality Models (ISO/IEC 25010, McCall's Quality Model, etc.)	1
3.	Software Quality Management	1
4.	Types of Testing (Unit Testing, Integration Testing, System Testing, Acceptance Testing)	1
5.	Test Planning and Management	1
6.	Test Case Design and Execution	1
7.	Test Automation	1
8.	Software Metrics (Product Metrics, Process Metrics, Project Metrics)	1
9.	Software Process Improvement	1
10.	Software Quality Tools	1
11.	Software Quality Standards	1
12.	Real-world Examples of Software Quality Management	1
13.	Ethics and Professionalism in Software Quality	1
14.	AI and Machine Learning in Quality Assurance	1
15.	Continuous Testing and Continuous Quality Improvement	1
	TOTAL	**15**

Text Book (s):

Title	Author/s	Publication
Software Quality Assurance From Theory to Implementation	Daniel Galin	Pearson Addison Wesly

Reference Book (s):

Title	Author/s	Publication
Software Quality Assurance	Claude Y. Laporte, Alain April	IEEE Press, IEEE Computer Society, Wiley

Web Material Link(s):

- https://onlinecourses.nptel.ac.in/
- https://onlinecourses.swayam2.ac.in/
- https://nptel.ac.in/courses/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

Tutorial:

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each practical and average of the same will be converted to 50 marks.
- Viva/ Oral performance consists of 50 marks.

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

ICCS7040	Software Quality & Assurance
CO 1	Comprehend the Software Development Life Cycle (SDLC) and the fundamental concepts of Software Quality Assurance (SQA).
CO 2	Identify and apply various software testing techniques and quality assurance practices across different types of software.
CO 3	Analyze and implement quality control processes, including bug tracking, SQA plans, and various quality control techniques.
CO 4	Utilize different quality management diagrams to track and improve software quality.
CO 5	Understand and apply software quality management standards and models for continuous quality improvement and cost-effective decision-making.

Mapping of CO with PO

ICCS7040	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3											
CO 2	2	3										
CO 3	2	2	3									
CO 4	1	2	2	3								
CO 5	1	1	2	2	3							

Mapping of CO with PSO

ICCS700	PSO1	PSO2	PSO3
CO 1	3		
CO 2	2	3	
CO 3	2	2	3
CO 4	1	2	2
CO 5	1	1	2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Introduction	1,2,3

2	Software Quality Control	2,3,5,6
3	Tracking the Software Quality using Diagrams	1,2,3,6
4	Software Quality Management	2,3,6
5	Quality Cost	2,3,6
6	Quality Assurance Standards	6

P P Savani University
School of Engineering
Institute of Computer Science and Application
Department of Computer Science

Course Code: ICCS7910
Course Name: Project - I
Prerequisite Course(s): --

Teaching & Examination Scheme:

Teaching Scheme (Hours/Week)				Examination Scheme (Marks)						
Theory	Practical	Tutorial	Credit	Theory		Practical		Tutorial		Total
				CE	ESE	CE	ESE	CE	ESE	
-	10	-	10	-	-	100	00	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:
To help learners to

- identify, analyze, and articulate projects with a comprehensive and systematic approach.
- develop creative thinking.
- perform in a team.

Course Content:

Module No.	Content
1.	**Selection of Title** Select a topic of interest to work upon which can be from any domain. After selecting the topic and proposing the title, get approval from the concerned faculty
2.	**Literature Review** Study in detail about the topic chosen.
3.	**Project Proposal** Prepare the proposal on the aspect of the selected area to work upon.
4.	**Implementation** Implementation of the proposal in any of the programming languages
5.	**Report Writing** The report must be prepared as per suggested guidelines consisting of Software Engineering, Preamble, Objectives, Scope, Introduction, Conclusions, Recommendations and Annexure.
6.	**Presentation & Question-Answer** At the end of the semester, the student/group of students shall give a presentation of their work followed by a viva-voce examination.

Course Evaluation:

Sr. No	Evaluation Criteria	Marks
1.	Selection of the topic (Within first 20 Days of commencement of semester)	10
2.	Initial Presentation of the topic	10
3.	An actual work carried out.	10
4.	Report writing as per guidelines.	10
5.	Project and report submission	10
6.	Presentation & Question-Answer session.	50
	GRAND TOTAL	**100**

Course Outcome(s):

After the completion of the course, the following course outcomes will be able to:

ICCS7910	PROJECT-I
CO 1	Analyze user requirements and implement innovative ideas for social and environmental benefits.
CO 2	Apply new technologies and design techniques concerned for devising a solution for a problem statement.
CO 3	Apply new technologies and design techniques concerned for devising a solution for a problem statement.
CO 4	Prepare reports and presentations to communicate technical information.

Mapping of CO with PO

ICCS7910	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	1	1	1	2	2	3		1	2	
CO 2	2	2	2	3	3		1		1		2	2
CO 3	1	2	1	3		2	2	1	3	1		2
CO 4		1	1	2	1	2			1	3	2	1

Mapping of CO with PSO

ICCS7910	PSO1	PSO2	PSO3
CO 1	3	1	3
CO 2	2	3	2
CO 3	1	3	2
CO 4	1		2

Level of Bloom's Revised Bloom's Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create

Module No	Content	RBT Level
1	Selection of Title	2
2	Literature Review	4
3	Project Proposal	2,3
4	Implementation	5,6
5	Report Writing	4,6
6	Presentation & Question-Answer	4,5