PPSU

P P SAVANI UNIVERSITY

SCHOOL OF ENGINEERING

INSTITUTE OF COMPUTER SCIENCE AND APPLICATION

MASTER OF COMPUTER APPLICATION (MCA)

AY 2024-25

VISION – MISSION – PROGRAMME OUTCOMES – PROGRAMME SPECIFIC OUTCOMES

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:

VISION – MISSION – PROGRAMME OUTCOMES – PROGRAMME SPECIFIC OUTCOMES	
PO No	**PROGRAMME OUTCOMES**
	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:

VISION – MISSION – PROGRAMME OUTCOMES – PROGRAMME SPECIFIC OUTCOMES	
PO No	**PROGRAMME OUTCOMES**
	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) MASTER OF COMPUTER APPLICATION
PSO 1	Develop technical project reports and present/demonstrate them among the users.
PSO 2	Apply problem-solving skills and the knowledge of computer applications to solve real world problems.
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

M.C.A.

P P Savani University

School of Engineering

Effective From: 2024-25

Authored by: P P Savani University

CONTENT

FIRST YEAR M.C.A.

P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING INSTITUTE OF COMPUTER SCIENCE & APPLICATION															
TEACHING & EXAMINATION SCHEME FOR M.C.A. PROGRAMME AY: 2024-25															
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	SESH2040	Discrete Mathematics	SH	3	-	2	5	5	40	60	-	-	50	0	150
	SSCA7010	Programming Concepts	CA	3	4	-	7	5	40	60	40	60	-	-	200
	SSCA7020	Relational Database Management System	CA	3	2	-	5	4	40	60	40	60	-	-	200
	SSCA7030	Web Application & Development	CA	1	2	-	3	2	100	0	40	60	-	-	200
	SSCA7040	Computer Architecture	CA	3	-	2	5	5	40	60	-	-	50	0	150
	CFLS7110	Professional & Academic Communication	CFLS	3	-	-	3	3	100	0	-	-	-	-	100
						Total	**28**	**24**							**1000**
2	SSCA7050	Programming with Python	CA	3	4	-	7	5	40	60	40	60	-	-	200
	SSCA7061	Java Web Technologies	CA	3	2	-	5	4	40	60	40	60	-	-	200
	SSCA7070	Computer Networks & Cyber Security	CA	3	2	-	5	4	40	60	40	60	-	-	200
	SSCA7080	Data Structures & Algorithms	CA	3	2	-	5	4	40	60	40	60	-	-	200
	SSCA7090	Software Engineering	CA	3	-	2	5	5	40	60	-	-	100	0	200
	SSCA7910	Project-I	CA	-	5	-	5	5	-	-	100	0	-	-	100
						Total	**32**	**27**							**1100**

P P Savani University

School of Engineering

Institute of Computer Science & Application

Department of Science & Humanities

Course Code: SESH2040

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	-	-	50	-	150

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, Composition of function, Recursive function	08	17
2.	**Lattices** Definition & properties of Lattice, Lattices as Algebraic System, Sublattices, Types of lattices, Distributive lattices, Modular lattices, complemented lattices, Bounded lattices, Complete lattices, Finite Boolean algebra	07	16
3.	**Group Theory** Binary operations, Properties of Group, Groupoid, semigroup & monoid, Abelian group, Subgroup, Cosets, Normal subgroup, Lagrange's theorem, Cyclic group, Permutation group, Homomorphism & Isomorphism of groups.	08	17
Section II			
Module No.	**Content**	**Hours**	**Weightage in %**

4.	**Mathematical Logic and Proof** Propositions, logical operators, Algebra of proposition, Predicates & quantifiers, Nested Quantifiers, Rules of Inference, Proof Methods, Program Correctness techniques.	06	14
5.	**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.	08	18
6.	**Tree** 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.	08	18
	TOTAL	45	100

List of Tutorial(s):

Sr. No.	Name of Tutorial	Hours
1.	Problems based on Set, Relation & Function-1	02
2.	Problems based on Set, Relation & Funciton-2	02
3.	Problems based on Set, Relation & Funciton-3	02
4.	Problems based on Lattices	04
5.	Problems based on Group Theory-1	02
6.	Problems based on Group Theory-2	04
7.	Problems based on Mathematical Logic and Proof	02
8.	Problems based on Graph Theory-1	02
9.	Problems based on Graph Theory-2	02
10.	Problems based on Graph Theory-3	04
11.	Problems based on Tree-1	02
12.	Problems based on Tree-2	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Discrete Mathematics and its Applications	Kenneth Rosen	McGraw Hill, New York.

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):

- http://nptel.ac.in/courses/111107058/
- http://nptel.ac.in/courses/111106086/
- http://nptel.ac.in/courses/111104026/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted out of 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 30 marks.
- MCQ based examination consists of 10 marks.
- Internal viva consists of 10 marks.

Course Outcome(s):

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

SESH2040	Discrete Mathematics
CO1	Summarize the concepts of set theory for understanding & fetching data from a database using query.
CO2	Classify the basic concepts of spanning tree algorithms namely DFA, BFS, Prim's and Kruskal's in the design of networks.
CO3	Construct the algorithm of group theory for data encryption.
CO4	Combination of design, foundational concepts of notations and results of graph theory used for better understanding of problems.

Mapping of CO with PO

SESH2040	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	1	1								1
CO 2	3	3	1	1								3
CO 3	2	2	1	1								1
CO 4	3	3	1	1								3

Mapping of CO with PSO

SESH2040	PSO1	PSO2	PSO3
CO 1	1	2	
CO 2	2	2	
CO 3	1	1	
CO 4	3	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	Set, Relation & Function	1,2,4,6
2	Lattices	1,2,3,4,6
3	Group Theory	1,2,3,5,6
4	Mathematical Logic and Proof	1,2,3,4,6
5	Graph Theory	1,2,3,5,6
6	Tree	1,2,3,5,6

P P Savani University
School of Engineering
Institute of Computer Science & Application

Master of Computer Application

Course Code: SSCA7010
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	04	-	05	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 importance of object-oriented approach.
- develop expertise in creating robust applications using the Java Programming Language.
- understand concepts of Interface, Lambda Expressions, Generic Programming and to implement them.
- implement application including different file operations.
- understand database connectivity and work with the JDBC applications.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**Introduction to Procedural Programming Paradigm** Know about the basics of C programming, learn about the control statements, acquire knowledge about the storage classes, Know about the arrays and structures, Gain knowledge about the pointers	08	10
2.	**Object Oriented Program ming** Introduction to OOP, Objects and Classes, Characteristics of OOP, Difference between OOP and Procedure Oriented Programming, Summary Introduction to Java Programming - Introduction, Features of Java, Comparing Java and other languages, Java Development Kit, More Complex Programs, Java Source file structure, Prerequisites for Compiling and Running Java Programs. Java Language Fundamentals - The building Blocks of Java – Data types – variable declarations – wrapper classes – Operators and Assignment – Control structures	06	10
3.	**Introducing Classes &Objects, Methods, Inheritance & Interface**	06	25

	Objects and Classes, Inheritance, Interface Objects and Classes: classes, objects, objects and object variables, Local Date Class, Mutator and Accessor methods, defining your own classes, static fields and methods, method parameters, object construction, packages and the class path. Inheritance: classes, super classes, and subclasses, overriding methods, inheritance hierarchies, polymorphism, final class and methods, casting, abstract classes and, protected access, Object: Cosmic superclass, Object Wrappers and Autoboxing and Enumeration classes. Interface.		
4.	**Packages** Packages (Defining a Package, Finding Packages and CLASSPATH, A Short Package Example), Packages and Member Access (A Package Access Example), Understanding Protected Members, Importing Packages, Java's Class Library Is Contained in Packages	03	5
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
5.	**Multithreading and Exception Handling.** Multithreaded Programming - Multithreading Fundamentals, The Thread Class and Runnable Interface, creating a Thread, (One Improvement and Two Simple Variations), Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, Using Synchronized Methods, the synchronized Statement, Exception Handling, Generic Programming Exception Handling: dealing with errors, catching exceptions, tips for using exceptions	07	15
6.	**File Handling** Input and Output 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: paths, reading and writing files, creating files and directories, copying, moving and deleting files and getting file information.	04	10
7.	**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
8.	**The SWING & Collection Framework** Introduction, Collection framework (Collection interface, list interface, set interface, sorted set interface), The collection class, Array list and Link list classes (maintaining the capacity and the link list class), iterating elements of collection (the list iterator interface), hash set and tree set classes, SWING Framework - Origins of Swing, Two Key Swing Features, Components & Containers - Understanding Layout Managers – Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout, The	07	15

	Swing Packages, A Simple Swing Application, differentiate Swing & Applet, GUI Events-Event Delegation Model, and Exploring Swing Components.		
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Working with practical concepts of procedural paradigm	06
2.	Implementation of basic concepts of java fundamentals – data types, classes, objects, operators, control & looping structures.	04
3.	Implementation of compile time polymorphism.	02
4.	Implementation of Inheritance.	04
5.	Implementation of runtime polymorphism (overriding & dynamic method dispatch).	04
6.	Implementation of user defined packages.	04
7.	Implementation of thread and different methods and mechanism.	06
8.	Implementation of exception handling.	04
9.	Implementation of user defined exception handling.	02
10.	Implementation of various file operations using different streams, classes and methods.	06
11.	Implementation of database connectivity using JDBC.	06
12.	Implementation of various collection framework classes and utility.	06
13.	Implementation of SWING Framework	06
	TOTAL	60

Textbook(s):

Title	Author/s	Publication
Core Java, Volume I – Fundamentals	Cay S. Horstmann	Pearson Education
Core Java, Volume II – Advanced Features	Cay S. Horstmann	Pearson Education
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://www.youtube.com/watch?v=rfscVS0vtbw
- https://inventwithpython.com/hacking/chapters
- https://www.youtube.com/watch?v=ayi5_yx61Zg

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 30marks during End Semester Examination.

Course Outcome(s):

SSCA7010	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

SSCA7010	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

SSCA7010	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	Introduction to Procedural Programming Paradigm	1, 2
2	Object Oriented Programming	1, 2, 3
3	Introducing Classes & Objects, Methods, Inheritance & Interface	2, 3,4
4	Packages	2, 5,6
5	Multithreading and Exception Handling	2,4,5,
6	File Handling	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 & Application

Master of Computer Application

Course Code: SSCA7020
Course Name: Relational Database Management System
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,	06	15

	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		
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
4.	**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
5.	**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
6.	**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
7.	**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	02

	alter table command.	
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):

SSCA7020	RELATIONAL DATABASE MANAGEMENT SYSTEM
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.
CO5	Understand different database models and query languages to manage the data for given real life application scenario.

Mapping of CO with PO

SSCA7020	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	3	2								2		

Mapping of CO with PSO

SSCA7020	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 & Application

Master of Computer Application

Course Code: SSCA7030
Course Name: Web Application & 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	
01	02	-	02	100	-	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s)of the Course:

To help learners to

- To teach students the basics of server-side scripting using PHP
- To explain web application development procedures
- To impart servlet technology for writing business logic
- To facilitate students to connect to databases using JDBC

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in%**
1.	**Introduction to PHP:** Declaring variables, datatypes, arrays, strings, operations, expressions, control structures, functions, reading data from web form controls like Textboxes, radio buttons, lists etc. Handling File Uploads, connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies.	04	25
2.	**Client-side Scripting:** Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. Simple AJAX applications.	03	25
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
3.	**XML:** Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML Parsing XML Data-DOM, and SAX parsers in java	03	25
4.	**Introduction to Servlets:** Common Gate way Interface (CGI), Life cycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, reading initialization parameters, Handling Http Request & Responses, Using Cookies, and sessions, connecting to a Database using JDBC.	05	25
	Total	15	100

List of Practical:

Sr. No	Name of Practical	Hours
1.	Create a PHP page using functions for comparing three integers and print the largest number.	01
2.	Write a function to calculate the factorial of a number (non-negative integer). The function accepts the number as an argument.	01
3.	WAP to check whether the given number is prime or not.	01
4.	Create a PHP page which accepts string from user. After submission that Page displays the reverse of provided string.	01
5.	Write a PHP function that checks if a string is lowercase.	01
6.	Write a PHP script that checks whether a passed string is palindrome or not? (A palindrome is word, phrase, or sequence that reads the same backwards forward)	01
7.	WAP to sort an array.	01
8.	Write a PHP script that removes the whitespaces from a string. Sample string: 'The quick" "brown fox' Expected Output: The quic brown fox	01
9.	Write a PHP script that finds out the sum of first n odd numbers.	01
10.	Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message displayed.	01
11.	Write a java script that checks if a string contains another string.	01
12.	Create a simple 'birthday countdown' script, the script will count the number of days between current day and birthday.	01
13.	Create a script to construct the following pattern, using nested for loop. * ** *** ****	01
14.	Write a simple java Script program to check that emails are valid.	02
15.	WAP using servlet to print first n even numbers.	02
16.	$color = array('white', 'green', 'red'') Write a java script which will display the colors in the following way: Output: white, green, red,•green•red•white	01
17.	Using switch case and dropdown list display a "Hello" message depending on the language selected in dropdown list.	02
18.	Develop a page using HTML, Java script, CSS and servlet to take input from users and save it in a separate database.	02
19.	Write a java script to replace the first 'the' of the following string with' That'. Sample :'the quick brown fox jumps over the lazy dog.' Expected Result: That quick brown fox jumps over the lazy dog.	04
20.	Create a web page using XML. Write a program to connect a XML web page to any database engine	04
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Web Technologies	Uttam K Roy	Oxford University Press
The Complete Reference PHP	Steven Holzner	TataMcGraw-Hill
Web Programming, building internet applications	ChrisBates2ndedition	WileyDremtech

Web material link:

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

Course Evaluation:

Theory:

- Faculty evaluation consists of 100 marks as per the guidelines provided by the course coordinator.

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):

SSCA7030	WEB APPLICATION &DEVELOPMENT
CO 1	Understand the basics in php programming in terms of constructs, control statements, string functions etc.
CO 2	Develop the server side php scripts using various features.
CO 3	Write the server side and client-side scripts for designing web-based services with database connectivity.
CO 4	Defining xml tags, attributes and values, document type definition, etc.
CO 5	Develop a web application using advanced web programming features.

Mapping of CO with PO

SSCA7030	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2		1		1							
CO 2	2	2	1	3	3		3					1
CO 3	2	2	3	3	3	3	3	3	3	3	3	3
CO 4	2		1		1							
CO 5	2	2	3	3	3	3	3	3	3	3	3	3

Mapping of CO with PSO

SSCA7030	PSO1	PSO2	PSO3
CO 1		1	
CO 2	3	3	3
CO 3	3	3	3
CO 4		1	
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

Module No	Content	RBT Level
1	Introduction to PHP	1,2,4
2	Decision and Loops	2,3,4,6
3	Function	1,2,3,4
4	Array	1,2,3
5	Handling HTML form with PHP	2,4,5
6	Session and Cookie	1,2,3,6
7	Database Connectivity with MySQL	1,3,6

P P Savani University
School of Engineering
Institute of Computer Science & Application

Master of Computer Application

Course Code: SSCA7040
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	-	02	05	40	60	-	-	50	-	150

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, Mux, De-Mux, Sequential Circuits: Flip-Flops (SR, JK & D) Data Representation: Decimal, Binary, Octal and Hexadecimal numbers.	08	20
2.	**Computer System** Comparison of Computer Organization &Architecture, Computer Components and Functions, Accessing Input/output devices; Interrupts; Data transfer schemes - programmed I/O and DMA transfer; data transfer schemes for microprocessors.	08	15
3.	**Memory System Organization** Memory Hierarchy; Primary memory, 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	07	15
Section II			
Module No.	**Content**	**Hours**	**Weightage in %**
	Processor Organization Instruction Formats, Instruction Sets, Addressing Modes,	10	20

4.	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.		
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	10	20
6.	**Case Study** Pentium 4 processor Organization and Architecture	02	10
	TOTAL	45	100

List of Tutorial:

Sr. No	Name of Tutorial	Hours
1.	Simplification of Logic Circuits using K-Map	04
2.	Number Conversion (Decimal, Binary, Hexadecimal, Octal)	04
3.	Addition and Subtraction of binary numbers.	04
4.	Computer System	04
5.	Memory System Organization	04
6.	Processor Organization	04
7.	Fundamentals of Advanced Computer Architecture	04
8.	Case Study	02
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Modern Digital Electronics,	R.P.Jain	Tata McGraw Hill
Computer Organization & Architecture	William Stallings.	Pearson Education
Computer System Architecture	M. Morris Mano	Pearson Education.

Web material link:

- https://nptel.ac.in/courses/106/105/106105163/
- http://www.intel.com/pressroom/kits/quickreffam.htm
- 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.

Tutorial:

- Continuous evaluation consists of performance of tutorial which should be evaluated out of 10 Marks for each tutorial in the next turn and average of the same will be converted to 30 Marks.
- MCQ based examination of 10 Marks.
- Internal Viva of 10 Marks.

Course Outcome(s):

SSCA7040	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

SSCA7040	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

SSCA7040	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

P P Savani University
School of Engineering
Institute of Computer Science & Application

Master of Computer Application

Course Code: SSCA7050
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	04	-	05	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s)of the Course:

To help learners to

- Understand importance of practical oriented approach.
- Develop ability to implement real life programming problems.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1	**Introduction** Introduction to Python, History, Features and Applications of Python, Python Input Output, Python basic Operators.	03	06
2	**Python Data Types and Program Flow Control** Different Data Types in Python: Numeric, String and Sequential, Variables in Python, Conditional blocks using if, else and elseif, Simple for loops in Python, for loop using ranges, use of while loops in Python, Loop manipulation using pass, continue, break and else.	04	04
3	**Python String, List, Tuple, Set and Dictionary Manipulation** String in Python and its built-in methods, List & Dictionary manipulation, Functions &methods for Tuple and Sets, Functions as Object.	05	12
4	**Python Functions Modules and Packages** Organizing Python codes using functions, organizing Python projects into Modules, importing own Module as well as external Modules, understanding Packages, Programming using functions, Modules and external packages.	05	14
5.	**Files in Python** Introduction to file input and output, Writing Data to a File, Reading Data from a File, using loops to process files.	05	14

Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
6.	**Python Object Oriented Programming** Introduction to Oops Concept of class and its attributes, objects and instances, Inheritance and Polymorphism, Constructor and destructors, Python programming using OOP concepts.	04	14
7.	**Exception Handling in Python** Introduction to Exception and Errors, The Exception Handling mechanism in Python Types of testing-Black box and Glass-box.	04	14
8.	**Simple Algorithms and Data structures** Search Algorithms, Sorting Algorithms, Hash Tables, MD5	04	06
9.	**Advanced Topics I** Regular Expressions–Res and Python, Plotting using PyLab, Networking and Multithreaded, Programming–Sockets, Threads and Processes, Chat Application	06	06
10.	**Advance Topics II** Security–Encryption and Decryption, Classical Cyphers Graphics and GUI Programming–Drawing using Turtle, Tkinter and Python, Other GUIs	05	10
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Installation and Introduction to Python Environment.	02
2.	Learning Input and Output in Python.	02
3.	Working with different Datatypes in Python.	02
4.	Implementation of flow control statements.	04
5.	Implementation of Lists, Dictionaries, Sets, Tuples.	02
6.	Implementation of Strings in Python.	04
7.	Implementation of functions and Modules.	04
8.	Working with Packages and use different Packages available to work with Python	04
9.	Working with files in Python.	04
10.	Implementation of OOP features.	04
11.	Basics of Exception handling, Exception handling mechanism.	02
12.	SQL Database connection using Python, Creating and searching tables, Reading and storing information on database, Programming using Database connections.	04
13.	Implement classical ciphers using python.	02
14.	Learn to plot different types of graphs using Py Plot.	02
15.	Python Regular Expressions Email, URL validation and Pattern finding using regular expression.	06
16.	Developing mini application using Python.	06
17.	Develop programs to learn GUI programming using Tkinter. Draw graphics using Turtle.	06
	TOTAL	60

Textbook(s):

Title	Author/s	Publication
Learning to Program with Python	Richard L. Halterman	Pearson
Python Programming: A modular Approach	Sheetal Taneja, Naveen Kumar	Pearson

Reference Book(s):

Title	Author/s	Publication
Python Cookbook	David Ascher, Alex Martelli	OReilly
Introduction to Computation and Programming Using Python	John V Guttag	Prentice Hall of India

Web Material Link(s):

- https://www.python.org/
- https://www.w3schools.com/python
- https://www.youtube.com/watch?v=rfscVS0vtbw
- https://inventwithpython.com/hacking/chapters
- https://www.youtube.com/watch?v=ayi5_yx61Zg

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 guide lines 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):

SSCA7050	PROGRAMMING WITH PYTHON
CO1	Apply python programming principles.
CO2	Understand the syntax and semantics of the 'python' language.
CO3	Develop efficient programs with logic& capabilities using python language.
CO4	Develop algorithmic solutions to data science related problems.
CO5	Develop python projects using in built tools to solve computing problems in real world.

Mapping of CO with PO

SSCA7050	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	2	2	2				3	2	1	3
CO 2	2	2	2	2	2				3	2	1	3

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

Mapping of CO with PSO

SSCA7050	PSO1	PSO2	PSO3
CO 1	3	1	2
CO 2	3	1	2
CO 3	3	1	2
CO 4	3	1	2
CO 5	3	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
2	Python Data Types and Program Flow Control	2,3
3	Python String, List, Tuple, Set and Dictionary Manipulation	2,3
4	Python Functions Modules and Packages	3,4,6
5	Files in Python	3,4,6
6	Python Object Oriented Programming	1,2
7	Exception Handling in Python	2,3
8	Simple Algorithms and Data structures	3,4,6
9	Advanced Topics I	6
10	Advance Topics II	6

P P Savani University
School of Engineering
Institute of Computer Science & Application

Master of Computer Application

Course Code: SSCA7061
Course Name: Java Web Technologies
Prerequisite Course (s): SSCA7010 Programming Concepts

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 J2EE architecture.
- construct web application using servlets, Java Server pages.
- learn advanced java programming concepts like hibernate, Enterprise java beans, etc.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**Advance Networking** Networking Basics, Introduction of Socket, Types of Sockets, Socket API, TCP-IP: Client/Server Sockets, URL, UDP: Datagrams, java.net package classes: Socket, Server Socket, Inet Address, URL, URL Connection, RMI Architecture, Client Server Application using RMI.	06	10
2.	**Servlets Programming** Introduction, Servlet Implementation, Servlet configuration, Servlet life cycle, servlet session, Context and Collaboration, Web Archive files, Deployment Descriptor, Deployment Configuration. .	08	20
3.	**Java Server Page** JSP: Overview, lifecycle, Architecture, JSP Elements: Directives, Scripting, Action tags, Implicit Objects, Comments, Custom Tags, page, Scope: page, request, session, JSP Exception Handling.	08	20
Section II			

Module No.	Content	Hours	Weightage in %
4.	**JDBC** Introduction to java database programming, JDBC driver types, Steps to connect JDBC, JDBC statement interface, JDBC prepared statement interface, JDBC callable statement interface, Transaction management, Java beans.	06	15
5.	**Web Services** Introduction, Web Service Technology, J2EE for web service, developing web services.	03	5
6.	**Hibernate** Introduction to Hibernate, Exploring Architecture of Hibernate, Object Relation Mapping (ORM) with Hibernate, Hibernate Annotation, Hibernate Query Language (HQL), CRUD Operation using Hibernate API.	07	15
7.	**Java Web Frameworks:** Spring MVC Spring: Introduction, Architecture, Spring MVC Module, Life Cycle of Bean Factory, explore: Constructor Injection, Dependency Injection, Inner Beans, Aliases in Bean, Bean Scopes, Spring Annotations, Spring AOP Module, Spring DAO, Database Transaction Management, CRUD Operation using DAO and Spring API.	07	15
	TOTAL	45	100

List of Practical:

Sr. No	Name of Practical	Hours
1.	Introduction to client-server architecture	02
2.	Study and implementation of servlet programming	06
3.	Study and implementation of java server page	06
4.	Study and implementation of java database connectivity	06
5.	Study and implementation of web service	04
6.	Study and implementation of hibernate	04
7.	Study and implementation of Java Web Frameworks	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Complete Reference J2EE	James Keogh	Mc Graw Hill

Reference Book(s):

Title	Author/s	Publication
Spring in Action 3rd edition	Craig walls	Manning
JDBC™ API Tutorial and Reference	Maydene Fisher, Jon Ellis, Jonathan Bruce	Addison Wesley

Web material link:

- https://www.javatpoint.com/servlet-tutorial/
- https://www.javatpoint.com/jsp-tutorial/

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):

SSCA7061	JAVA WEB TECHNOLOGIES
CO1	Understand and implemented real time client server architecture.
CO2	Design web applications using a servlet, java server pages and jdbc.
CO3	Examine advanced frameworks and discuss their business applications.
CO4	Implementation and testing strategies in real time applications.
CO5	Use advanced concepts related to web services, hibernate and ejb.

Mapping of CO with PO

SSCA7061	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	2	1	2				3				3
CO 2	1	3	3	3	3			3				3
CO 3	1	3	3	3	3			3				3
CO 4	1	3	3	3	3			3				3
CO 5	1	3	3	3	3			3				3

Mapping of CO with PSO

SSCA7061	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	3	3	1
CO 3	3	3	3
CO 4	3	3	3
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

Module No	Content	RBT Level
1	Client Server Technology	1,2,3
2	Servlets Programming	2,3,6
3	Java Server Page	2,3,6
4	JDBC	3,6
5	Web Services	2,3,6
6	Advance Frameworks hibernate & EJB	6

P P Savani University
School of Engineering
Institute of Computer Science & Application

Master of Computer Application

Course Code: SSCA7070
Course Name: Computer Network and Cyber Security
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

- make students understand, network security protocol including firewall.
- students will be able to know advanced attacking techniques.
- students will be able to understand cyber security fundamentals.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**Introduction:** Layered Network Architecture, ISO- OSI Model, Introduction to TCP/IP Model.; Data Communication Techniques: Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM).; Multiplexing Techniques: Frequency Division, Time Division, Statistical Time Division Multiplexing; Transmission Media: Wires, Cables, Radio Links, Satellite Link, Fiber Optic.	04	11
2.	**Data Link Layer Protocols** AND **Medium Access Control Sub Layer** Noise Free Channels Protocol: Stop and Wait Protocols, Sliding Window Protocol, Noisy Channels Protocols: Stop and Wait ARQ, Sliding Window ARQ: Go Back and Selective Repeat ARQS, ISDN, Asynchronous Transfer Mode (ATM), ATM cells, Header and Cell Formats, Error Detection And Correction: Single and Burst Error, Parity Check Codes, Cyclic Redundancy Code & Hamming Code, Concept of Random Access, LAN: IEEE 802.3, 802.4 and 802.5 Protocols, Token Ring Protocol, FDDI Protocol, Distributed Queue Dual Bus (DQDB) Protocol.	07	12
	Network and Transport Layer Protocols: General Principles, Virtual Circuits and Data-grams, Windows Flow Control, Packet Discarding, Traffic Shaping, Choke RSVP, Network Devices: Bridges, Routers and Gateways, Routing Algorithms**:** Optimality principle, Shortest Path Routing-		

3.	Dijkstra, Distance Vector Routing, Link State Routing, Flow Based Routing, Multicasting Routing, Flooding and Broadcasting, Flow and Congestion Control, Internet Architecture and Addressing, Transport Layer: Design Issues, Quality of Services, Primitives, Connection Management: Addressing, Connection Establishment and Releases, Flow Control and Buffering, Crash Recovery, Protocols: Transmission Control Protocol (TCP), User Datagram Protocol UDP).	08	15
4.	**Application Layer Protocols and Other Networks**: Cryptography: Substitution and Transposition, Ciphers, Data Encryption Standard (DES), DES Chaining, Breaking DES, Public key Cryptography, Authentication Protocols, Virtual LAN (VLAN), Virtual Private Network (VPN).	03	12
	Section II		
Module No.	**Content**	**Hours**	**Weightage in %**
5.	**Introduction** Overview of Public Key Cryptography, Symmetric Cryptography, Digital Signature, Encryption/Decryption Algorithms, Public Key Infrastructure, Internet Key Exchange Protocol	07	21
6.	**Network Defense tools** Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System	08	21
7.	**Cyber Security Policy Catalog** Cyber Governance Issues, Internet Names and Numbers, Copyrights and Trademarks, Email and Messaging, Cyber User Issues, Cyber Crime, Geo location, Privacy, Cyber Conflict Issues, Intellectual Property Theft, Cyber Espionage.	08	8
	TOTAL	45	100

List of Practical:

Sr. No	Name of Practical	Hours
1.	Implementation of basic Client Server program using TCP Socket (Eg. Day time server and client).	06
2.	Implementation of basic Client Server program using UDP Socket	06
3.	Implementation of TCP Client Server program with concurrent connection from clients.	04
4.	Implementing fully concurrent application with a TCP server acting as a directory server and client programs allowing concurrent connection and message transfer (Eg. Chat system).	06
5.	TCP scanning using NMAP	04
6.	Port scanning using NMAP	04
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Computer Network: Second Ed.	A.S. Tanenbaum	Prentice Hall, India(tan)
Data Communication	B.A. Frouzan	Tata McGraw Hill.
Anti-Hacker Tool Kit (Indian Edition)	Mike Shema	Mc Graw Hill
Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives	Nina Godbole	Wiley

Web material link:

- https://www.netacad.com/courses/packet-tracer

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 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):

SSCA7070	COMPUTER NETWORK AND CYBER SECURITY
CO1	Understand the organization of computer networks and communication techniques and functions of physical layer.
CO2	Examine the basic concepts of data link layer properties; including the flow control mechanisms.
CO3	Illustrate property of network layer and transport layer protocols.
C04	Understand the basic concepts of application layer protocol design.
C05	Explore and implement the basic concepts of network security concepts and evaluate network defense tools. .

Mapping of CO with PO

SSCA7070	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	3		3					3		
CO 2		3	3	3	3		3					
CO 3		3	3	3	3	3	3	3	3			
CO 4			3			3	3	3		3	3	3
CO 5		3	3	3	3		3	3	3			3

Mapping of CO with PSO

SSCA7070	PSO1	PSO2	PSO3
CO 1	**3**		
CO 2		**3**	**3**
CO 3		**3**	**3**
CO 4	**3**		**3**
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	1,2
2	Data Link Layer Protocols AND Medium Access Control Sub Layer	2,3
3	Network and Transport Layer Protocols	2,4
4	Application Layer Protocols and Other Networks	2,3,6
5	Introduction	2
6	Network Défense tools	3,6
7	Cyber Security Policy Catalog	2,4

P P Savani University
School of Engineering
Institute of Computer Science & Application

Master of Computer Application

Course Code: SSCA7080
Course Name: Data Structures & Algorithms
Prerequisite Course (s): SSCA7010 Programming Concepts

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
- develop logic building and problem-solving skills.
- learn to optimize programmatic aspect to solve real-time problems.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in%**
1.	**Introduction** Data types – Primitive and Non-primitive, Types of Data Structure Algorithm: characteristics, specifications, Writing Pseudo-code Algorithm vs Program, Analysis of Algorithm, Methods to measure Time and Space Complexity of Algorithm, Asymptotic Notations to represent Time complexity & Space complexity of an algorithm	06	13
2.	**Linear Data Structure** Array: Representation of arrays, Insert and Delete Operations on Array, Applications of arrays, Stack: Representation of Stack, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression and Their Compilation, Recursion, Tower of Hanoi, Queue: Representation of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue, Linked List: Singly Linked List, Doubly Linked list, Applications of linked list.	06	12
3.	**Nonlinear Data Structure** Tree: Definitions and Concepts, Representation of binary tree, Binary tree traversal, Binary search trees, Heap, AVL trees,2-3 Trees, Applications of Tree, Graph: Matrix Representation of Graphs, Graph operations, Graph traversal with BFS and DFS, Applications of Graph	05	10
4.	**Sorting and Searching** Searching algorithms: Sequential and Binary search and its Analysis, Min-Max Problem & its Analysis, Concept of Internal and External	06	15

	Sorting, Sorting methods: Bubble, Insertion, Selection, Heap, Quick and Merge Sort, Analyse each sorting method for Best, Average and worst case		
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
5.	**Greedy Method** Basic algorithm and characteristics, Coin change problem, Fractional Knapsack Problem, Job Sequencing with deadline Minimum Spanning tree using Prim's and Kruskal's Algorithm Dijkstra's Single source shortest path algorithm, Measure Complexity of listed Problems	07	15
6.	**Dynamic Programming Method** Basic algorithm and characteristics, 0/1 Knapsack Problem, Travelling Salesman Problem, Calculate complexity of listed Problems	06	15
7.	**Backtracking Method** Basic algorithm and characteristics, Solving n-queens problem, Graph colouring, Hamiltonian cycle (TSP)	06	13
8.	**String Matching** Concept of String Pattern Match, The naive string-matching algorithm, The Rabin Karp algorithm	03	7
	TOTAL	45	100

List of Practical(s):

Sr.No	Name of Practical	Hours
1.	Implement Insertion and Deletion operation on Array.	02
2.	Implement Stack and Queue operations using Array.	02
3.	Implement Singly and doubly Linked list.	02
4.	Implement Stack and Queue with Linked List.	02
5.	Implement Binary Tree and perform Insert, Delete and Traversal Operations.	02
6.	Implement Graph Traversal Techniques.	02
7.	Implement and Time analysis of Searching Algorithms.	02
8.	Implement and Time analysis of Min-Max problem.	02
9.	Implement and Time analysis of Bubble, Insertion, Selection, Heap Sort, Quick and Merge Sort.	06
10.	Implement Greedy approach for Implementing Dijkstra's Single source shortest path algorithm.	02
11.	Implement solution for 0/1 Knapsack problem using Dynamic Programming approach.	02
12.	Implement Backtracking Method for Solving N-Queen Problem.	02
13.	Implementation of Naïve String-matching algorithm and Rabin-Karp algorithm.	02
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
An Introduction to Data Structures	Jean-Paul Tremblay, Paul G. Sorenson	Tata McGraw

with Applications		Hill
Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein	MIT Press

Reference Book(s):

Title	Author/s	Publication
Design and Analysis of Algorithm	S. Sridhar	Oxford Higher Education
C & Data Structures	P S Deshpande, O. G. Kakde	Charles River Media
Data Structures using C & C++	Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum	Prentice-Hall

Web Material Link:

- https://nptel.ac.in/courses/106102064/

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):

SSCA7080	DATA STRUCTURES & ALGORITHMS
CO1	Design and apply appropriate data structures for solving computing problems.
CO2	Analyze algorithms and algorithm correctness.
CO3	Understand how asymptotic notation is used to provide a rough classification of algorithms.
C04	Design time and space efficient algorithms using different techniques.

Mapping of CO with PO

SSCA7080	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1		2								
CO 2	2	2		2	1	2						
CO 3	2	1		1	1							
CO 4	2	2		2	1							

Mapping of CO with PSO

SSCA7080	PSO1	PSO2	PSO3
CO 1	1	1	2
CO 2	3	3	3
CO 3	1	1	2
CO 4	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	Introduction	1,2
2	Linear Data Structure	3
3	Nonlinear Data Structure	3
4	Sorting and searching	3,4
5	Greedy Method	2,3
6	Dynamic Programming Method	3,4
7	Backtracking Method	3
8	String Matching	3

P P Savani University
School of Engineering
School of Computer Science & Application

Master of Computer Application

Course Code: SSCA7090

Course Name: Software 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	05	40	60	-	-	100	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help learners to

- comprehend the key concepts and process of software engineering that are implemented and followed in developing software.
- illustrate and conceptualize the software development life cycle (SDLC) models and agile methodologies.
- make acquainted with project management framework and tools.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**Introduction** Software Engineering, Software Components, Software Crisis, Software Engineering Process, Software Process Models - Waterfall Model, Evolutionary Process Model: Prototype and Spiral Model, , Incremental Process model: Iterative approach, Agile Development: Extreme programming, Scrum.	07	15
2.	**Software Requirement Engineering & Specification** Requirement Engineering Process, Management of User Needs, Developing Use Cases, Building the Requirements Model, Negotiating Requirements; Validating Requirements, Data Flow oriented modeling, SRS, Standards for SRS.	05	10

3.	**Design Engineering** Design process and design quality, Design concepts, Design model, Architectural styles, User Interface Design: Golden Rules of User Interface Design; User Interface Analysis and Design; Interface Analysis; Interface Design steps, Software Measurement and Metrics: Various Size Oriented Measures: Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs, Object Oriented Designing concepts.	06	15
4.	**Software Testing** Testing fundamentals, Testing principles, Test characteristics, White box testing: Basis path testing, Control structure Black box testing: Equivalence partitioning, Boundary value analysis, Testing strategies for specialized environment – Object Oriented concepts, mobile application and Web Application.	05	10
Section II			
Module No.	**Content**	**Hours**	**Weightage in %**
5.	**Software Project Management** An Overview of IT Project Management: Define project, project management framework, The role of project Manager, Systems View of Project Management, Stakeholder management, Project phases and the project life cycle. Case Study: Use of various framework and tools for project management	06	15
6.	**Project Scheduling** Basic concepts, Basic principles, Relationship between people and effort, Effort distribution, Task network, Scheduling and tracking, Earned value analysis	04	10
7.	**Software Effort Estimation** The Management Spectrum – 4P's, Metrics for Size Estimation – Line of Code, Function Points, Project Cost Estimation Approaches – Overview of Heuristic, Analytical and Empirical Estimation, COCOMO, COCOMO – II, Risk Management: Identify IT Project Risk, Risk Analysis and Assessment, Risk Strategies, Risk Monitoring and Control	05	10
8.	**System Analysis & Design using UML** UML Diagrams, Structure Diagram, Behavior Diagrams, use case, Activity, State Diagram, Interaction Diagrams, Sequence Diagram, Communication Diagram, Timing Diagram, Interaction Overview Diagram, Case study: Prepare UML diagrams for any system and application.	07	15
	TOTAL	45	100

List of Tutorials:

Sr. No	Name of Tutorials	Hours
1.	Identify software process model suited for various system and application.	04
2.	Case Study on Agile methodology.	06
3.	SRS structure and documentation.	02
4.	Analysis and designing user interface and design and developing user scenario.	04
5.	Case Study: Prepare Test Cases for system and application.	04
6.	Study and prepare documentation on various framework and tools used in project management.	04
.7.	Analysis and design Consider an system and application using various UML diagrams.	04
8.	Agile Documentation	02
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Software Engineering: A Practitioners Approach.	R.S. Pressman	McGraw Hill.
Software Engineering.	Ian Sommerville	Addition Wesley / Pearson education
Software engineering principles and practice.	Waman S. Jawadekar	Tata McGraw Hill
Software Engineering – A Precise Approach.	Pankaj Jalote	Wiley India
Beginning Agile.	Andrew Stellman, Greene Jennifer	O'Reilly
Beginning Software Engineering	Rods Stephen	WROX

Web material link:

- https://nptel.ac.in/courses/106105087/
- https://www.nptelvideos.com/software_engineering/

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 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.
- MCQ based examination consists of 25 marks.
- Internal viva consists of 25 marks.

Course Outcome(s):

SSCA7090	SOFTWARE ENGINEERING
CO1	Understand a high-level overview of the software development process.
CO2	Demonstrate an ability to design the software by applying the software engineering design principles.
CO3	Study about agile methodology & practical implementation of different agile methodologies in it industry.
C04	Understand project management processes to successfully complete project in it industry.
CO5	Evaluate software testing process to analyze the functionality of application.

Mapping of CO with PO

SSCA7090	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1	1									
CO 2			2	1								
CO 3					1				1	1		
CO 4						1			1		1	
CO 5				1	1					1		

Mapping of CO with PSO

SSCA7090	PSO1	PSO2	PSO3
CO 1	3	3	
CO 2	2		
CO 3		3	
CO 4			2
CO 5	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
2	Software Requirement Engineering & Specification	2,3
3	Design Engineering	2,3
4	Software Testing	2,3
5	Software Project Management	3,4
6	Project Scheduling	2,4
7	Software Effort Estimation	2,4
8	System Analysis & Design using UML	2,3

P P Savani University
School of Engineering
Institute of Computer Science & Application

Master of Computer Application

Course Code: SSCA7910
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	
-	05	-	05	-	-	100	-	-	-	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.

Objective of the Project-I:

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
	TOTAL	**100**

Course Outcome(s):

SSCA7910	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

SSCA7910	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

SSCA7910	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

SECOND YEAR M.C.A.

P P SAVANI UNIVERSITY																
SCHOOL OF ENGINEERING INSTITUTE OF COMPUTER SCIENCE AND APPLICATION																
TEACHING & EXAMINATION SCHEME FOR M.C.A. PROGRAMME AY: 2024-25																
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**		
3	SSCA8011	Advance Web Application & Development	CA	3	2	-	5	4	40	60	40	60	-	-	200	
	SSCA8020	Mobile Application Development	CA	3	2	-	5	4	40	60	40	60	-	-	200	
	SSCS8030	Research Methodology	CS	3	-	-	3	3	40	60	-	-	-	-	100	
		Elective-I	CA/CS	3	2	-	5	4	40	60	40	60	-	-	200	
		Elective-II	CA/CS	3	2	-	5	4	40	60	40	60	-	-	200	
		Life Skill Elective Course-I	CLSC	2	-	-	2	2	100	-	-	-	-	-	100	
						Total	**25**	**21**							**1000**	
4	SSCA8030	Online Course	CA	4	-	-	4	4	100	0	-	-	-	-	100	
	SSCA8920	Major Project/Dissertation	CA	24			24	24	-	-	200	300	-	-	500	
						Total	**28**	**28**							**600**	
						Grand Total	**113**	**100**							**3700**	

P P SAVANI UNIVERSITY															
SCHOOL OF ENGINEERING INSTITUTE OF COMPUTER SCIENCE AND APPLICATION															
TEACHING & EXAMINATION SCHEME FOR M.C.A. PROGRAMME AY: 2024-25															
Sem	**Course Code**	**Course Title**	**Offered By**	**Teaching Scheme**					**Examination Scheme**						
				Contact Hours				**Credit**	**Theory**		**Practical**		**Tutorial**		**Total**
	Elective -I			**Theory**	**Practical**	**Tutorial**	**Total**		**CE**	**ESE**	**CE**	**ESE**	**CE**	**ESE**	
3	SSCS8010	Machine Learning	CS	3	2	-	5	4	40	60	40	60	-	-	200
	SSCS8510	Artificial Intelligence	CS	3	2	-	5	4	40	60	40	60	-	-	200
	SSCA8510	Cloud Computing	CA	3	2	-	5	4	40	60	40	60	-	-	200
	Elective -II														
	SSCS8020	Natural Language Processing	CS	3	2	-	5	4	40	60	40	60	-	-	200
	SSCS8520	Computer Vision	CS	3	2	-	5	4	40	60	40	60	-	-	200
	SSCS8530	Data Science	CS	3	2	-	5	4	40	60	40	60	-	-	200
	Life Skill Elective Course-I														
	CLSC2040	Life Skill Lessons from Bhagavad Gita	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2050	Learnings from Ramayana	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2060	Indian Heritage & Culture	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2070	Indian Classical Music	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2080	Indian Classical Dance	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2090	Constitutional Empowerment	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2100	Indian Agriculture	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2110	Indian Heath Science	CLSC	2	-	-	2	2	100	0	-	-	-	-	100
	CLSC2120	Indian Architecture and Town Planning	CLSC	2	-	-	2	2	100	0	-	-	-	-	100

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

Master of Computer Application

Course Code: SSCA8011
Course Name: Advance Web Application & Development
Prerequisite Course(s): Web Application & Development (SSCA7030)

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

- Write backend code in Python/Java, PHP languages and writing optimized front end code HTML and JavaScript.
- Understanding MVC architecture in Web based applications, with Advanced PHP concepts and Laravel Framework along with Node.js and Angular js.
- Give basic understanding of URL methods, MVC Framework, Unit Testing, Web Services, API, Node Servers, and routing.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**PHP** Introduction to PHP and its syntax, combining PHP and HTML, understanding PHP code blocks like Arrays, Strings, Functions, looping and branching, file handling, processing forms on server side, cookies and sessions.	08	10
2.	**Object Oriented PHP** Object Oriented Programming with PHP – Classes, Properties, Methods, Constructor, Destructor, Getter and Setter, capsulation, Inheritance, Data Abstraction, Polymorphism.	08	20
3.	**PHP & MySQL** Introduction to PHP My Admin, connection to MySQL server from PHP, execution of MySQL queries from PHP, receiving data from database server and processing it on webserver using PHP. Web Scraping using cURL, Regular Expression, Mail function, Web Services & APIs	06	20
Section II			
Module No.	**Content**	**Hours**	**Weightage in %**

4.	**PHP MVC Framework – Laravel** Introduction to Laravel and MVC, Environment Setup, Routes, Namespaces, Controllers, Views, Blade Template, Migration, Request Response, Redirections, Forms, Session, Cookie, Database Connectivity and CRUD operations	09	15
5.	**Node JS and Angular** Basic web developments, environmental setup, callbacks, node package manager (NPM) utilization, streams and buffers, express framework basics, MongoDB basics, and RestAPI creation, Setup Node js with angular	08	15
6.	**Web Sockets** Introduction to Web sockets, Web socket URIs, Web socket APIs, Opening Handshake, Data Framing, Sending and Receiving Data, Closing the Connections, Error Handling, Web socket Security	06	20
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Develop a simple web page in PHP using Class, Object, Inheritance, Function.	02
2.	Develop a web application in PHP using Constructor and Destructor.	02
3.	Write a php program to calculate Date and Time function.	02
4.	Create a web page to advertise a product of the company using images and audio.	02
5.	Create a PHP page for login system using session.	02
6.	Create a web page for Travel agency with database connectivity.	02
7.	Install and configure both PHP and MySQL.	04
8.	Develop a small project using Laravel framework.	04
9.	Develop web application as a Mini Project using Node JS.	10
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Black Book, Web Technologies	Kogent Learning Solutions Inc	Dreamtech Press
Full Stack Web Development for Beginners	Riaz Ahmed	Atlantic publisher

Reference Book(s):

Title	Author/s	Publication
Web Technologies--A Computer Science Perspective	Jeffrey C. Jackson	Pearson Education
AngularJS: Up and Running Enhanced Productivity with Structured Web Apps	Brad Green, Shyam Seshadri	O'Reilly Media
Learning React Functional Web Development with React and Redux	Alex Banks, Eve Porcello	O'Reilly Media

Web Material Link(s):

•https://www.w3schools.com/whatis/whatis_fullstack.asp

•https://www.youtube.com/watch?v=nu_pCVPKzTk (Free code camp)
•https://www.javatpoint.com/how-to-be-a-full-stack-developer
• https://www.tutorialspoint.com/the-full-stack-web-development/index.as

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 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 completion of the course, the student will be able to

SSCA8011	**ADVANCE WEB APPLICATION & DEVELOPMENT**
CO1	Identify the basic concepts of web & markup languages.
CO2	Develop web applications using scripting languages & frameworks.
CO3	Creating controller working with and displaying in angular js and nested forms with ng-form.
CO4	Working with the files in react js and constructing elements with data.
CO5	Develop dynamic web pages with usage of server-side scripting NodeJS and MongoDB.

Mapping of CO with PO

SSCA8011	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1		3	3	2	3	2		3	1			1
CO 2		3	3	2	3	2		3	3		2	2
CO 3		3	3	2	3	2		3	3		3	3
CO 4		3	3	2	3	2		3	3		2	3
CO 5		3	3	2	3	2		3	3		3	3

Mapping of CO with PSO

SSCA8011	PSO1	PSO2	PSO3
CO 1	2	2	1
CO 2	1	3	3
CO 3	3	3	3
CO 4	3	3	3
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

Module No	Content	RBT Level
1	PHP	1,2,3
2	Object Oriented PHP	2,3
3	Advance PHP	2,3,6
4	PHP MVC Framework – Laravel	2,3
5	PHP & MySQL	2,3,4,6
6	Web Sockets	2,3,4,6

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

Master of Computer Application

Course Code: SSCA8020
Course Name: Mobile Application 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	
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 fundamentals of mobile application development.
- Learn programming languages and frameworks for mobile development.
- Develop skills in designing user-friendly mobile interfaces.
- Implement data management and storage in mobile applications.
- Explore mobile application testing, debugging, and optimization techniques.
- Gain knowledge of deployment strategies and app store guidelines.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**Introduction of Android** Android Operating System, History of Mobile Software Development, Open Handset Alliance (OHA), Downloading and Installing Android Studio, Using the Command-Line Tools and the Android Emulator, Build the First Android application, Android Terminologies, Application Context, Android Activities.	04	10
2.	**Android Application Design and Resource with User Interface** Anatomy of an Android Application, Android Manifest file, Editing the Android Manifest File, Managing Application's Identity, Working with Permissions. Introducing Android Views and Layouts, Displaying Text with Text View, Retrieving Data from Users, Handling User Events, Working with Dialogs, Working with Styles, Working with Themes.	05	10
3.	**Designing User Interfaces with Layouts and Animation** Creating User Interfaces in Android, view versus View Group, Using Built-In Layout Classes such as Fame Layout, Linear Layout, Relative Layout, Table Layout, Multiple Layouts on a Screen, Organizing Screens with Tabs, Adding Scrolling Support.	08	15
4.	**Drawing and Working with Animation** In Kotlin working with Canvases and Paints, Working with Text, Working with Bitmaps, Working with Shapes, Working with Animation.	05	15
Section II			
Module No.	**Content**	**Hours**	**Weightage in %**

5.	**Android Storage APIs** Working with Application Preferences such as Creating Private and Shared Preferences, Adding, Updating, and Deleting Preferences. Working with Files and Directories, Storing SQLite Database such as Creating an SQLite Database, Creating, Updating, and Deleting.	07	15
6.	**Flutter** Features of Flutter, Advantages and Disadvantages of Flutter, Installation in Window and MacOS, architecture of Flutter application: types of widgets, gestures, Concept of States, Layers.	06	10
7.	**Flutter with Programming** Variable and data types, Decision making and loops, functions, Object oriented programming, State management, animation based on classes, work flow of flutter animation.	06	15
8.	**Flutter Packages and Databased** Types of packages, SQLite, Cloud Firestone, types of testing.	04	10
	TOTAL	45	100

List of Practical:

Sr No	Name of Practical	Hours
1.	Create Hello World Application.	02
2.	Create login application where you will have to validate Email ID and Password.	02
3.	Create an application that will display toast (Message) on specific interval of Time.	02
4.	Create an application UI component: Image Button, Toggle button, Progress Bar, Spinner, Date Picker, Time Picker, Seek Bar, Switch, Rating Bar	04
5.	Using content providers and permissions, read phonebook contacts using content providers and display in list.	02
6.	Create an app to send SMS and email	02
7.	Create an application to make Insert, Update, Delete and Retrieve operation on the database.	02
8.	Create an application that will play a media file from the memory card.	02
9.	Create application using Google speech API	02
10.	Create a new Flutter project and run it on an Android/iOS emulator or physical device.	02
11.	Create a simple Flutter app with a Material App widget and Scaffold. Add text widgets, buttons, images, and icons to the app.	04
12.	Make HTTP GET and POST requests to a RESTful API using the http package.	04
	TOTAL	30

Text Book(s):

Title	Author/s	Publication
Introduction to Android Application Development	Joseph Annuzzi Jr., Lauren Darcey, Shane Conder	Pearson Education

Reference Book(s):

Title	Author/s	Publication
Android Application Development for Dummies, 3rd Edition	Donn Felker	Wiley Publication

Web Material Link(s):

- https://nptel.ac.in/courses/106106156/

Course Evaluation:

Theory:

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted out of 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 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 completion of the course, the students will be able to

SSCA8020	MOBILE APPLICATION DEVELOPMENT
CO 1	Develop user friendly mobile applications by implementing different practical.
CO 2	Understand the concepts of front-end development using various technologies.
CO 3	Analyse and implement frameworks, database, and design patterns in mobile applications.
CO 4	Create a small but realistic working mobile application using different application programming interface.

Mapping of CO with PO

SSCA8020	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1			1		1							
CO 2	1	2	1		1				1			
CO 3	2	1	1		1				2			
CO 4	1	1	1		3				3			

Mapping of CO with PSO

SSCA8020	PSO1	PSO2	PSO3
CO 1	1	3	1
CO 2	1	1	
CO 3	2	1	
CO 4	2	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	Introduction of Android	1,2,3
2	Android Application Design and Resource with User Interface	3,4
3	Designing User Interfaces with Layouts and Animation	2,3,4
4	Drawing and Working with Animation	2,6
5	Android Storage APIs	2,4,6
6	Flutter	2,5
7	Flutter with Programming	1,2,4
8	Flutter Packages and Databased	2,5

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

Master of Computer Science

Course Code: SSCS8030
Course Name: Research Methodology
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 students to,

- Provide brief knowledge about research and its various terminologies.
- Understand the possible area of research in computer science.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**Introduction** Introduction to research problem, sources of finding a research problem, characteristics of a research problem, pitfalls in selecting a research problem, scope and objectives of research problem, approaches of investigation of solutions for research problem.	07	10
2.	**Research Process** Finding Good Literature, Decide which sources you will need, Differentiate between journals, conferences, books, magazines and their quality, Understand how to establish their quality and authenticity, Finding Information, How to conduct effective searches, How to find relevant papers related to your area of research, How to capture critical information, Identify main ideas in scholarly literature, Understand and identify the bias, theoretical position and evidence produced, Write notes to organize your ideas, Compare ideas and concepts from different papers.	08	20
3.	**Research Methodology** Writing and Presenting your Work, Effective technical writing, how to write Report, Paper, developing a Research Proposal, Format of research proposal, build your argument, Recognize the importance of emphasizing your point, distinguish between your point and the evidence available, Acknowledge the evidence, Check the logistics of your presentation, Identify the key message of your presentation, Understand the expectations and what will be the key review points, prepare for delivery of your Oral presentation,	08	20

	Rehearse and time your presentation, prepare to answer questions from the audience: Fundamental concepts should be spoken from memory as reviewer will be looking for evidence of your thorough understanding		
Section II			
Module No.	**Content**	**Hours**	**Weightage in %**
4.	**Intellectual Property Rights** Introduction and significance of intellectual property rights, types of Intellectual Property Rights, copyright and its significance, introduction to patents and its filing, introduction to patent drafting, best practices in national and international patent filing, copyrightable work examples.	05	15
5.	**Patent Right** Patents and its basics, patentable items, designs, process of filing patent at national and international level, process of patenting and development, technological research and patents, innovation, patent and copyright international intellectual property, procedure for grants of patents, need of specifications, types of patent applications, provisional and complete specification, patent specifications and its contents, trade and copyright.	08	20
6.	**New Developments in Intellectual Property Rights(IPR)** Administration of patent system in India, India's stand in the world of IPs, new developments in IPR at national and international level, prosecution (filing) PCT / international filing, national phase filing, scope of patent rights, licensing and transfer of technology, patent information and databases, geographical indications, basic laws related to patent filing, case studies- IPR of Hardware, computer software.	09	15
	TOTAL	45	100

Reference Book(s):

Title	**Author/s**	**Publication**
Resisting Intellectual Property	Halbert	Taylor &Francis Ltd
Introduction to Design	Rajesh Kariya	Prentice Hall
Research methodology: an introduction for science &engineering students	Stuart Melville and Wayne Goddard	Juta & CoLtd
Intellectual Property Rights Under WTO	T. Ramappa	S. Chand,2008
Research Methodology: A Step by Step Guide for Beginners	Ranjit Kumar	Pearson

Web material link:

- https://nptel.ac.in/courses/121/106/121106007/

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 course, the students will be able to,

SSCS8030	RESEARCH METHODOLOGY
CO 1	Create a quality literature review and find the research gap.
CO 2	Identify the relevant problem and methods to find its solution.
CO 3	Summarize the solution obtained in an effective manner.
CO 4	Propose research ethics.
CO 5	Review ipr protection for further research and better products.

Mapping of CO with PO

SSCS8030	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	2	2	2		1			2	1	3
CO 2	2	2	2	2	1	3	2			3	2	3
CO 3	2	2	2	2	2		1			2	1	3
CO 4	2	3	3	2	3	3	2			3	3	2
CO 5	2	2	2	2	2		1			2	1	3

Mapping of CO with PSO

SSCS8030	PSO1	PSO2	PSO3
CO 1	3	3	3
CO 2	3	3	3
CO 3	3	3	3
CO 4	3	3	3
CO 5	3	3	3

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	Introduction	1,2
2	Finding Good Literature	2,3,4
3	Writing and Presenting your Work	3,4,6
4	Intellectual Property Rights	2
5	Patent Right	2,4
6	New Developments in Intellectual Property Rights (IPR)	2,4

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

Master of Computer Science

Course Code: SSCS8010
Course Name: Machine Learning
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

- Master the concepts of supervised and unsupervised learning, recommendation engine, and time series modeling.
- Implement models such as support vector machines, kernel SVM, naive Bayes, decision tree classifier, random forest classifier, logistic regression, K-means clustering and more in Python.
- Comprehend the theoretical concepts and how they relate to the practical aspects of Machine Learning.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in %**
1.	**Introduction to Machine Learning** Overview of Machine Learning: Definitions, types, and applications. Fundamentals of Python programming language for Machine Learning. Data Preprocessing: Handling missing data, feature scaling, and data transformation techniques. Exploratory Data Analysis (EDA) and Data Visualization techniques. Introduction to Scikit-learn library for implementing Machine Learning algorithms.	04	10
2.	**Supervised learning** Linear Regression: Simple and Multiple Regression, Evaluation metrics. Logistic Regression: Binary and Multiclass classification, Evaluation metrics. Decision Trees and Random Forests: Concepts, Decision tree construction, Ensemble methods. Support Vector Machines (SVM): Linear and non-linear SVM, Kernel methods. Naive Bayes Classifier: Bayes' theorem, Gaussian Naive Bayes, Multinomial Naive Bayes.	10	20

3.	**Unsupervised Learning** K-Means Clustering: Algorithm, Choosing the number of clusters, Evaluation. Hierarchical Clustering: Agglomerative and Divisive methods. Principal Component Analysis (PCA): Dimensionality reduction, Eigenvectors, Eigenvalues. Association Rule Learning: Apriori algorithm, Market Basket Analysis. Anomaly Detection: Techniques for detecting outliers in data.	09	20
Section II			
Module No.	**Content**	**Hours**	**Weightage in %**
4.	**Neural Networks and Deep Learning** Introduction to Artificial Neural Networks (ANNs): Perceptrons, Activation functions. Multi-layer Perceptron (MLP): Architecture, Backpropagation algorithm. Convolutional Neural Networks (CNNs): Architecture, Convolutional layers, Pooling layers. Recurrent Neural Networks (RNNs): Architecture, LSTM (Long Short-Term Memory) networks. Introduction to Deep Learning frameworks: TensorFlow or PyTorch.	09	20
5.	**Model Evaluation and Optimization** Cross-Validation techniques: K-Fold Cross-Validation, Stratified Cross-Validation. Hyperparameter tuning: Grid Search, Random Search, and Bayesian Optimization. Model evaluation metrics: Precision, Recall, F1-score, ROC-AUC. Bias-Variance trade-off: Understanding underfitting and overfitting. Feature selection and Dimensionality reduction techniques.	08	20
6.	**Advanced Topics in Machine Learning** Reinforcement Learning: Markov Decision Processes, Q-Learning, Deep Q-Learning. Time Series Analysis: ARIMA models, Seasonal decomposition, Forecasting techniques. Generative Adversarial Networks (GANs): Introduction, GAN architecture, Applications. Transfer Learning and Model Deployment: Fine-tuning pre-trained models, Deployment strategies.	05	10
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Handling missing data using pandas, Featuring, scaling and normalization techniques and Data transformation: Encoding categorical variables.	02
2.	Generating descriptive statistics and visualizations using matplotlib and seaborn, Exploring correlation between features and target variables and Visualizing data distributions and relationships.	02
3.	Linear Regression: Predicting house prices using a dataset like the Boston Housing dataset. Logistic Regression: Classifying iris flower species in the Iris dataset. Decision Trees and Random Forests: Predicting diabetes occurrence using the Pima Indians Diabetes dataset.	02
4.	K-Means Clustering: Clustering customers based on their purchase history. Hierarchical Clustering: Visualizing hierarchical clusters on a dendrogram.	02

	Principal Component Analysis (PCA): Reducing the dimensionality of a dataset and visualizing principal components.	
5.	Building a simple feedforward neural network using TensorFlow or PyTorch for classifying handwritten digits in the MNIST dataset. Implementing a Convolutional Neural Network (CNN) for image classification using the CIFAR-10 dataset. Training a Recurrent Neural Network (RNN) for sentiment analysis on movie reviews.	04
6.	Implementing cross-validation techniques to evaluate model performance. Tuning hyperparameters of machine learning models using Grid Search or Random Search. Assessing the impact of feature selection on model performance.	04
7.	Implementing a basic reinforcement learning algorithm like Q-learning for solving a simple grid world problem. Time series forecasting using ARIMA models on stock price data.	02
8.	Implementing a basic GAN architecture for generating synthetic images. Fine-tuning pre-trained GAN models for image generation tasks.	04
9.	Deploying a machine learning model using Flask for creating a simple web application. Integrating a trained model into a mobile application using TensorFlow Lite or ONNX.	04
10.	Investigating bias and fairness issues in machine learning models using fairness metrics. Analyzing the trade-off between bias and variance in different machine learning algorithms.	04
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Introduction to Machine Learning with Python: A Guide for Data Scientists	Andreas C. Müller and Sarah Guido	O'Reilly Media
Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems	Aurélien Géron	O'Reilly Media
Interpretable Machine Learning: A Guide for Making Black Box Models Explainable	Christoph Molnar	Leanpub
Ethics of Artificial Intelligence and Robotics	Vincent C. Müller and Nick Bostrom	Cambridge University Press

Web Material Link(s):

- https://www.coursera.org/specializations/generative-adversarial-networks-gans
- https://www.coursera.org/learn/machine-learning-with-python
- https://www.coursera.org/specializations/machine-learning-introduction

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 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 completion of the course, the student will be able to

SSCS8010	MACHINE LEARNING
CO1	Apply Python programming for data preprocessing and implementing Machine Learning algorithms.
CO2	Evaluate and compare supervised and unsupervised learning algorithms using appropriate metrics.
CO3	Develop neural network models for classification and regression tasks using TensorFlow or PyTorch.
CO4	Optimize machine learning models through hyperparameter tuning and feature selection techniques.
CO5	Design and deploy advanced machine learning solutions for real-world applications, considering ethical implications.

Mapping of CO with PO

SSCS8010	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	3	3	3	2		2		3			3
CO 2	2	3	3	3	2		3		3			3
CO 3	3	3	3	3	3		3		2			3
CO 4	1	3	3	3	3		3		2			3
CO 5	3	3	3	3	3	3	2	3	3			3

Mapping of CO with PSO

SSCS8010	PSO1	PSO2	PSO3
CO 1	2	2	3
CO 2	3	2	3
CO 3	2	3	3
CO 4	3	3	3
CO 5	1	2	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 Machine Learning	1,2,3
2	Supervised Learning	2,3
3	Unsupervised Learning	2,3,6
4	Neural Networks and Deep Learning	2,3
5	Model Evaluation and Optimization	2,3,4,6
6	Advanced Topics in Machine Learning	2,3,4,6

P P Savani University
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Institute of Computer Science and Application

Master of Computer Science

Course Code: SSCS8510
Course Name: Artificial Intelligence
Prerequisite Course (s): Data Structures & Algorithms (SSCA7080)

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 basic concepts.
- apply AI knowledge to solve real life problems.
- Learn to automate machine through AI.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in%**
1.	**Introduction to Artificial Intelligence** Definition and Scope of Artificial Intelligence, History and Evolution of Artificial Intelligence, Applications and, Importance of Artificial Intelligence, Ethics and Societal Impact of Artificial Intelligence.	04	5
2.	**Problem Solving and Search Algorithms** Problem-Solving Agents, Search Algorithms: Breadth-First Search, Depth-First Search, A* Search, Heuristic Search Techniques, Informed and Uninformed Search Strategies.	07	15
3.	**Knowledge Representation and Reasoning** Knowledge Representation: Propositional and First-Order Logic, Semantic Networks, Frames. Inference Techniques: Forward Chaining, Backward Chaining, Resolution Ontologies and Semantic Web Uncertainty in AI: Bayesian Networks, Fuzzy Logic.	10	30
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
4.	**Game Theory in AI** Introduction to Game Theory. Minimax Algorithm	8	20

	Alpha-Beta Pruning. Applications of Game Theory in AI: Game Playing Agents.		
5.	**Natural Language Processing (NLP)** Basics of NLP: Syntax, Semantics, Pragmatics. Text Processing Techniques: Tokenization, Stemming, Lemmatization Language Modelling: N-grams, Hidden Markov Models NLP Applications: Sentiment Analysis, Named Entity Recognition.	8	20
6.	**Connectionist Models in AI** Introduction to Neural Networks. Feedforward Neural Networks. Recurrent Neural Networks. Deep Learning: Convolutional Neural Networks, Generative Adversarial Networks.	8	10
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Implement Breadth-First Search and Depth-First Search algorithms in Python and test the algorithms on different search problems, such as finding paths in a maze.	02
2.	Implement A* Search algorithm in Python and design heuristic functions for informed search and compare their performance.	02
3.	Implement knowledge representation techniques such as Semantic Networks or Frames in Python and Develop inference engines using forward and backward chaining for logical reasoning.	04
4.	Implement Bayesian Networks using libraries like pymc3 or pgmpy in Python and Analyze uncertain scenarios and make probabilistic predictions.	04
5.	Develop a Tic-Tac-Toe game-playing agent using the Minimax algorithm and Implement Alpha-Beta Pruning to improve the efficiency of the game-playing agent.	04
6.	Build a sentiment analysis classifier using techniques like Bag-of-Words or Word Embeddings and Utilize libraries such as NLTK or SpaCy for text processing and feature extraction.	06
7.	Implement a simple feedforward neural network using libraries like TensorFlow or PyTorch and Train the neural network on a dataset (e.g., MNIST digits classification) and evaluate its accuracy.	04
8.	Implement a Convolutional Neural Network (CNN) for image classification tasks and Experiment with different architectures and hyperparameters to improve model performance.	04
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Artificial Intelligence	Elaine Rich And Kevin Knight	Tata McGraw-Hill

Artificial Intelligence: Foundations of Computational Agents	David L. Poole and Alan K. Mackworth	Cambridge University Press
Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	Pearson

Web Material Link:

- https://nptel.ac.in/courses/106102220
- https://nptel.ac.in/courses/106105077

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 will be cumulative of practical performances, activities, presentations, viva, and submissions consisting of 40marks.
- Practical performance/quiz/drawing/test/submission of 30 marks during End Semester Exam
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

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

SSCS8510	**Artificial Intelligence**
CO 1	Understand the foundational concepts and techniques of Artificial Intelligence.
CO 2	Apply problem-solving and search algorithms to address AI-related challenges effectively.
CO 3	Demonstrate proficiency in knowledge representation and reasoning methods for AI applications.
CO 4	Analyze and apply game theory concepts in AI scenarios, particularly in game playing agents.
CO 5	Utilize natural language processing techniques and connectionist models to solve real-world AI problems.

Mapping of CO with PO

SSCS8510	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1			2	1			1			2		
CO 2			2	1	3	2	1		3			1
CO 3				2		2	1			2		
CO 4			2	2	2	2			3			
CO 5			1	1	1		2		2	3	2	3

Mapping of CO with PSO

SSCS8510	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	Introduction to Artificial Intelligence	1,2
2	Problem Solving and Search Algorithms	2,3
3	Knowledge Representation and Reasoning	2,3,4
4	Game Theory in AI	2,3
5	Natural Language Processing (NLP)	2,3,4
6	Connectionist Models in AI	3,6

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

Course Code: SSCA8510
Course Name: 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	
03	02	-	04	40	60	40	60	-	-	200

CE: Continuous Evaluation, ESE: End Semester Exam

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

- Understand the fundamentals of cloud computing, including its definition, characteristics, and service models (IaaS, PaaS, SaaS).
- Explain the significance of virtualization technologies in Cloud Computing.
- Explore different Cloud platforms and services offered by major Cloud Service Providers (CSPs) like AWS, Azure, and Google Cloud Platform.
- Discuss the security challenges and solutions in Cloud Computing, including identity and access management, data encryption, and compliance.
- Enable students to develop Cloud-native applications and understand microservices architecture and DevOps practices in Cloud environments.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in%**
1.	**Introduction to Cloud Computing** Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks	05	10
2.	**Cloud Architecture, Services and Applications** Exploring the Cloud Computing Stack, connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Saas Vs. Paas, Using PaaS Application Frameworks, Software as a Service, Cloud Deployment Models, Public vs Private Cloud, Cloud Solutions, Cloud ecosystem, Service management, Identity as a Service, Compliance as a Service	05	10
3.	**Virtualization, Abstraction and Cloud Platform** Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hypervisors,	07	15

	Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Hypervisors		
4.	**Cloud Infrastructure and Cloud Resource Management** Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards	06	15
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
5.	**Cloud Security** Security Overview, Cloud Security Challenges and Risks, Software-as-a- Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security, Identity and Presence, Identity Management and Access Control, Autonomic Security Establishing Trusted Cloud computing, Secure Execution Environments and Communications, , Identity Management and Access control Identity management, Access control, Autonomic Security Storage Area Networks, Disaster Recovery in Clouds	06	15
6.	**AWS Programming, Management Console and Storage** Basic Understanding APIs - AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Elastic block store - Simple storage service, Define the AWS Cloud and its value proposition, Identify aspects of AWS Cloud economic, List the different cloud architecture design principles, Security and Compliance, Define the AWS shared responsibility model, Define AWS Cloud security and compliance concepts, Identify AWS access management capabilities, Identify resources for security support	09	20
7.	**AWS Technology, Billing and Pricing** Define methods of deploying and operating in the AWS Cloud, Define the AWS global infrastructure, Identify the core AWS services, identify resources for technology support, Compare and contrast the various pricing models for AWS, Recognize the various account structures in relation to AWS billing and pricing, Identify resources available for billing support	07	15
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Setting Up a Cloud Environment	02
2.	Exploring Cloud Delivery Models	02
3.	Implementing Cloud Software Security	04
4.	Assessing Cloud Computing Risks	04
5.	Case Study of AWS Cloud Services	04
6.	Explore Compute Services (IAAS)	04
7.	Explore Storage Services	04
8.	Cloud Computing Performance Optimization	02
9.	Disaster Recovery and Business Continuity Planning	02
10.	Cloud Governance and Compliance	02
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Deep Learning with Python Cloud Computing: Concepts, Technology & Architecture	Thomas Erl, Ricardo Puttini, and Zaigham Mahmood	Prentice Hall
Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance	Tim Mather, Subra Kumaraswamy, and Shahed Latif	O'Reilly Media
Green Cloud Computing: Balancing Energy Efficiency and Carbon Emissions	Amir H. Alavi and Rajkumar Buyya	MIT Press

Web Material Link(s):

- https://learn.microsoft.com/en-us/training/paths/microsoft-azure-fundamentals-describe-cloud-concepts/

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 will consist of 60 marks exam.

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 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/test consists of 15 marks during End Semester Exam.
- Viva/oral performance consists of 15 marks during End Semester Exam

Course Outcome(s):

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

SSCA8510	Cloud Computing
CO 1	Understand the foundational principles of cloud computing, including essential characteristics, architectural, technological, and operational influences.
CO 2	Explore various aspects of cloud computing architecture, encompassing delivery models.
CO 3	Gain proficiency in cloud computing software security fundamentals, covering cloud information security objectives, secure development practices, and approaches to cloud security policy implementation.
CO 4	Analyze cloud computing risk issues, including the CIA triad, privacy and compliance risks, threats to infrastructure, and cloud service provider risks.
CO 5	Develop insights into green cloud computing, focusing on energy-efficient data centers, renewable energy integration, sustainable architecture design, case studies, and challenges.

Mapping of CO with PO

SSCA8510	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1	3	2	3	2				1	3	3	3
CO 2	1	3	2	3	3				1	3	3	3
CO 3	1	3	2	3	2				1	3	3	3
CO 4	1	2	2	3	3				1	3	3	3
CO 5	1	3	2	3	3				1	3	3	3

Mapping of CO with PSO

SSCA8510	PSO1	PSO2	PSO3
CO 1	3	2	3
CO 2	3	2	3
CO 3	3	2	3
CO 4	3	3	3
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

Module No	Content	RBT Level
1	Introduction to Cloud Computing	1, 2
2	Cloud Architecture, Services and Applications	1, 2
3	Virtualization, Abstraction and Cloud Platform	1, 2, 3
4	Cloud Infrastructure and Cloud Resource Management	1, 2, 3
5	Cloud Security	1, 2, 3
6	AWS Programming, Management Console and Storage	1, 2, 3, 4
7	AWS Technology, Billing and Pricing	3, 4, 5, 6

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

Master of Computer Science

Course Code: SSCS8020
Course Name: Natural Language Processing
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

- comprehend the key concepts of NLP which are used to describe and analyze language.
- illustrate computational methods to understand language phenomena of word sense.
- design and develop applications with natural language capabilities.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in%**
1.	**Introduction to NLP** Overview of NLP, History and Evolution, Applications of NLP, NLP Pipeline.	06	5
2.	**Text Preprocessing and Feature Extraction** Tokenization, Stop Words Removal, Stemming and Lemmatization, Feature Extraction Techniques: Bag-of-Words, TF-IDF.	08	15
3.	**Morphological Analysis and Part-of-Speech Tagging** Morphological Analysis, Part-of-Speech (POS) Tagging Hidden Markov Models for POS Tagging, Evaluation Metrics for POS Taggers.	08	30
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
4.	**Syntactic and Semantic Analysis** Syntax and Parsing, Dependency Parsing, Semantic Role Labelling, Word Sense Disambiguation	07	20
5.	**Language Modelling and Machine Translation** N-gram Language Models, Neural Language Models, Statistical Machine Translation, Neural Machine Translation. Advanced LLM Model inclusion, LLM Customization	09	20

6.	**Natural Language Understanding and Generation** Named Entity Recognition (NER), Sentiment Analysis, Question Answering Systems, Text Generation Techniques	07	10
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Implement tokenization, stop words removal, stemming, and lemmatization on a given text dataset and compare the effects of different preprocessing techniques on text data.	02
2.	Implement Bag-of-Words and TF-IDF feature extraction techniques on text data and visualize the extracted features to understand their importance in the dataset.	02
3.	Implement POS tagging using Hidden Markov Models (HMM) on a corpus and evaluate the performance of the POS tagger using accuracy and F1-score metrics.	02
4.	Implement dependency parsing on sentences from a corpus using libraries like SpaCy or NLTK and perform semantic role labeling on a dataset to identify relationships between words in sentences.	04
5.	Implement N-gram language models on a text corpus and generate text samples and Train a neural language model using recurrent neural networks (RNNs) on a given dataset.	04
6.	Implement a statistical machine translation system using phrase-based translation methods and Train a neural machine translation model using sequence-to-sequence architecture with attention mechanism.	04
7.	Implement NER using conditional random fields (CRF) on a dataset containing named entities and evaluate the NER model performance using precision, recall, and F1-score.	04
8.	Implement sentiment analysis on a text dataset using machine learning classifiers like Naive Bayes or SVM and Train a deep learning model (such as LSTM or Transformer) for sentiment analysis on a sentiment-labeled dataset.	04
9	Implement a simple rule-based question answering system using named entity recognition and syntactic parsing and develop a more advanced question answering system using deep learning models like BERT or GPT.	02
10	Implement text generation using recurrent neural networks (RNNs) with long short-term memory (LSTM) cells and fine-tune a pre-trained language model (e.g., GPT) for text generation on a specific domain dataset.	02
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Natural Language Processing with Python	Steven Bird, Ewan Klein, and Edward Loper	O'Reilly Media
Speech and Language Processing: An Introduction to Natural Language Processing,	Daniel Jurafsky and James H. Martin.	Pearson

Computational Linguistics, and Speech Recognition		
Handbook of Natural Language Processing	Nitin Indurkhya and Fred J. Damerau	CRC Press

Web Material Link:

- https://onlinecourses.nptel.ac.in/noc23_cs45/preview
- https://www.coursera.org/specializations/natural-language-processing
- https://online.stanford.edu/courses/xcs224n-natural-language-processing-deep-learning

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 will be cumulative of practical performances, activities, presentations, viva, and submissions consisting of 40 marks.
- Practical performance/quiz/drawing/test/submission of 30 marks during End Semester Exam
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

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

SSCS8020	Natural Language Processing
CO 1	Understand the foundational concepts and techniques of Natural Language Processing.
CO 2	Apply text preprocessing and feature extraction methods to prepare textual data for analysis.
CO 3	Demonstrate proficiency in morphological analysis, part-of-speech tagging, and syntactic/semantic analysis.
CO 4	Analyze and implement language modeling techniques for machine translation and text generation tasks.
CO 5	Develop applications for natural language understanding and generation, including sentiment analysis and question answering systems.

Mapping of CO with PO

SSCS8020	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1			1				3	3	3	3
CO 2	3	2		1	1				3	3	3	3
CO 3	3	2		1	3				3	3	3	3
CO 4	3	2		1	3				3	3	3	3
CO 5	2	2		3	3				3	3	3	3

Mapping of CO with PSO

SSCS8020	PSO1	PSO2	PSO3
CO 1	2	2	3
CO 2	3	3	2
CO 3	3	2	2
CO 4	3	3	2
CO 5	2	2	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 to NLP	1,2
2	Text Preprocessing and Feature Extraction	2,3
3	Morphological Analysis and Part-of-Speech Tagging	2,3,4
4	Syntactic and Semantic Analysis	2,3
5	Language Modelling and Machine Translation	2,3,4
6	Natural Language Understanding and Generation	3,6

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

Master of Computer Science

Course Code: SSCS8520
Course Name: Computer Vision
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 foundational concepts and principles of Computer Vision and its diverse applications.
- Develop proficiency in image processing techniques, including filtering, denoising, and enhancement, for preprocessing images.
- Master feature extraction and description methods for identifying and characterizing key features in images accurately.
- Explore advanced topics in Computer Vision, such as image segmentation, scene understanding, and 3D Computer Vision, to address complex real-world challenges.
- Acquire knowledge and skills in ethical considerations and societal implications associated with the deployment of Computer Vision systems.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in%**
1.	**Introduction to Computer Vision** Overview of Computer Vision and its applications. History and evolution of Computer Vision. Image formation and representation. Human visual perception and its relation to Computer Vision.	05	5
2.	**Image Processing Techniques** Image preprocessing (filtering, denoising, enhancement). Image segmentation (thresholding, region-based, edge-based). Feature extraction (corners, edges, textures). Morphological operations	06	15

3.	**Feature Extraction and Description** Introduction to feature detection and description. Corner detection (Harris corner detector, Shi-Tomasi corner detector). Edge detection (Sobel, Canny) Scale-invariant feature transform (SIFT), Speeded-Up Robust Features (SURF), and other feature descriptors	08	30
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
4.	**Image Classification and Object Detection** Introduction to classification and object detection. Traditional machine learning-based classifiers (SVM, k-NN). Convolutional Neural Networks (CNNs) for image classification. Object detection techniques (R-CNN, Fast R-CNN, YOLO)	10	20
5.	**Image Segmentation and Scene Understanding** Semantic segmentation. Instance segmentation. Image-to-image translation. Scene understanding and scene parsing	10	20
6.	**Advanced Topics in Computer Vision** 3D Computer Vision. Motion analysis and tracking. Deep learning for Computer Vision (advanced CNN architectures, transfer learning). Generative models in Computer Vision (GANs, VAEs). Ethical considerations and societal implications of Computer Vision	06	10
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Implement various image filtering techniques such as Gaussian blur, median filter, and histogram equalization to enhance the quality of images.	02
2.	Develop algorithms to detect edges in images using methods like Sobel, Prewitt, or Canny edge detectors.	02
3.	Implement corner detection algorithms such as Harris corner detector or Shi-Tomasi corner detector to identify key points in images.	04
4.	Utilize feature extraction techniques such as SIFT or SURF to extract robust features from images for further analysis.	04
5.	Use Support Vector Machines (SVM) or k-Nearest Neighbors (k-NN) classifiers to classify images into predefined categories based on extracted features.	04
6.	Train a CNN model (e.g., using TensorFlow or PyTorch) to detect objects in images using architectures like Faster R-CNN or YOLO.	04
7.	Implement image segmentation algorithms like region-based or edge-based segmentation to partition images into meaningful regions.	04
8.	Develop a semantic segmentation model using deep learning frameworks like TensorFlow or PyTorch to classify each pixel in an image into semantic categories.	04
9.	Implement instance segmentation techniques (e.g., Mask R-CNN) to identify	02

	and segment individual objects within an image.	
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Computer Vision: Algorithms and Applications	Richard Szeliski	Springer
Digital Image Processing	Rafael C. Gonzalez and Richard E. Woods	Pearson Education
Feature Extraction and Image Processing for Computer Vision	Mark Nixon and Alberto Aguado	Academic Press

Web Material Link:

- https://www.coursera.org/learn/introduction-computer-vision-watson-opencv
- https://onlinecourses.nptel.ac.in/noc20_cs88/preview

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 will be cumulative of practical performances, activities, presentations, viva, and submissions consisting of 40 marks.
- Practical performance/quiz/drawing/test/submission of 30 marks during End Semester Exam
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

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

SSCS8520	Computer Vision
CO 1	Understand the fundamental principles, techniques, and algorithms used in Computer Vision.
CO 2	Apply image processing techniques to preprocess and enhance images for further analysis.
CO 3	Implement feature extraction and description methods to identify and describe key features in images.
CO 4	Design and develop Computer Vision systems for tasks such as image classification, object detection, and image segmentation using traditional and deep learning-based approaches.
CO 5	Critically analyze and evaluate the performance of Computer Vision algorithms and models, considering their accuracy, efficiency, and ethical implications.

Mapping of CO with PO

SSCS8520	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1	1	3				3			3	3
CO 2	2	2	2	1				1			2	1
CO 3	2	1	2	2				0			3	1

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

Mapping of CO with PSO

SSCS8520	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	Introduction to Computer Vision	1,2
2	Image Processing Techniques	2,3
3	Feature Extraction and Description	3,4
4	Image Classification and Object Detection	2,3
5	Image Segmentation and Scene Understanding	2,3,4
6	Advanced Topics in Computer Vision	3,4,6

P P Savani University
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Institute of Computer Science and Application

Master of Computer Science

Course Code: SSCS8530
Course Name: Data Science
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 fundamental concepts and techniques of Data Science, including data wrangling, exploratory data analysis, and machine learning.
- Apply various data preprocessing and cleaning techniques to prepare data for analysis effectively.
- Analyze datasets using descriptive statistics and visualization methods to derive meaningful insights.
- Implement machine learning algorithms and evaluate their performance on real-world datasets.

Course Content:

Section I			
Module No.	**Content**	**Hours**	**Weightage in%**
1.	**Introduction to Data Science** Overview of Data Science, Importance and Applications, Data Science Workflow, Tools and Technologies.	05	5
2.	**Data Wrangling and Preprocessing** Data Acquisition, Data Cleaning, Data Transformation, Handling Missing Values and Outliers.	07	15
3.	**Exploratory Data Analysis (EDA)** Descriptive Statistics, Data Visualization Techniques, Univariate and Multivariate Analysis, Correlation and Covariance Analysis.	07	30
Section II			
Module No.	**Content**	**Hours**	**Weightage in%**
4.	**Machine Learning Fundamentals** Supervised Learning: Regression, Classification, Unsupervised Learning: Clustering, Dimensionality	09	20

	Reduction, Model Evaluation and Selection Cross-Validation Techniques.		
5.	**Advanced Machine Learning Techniques** Ensemble Learning: Random Forest, Gradient Boosting, Neural Networks and Deep Learning, Hyperparameter Tuning, Feature Engineering	09	20
6.	**Data Visualization and Communication** Principles of Data Visualization, Tools and Libraries: Matplotlib, Seaborn, Plotly, Interactive Visualization Dashboard Creation.	08	10
	TOTAL	45	100

List of Practical(s):

Sr. No	Name of Practical	Hours
1.	Acquire datasets from online repositories or APIs using Python libraries like Pandas or Requests and Clean the datasets by handling missing values, outliers, and inconsistencies.	02
2.	Perform descriptive statistics on datasets to understand data distributions and summary metrics and Visualize data using Matplotlib and Seaborn to explore relationships between variables.	02
3.	Experiment with different types of plots such as histograms, scatter plots, and box plots to visualize data distributions and patterns and create interactive visualizations using Plotly to enhance data exploration.	04
4.	Transform categorical variables using techniques like one-hot encoding or label encoding and Engineer new features from existing data to improve machine learning model performance.	04
5.	Implement supervised learning algorithms such as linear regression or decision trees using Scikit-learn and Train the models on prepared datasets and evaluate their performance using appropriate metrics.	04
6.	Use cross-validation techniques to assess the generalization performance of machine learning models and compare and select the best-performing model based on evaluation metrics like accuracy or mean squared error.	04
7.	Implement ensemble learning algorithms like Random Forest or Gradient Boosting and Apply hyperparameter tuning techniques such as grid search or random search to optimize model performance.	04
8.	Create interactive dashboards using tools like Tableau or Power BI or Google Data Studio or Looker lit to visualize insights from datasets and Incorporate widgets and filters to allow users to interactively explore data.	04
9.	Work on a data science project from start to finish, including data acquisition, preprocessing, analysis, modeling, and visualization and Present findings and insights from the project in a clear and visually appealing manner.	02
	TOTAL	30

Reference Book(s):

Title	Author/s	Publication
Data Science for Business: What You Need to Know about Data	Foster Provost and Tom Fawcett	O'Reilly Media

Mining and Data-Analytic Thinking		
Data Science from Scratch: First Principles with Python	Joel Grus. Publisher	O'Reilly Media
Storytelling with Data: A Data Visualization Guide for Business Professionals	Cole Nussbaumer Knaflic.	Wiley

Web Material Link:

- https://www.coursera.org/professional-certificates/ibm-data-science
- https://pll.harvard.edu/subject/data-science
- https://onlinecourses.nptel.ac.in/noc21_cs69

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 will be cumulative of practical performances, activities, presentations, viva, and submissions consisting of 40 marks.
- Practical performance/quiz/drawing/test/submission of 30 marks during End Semester Exam
- Viva/Oral performance of 30 marks during End Semester Exam.

Course Outcome(s):

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

SSCS8530	Data Science
CO 1	Understanding the Importance and Workflow, and Exploring Data Wrangling Techniques.
CO 2	Dive into Exploratory Data Analysis and Mastering Visualization for Effective Communication.
CO 3	Embrace Supervised and Unsupervised Learning, along with Model Evaluation Techniques.
CO 4	Delve into Ensemble Methods, Neural Networks, and Hyperparameter Tuning.
CO 5	Harness the Power of Visualization Tools and Techniques to Create Dynamic Dashboards.

Mapping of CO with PO

SSCS8530	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	1			1				3	3	3	3
CO 2	3	2		1	1				3	3	3	3
CO 3	3	2		1	3				3	3	3	3
CO 4	3	2		1	3				3	3	3	3
CO 5	2	2		3	3				3	3	3	3

Mapping of CO with PSO

SSCS8530	PSO1	PSO2	PSO3
CO 1	2	2	1
CO 2	1	3	3
CO 3	3	3	3
CO 4	3	3	3
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

Module No	Content	RBT Level
1	Introduction to Data Science	1,2
2	Data Wrangling and Preprocessing	2,3
3	Exploratory Data Analysis (EDA)	2,3,4
4	Machine Learning Fundamentals	2,3
5	Advanced Machine Learning Techniques	2,3,4
6	Data Visualization and Communication	3,6

P P Savani University
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Institute of Computer Science and Application
Master of Computer Application

Course Code: SSCA8030
Course Name: Online Course
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	-	-	04	100	00	-	-	-	-	100

CE: Continuous Evaluation, ESE: End Semester Exam

Objective(s) of the Course:

To help the learners to

- learn new subjects as per recent trends in the industry from national experts.

Course Content:

Performance analysis will be based on any one of the following subjects:

1. Deep Learning
2. Computer Graphics
3. Natural Language Processing
4. Blockchain Technology
5. Virtual Reality
6. Real time systems
7. Big Data
8. Advanced graph theory
9. Theory of computation
10. Cryptology

Or any other Online course; available time to time.

Course Evaluation:

Theory:

- Continuous Evaluation as per the guidelines of assignments and tests.
- The course score will be directly fetched and converted out of 100.

Course Outcome(s):

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

SSCA8030	**Online Course**
CO1	Exercise and execute acquired knowledge within the chosen area of technology.
CO2	Learn from experts from IITs.
CO3	Formulate and implement innovative ideas in a concerned field.
C04	Engage in continuous learning and self-improvement through course assignments, quizzes, and discussions, fostering lifelong learning habits.

Mapping of CO with PO

SSCA8030	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	1		1									
CO 2												1
CO 3	1	1	1									
CO 4												1

Mapping of CO with PSO

SSCA8030	PSO1	PSO2	PSO3
CO 1	1	1	
CO 2			1
CO 3	1	1	
CO 4			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	Online Course	1, 2, 3

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

Course Code: SSCA8920
Course Name: Major Project/Dissertation
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	
-	24	-	24	-	-	200	300	-	-	500

CE: Continuous Evaluation, ESE: End Semester Exam

Outline of the Course:
Project

- The project will be aligned with the aims of the engineering Programme and its areas of specialization and shall be based on the recent trends in technology.
- The student shall carry out a comprehensive project at relevant academic / R&D / industrial organization.
- The student is required to submit a project report based on the work carried out.

Training

- The aim of this course is to use the internship experience to enable students to develop their engineering skills and practices.
- The student will be placed in industry/organization for 12 to 18 weeks and assessed for academic credit.
- The students may select industry on their own or one which is offered by institute.
- Students are expected to experience a real-life engineering workplace and understand how their engineering and professional skills can be utilized in industry.
- The student is required to submit a project report based on the work carried out.

Course Outcome(s):

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

SSCA8920	**Major Project/Dissertation**
CO1	Facilitate theoretical learning through practical applications, while fostering team-building to integrate knowledge effectively for engineering applications.
CO2	Adapt to real time industry exposure and experience
CO3	Solve challenging projects for commercial, societal and environment benefit.
CO4	Explain the importance of planning, documentation, punctuality, and work ethics.
CO5	Document the work which is carried out in proper format with industry standards.

Mapping of CO with PO

SSCA8920	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	2	2	2	3	1		3	3			1	3
CO 2	3	1	1	1			2	3	1	1		1
CO 3	3	3	2	3							1	1

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

Mapping of CO with PSO

SSCA8920	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2			1
CO 3	3		2
CO 4			1
CO 5		1	1