

**GOVERNMENT COLLEGE FOR WOMEN
(AUTONOMOUS)**

KUMBAKONAM

PG & Research Department of Computer Science

Programme : M.Sc., Computer Science

Programme Code : PSCS



SYLLABUS

2023 – 2024 – I Year

2024 – 2025 – II Year

Programme Outcomes (Pos)

PO1: Problem Solving Skill

Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.

PO2: Decision Making Skill

Foster analytical and critical thinking abilities for data-based decision-making.

PO3: Ethical Value

Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.

PO4: Communication Skill

Ability to develop communication, managerial and interpersonal skills.

PO5: Individual and Team Leadership Skill

Capability to lead themselves and the team to achieve organizational goals.

PO6: Employability Skill

Inculcate contemporary business practices to enhance employability skills in the competitive environment.

PO7: Entrepreneurial Skill

Equip with skills and competencies to become an entrepreneur.

PO8: Contribution to Society

Succeed in career endeavors and contribute significantly to society.

PO 9 Multicultural competence

Possess knowledge of the values and beliefs of multiple cultures and a global perspective.

PO 10: Moral and ethical awareness/reasoning

Ability to embrace moral/ethical values in conducting one's life.

Program Specific Outcomes(PSOs)

PSO1 – Placement

To prepare the students who will demonstrate respectful engagement with others’ ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.

PSO 2 - Entrepreneur

To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

PSO3 – Research and Development

Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.

PSO4 – Contribution to Business World

To produce employable, ethical and innovative professionals to sustain in the dynamic business world.

PSO 5 – Contribution to the Society

To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS), KUMBAKONAM (Common Course Structure – PG - 2023 - 2024)

Department : Computer Science
Programme Code: PSCS

SEMESTER – I

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits
I	CC – I	P23CSC101	Analysis & Design of Algorithms	6	5
I	CC – II	P23CSC102	Object Oriented Analysis and Design & C++	6	5
I	CC – III	P23CSC103	Python Programming	6	4
I	EC – I	P23CSDE1P	Algorithm and OOPS Practical	5	3
I	EC – II	P23CSDE2P	Python Programming Practical	5	3
II	SEC – I	P23CS1SE1	Web Application and Development	2	2
Total				30	22

SEMESTER – II

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits
I	CC – IV	P23CSC204	Data Mining and Warehousing	6	5
I	CC – V	P23CSC205	Compiler Design	6	5
I	CC –VI	P23CSC206	Advanced Java Programming	6	4
I	EC – III	P23CSDE3P	Data Mining using R Practical	5	3
I	EC – IV	P23CSDE4P	Advanced Java Programming Practical	5	3
II	SEC – II	P21CS2SE2	Software Testing	2	2
II	ECC – I		Moocs / Swayam Courses	-	2/3
			Internship/Industrial training*		
Total				30	22

***Internship/industrial training during summer vacation. The credits shall be awarded in Semester III statement of marks.**

SEMESTER – III

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits
I	CC -VII		Digital Image Processing	6	5
I	CC-VIII		Cloud Computing	6	5
I	CC - IX		Data Science & Analytics	6	5
I	CC -X		Network Security and Cryptography	5	4
I	EC - V		Digital Image Processing using Matlab Practical	5	3
II	SEC -III		Cloud Computing Practical	2	2
II	ECC - I		Moocs / Swayam Courses	-	2/3
II	AEC		Internship/Industrial training	-	2
			Total	30	26

SEMESTER – IV

Part	Course Type	Course Code	Title of the Course	Hrs/Week	Credits
I	CC – XI		Deep Learning	6	5
I	CC -XII		Open Source Technologies	6	5
I	CC-XIII		Project with Viva-Voce	8	5
I	EC - VI		Open Source Technologies Practical	5	3
II	SEC -IV		Professional competency skill - Computer Science for NET / SET Examinations	5	2
II	EA		Extension Activity	-	1
			Total	30	21

PG – List of Discipline Specific Elective Course

S.No	Subject Code	Title of the Paper	Credits
1.	P23CSDE1P	Algorithm and OOPS Practical	5
2.	P23CSDE2P	Python Programming Practical	5
3.	P23CSDE3P	Data Mining using R Practical	5
4.	P23CSDE4P	Advanced Java Programming Practical	5
5.	P23CSDE5P	Digital Image Processing using Mat lab Practical	5
6.	P23CSDE6P	Open Source Technologies Practical	5

Semester – I – Core Course - CC - I

Course code	P23CSC101	ANALYSIS & DESIGN OF ALGORITHMS	L	T	P	C
Core/Elective/Supportive		Core	6			5
Pre-requisite		Basic Data Structures & Algorithms				
Course Objectives:						
The main objectives of this course are to :						
1. Enable the students to learn the Elementary Data Structures and algorithms.						
2. Presents an introduction to the algorithms, their analysis and design						
3. Discuss various methods like Basic Traversal And Search Techniques, divide and conquer method, Dynamic programming, back tracking						
4. Understood the various design and analysis of the algorithms.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Get knowledge about algorithms and determines their time complexity. Demonstrate specific search and sort algorithms using divide and conquer technique.					K1, K2
2	Gain good understanding of Greedy method and its algorithm.					K2, K3
3	Able to describe about graphs using dynamic programming technique.					K3, K4
4	Demonstrate the concept of back tracking & branch and bound technique.					K5, K6
5	Explore the traversal and searching technique and apply it for trees and graphs.					K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION					
Introduction: - Algorithm Definition and Specification – Space complexity-Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heap sort- Graph.						
Unit:2	TRAVERSAL AND SEARCH TECHNIQUES					
Basic Traversal And Search Techniques: Techniques for Binary Trees- Techniques for Graphs -Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.						
Unit:3	GREEDY METHOD					
The Greedy Method:- General Method – Knapsack Problem – Minimum Cost Spanning Tree – Single Source Shortest Path.						

Unit:4	DYNAMIC PROGRAMMING
Dynamic Programming-General Method–Multi stage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.	
Unit:5	BACKTRACKING
Backtracking:-General Method – 8-Queens Problem – Sum Of Subsets – Graph Coloring – Hamiltonian Cycles – Branch And Bound: - The Method – Traveling Salesperson.	
Text Books	
1	Ellis Horowitz, “Computer Algorithms”, Galgotia Publications.
2	Alfred V.Aho, John E.Hopcroft, Jeffrey D.Ullman, "Data Structures and Algorithms".
Reference Books	
1	Goodrich, “Data Structures & Algorithms in Java”, Wiley 3rd edition.
2	Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008
3	Anany Levith, “Introduction to the Design and Analysis of algorithm”, Pearson Education Asia, 2003.
4	Robert Sedgewick, Phillipe Flajolet, “An Introduction to the Analysis of Algorithms”, Addison - Wesley Publishing Company,1996.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/106/106106131/
2	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3	https://www.javatpoint.com/daa-tutorial

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

Semester – I – Core Course - CC - II

Course code	P23CSC102	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	L	T	P	C
Core/Elective/Supportive		Core	6			5
Pre-requisite	Basics of C++ and Object Oriented Concepts					
Course Objectives:						
The main objectives of this course are to:						
<ol style="list-style-type: none"> 1. Present the object model, classes and objects, object orientation, machine view and model management view. 2. Enables the students to learn the basic functions, principles and concepts of object oriented analysis and design. 						
<ol style="list-style-type: none"> 1. Enable the students to understand C++ language with respect to OOAD 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the concept of Object-Oriented development and modeling techniques					K1, K2
2	Gain knowledge about the various steps performed during object design					K2, K3
3	Abstract object-based views for generic software systems					K3
4	Link OOAD with C++ language					K4, K5
5	Apply the basic concept of OOPs and familiarize to write C++ program					K5, K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	OBJECT MODEL					
The Object Model: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects.						
Unit:2	CLASSES AND OBJECTS					
Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification –identifying classes and objects –Key Abstractions and Mechanism.						
Unit:3	C++ INTRODUCTION					

IntroductiontoC++-InputandoutputstatementsinC++-Declarations-controlstructures– Functions in C++.	
Unit:4	INHERITANCE AND OVERLOADING
ClassesandObjects–ConstructorsandDestructors–operatorsoverloading–Type Conversion- Inheritance – Pointers and Arrays.	
Unit:5	POLYMORPHISM AND FILES
MemoryManagementOperators-Polymorphism–Virtualfunctions–Files– Exception Handling – String Handling -Templates.	
Text Books	
1	“Object Oriented Analysis and Design with Applications”, Grady Booch, Second Edition, Pearson Education.
2	“Object-Oriented Programming with ANSI & Turbo C++”, Ashok N.Kamthane, First Indian Print -2003, Pearson Education.
Reference Books	
1	Balagurusamy “Object Oriented Programming with C++”, TMH,SecondEdition,2003.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ood_object_oriented_analysis.htm

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

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

Semester – I – Core Course - CC - III

Course code	P23CSC103	PYTHON PROGRAMMING	L	T	P	C
Core/Elective/Supportive	Core		6			4
Pre-requisite	Basics of Python Programming Language					
Course Objectives:						
The main objectives of this course are to :						
<ol style="list-style-type: none"> 1. Presents an introduction to Python, creation of web applications, network applications and working in the clouds 2. Use functions for structuring Python programs 3. Understand different Data Structures of Python 2. Represent compound data using Python lists, tuples and dictionaries. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic concepts of Python Programming				K1, K2	
2	Understand File operations, Classes and Objects				K2, K3	
3	Acquire Object Oriented Skills in Python				K3, K4	
4	Develop web applications using Python				K5	
5	Develop Client Server Networking applications				K5, K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	INTRODUCTION					
Python: Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets–Comparison.						
Unit:2	CODE STRUCTURES					
Code Structures: if, elseif, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.						
Unit:3	MODULES, PACKAGES AND CLASSES					
Modules, Packages, and Programs: Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library.						
Objects and Classes: Define a Class with class – Inheritance – Override a Method –						

Add a Method – Get Help from Parent with super – Inself Defense – GetandSet Attribute Values with Properties – Name Mangling for Privacy – Method Types – Duck Typing – Special Methods –Composition.						
Unit:4	DATA TYPES AND WEB					
DataTypes: Text Strings – Binary Data. Storing and Retrieving Data : File Input / Output - Structured Text Files – Structured Binary Files - Relational Databases – No SQL Data Stores.						
Web: Web Clients –Web Servers–Web Services and Automation						
Unit:5	SYSTEMS AND NETWORKS					
Systems: Files–Directories–Programs and Processes–Calendars and Clocks.						
Concurrency: Queues– Processes–Threads–Green Threads andg event–twisted–Redis.						
Networks: Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – ZeroMQ – Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Working in the Clouds.						
Text Books						
1	Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition – Second Release, 2014.					
2	Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.					
Reference Books						
1	David M. Beazley, “Python Essential Edition, 2009.					
2	Sheetal Taneja, Naveen Kumar, Approach”, Pearson Publications.					
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]						
1	https://www.programiz.com/python-programming/					
2	https://www.tutorialspoint.com/python/index.htm					
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview					

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

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

Semester – I – Elective Course EC – I

Course code	P23CSDE1P	PRACTICAL I : ALGORITHM AND OOPS PRACTICAL	L	T	P	C
Core/Elective/Supportive	Core				5	3
Pre-requisite	Basic Programming of C++ language					

Course Objectives:

The main objectives of this course are to :

1. This course covers the basic data structures like Stack, Queue, Tree, List.
2. This course enables the students to learn the applications of the data structures using various techniques
3. It also enable the students to understand C++ language with respect to OOAD concepts
4. Application of OOPS concepts.

Expected Course Outcomes:

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

1	Understand the concepts of object oriented with respect to C++	K1, K2
2	Able to understand and implement OOPS concepts	K3, K4
3	Implementation of data structures like Stack, Queue, Tree, List using C++	K4, K5
4	Application of the data structures for Sorting, Searching using different techniques.	K5, K6
5	Understand the concepts of object oriented with respect to C++	K1, K2

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

LIST OF PROGRAMS

- 1) Write a program to solve the tower of Hanoi using recursion.
- 2) Write a program to traverse through binary search tree using traversals.
- 3) Write a program to perform various operations on stack using linked list.
- 4) Write a program to perform various operation in circular queue.
- 5) Write a program to sort an array of an elements using quick sort.
- 6) Write a program to solve number of elements in ascending order using heap sort.
- 7) Write a program to solve the knap sack problem using greedy method

- 8) Write a program to search for an element in a tree using divide & conquer strategy.
- 9) Write a program to place the 8 queen son an 8X8 matrix so that no two queens Attack.
- 10) Write a C++ program to perform Virtual Function
- 11) Write a C++ program to perform Parameterized constructor
- 12) Write a C++ program to perform Friend Function
- 13) Write a C++ program to perform Function Overloading
- 14) Write a C++ program to perform Single Inheritance
- 15) Write a C++ program to perform Employee Details using files.

Text Books

1	Goodrich, "Data Structures & Algorithms in Java", Wiley 3rd edition.
2	Skiena,"The Algorithm Design Manual",Second Edition, Springer, 2008

Reference Books

1	Anany Levith, "Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
2	Robert Sedgewick, Phillipe Flajolet, "An Introduction to the Analysis of Algorithms", Addison - Wesley Publishing Company,1996.

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

1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3	https://www.tutorialspoint.com/object_oriented_analysis_design/ood_object_oriented_analysis.htm

Mapping with Programming Outcomes

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

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

Semester – I – Elective Course - EC - II

Course code	P23CSDE2P	PRACTICAL II : PYTHON PROGRAMMING PRACTICAL	L	T	P	C
Core/Elective/Supportive	Core				5	3
Pre-requisite	Basics of Python Programming Language					
Course Objectives:						
The main objectives of this course are to :						
<ol style="list-style-type: none"> 1. This course presents an overview of elementary data items, lists, dictionaries, sets and tuples 2. To understand and write simple Python programs 3. To Understand the OOPS concepts of Python. 4. To develop web applications using Python. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Able to write programs in Python using OOPS concepts				K1, K2	
2	To understand the concepts of File operations and Modules in Python				K2, K3	
3	Implementation of lists, dictionaries, sets and tuples as programs				K3, K4	
4	To develop web applications using Python				K5, K6	
5	Able to write programs in Python using OOPS concepts				K1, K2	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LIST OF PROGRAMS						
Implement the following in Python:						
<ol style="list-style-type: none"> 1. Programs using elementary data items, lists, dictionaries and tuples 2. Programs using conditional branches, 3. Programs using loops. 4. Programs using functions 						

5. Programs using exception handling
6. Programs using inheritance
7. Programs using polymorphism
8. Programs to implement file operations.
9. Programs using modules.
10. Programs for creating dynamic and interactive web pages using forms.

Text Books

1	Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition – Second Release, 2014.
2	Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.

Reference Books

1	David M. Beazley, “Python Essential Edition,2009.
2	Sheetal Taneja, Naveen Kumar, Approach”, Pearson Publications.

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

1	https://www.programiz.com/python-programming/
2	https://www.tutorialspoint.com/python/index.htm
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

Mapping with Programming Outcomes

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

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

Semester – I – Skill Based Elective Course - SEC - I

Course code	P23CS1SE1	Web Application and Development	L	T	P	C
Core/Elective/Supportive	Core		2			
Pre-requisite	Basics of Python Programming Language					
Learning Objectives: (for teachers: what they have to do in the class/lab/field)						
<ul style="list-style-type: none"> To learn the basic web concepts and to create rich internet applications that use most recent client-side programming technologies. To learn the basics of HTML, DHTML, XML, CSS, Java Script and AJAX. 						
Course Outcomes: (for students: To know what they are going to learn)						
CO1	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).					
CO2	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).					
CO3	Ability to Understand, analyze and apply the role of languages to create a capstone					
CO4	Website using client-side web programming languages like HTML, DHTML, CSS, XML, JavaScript, and AJAX					
CO5	Able to understand the concept of jQuery and AngularJS					
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Units	INTRODUCTION					
I	HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment- links-tables-frames					

II	Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page
III	XML & DHTML: Cascading style sheet (CSS)-what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language (XML). Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding
IV	JavaScript : Client side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition, Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.
V	Ajax: Introduction, advantages &disadvantages, Purpose of it, ajax based web application, alternatives of ajax Java Script & AJAX: Introduction to array-operators, making statements-date & time-mathematics- strings-Event handling-form properties. AJAX. Introduction to jQuery and AngularJS
Learning Resources:	
<ul style="list-style-type: none"> Recommended Texts <ol style="list-style-type: none"> Pankaj Sharma, “<i>Web Technology</i>”, Sk Kataria & Sons Bangalore, 2011. (UNIT I, II, III & IV). Achyut S Godbole & Atul Kahate, “<i>Web Technologies</i>”, 2002, 2nd Edition. (UNIT V: AJAX) Reference Books <ol style="list-style-type: none"> Laura Lemay, Rafe Colburn , Jennifer Kyrnin, “<i>Mastering HTML, CSS & Javascript Web Publishing</i>”, 2016. DT Editorial Services (Author), “<i>HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)</i>”, Paperback 2016, 2nd Edition. 	

Semester – II – Core Course - CC - IV

Course code	P23CSC204	DATAMINING AND WAREHOUSING	L	T	P	C
Core / Elective / Supportive		Core	6			5
Pre-requisite	Basics of Data Mining Algorithms					
Course Objectives:						
The main objectives of this course are to :						
<ol style="list-style-type: none"> 1. Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing. 2. Develop skill so fusing recent data mining software for solving practical problems. 3. Develop and apply critical thinking, problem-solving, and decision-making skills. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the basic data mining techniques and algorithms				K1, K2	
2	Understand the Association rules, Clustering techniques and Data warehousing contents				K2, K3	
3	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining				K4, K5	
4	Design data warehouse with dimensional modeling and apply OLAP operations				K5, K6	
5	Identify appropriate data mining algorithms to solve real world problems				K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	BASICS AND TECHNIQUES					
Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.						
Unit:2	ALGORITHMS					
Classification : Introduction –Statistical –based algorithms -distance–based algorithms - decision tree-based algorithms-neural network – based algorithms – rule – based algorithms – combining techniques.						
Unit:3	CLUSTERING AND ASSOCIATION					
Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms - Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced						

association rules techniques – measuring the quality of rules.	
Unit:4	DATAWAREHOUSING AND MODELING
Dataware housing: introduction – characteristics of a data ware house – data marts – other aspects of datamart. Online analytical processing : introduction – OLTP & OLAP systems Data modeling – star schema for multidimensional view – data modeling – multifact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	
Unit:5	APPLICATIONS OF DATA WAREHOUSE
Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.	
Text Books	
1	Margaret H.Dunham, “Data Mining:Introductory and Advanced Topics”, Pearson education, 2003.
2	C.S.R. Prabhu, “Data Warehousing Concepts, Techniques, Products and Applications”, PHI, Second Edition.
Reference Books	
1	Arun K.Pujari, “Data Mining Techniques”, Universities Press (India) Pvt. Ltd.,2003.
2	Alex Berson, StephenJ.Smith,“Data Warehousing, Data Mining and OLAP”, TMCH, 2001.
3	Jiawei Han & Micheline Kamber, Academic press.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/data-warehouse
2	https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/
3	https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html

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

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

Semester – II – Core Course - CC - VI

Course code	P23CSC206	ADVANCED JAVA PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core	6			4
Pre-requisite		Basics of Java & its Usage				
Course Objectives:						
The main objectives of this course are to :						
<ol style="list-style-type: none"> 1. Enable the students to learn the basic functions, principles and concepts of advanced java programming. 2. Provide knowledge on concepts needed for distributed Application Architecture. 3. Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the advanced concepts of Java Programming					K1, K2
2	Understand JDBC and RMI concepts					K2, K3
3	Apply and analyze Java in Database					K3, K4
4	Handle different event in java using the delegation event model, event listener and class					K5
5	Design interactive applications using JavaServlet, JSP and JDBC					K5, K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Unit:1	BASICS OF JAVA					
Java Basics Review: Components and event handling – Threading concepts – Networking features – Media techniques						
Unit:2	REMOTE METHOD INVOCATION					
Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons- Defining Remote objects- Remote Object Activation- Object Serialization-Java Spaces						
Unit:3	DATA BASE					

Java in Databases- JDBC principles–database access-Interacting-database search–Creating multimedia databases – Database support in web applications						
Unit:4	SERVLETS					
Java Servlets: Java Servlet and CGI programming- A simple java Servlet-Anatomy of a java Servlet-Reading data from a client-Reading http request header-sending data to a client and writing the http response header-working with cookies						
Java Server Pages: JSP Overview-Installation-JSP tags-Components of a JSP page-Expressions- Scriptlets-Directives-Declarations-A complete example						
Unit:5	ADVANCED TECHNIQUES					
JAR file format creation–Internationalization–Swing Programming – Advanced java techniques						
Text Books						
1	Jamie Jaworski, “Java Unleashed”,SAMS Techmedia Publications, 1999.					
2	Campione, Walrath and Huml, “The Java Tutorial”, Addison Wesley,1999.					
Reference Books						
1	JimKeogh,”The Complete Reference J2EE”,Tata McGraw Hill Publishing Company Ltd, 2010.					
2	David Sawyer McFarland, “Java Script And JQuery – The Missing Manual”, Oreilly Publications, 3rd Edition,2011.					
3	Deitel and Deitel, “Java How to Program”, Third Edition, PHI / Pearson Education Asia.					
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]						
1	https://www.javatpoint.com/servlet-tutorial					
2	https://www.tutorialspoint.com/java/index.htm					
3	https://onlinecourses.nptel.ac.in/noc19_cs84/preview					

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

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

Semester – II –Elective Course - EC - III

Course code	P23CSDE3P	PRACTICAL III : DATA MINING USING R PRACTICAL	L	T	P	C
Core/Elective/Supportive		Core			5	3
Pre-requisite	Basics of DM Algorithms & R Programming					
Course Objectives:						
The main objectives of this course are to :						
<ol style="list-style-type: none"> To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression.... To understand & write Programs using the DM algorithms To apply statistical interpretations for the solutions Able to use visualizations techniques for interpretations 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Able to write Programs using R for Association rules, Clustering techniques				K1, K2	
2	To implement data mining techniques like classification, prediction				K2, K3	
3	Able to use different visualizations techniques using R				K4, K5	
4	To apply different data mining algorithms to solve real world applications				K5, K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LIST OF PROGRAMS						
<ol style="list-style-type: none"> Implement Apriori algorithm to extract association rule of data mining. Implement k-means clustering technique. Implement anyone Hierarchal Clustering. Implement Classification algorithm. 						

5. Implement Decision Tree.	
6. Linear Regression.	
7. Data Visualization.	
Text Books	
1	Margaret H.Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson education,2003.
2	C.S.R. Prabhu, “Data Warehousing Concepts, Techniques, Products and Applications”, PHI, Second Edition
Reference Books	
1	Arun K.Pujari, “Data Mining Techniques”, Universities Press(India) Pvt. Ltd., 2003.
2	AlexBerson, StephenJ.Smith, “Data Warehousing, Data Mining and OLAP”, TMCH, 2001.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/data-warehouse
2	https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/
3	https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html

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

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

Semester – II –Elective Course - EC - IV

Course code	P23CSDE4P	PRACTICAL IV : ADVANCED JAVA PROGRAMMING PRACTICAL	L	T	P	C
Core/Elective/Supportive		Core			5	3
Pre-requisite	Basics in Java Programming					
Course Objectives:						
The main objectives of this course are to :						
<ol style="list-style-type: none"> 1. To enable the students to implement the simple Programs using JSP, JAR 2. To provide knowledge on using Servlets, Applets 3. To introduce JDBC and navigation of records 4. To understand RMI& its implementation 5. To introduce to Socket programming. 						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand to the implement concepts of Java using HTML forms, JSP & JAR				K1, K2	
2	Must be capable of implementing JDBC and RMI concepts				K3, K4	
3	Able to write Applets with Event handling mechanism				K4, K5	
4	To Create interactive web based applications using servlets and jsp				K5, K6	
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
LIST OF PROGRAMS						
<ol style="list-style-type: none"> 1. Display a welcome message using Servlet. 2. Design a Purchase Order form using Html form and Servlet. 3. Develop a program for calculating the percentage of marks of a student using JSP. 4. Design a Purchase Order form using Html form and JSP. 5. Prepare a Employee payslip using JSP. 6. Write a program using JDBC for creating a table, Inserting, 						

Deleting records and list out the records.	
7. Write a program using JavaserVlet to handle form data.	
8. Write a simple Servlet program to create a table of all the headers it receives along with their associated values.	
9. Write a program in JSP by using session object.	
10. Write a program to build a simple Client Server application using RMI.	
11. Create an applet for a calculator application.	
12. Program to send a text message to another system and receive the text message from the system (use socket programming).	
Text Books	
1	Jamie Jaworski, “Java Unleashed”, SAMS Techmedia Publications, 1999.
2	Campione, Walrath and Huml, “The Java Tutorial”, AddisonWesley,1999.
Reference Books	
1	Jim Keogh, “The Complete Reference J2EE”, Tata McGraw Hill Publishing Company Ltd, 2010.
2	David Sawyer McFarland, “Java Script And JQuery – The Missing Manual”, Oreilly Publications, 3rd Edition,2011.
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*S-Strong;M-Medium;L-Low

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

Semester – II – Skill Based Elective Course - SEC - II

Course code	P21CS2SE2	Software Testing	L	T	P	C
Core/Elective/Supportive		Core	2			
Pre-requisite						
Learning Objectives: (for teachers: what they have to do in the class/lab/field)						
<ul style="list-style-type: none"> • To study various Software techniques. • To study fundamental concepts in software testing 						
Course Outcomes: (for students: To know what they are going to learn)						
CO1	To provide the basic knowledge about software tools					
CO2	To introduce Data Flow Testing Strategies					
CO3	To understand various testing methodologies					
CO4	Able to understand the various test cases.					
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create						
Units	INTRODUCTION					
I	Introduction: Purpose – Productivity and Quality in Software – Testing Vs Debugging – Model for Testing – Bugs – Types of Bugs – Testing and Design Style.					
II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation – Application – Transaction Flow Testing Techniques					
III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.					

IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats – Test Cases.
V	Logic Based Testing – Decision Tables – Transition Testing- States, State Graph, State Testing.
Learning Resources:	
<ul style="list-style-type: none"> • Recommended Texts <ol style="list-style-type: none"> 1. B. Beizer, “Software Testing Techniques”, II Edn., DreamTech India, NewDelhi, 2003. 2. K.V.K. Prasad , “Software Testing Tools”, DreamTech. India, New Delhi,2005. • Reference Books <ol style="list-style-type: none"> 1. Burnstein, 2003, “Practical Software Testing”, Springer International Edn. 2. . Kit, 1995, “Software Testing in the Real World: Improving the Process”, Pearson Education, Delhi. 3. R. Rajani, and P.P.Oak, 2004, “Software Testing”, Tata Mcgraw Hill, New Delhi. 	