VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
DEPARTMENT OF MCA
MCA CURRICULUM
(For candidates admitted from 2020-2021 onwards)

SEM	COURSE CODE	TITLE	HOURS	CREDIT	MARKS		
					CIA	EE	TOTAL
I	20P1CA01	Core Course- 1 Object oriented programming with C++	4	4	25	75	100
	20P1CA02	Core Course - 2 Web Technologies	4	4	25	75	100
	20P1CA03	Core Course- 3 Design and Analysis of Algorithms	4	4	25	75	100
	20P1CA04	Core Course- 4 Advanced Operating System	4	4	25	75	100
	20P1CAE_	Elective I -	4	4	25	75	100
	20P1CAP01	Core Course Practical - 1 Design and Analysis of Algorithms Lab Using C++	4	2	40	60	100
	20P1CAP02	Core Course Practical - 2 Web Technologies Lab	4	2	40	60	100
	20P1CAJ01	Soft Skills	2	1	25	75	100
		Total	**30**	**25**	**230**	**570**	**800**
II	20P2CA05	Core Course - 5 Advanced Java Programming	4	4	25	75	100
	20P2CA06	Core Course - 6 Advanced Software Engineering	4	4	25	75	100
	20P2CA07	Core Course - 7 Advanced Relational Database Management Systems	4	4	25	75	100
	20P2CAE_	Elective II -	4	4	25	75	100
		EDC - Resource Management Techniques	4	2	25	75	100
	20P2CAP03	Core Course Practical - 3 Advanced Java Programming Lab	4	2	40	60	100
	20P2CAP04	Core Course Practical - 4 ADBMS Lab	4	2	40	60	100
	20P2CAPR01	Mini Project	2	2	40	60	100
		Total	**30**	**24**	**245**	**555**	**800**
III	20P3CA08	Core Course - 8 C# and .NET Programming	4	4	25	75	100
	20P3CA09	Core Course - 9 Scripting Languages	4	4	25	75	100
	20P3CA10	Core Course - 10 Big Data Analysis	4	4	25	75	100
	20P3CAE-	Elective Course – III	5	4	25	75	100
	20P3CAE_	Elective IV-	5	4	25	75	100
	20P3CAP05	Core Course Practical - 5 C# and .NET Programming Lab	4	2	40	60	100
	20P3CAP06	Core Course Practical – 6 Scripting Languages Lab	4	2	40	60	100
		Human Rights	-	1	25	75	100
		Total	**30**	**25**	**230**	**570**	**800**
IV	20P4CAPR02	Core Course Project – 2 Dissertation and Viva Voce	-	18	50	150	200

		Total	**0**	**18**	**50**	**150**	**200**
		Grand Total	**90**	**92**	**755**	**1845**	**2600**

Elective : I

	Course Code	Title
Semester I	20P1CAE01	Professional Ethics
	20P1CAE02	E-Commerce
	20P1CAE03	Business Intelligence
	20P1CAE04	Enterprise Resource Planning

Elective II

	Course Code	Title
Semester II	20P2CAE05	Mobile Computing
	20P2CAE06	Advanced Networks
	20P2CAE07	Cryptography and Network Security
	20P2CAE08	Information Security

Elective III

	Course Code	Title
Semester III	20P3CAE09	Digital Image Processing
	20P3CAE10	Soft Computing
	20P3CAE11	Cloud Computing
	20P3CAE12	Internet of Things

Elective IV

	Course Code	Title
Semester III	20P3CAE13	Artificial Intelligence and Machine Learning
	20P3CAE14	Data Mining and Warehousing
	20P3CAE15	R Programming
	20P3CAE16	Python Programming

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CA01	Programming in C++	4	0	0	4	25	75	100

COURSE OBJECTIVES	To impart adequate knowledge on basics of programming in C,understand the basics and applications of OOPS in C++,enable effective usage of inheritance and polymorphism concepts, teach the various I/O streams and file handling
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	To learn about key concepts of programming in C++
CO 2	To understand the basic concepts of OOPS and C++
CO 3	To apply the OOPS concepts inheritance polymorphism in C++
CO 4	To gain knowledge about various I/O streams and files
CO 5	To impart knowledge about templates and exception handling in C++
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	3
CO 2	3	PO 4	1
		PO 5	2
		PO 6	1
CO 3	3	PO 7	1
		PO 8	3
		PO 9	2
CO 4	4	PO 10	2
		PO 11	1
		PO 12	3
CO 5	3	PO 13	1
		PO 14	2
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	2	3	2	2	2	3	3	2	2	2	3	3
CO2	2	3	3	1	2	1	1	3	2	2	1	3	1	2	2
CO3	2	3	3	1	2	1	1	3	2	2	1	3	1	2	2
CO4	1	2	2	1	1	1	1	2	1	1	1	2	1	1	1
CO5	2	3	3	1	2	1	1	3	2	2	1	3	1	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Basic Concepts of OOP	Periods	12
	Benefits of OOP- Applications of OOP- Structure of C++ - Applications of C++ - Differences between C & C++. Tokens - Data types - Operators- Manipulators- Expressions – Control structures. Function in C++ : Prototype- Call by Value - Call by Reference - Return by Reference - Inline Function - Default Arguments - Const arguments.		
Unit - II	Class and Objects	Periods	12
	Specifying a class – Member function – Arrays within a class – Memory Allocation for objects – Static data members – Static member function – Array of objects - Object as Function Arguments - Friend functions - Returning Objects – Const member functions – Pointer to members.		
	Constructors and Destructors	Periods	12
Unit - III	Constructors - Parameterized constructors – Multiple constructors in a class – Dynamic Initialization of objects – Copy Constructors –Destructors – Operator Overloading and Type Conversion .		
	Inheritance	Periods	12
Unit - IV	Extending classes – Derived classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid inheritance – Virtual Base class – Abstract class – Pointers . Virtual Functions and Polymorphism : Pointers – This Pointers – Virtual Functions – Pure Virtual Functions.		
	Working with Files	Periods	12
Unit - V	Classes for file stream Operations – Opening and Closing a file – Detecting End of File – File Pointers and their Manipulators – Error Handling during file Operations-Command line arguments – Templates : class Templates – function Templates – Exception Handling : Throwing Mechanism – Catching mechanism – Re throwing an exception - Specifying Exceptions.		
Total Periods			60

Text Books	
1	Object Oriented Programming with C++, E.Balagurusamy, 6th edition, T.M.H Publisher, New Delhi, 2013 (Unit I to V).
References	
1	The C++ Programming Language, Bjarne Stroustrup, Fourth edition, 2013.
2	C++ Programming in Easy Steps, Mike McGrath, Fourth Edition, 2011
E-References	
1	www.tutorialspoint.com
2	www.w3schools.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CA02	WEB TECHNOLOGIES	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about web technologies with HTML,CSS, PHP and MySQL concepts.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as acomputing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these toones own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local andglobal contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth forthe betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	Understand the basics of web design using HTML and cascading style sheets.
CO 2	Understand the basics of PHP.
CO 3	Learn about PHP control structures, functions, string handling and arrays
CO 4	Acquire knowledge in file system, cookies and sessions and understand PHP types
CO 5	Implement connecting database with PHP and MySQL.
Pre-requisites	Basic Knowledge about HTML and Tags.

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	3
		PO 3	4
CO 2	2	PO 4	4
		PO 5	2
		PO 6	3
CO 3	3	PO 7	2
		PO 8	4
		PO 9	2
CO 4	3	PO 10	3
		PO 11	3
		PO 12	4
CO 5	4	PO 13	4
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO2	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO3	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO4	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO5	2	2	3	3	1	2	1	3	1	2	2	3	3	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	HTML Basics	Periods	12
	Understanding HTML - Formatting text by Using Tags - Creating Lists and Backgrounds - Creating Hyperlinks and Anchors. Creating Tables- Creating simple Forms. Style Sheets and Graphics: Introduction to Style Sheets - Cascading Style sheets- -Formatting Text using Style Sheets - Formatting Paragraphs using Style Sheets.		
Unit - II	Introducing PHP	Periods	12
	Why PHP and MySQL-Server-Side Scripting Overview - Getting Started with PHP - Learning PHP Syntax and Variables.		
Unit - III	Introducing PHP Control Structures	Periods	12
	Learning PHP Control Structures and Functions-Passing Information with PHP- Learning PHP String Handling - Learning Arrays.		
Unit - IV	Introducing PHP File Systems	Periods	12
	Learning PHP Number Handling. More PHP: Working with the File System -Working with Cookies and Sessions - Learning PHP Types.		
Unit - V	MySQL Database Integration	Periods	12
	Introducing Databases and MySQL -- Learning Database Administration and Design - Integrating PHP and MySQL Performing Database Queries - Integrating Web Forms and Databases.		
	Total Periods		60

Text Books	
1	Microsoft Step by Step â€“ HTML and XHTML", Faithe Wempen. PHI, 2009
2	Steve Suehring, Tim Converse, and Joyce Park, "PHP6 and MySQL Bible", Wiley Publishing, Inc., 2010.
References	
1	Jay Greenspan and Brad Bulger, MySQL/PHP Database Applications, M & T Books, 2001.
2	Adam Trachtenberg and David Sklar, PHP Cookbook , OReilly, 2nd Edition, 2006.
3	W. Jason Gilmore, Beginning PHP and MySQL from Novice to Professional, Apress, 4th Edition, 2010.
4	Luke Welling, Laura Thomson, PHP and MySQL Web Development, Pearson Education, Inc., 4th Edition, 2009.
E-References	
1	https://www.w3schools.com/php/
2	https://www.tutorialspoint.com/php/
3	https://www.guru99.com/php_tutorials.html

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**			Regulations		**2020-2021**
Department	**M.C.A**				Semester			**1**
Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CA03	DESIGN AND ANALYSIS OF ALGORITHMS	4	0	0	4	25	75	100

COURSE OBJECTIVES	To understand the analysis of various algorithms, different categories of algorithms and implementation of algorithms.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as acomputing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these toones own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local andglobal contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth forthe betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	Recognize general principles and good algorithm design techniques for developing efficient algorithms.
CO 2	Estimate the time and space complexities of algorithms.
CO 3	Apply mathematical preliminaries to the analysis and design stages of different types of algorithms
CO 4	Compare the time and space complexities of different types of algorithms.
CO 5	Analysis the algorithms based on that which algorithm is an efficient one for specific input.
Pre-requisites	Basic Knowledge about Programming Knowledge and algorithms.

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	3
		PO 3	4
CO 2	2	PO 4	4
		PO 5	2
		PO 6	3
CO 3	3	PO 7	2
		PO 8	4
		PO 9	2
CO 4	3	PO 10	3
		PO 11	3
		PO 12	4
CO 5	4	PO 13	4
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO2	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO3	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO4	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO5	2	2	3	3	1	2	1	3	1	2	2	3	3	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Algorithms: Structure, properties - analysis of iterative and recursive algorithms - best case, worst case, average case complexities- Notations. Elementary Data Structures: Stacks and Queues-Lists.		
Unit - II	Trees	Periods	12
	Introduction-Binary Trees-BINARY SEARCH TREES: Operations: Insert, delete, search-implementation-Analysis.AVL TREES: Definition - Height - searching - insert, delete operations-AVL rotations - Examples.		
Unit - III	Graphs	Periods	12
	Definition - terminologies- Representations: Adjacency matrix, Adjacency list, - Graph search methods: Breadth first Search; Depth first Search. DIVIDE AND CONQUER: Method - Examples -Binary Search, Merge Sort, Quick Sort- analysis.		
Unit - IV	Greedy and Dynamic Programming	Periods	12
	Method - Examples - Minimum cost spanning tree, Kruskalâ€™s algorithm, Primâ€™s algorithm. Single source Shortest Path algorithms. DYNAMIC PROGRAMMING: Method - Examples - All pairs shortest path problem - Traveling salesman problem.		
Unit - V	Back Tracking	Periods	12
	Method-Examples-Eight queenâ€™s problem ,Graph Coloring, Hamiltonian Cycles. NP-HARD, NP-COMPLETE CLASSES : Basic concepts - Non deterministic algorithms - Satisfiability problem - NP-hard and NP-complete Problems.		
Total Periods			60

Text Books	
1	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, The MIT Press, 2009
2	Horowitz Ellis, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second Edition Reprint 2012.
References	
1	Vijayalakshmi Pai G.A, Data Structures and Algorithms: Concepts, Techniques and Applications, Tata Mc Graw Hill, 2009.
2	Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson Publications, 3rd Edition, 2012
E-References	
1	www.cs.usfca.edu/~galles/visualization/Algorithms.html
2	onlinecourses.nptel.ac.in/noc16_cs04/preview
3	www.coursera.org/learn/introduction-to-algorithms

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CA04	Advanced Operating System	4	0	0	4	25	75	100

COURSE OBJECTIVES	To provide the overview of computer system and the operating system, the concepts of process management, memory management, storage management, protection and security issues, and distributed systems. To gain knowledge on Distributed operating system
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisand interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsof professional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects ofmarketdemands

COs	COURSE OUTCOME
CO 1	After completion of the course the student will be able to use the system with knowledge of operating system.
CO 2	Able to recognize the process management.
CO 3	Able to understand building blocks operating system.
CO 4	Able to understand security issues of operating system.
CO 5	Able to utilize the languages in all the types of operating environment.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	4
		PO 2	3
		PO 3	3
CO 2	3	PO 4	2
		PO 5	3
		PO 6	4
CO 3	4	PO 7	2
		PO 8	4
		PO 9	3
CO 4	3	PO 10	4
		PO 11	3
		PO 12	2
CO 5	2	PO 13	4
		PO 14	3
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	2	2	3	2	1	1	1	2	1	2	3	1	2	2
CO2	2	3	3	2	3	2	2	2	3	2	3	2	2	3	3
CO3	3	2	2	1	2	3	1	3	2	3	2	1	3	2	2
CO4	2	3	3	2	3	2	2	2	3	2	3	2	2	3	3
CO5	1	2	2	3	2	1	1	1	2	1	2	3	1	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	An Overview of Operating System and Its Structures	Periods	12
	Introduction : Definition of OS- Operating System Structure-System Components-System Calls- Process-Concepts-Process Scheduling-Scheduling Concepts-Criteria-Scheduling Algorithms.		
Unit - II	Process Synchronization and Dead Locks	Periods	12
	Process Synchronization - Background, Critical Section-Synchronization Hardware-Semaphores-Problems of Synchronization-Critical Regions-Monitors-Deadlocks-System model, Characterization-Methods of Handling Deadlocks-Deadlock Prevention-Avoidance-Detection-Deadlock Recovery.		
Unit - III	Memory Management	Periods	12
	Background , Swapping ,Contiguous-Non Contiguous Storage Allocation-Paging - Segmentation - Segmentation with paging - Virtual Memory-Basic Concepts- Page Replacement Methods-Allocation of frames-Thrashing.		
Unit - IV	I/O And File Systems	Periods	12
	File Concepts-File System Structure-Access Methods-Directory Structure-Protection-Directory Implementation- Distributed systems - Goals, Software concepts - Network Operating systems- True distributed systems Multiprocessor, Time sharing system,- Distributed File system design- system structure.		
Unit - V	Linux System	Periods	12
	Distributed Operating Systems Issues in Distributed Operating System Architecture. Linux System: Design Principles -Kernel Modules -Process Management Scheduling -Memory Management -Input-Output Management -File System Inter process Communication. iOS and Android: Architecture and SDK Framework -Media Layer -Services		
Total Periods			60

Text Books	
1	Silberschatz and Galvin, Operating System Concepts, 6th Edition, John Wiley & Sons, (Asia) Pvt Ltd , 2005.
2	Andrew and Tanenbaum , Distributed Operating System, 4th Edition, Pearsons Ltd, 2002.
3	Daniel P Bovet and Marco Cesati, Understanding the Linux kernel, 3rd edition, OReilly, 2005.
References	
1	Milankovic M., Operating System Concepts and Design, 2nd Edition, McGraw Hill, 1992
2	P.C.Bhatt, An Introduction to Operating Systems-Concepts and Practice, Prentice Hall Of India, 2004
3	H.M.Deitel, An Introduction to Operating Systems, 2nd Edition, Pearson Education, 2002
4	Mukesh Singhal and Niranjan G. Shivaratri, Advanced Concepts in Operating Systems Distributed, Database, and Multiprocessor Operating Systems•, Tata McGraw-Hill, 2001
5	Rajib Mall, Real-Time Systems: Theory and Practice", Pearson Education India, 2006.
E-References	
1	https://technet.microsoft.com
2	https://en.wikipedia.org
3	www.tutorialspoint.com
4	https://books.google.co.in
5	www.webopedia.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**		Regulations		**2020-2021**
Department	**M.C.A**		Semester				**2**
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
20P2CA05	Advanced Java Programming	4	0	0	4	25	75	100

COURSE OBJECTIVES	To impart the knowledge of core JavaTo introduce advanced java conceptsTo learn about basic concepts web applicationsTo understand how to create, test, debug and deploy an web applications
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	To revisit the important concepts of Core Java Programming
CO 2	To understand the concepts of GUI programming in Java and to implement RPC mechanism through RMI
CO 3	To learn about the server side scripting using servlets
CO 4	To understand the elements of JSP and its syntax and creating custom tags
CO 5	To acquire knowledge in connecting databases with JSP and creating,testing,debugging and deploying web applications
Pre-requisites	Programming Language and OOPS

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	2
CO 2	3	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	2
		PO 8	3
		PO 9	4
CO 4	3	PO 10	3
		PO 11	4
		PO 12	2
CO 5	4	PO 13	3
		PO 14	4
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	3	1	2	2	1	2	1	2	1	3	2	1	2
CO2	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3
CO3	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3
CO4	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3
CO5	1	2	1	3	2	2	1	2	3	2	3	1	2	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	An Overview of Java	Periods	12
	Features of Java-Creating and executing simple Java programs-Classes and Objects: A Simple Class and Declaring Objects, Methods - Examples - Constructors- Packages and Interfaces-Multithreaded Programming- Exception Handling: Fundamentals-Types-Using try and catch-Built in Exceptions -Throwing our own Exception.		
Unit - II	GUI Programming and RMI	Periods	12
	The Applet Class- Event Handling-Introducing the AWT: Working with Windows, Graphics and Text-Using AWT Controls, Layout Manager and Menus-A tour of SWING-.RMI: An Overview of RMI-Building a Simple Client/Server Application		
Unit - III	Servlets	Periods	12
	The Life Cycle of a Servlet-A Simple Servlet-The Servlet API-The javax.servlet Package-Reading Servlet Parameters- The javax.servlet.http Package-Handling HTTP Requests and Responses-Using Cookies-Session Tracking		
Unit - IV	JSP Elements	Periods	12
	JSP - Elements of JSP-JSP Syntax and Semantics- Expressions, Scriptlets, and Declarations-Request Dispatching-Session and Thread Management-JSP Tag Extensions: Introduction to Custom Tag-Developing your first Custom Tag		
Unit - V	JSP Applications	Periods	12
	Database Access with JDBC-Overview of JDBC-JDBC Drivers-Connecting to a Database with DriverManager-The Statement Interface-Result Sets-Using Metadata-JSP and XML-JSP Testing and Debugging-Deploying Web Applications.		
Total Periods			60

Text Books	
1	1. H. Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.(Unit I,UnitII,Unit III)
2	2. Phil Hanna ,JSP 2.0: The Complete Reference, Tata McGraw Hilll Edition,2003 New Delhi,(Unit IV, Unit V)
References	
1	1. James Koegh,2003, J2Me: The complete Reference, Tata McGraw Hill, New Delhi
2	2. J.McGovern, R.Adatia,Y.Fain,2003,J2EE 1.4 Bible, Wiley-Dreamtech India Pvt.Ltd, New Delhi
E-References	
1	1. www.w3schools.com
2	2. www.javatpoint.com
3	3. https://java-made-easy.com
4	4. www.geeksforgeeks.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P2CA06	Advanced Software Engineering	4	0	0	4	25	75	100

COURSE OBJECTIVES	To gain Knowledge of basic SW engineering methods and practices, and their appropriate application and general understanding of software process models and testing concepts
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization ofcomputing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiatedconclusions using fundamental principles of mathematics, computing sciences, and relevant domaindisciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complexcomputing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as acomputing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these toones own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local andglobal contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth forthe betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	Understand the software engineering concepts and various process models
CO 2	Learn about the quality management and software quality assurance
CO 3	Analyze the various testing strategies and testing fundamentals
CO 4	Acquire knowledge in testing of various applications such as object-oriented and web applications
CO 5	Understand the estimation for software projects and advanced trends in software engineering
Pre-requisites	Basic concepts of Software Engineering

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	3
		PO 3	4
CO 2	3	PO 4	4
		PO 5	2
		PO 6	3
CO 3	3	PO 7	2
		PO 8	4
		PO 9	2
CO 4	2	PO 10	3
		PO 11	3
		PO 12	4
CO 5	3	PO 13	4
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO2	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO3	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO4	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO5	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Software Engineering&practices	Periods	12
	Software and Software Engineering: Natural Software - The Unique nature of WebApps - SoftwareEngineering - The Software Process - Software Engineering Practices - Software Myths. The SoftwareProcess: Process Models: A Generic Process Model- Process Assessment And Improvement - PrescriptiveProcess Models - Specialized Process Models - The Unified Process - Personal and Team Process Models.		
Unit - II	Quality Management & standards	Periods	12
	Quality Management: Quality Concepts - What is Quality? - Software Quality - Software Quality Dilemma- Achieving Software Quality. Review Techniques: Cast Impact of Software Defects - Defect Amplificationand Removal - Review Metrics and Uses - Reviews (A Formality Spectrum) - Informal Reviews - FormalTechnical Reviews. Software Quality Assurance: Background Issues - Elements of Software QualityAssurance - SQA Tasks - Goals and Metrics - Formal Approaches to SQA - Statistical Software QualityAssurance - Software Reliability - ISO 9000 Quality Standards - The SQA Plan.		
Unit - III	Software Testing Strategies	Periods	12
	A Strategic Approach to Software Testing - Strategic Issues - Test Strategies for Conventional Software -Test Strategies For Object-Oriented Software - Test Strategies for WebApps -Validation Testing - SystemTesting - Art of Debugging. Testing Conventional Applications: Software Testing Fundamentals - Internaland External Views of Testing - White-Box Testing - Basis Path Testing - Control Structure Testing -Black-Box Testing - Model-Based Testing.		
Unit - IV	Testing Object	Periods	12
	Oriented Applications: Broadening the View of Testing - Testing OOA and OOD Models - Object-OrientedTesting Strategies - Object-Oriented Testing Methods - Testing Methods Applicable at the Class Level -Interclass Test-Case Design. Testing Web Applications: Testing Concepts for WebApps - The TestingProcess - Content Testing - User Interface Testing - Component Level Testing - Navigation Testing -Configuration Testing - Security Testing - Performance Testing		
Unit - V	Estimation for Software Projects	Periods	12
	Observations on Estimation, The Project Planning Process-Software Scope and Feasibility- Resources-Software Project Estimation -Decomposition Techniques -Empirical Estimation Models - Estimation forObject-Oriented Projects -Specialized Estimation Techniques (Chapter 26) Advanced Topics: EmergingTrends in Software Engineering: Technology Evolution - Observing Software Engineering Trends -Identifying Soft Trends - Technology Directions - Tools-Related Trends		
Total Periods			60

Text Books	
1	Roger Pressman, Software Engineering A Practitioners Approach, McGraw Hill India Pvt. Ltd. 7th Edition, 2014
References	
1	Rod Stephens, Begininng Software Engineering, An Imprint of Wiley Publications 2015 Edition
2	Frank Tsui, Orlondo Karam, Essentials of Software Engineering Second Edtion
E-References	
1	https://www.geeksforgeeks.org/software-engineering

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P2CA07	Advanced database Management System	4	0	0	4	25	75	100

COURSE OBJECTIVES	Students will be explored to various databases and its design techniquesof the distributed distributed environment. They are also able to design temporal, spatial & web databases.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsof professional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects ofmarketdemands

COs	COURSE OUTCOME
CO 1	Understand various databases such as object oriented, parallel, distributed, spatial, distributed, geographic & multimedia databases
CO 2	Understand query processing, transaction management, concurrency control etc. in distributed environment
CO 3	Understand various design issues and techniques of different databases
CO 4	Understand web databases and various concepts of wb related to DBMS
CO 5	Understand how to develop an application using an advanced database system
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	2
		PO 2	4
		PO 3	3
CO 2	3	PO 4	3
		PO 5	4
		PO 6	2
CO 3	4	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	3
		PO 11	4
		PO 12	3
CO 5	3	PO 13	4
		PO 14	2
		PO 15	4

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	3	3	2	2	1	3	2	3	2	3	2	2	2
CO2	2	2	3	3	2	2	1	3	2	3	2	3	2	2	2
CO3	1	3	2	2	3	1	2	2	1	2	3	2	3	1	3
CO4	3	1	2	2	1	3	2	2	3	2	1	2	1	3	1
CO5	2	2	3	3	2	2	1	3	2	3	2	3	2	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Object Oriented Databases And Object	Periods	12
	Relational Databases: Object oriented databases - Complex data types, Object-oriented data model, Object-oriented languages, Persistent programming languages - Object relational databases - Nested relations, Complex types, Inheritance, Reference types, Querying with complex types, Functions and procedures, Object-oriented versus object-relational.		
Unit - II	Distributed Databases And Parallel Databases	Periods	12
	Distributed databases - Homogeneous and heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases.		
	Directory systems	Periods	12
Unit - III	Directory systems - Parallel databases - I/O parallelism, Inter query parallelism, Intra query parallelism, Intra operation parallelism, Interoperation parallelism, Design of parallel systems.		
	Specialized Databases	Periods	12
Unit - IV	Spatial databases and spatial, Geographic data - Representation of geometric information - Design databases, Geographic data, Spatial queries, Indexing of spatial data - Temporal and time series databases - Time in databases- Time specification in SQL, Temporal query language.		
	Other Databases	Periods	12
Unit - V	Multimedia databases - Multimedia data formats, Continuous media data, Similarity-based retrieval - Web databases - Web fundamentals, URL, HTML, Client side scripting and Applets, Web servers and sessions, Servlets, Server side scripting, Improving performance.		
	Total Periods		60

Text Books	
1	Henry Korth, F., Abraham Silberchatz, Sudarshan, S.,Database System Concepts, 4th Edition , Mc Graw Hill International Editions.
2	Elmasri, R., Navathe, S.B., Fundamentals of Database Systems , Addison Wesley, 2000.
References	
1	Gary Hanson,W., James Hanson, V., Database Management and Design, Prentice Hall of India Pvt. Ltd., 1999.
2	Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, Tata McGraw-Hill,2000.
3	Stefano Ceri, Giuseppe Pelagatti, Distributed Databases: Principles and Systems , Mc Graw-Hill Computer Science Series.
E-References	
1	https://onlinecourses.nptel.ac.in/noc16_cs04/preview
2	https://www.coursera.org/learn/database-management-systems

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P3CA09	SCRIPTING LANGUAGES	4	0	0	4	25	75	100

COURSE OBJECTIVES	To understand the various concepts of scripting languagesTo study the basics of Java Script, to understand the latest trends in Java script through AngularJS and to gain the knowledge in VBScript
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	To Introduce the fundamental concepts of JavaScript
CO 2	To provide a foundation to use AngularJS tool for creating and executing dynamic web pages
CO 3	Learn to develop simple web application using AngularJS
CO 4	To explore various VBScript essentials
CO 5	To provide the basic knowledge to use web page tricks & error handling mechanisms
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	3
CO 2	3	PO 4	2
		PO 5	2
		PO 6	3
CO 3	3	PO 7	3
		PO 8	2
		PO 9	2
CO 4	2	PO 10	3
		PO 11	1
		PO 12	2
CO 5	3	PO 13	3
		PO 14	2
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	3	3	2	2	3	3	2	2	3	2	3	3
CO2	2	3	3	2	2	3	1	2	2	3	1	2	3	2	2
CO3	2	3	3	2	2	3	1	2	2	3	1	2	3	2	2
CO4	3	2	2	3	3	2	2	3	3	2	2	3	2	3	3
CO5	2	3	3	2	2	3	1	2	2	3	1	2	3	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to JavaScript	Periods	12
	Introduction to JavaScript-Inserting Java Script into HTML document-Variables-Keywords-Constants-Strings-Functions-Event handling in Java Script-Java script Objects		
Unit - II	Introduction to AngularJS	Periods	12
	Introduction to AngularJS: What is AngularJS-Download AngularJS-Benefits of AngularJS-First AngularJS Script-Hello world! Program-Filters- Directives.		
Unit - III	Event Handling, Modules & API	Periods	12
	Events: Click event- Double Click event- Mouse Events-Key Events-Copy & Cut event -Expressions String Expression- Number Expression- Object Expression- Array Expression- Using Expression. Module & API: What is AngularJS module?- What is AngularJS API?-Creating Simple web application using AngularJS.		
Unit - IV	Introducing VBScript	Periods	12
	Introducing VBScript: What is VBScript?-Integrating VBScript and Your webpages-Introducing the windows scripting host. VBScript Syntax-VBScript statements. VBScript Built-in Objects		
Unit - V	Webpage Tricks	Periods	12
	Webpage Tricks: Managing VBScript Errors-Making status bar enhancements-Performing timed operations-Controlling Frames with VBScript-Authenticating HTML Forms-A simple Registration Form application		
Total Periods			60

Text Books	
1	Ray Rao,"Angular JS Programming for Beginners" 2015 Edition (Unit I,II&III)
2	Jerry Lee Ford Jr. ,"Learn VBScript in a Weekend"-Premier development Press (Unit IV&V)
References	
1	Kishori Sharan, "Scripting in Java-Integrating Groovy and JavaScript", Apress Publication
2	Susane clark, Brain Matisk, "VBScript Programmerâ€™s Reference", Wrox Press
E-References	
1	https://www.w3schools.com/js/default.asp
2	https://www.tutorialspoint.com/javascript/index.htm
3	https://www.tutorialspoint.com/angular4/index.htm
4	https://www.tutorialspoint.com/vbscript/index.htm

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P3CA10	BIG DATA ANALYSIS	4	0	0	4	25	75	100

COURSE OBJECTIVES	To provide grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiatedconclusions using fundamental principles of mathematics, computing sciences, and relevant domaindisciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis andinterpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms ofprofessional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to oneÃ¢â‚¬â„¢s own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations.
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects of marketdemands.

COs	COURSE OUTCOME
CO 1	Able to understand building blocks of Internet of Things and characteristics
CO 2	Able to understand the introduction of Hadoop
CO 3	Able to understand the concepts of Hadoop architecture
CO 4	Able to understand Hadoop Ecosystem and YARN
CO 5	Able to understand HIVE and HIVEQL.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	4	PO 1	2
		PO 2	2
		PO 3	2
CO 2	2	PO 4	3
		PO 5	3
		PO 6	4
CO 3	2	PO 7	2
		PO 8	3
		PO 9	3
CO 4	1	PO 10	4
		PO 11	3
		PO 12	4
CO 5	3	PO 13	1
		PO 14	2
		PO 15	4

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	1	2	2	3	1	2	2	3	2	3	1	1	3
CO2	3	3	3	2	2	1	1	2	2	1	2	1	2	3	1
CO3	3	3	3	2	2	1	1	2	2	1	2	1	2	3	1
CO4	2	2	2	1	1	1	2	1	1	1	1	1	3	2	1
CO5	2	2	2	3	3	2	2	3	3	2	3	2	1	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	INTRODUCTION TO BIG DATA	Periods	12
	Introduction - distributed file system - Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.		
Unit - II	INTRODUCTION HADOP	Periods	12
	Big Data - Apache Hadoop & Hadoop EcoSystem - Moving Data in and out of Hadoop - Understanding inputs and outputs of MapReduce - Data Serialization.		
	HADOOPP ARCHITECTURE	Periods	12
Unit - III	Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup - SSH & Hadoop Configuration - HDFS Administering -Monitoring & Maintenance		
Unit - IV	HADOOP ECOSYSTEM AND YARN	Periods	12
	Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.		
	HIVE AND HIVEQL, HB	Periods	12
Unit - V	Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts- Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.		
Total Periods			60

Text Books	
1	Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2	Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012
3	Tom White, "HADOOP: The definitive Guide" , O Reilly 2012
References	
1	Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013
2	Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
3	Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013
E-References	
1	http://www.bigdatauniversity.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CAE01	Professional Ethics	4	0	0	4	25	75	100

COURSE OBJECTIVES	Students gained about the values in human society, social integration, ethics and its values and Industrial Standards.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisand interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsof professional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects ofmarketdemands

COs	COURSE OUTCOME
CO 1	The students will understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
CO 2	Able to realize the importance of values.
CO 3	Able to understand ethics and its values.
CO 4	Able to understand about industry and industrialization.
CO 5	Able to give importance for human resources.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	2
		PO 2	3
		PO 3	3
CO 2	2	PO 4	2
		PO 5	4
		PO 6	3
CO 3	3	PO 7	4
		PO 8	3
		PO 9	3
CO 4	4	PO 10	4
		PO 11	2
		PO 12	3
CO 5	4	PO 13	4
		PO 14	2
		PO 15	4

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	3	2	2	3	2	3	3	2	2	3	2	2	2
CO2	3	2	2	3	1	2	1	2	2	1	3	2	1	3	1
CO3	2	3	3	2	2	3	2	3	3	2	2	3	2	2	2
CO4	1	2	2	1	3	2	1	2	2	3	1	2	3	1	3
CO5	1	2	2	1	3	2	1	2	2	3	1	2	3	1	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Values in Human Society: Understanding of Values	Periods	12
	Definition and Concepts-Culture and Value, Formation of Values: Socialization, Formation of Self and Integration of Personality-Different theories. Types of Values: Societal Values-Justice, Rules of Law, Democracy, Indian Constitution, Secularism, Psychological Values, Mental Health. Aesthetic Values - Perception and Appreciation of Beauty. Organizational Values: Relationships, Obligations, Rights. Spiritual Values: Their role in our day to day life, Meaning of Good Life, Value Spectrum of a Good Life, Spiritual Values.		
Unit - II	Value Crisis in Contemporary Society	Periods	12
	Importance of Values-Value crisis at the individual level, Societal Level, Cultural Level, Social Disorganization, Value crisis management. Ethics and Ethical Values: Canons of Ethics-Virtue of Ethics, Standardisation, codification, acceptance and application. Types of Ethics-Ethics of duty, Ethics of Responsibility, Ethics of Moral Judgment, Work ethics and Quality of life at work.		
	Professional Ethics	Periods	12
Unit - III	Overview - Ethics in Engineering Profession, Code of Professional Ethics, Organizational Ethics. Violation of code Ethics: Causes and consequences. Whistle blowing-famous whistle blowers-famous whistle blowers.		
Unit - IV	Industry and Industrialization	Periods	12
	Man and Machine Interaction, Problems of man machine interaction, Impact of assembly line and automation, Industrial relations, Ethics and industrial Law: Institutionalizing ethics. Science, Technology and Engineering: Origin- Nature of scientific knowledge, Social Function of Science, Practical Application of Science. Engineering as a profession: Engineering and Ethics. Renewable and non renewable resources: Energy crisis, Indian context, Sustainable development.		
Unit - V	Environment & Eco friendly technology	Periods	12
	Environment-Components of Environment. Human development and environment: Depletion of natural resources-Environmental degradation, Fertilizers and plant protection chemicals, Impact of industrialization, Impact of urbanization, Impact of Energy Generation. Pollution and Pollution Control: Water Pollution, Water Quality Parameters, Air Pollution. Eco-Friendly technologies: Implementation, Impact of assessment, Strategies to meet the challenges, Eco-Friendly Technology (EFT), Green Technology in industry. Ethics & Management of Human Resources: Ecological Ethics-Depletion of Non renewable natural resources.		
Total Periods			60

Text Books	
1	Values of Ethics in Business and Profession, Samita Manna, Suparna Chakraborti, PHI Learning Private Limited, 2010.
2	Ethics and the Conduct of Business, John R. Boatright, 5th Edition, Pearson Education 2007.
References	
1	Business Ethics-An Indian Perspective, P.S. bajaj, Raj Agrawal, Biztantra, 2004.
E-References	
1	https://www.physio-pedia.com
2	www.eng.ufl.edu

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CAE02	E-COMMERCE	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about current marketing trend using E-commerce techniques in Internet and Extranet and payment systems
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	Students would be able to understand Electronic Commerce, Business Models Identifying Electronic Commerce Opportunities
CO 2	Students would understand E-Business Technology and Web Server and E-Mail Technologies
CO 3	Able to understand Trends in E-Business Law and Taxation
CO 4	Able to understand Web Hosting and E-Business Software and Online Security Issues
CO 5	Student understand about Online Payment Systems and Internet Technologies
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	3
CO 2	3	PO 4	1
		PO 5	2
		PO 6	1
CO 3	3	PO 7	2
		PO 8	3
		PO 9	2
CO 4	4	PO 10	1
		PO 11	2
		PO 12	3
CO 5	3	PO 13	1
		PO 14	2
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	2	3	2	1	2	3	2	3	2	2	3	3
CO2	2	3	3	1	2	1	2	3	2	1	2	3	1	2	2
CO3	2	3	3	1	2	1	2	3	2	1	2	3	1	2	2
CO4	1	2	2	1	1	1	1	2	1	1	1	2	1	1	1
CO5	2	3	3	1	2	1	2	3	2	1	2	3	1	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	The Second wave of Global E-Business	Periods	12
	Introduction- Electronic Commerce: The second wave-Business Models, Revenue Models and Business Processes- Advantages and Disadvantages of Electronic commerce- Identifying Electronic Commerce Opportunities- Internet Nature of Electronic Commerce		
Unit - II	E-Business Technology Basics	Periods	12
	Introduction- The Internet and The World Wide Web- Packet switched Networks- Internet Protocols- Markup Languages and the web- Intranets and Extranets- Internet Connection Options - Internet2 and the Semantic Web. Web Server and E-Mail Technologies: Introduction- Web Server Basics-Software for Web Servers-Electronic Mail (E-mail).		
Unit - III	E-Business Law and Taxation	Periods	12
	Introduction- The Legal Environment of Electronic Commerce- Use and Protection of Intellectual Property in Online Business- Online Crime, Terrorism, and Welfare- Ethical issues- Taxation and Electronic Commerce.		
Unit - IV	Web Hosting and E-Business Software	Periods	12
	Introduction - Web Hosting Alternatives - Basic Functions of Electronic Commerce Software - Advance Functions of Electronic Commerce Software. Online Security: Introduction- Online Security Issues Overview - Security for Client Computers- communication Channel Security - Security for Server Computers- Organizations that Promote computer Security.		
Unit - V	Online Payment Systems	Periods	12
	Introduction- Online Payment Basics- Payment Cards- Electronic Cash- Electronic Wallets- Stored Value Cards- Internet Technologies and the Banking Industry- Criminal Activity and Payment Systems: Phishing and Identity Theft		
Total Periods			60

Text Books	
1	Gary P.Schneider "E-Commerce: Strategy, Technology and Implementation, 9th Edition, Cengage Learning India Private Limited 2012
2	Kamalesh K.Bajaj, Debjani Neg, "E-Commerce the Cutting Edge of Business", TMH, 2000
References	
1	S. Jaiswal, "Doing Business on the Internet E-Commerce", Galgotia, 2002
E-References	
1	www.referenceforbusiness.com
2	cyber.law.harvard.edu/olds/ecommerce/library
3	https://www2.isye.gatech.edu/~pinar/ecom.html

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CAE03	BUSINESS INTELLIGENCE	4	0	0	4	25	75	100

COURSE OBJECTIVES POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	Describe the steps and stages involved in Business Intelligence Solutions.
CO 2	Identify business requirements and develop project management plan for BI Projects.
CO 3	Identify and apply suitable analytical techniques to design business problems.
CO 4	Apply the concepts of Data Extraction, Transformation and loading for Data Integration
CO 5	Describe Balanced Scorecard, Enterprise Dash Board and Enterprise Reporting Techniques
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
		PO 3	2
CO 2	2	PO 4	3
		PO 5	2
		PO 6	4
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	3	PO 10	3
		PO 11	3
		PO 12	2
CO 5	2	PO 13	3
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	3	2	3	1	2	2	3	2	2	3	2	3	2
CO2	3	2	3	2	3	1	2	2	3	2	2	3	2	3	2
CO3	2	1	2	3	2	2	1	3	2	3	3	2	3	2	3
CO4	2	1	2	3	2	2	1	3	2	3	3	2	3	2	3
CO5	3	2	3	2	3	1	2	2	3	2	2	3	2	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	INTRODUCTION TO BUSINESS INTELLIGENCE	Periods	12
	Business Intelligence Definition- BI Decision Support Initiatives- Development Approaches: Traditional Development Approach, Cross Organizational Development Approach - Engineering Stages and the Development Steps - Parallel Development Tracks - BI Project Team Structure. Business Case Assessment: Business Justification Business Drivers- Business Analysis Issues- Cost-Benefit Analysis- Risk Assessment- Business Case Assessment Activities- Deliverable.		
Unit - II	BI PROJECT PLANNING AND REQUIREMENTS DEFINITION	Periods	12
	Project Planning: Managing the BI Project-Defining the BI Project-Planning the BI Project-Project Planning Activities-Deliverables- Roles. Project Requirements Definition: General Business Requirements-Project Specific Requirements - Project Requirements Definition Activities - Deliverables- Roles		
Unit - III	DATA ANALYSIS AND APPLICATION PROTOTYPING	Periods	12
	Data Analysis: Business Focused Data Analysis - Top-Down Logical Data Modeling- Bottom Up Source Data Analysis- Data Cleansing- Data Analysis Activities Application Prototyping: Purposes of Prototyping-Best Practices for Prototyping- Types of Prototypes- Building Successful Prototypes- Application Prototyping Activities		
Unit - IV	EXTRACT/TRANSFORM/LOAD DESIGN AND DEVELOPMENT	Periods	12
	ETL Design: Implementation Strategies- Preparing for the ETL Process- Designing the Extract Programs - Designing the Transformation Programs- Designing the Load Programs-Designing the ETL Process Flow-Evaluating ETL Tools- ETL Design Activities ETL Development: Source Data Transformation - Reconciliation- Peer Reviews- ETL Testing- Formal Test Plan ETL Development Activities		
Unit - V	MEASURES, METRICS, KPIs PERFORMANCE MANAGEMENT AND ENTERPRISE REPORTING IN BI	Periods	12
	Understanding Measures and Performance- Terminologies-Attributes of good metrics-SMART test-Supply Chain Associated with metrics-"Fact-Based Decision Making" and KPIs-KPI Usage-Sources of Business Metrics and KPIs-Connecting the Dots:Measures to Business Decisions Enterprise Reporting Perspectives -Common Report Layout Types-Balanced Scorecard-Dashboard- Balanced Scorecard vs. Dashboard.		
	Total Periods		60

Text Books	
1	Larissa Terpeluk Moss, S. Atre,"Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-support Applications", Addison-Wesley Professional, 2003
2	. RN Prasad and Seema Acharya ,"Fundamentals of Business Analytics", Second Edition, Wiley India,2016
References	
1	David Loshin, "Business Intelligence", Second Edition, Elsevier Science and Technology, 2012
2	Mike Biere, "Business Intelligence for the Enterprise", Pearson, 2010.
E-References	
1	https://searchbusinessanalytics.techtarget.com/definition/business-intelligence-BI
2	https://www.udemy.com/course/the-business-intelligence-analyst-course-2018/
3	https://www.guru99.com/business-intelligence-definition-example.html

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CAE04	Enterprise Resource Planning	4	0	0	4	25	75	100

COURSE OBJECTIVES POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiatedconclusions using fundamental principles of mathematics, computing sciences, and relevant domaindisciplines.
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental consi
PO 4	Use research-based knowledge and research methods including design of experiments, analysis andinterpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms ofprofessional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to oneÃ¢â‚¬â„¢s own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations.
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects of marketdemands.

COs	COURSE OUTCOME
CO 1	To comprehend the technical aspects of ERP systems
CO 2	To relate ERP system implementations
CO 3	To understand the steps and activities in the ERP life cycle
CO 4	To be able to identify and describe typical functionality in an ERP system
CO 5	To relate to ERP system implementations
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	3
		PO 2	3
		PO 3	2
CO 2	3	PO 4	2
		PO 5	2
		PO 6	2
CO 3	2	PO 7	2
		PO 8	3
		PO 9	3
CO 4	4	PO 10	3
		PO 11	3
		PO 12	3
CO 5	2	PO 13	2
		PO 14	4
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	3	2	2	2	2	2	3	3	3	3	3	2	2	2
CO2	3	3	2	2	2	2	2	3	3	3	3	3	2	2	2
CO3	2	2	3	3	3	3	1	2	2	2	2	2	3	1	3
CO4	2	2	1	1	1	1	1	2	2	2	2	2	1	3	1
CO5	2	2	3	3	3	3	1	2	2	2	2	2	3	1	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to ERP	Periods	12
	Enterprise An Overview-Introduction to ERP-Basic ERP concepts-Risks of ERP- Benefits of ERP.ERP and Technology: ERP and Related Technologies-Business Intelligence, Business Process Reengineering (BPR)-Data Warehousing,-Data Mining-O LAP- SCM.		
Unit - II	ERP Implementation	Periods	12
	Implementation challenges-ERP implementation strategies- ERP implementation lifecycle- Implementation Methodology-Vendors and Consultants-Contracts with Vendors-Consultants and Employees-Training and education-Project Management and Monitoring-Success and failure factors of an ERP implementation		
Unit - III	The Business modules	Periods	12
	Business modules of an ERP Package-Finance- Manufacturing-Human Resources-Plant Maintenance-Materials Management-Quality		
Unit - IV	The ERP Market	Periods	12
	ERP market Place and market place dynamics- SAP AG- Oracle corporation-People soft-JD Edwards-QAD Inc.-SSA global.		
Unit - V	ERP present and future	Periods	12
	Turbo Charge the ERP System- EAI- ERP and E-business- ERP and Internet and WWW- Future Directions and trends in ERP.		
Total Periods			60

Text Books	
1	Alexis Leon, "ERP Demystified", Second Edition, Tata McGraw Hill, New Delhi, 2008
References	
1	Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000.
2	Ashim Raj Singla,"Enterprise Resource Planning ",2008 , Cengage Learning India Pvt.Limited ,NewDelhi..
E-References	
1	www.imc.com
2	www.webopeda.com
3	www.umsl.edu
4	www.oracle .com
5	www.informit.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P2CAE05	Mobile Computing	4	0	0	4	25	75	100

COURSE OBJECTIVES	students gain the knowledge to develop the capabilities in the area of mobile applications and computing technologies with latest networking trends.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisand interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsof professional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects ofmarketdemands

COs	COURSE OUTCOME
CO 1	After completion of the course the student will be able to use the features of mobile computing.
CO 2	Able to realize the revolution networking.
CO 3	Able to understand building blocks of network.
CO 4	Able to understand mobile application languages.
CO 5	Able to utilize the languages and its usages in mobile environment.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	3
		PO 3	4
CO 2	3	PO 4	4
		PO 5	2
		PO 6	3
CO 3	2	PO 7	2
		PO 8	4
		PO 9	2
CO 4	3	PO 10	3
		PO 11	3
		PO 12	4
CO 5	4	PO 13	4
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO2	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO3	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO4	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO5	2	2	3	3	1	2	1	3	1	2	2	3	3	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to Mobile computing	Periods	12
	Mobile communication - Mobile computing - Mobile computing architecture - Mobile devices. Mobile computing technology: GSM, SMS, GPRS, CDMA and 3G.		
Unit - II	Wireless LAN	Periods	12
	Introduction - Wireless LAN advantages - IEEE 802.11 standards - Wireless LAN architecture - Mobility in wireless LAN - Deploying wireless LAN - Mobile Ad Hoh networks and sensor networks - Wireless LAN security - WIFI versus 3G.		
Unit - III	Mobile IP Network Layer	Periods	12
	IP and Mobile IP network layers - Packet delivery and Handover management - Location management - Registration - Tunneling and Encapsulation - Route optimization - Dynamic Host Configuration Protocol.		
Unit - IV	Mobile Transport Layer	Periods	12
	Conventional TCP/IP Transport layer protocols - Indirect TCP - Snooping TCP Mobile TCP - Other methods of TCP - Layer transmission for mobile networks - TCP over 2.5G/3G Mobile networks.		
Unit - V	Mobile application languages and Operating Systems	Periods	12
	J2ME - Palm OS - Windows CE -Symbian OS - Linux for Mobile devices.		
	Total Periods		60

Text Books	
1	Computer Networks: A Systems Approach, 4th edition, by Larry L. Peterson, Bruce S. Davie,Publisher Elsevier/Morgan Kaufmann.
2	MPLS: Next Steps, by Bruce S. Davie, Adrian Farrel, Publisher: Morgan Kaufmann.
References	
1	Metro Ethernet, by Sam Halabi, Publisher: Cisco Press
2	Emerging Optical Network Technologies, by Krishna M. Sivalingham, Suresh Subramaniam, Publisher: Springer
3	Computer Networks, by A. S. Tanenbaum, Publisher: Prentice Hall;
4	Emerging Optical Network Technologies, by Krishna M. Sivalingham, Suresh Subramaniam, Publisher: Springer
5	Mesh Based Survivable Networks, by Wayne Grover, Publisher: Prentice Hall.
E-References	
1	www.doc.ic.ac.uk
2	www.humanergology.com
3	www.ncbi.nlm.nih.gov
4	www.ijarcsse.com
5	https://www.interaction-design.org

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P2CAE06	Advanced Networks	4	0	0	4	25	75	100

COURSE OBJECTIVES	The objective of this course is to introduce students to a set of advanced topics in networking and lead them to the understanding of the networking research with a target of accomplishing a research paper of their own.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiatedconclusions using fundamental principles of mathematics, computing sciences, and relevant domaindisciplines.
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental consi
PO 4	Use research-based knowledge and research methods including design of experiments, analysis andinterpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms ofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to oneÃ¢â‚¬â„¢s own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations.
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local andglobal contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems.
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects of marketdemands.

COs	COURSE OUTCOME
CO 1	Able to Understand the concepts of network and data link layerAbletorealizetherevolutionofInternetinMobileDevices,Cloud&SensorNetworksâ€¢Able to understand building blocks ofInternet of Things and characteristics
CO 2	Able to understand the network layer and unicast routing
CO 3	Able to understand Transport and Application Layer
CO 4	Able to understand the High Speed Networks and Congestion Control.
CO 5	Able to understand TCP and ATM Congestion Control.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	3
CO 2	3	PO 4	4
		PO 5	2
		PO 6	3
CO 3	1	PO 7	4
		PO 8	3
		PO 9	1
CO 4	4	PO 10	2
		PO 11	3
		PO 12	4
CO 5	2	PO 13	1
		PO 14	2
		PO 15	4

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	2	1	3	2	1	2	2	3	2	1	2	3	1
CO2	1	2	3	2	2	3	2	3	1	2	3	2	1	2	2
CO3	3	2	1	1	2	1	1	1	3	2	1	1	3	2	1
CO4	1	1	2	3	1	2	1	2	1	1	2	3	1	1	3
CO5	2	3	2	1	3	2	1	2	2	3	2	1	2	3	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Networks:	Periods	12
	Standards and Administration - Protocol Layering - OSI model -TCP/IP protocol suite. Transmission Media - Guided Media - Unguided Media. Data Link Layer: Introduction - Link Layer Addressing-Error Detection and Correction - Introduction - Types of Errors - Redundancy - Detection Vs Correction - Coding. DLC services - Framing - Flow Control and Error control - Connectionless and Connection Oriented		
	Network Layer	Periods	12
Unit - II	Network Layer Services - Packet Switching - Network Layer Performance- Internet Protocol (IP) - Datagram Format - Fragmentation - Options - Security of IPv4 Datagrams- Unicast Routing : Introduction - Routing Algorithms.		
Unit - III	Transport and Application Layer	Periods	12
	Introduction to Transport Layer - Transport-Layer Protocols - Introduction to Application Layer - Standard Client-Server Protocols		
Unit - IV	Speed Networks and Congestion Control	Periods	12
	Frame Relay Networks - Asynchronous transfer mode - ATM Protocol Architecture, ATM Logical Connections, ATM Cells - ATM Service Categories - AAL - High Speed LANâ€™s: Fast Ethernet, Gigabit Ethernet, Fiber Channel - Wireless LANs - Queuing Analysis- Queuing Models - Single Server Queues.		
	TCP and ATM Congestion Control	Periods	12
Unit - V	TCP Flow control - TCP Congestion Control - Retransmission Timer Management - Window management - Performance of TCP over ATM. Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work - Traffic Control - ABR traffic Management.		
	Total Periods		60

Text Books	
1	Behrouz A. Forouzan, "Data Communication and Networking", 5th Edition, Tata McGraw Hill, 2013.
2	Stallings, William., "High Speed Networks and Internets: Performance and QoS", Second Edition, Pearson Education, 2002
References	
1	Andrew S. Tanenbaum and David J. Wetherall, "Computer Networks", 5th Edition, Pearson Education, 2011
2	Larry L. Peterson and Peter S. Davie, "Computer Networks", 5th Edition, Elsevier, 2012.
3	Tanenbaum Andrew S., "Computer Networks", 5th Edition, Prentice Hall of India, New Delhi, 2013.
E-References	
1	http://developer.android.com/develop/index.html
2	https://docs.docker.com
3	www.microchip.com
4	www.sanfoundry.com
5	www.oxfordreference.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P2CAE07	Cryptography and Network Security	4	0	0	4	25	75	100

COURSE OBJECTIVES	To provide the overview of computer system and the various network topologies and security measures for secured access of our data.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisand interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsof professional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects ofmarketdemands

COs	COURSE OUTCOME
CO 1	After completion of the course the student will be able to understand the Physical Medium of network with topologies.
CO 2	Abletorecognizetransformation techniques in images
CO 3	AbletounderstandbuildingblocksInternet Protocols and its usage
CO 4	Able to understand various encryption and decryption techniques.
CO 5	Able to know about firewall and intrusion concepts
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	2
		PO 2	3
		PO 3	2
CO 2	3	PO 4	4
		PO 5	3
		PO 6	3
CO 3	2	PO 7	2
		PO 8	3
		PO 9	4
CO 4	4	PO 10	3
		PO 11	4
		PO 12	2
CO 5	2	PO 13	3
		PO 14	4
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3
CO2	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3
CO3	3	2	3	1	2	2	1	2	1	2	1	3	2	1	2
CO4	1	2	1	3	2	2	1	2	3	2	3	1	2	3	2
CO5	3	2	3	1	2	2	1	2	1	2	1	3	2	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Networking	Periods	12
	Types of Physical Medium - Topologies - Wireless Networking: Wireless Protocols. Data Link Layer: Layered Data Link Protocols - SLIP and PPP-MAC and ARP. Network Layer: Routing Risks-Addressing-Fragmentation-Security.		
Unit - II	Internet Protocol	Periods	12
	IP Addressing-ICMP-Security options. Transport Layer: Common Protocols-Transport Layer Functions-Gateways. TCP: Connection Oriented Protocols-TCP Connections-UDP. Session Layer: Session State Machine-Session and Stacks. SSL: SSL Functionality-Certificates. SSH: SSH and Security-SSH Protocols. STMP: Email Goals- Common Servers. HTTP: HTTP Goals-URL.		
Unit - III	Security	Periods	12
	Importance-Threat Models-Concepts-Common Mitigation Methods. Network theory: Standards Bodies-Network Stacks-Multiple Stacks-Layers and Protocols-Common Tools. Cryptography: Securing Information-Necessary Elements-Authentication and Keys-Cryptography and Randomness-Hashes-Ciphers-Encryption-Steganography.		
Unit - IV	Data Encryption	Periods	12
	Classical Encryption Techniques-Block Ciphers and the Data Encryption Standards- Symmetric Ciphers. Principles of Public Key Cryptosystems and RSA Algorithm-Key Management.		
Unit - V	Authentication	Periods	12
	Message Authentication and Hash Function-Digital Signatures and Authentication Protocols-Email Securityâ€”Web Security-Intrusion-Firewall.		
	Total Periods		60

Text Books	
1	Neal Krawetz, Introduction Network Security, India Edition, Thomson Delmar Learning.2007(Unit-I:5.1,5.4,7.2,8.3,9,10,11.2,11.3,11.5,11.9, unit-II:12.1,12.2,12.4,14.1,14.2,14.3,15.1,15.2,15.7,16.2,16.3, 19.2,19.3,20.1, 20.2,22.2, 23.1,23.2, UnitIII:1.1,1.2,1.3,1.4,3.1,3.2,3.3,3.4,3.5,4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8).
2	William Stallings, Cryptography and Network Security, Prentice-Hall of India,4th edition,2007, (Unit-IV: 2,3,6,9,10, Unit-V: 11,13,15,17,18,20).
References	
1	K.Pachghare, Cryptography and Information Security, PHI Learning Private Limited 2009.
2	Andrew S. Tanenbaum, Computer Networks, PHI 4th edition . 2009.
E-References	
1	williamstallings.com
2	www.sanfoundry.com
3	www.amazon.in
4	www.uptu.ac.in
5	www.ibm.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P2CAE08	Information Security	4	0	0	4	25	75	100

COURSE OBJECTIVES	Students gain the skills to exploit the capabilities of information security. Understand with a modern security technologies such as firewalls, VPNs, intrusion detection system.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as acomputing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these toones own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local andglobal contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth forthe betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	Understand the risk related to information security & system development life cycle.
CO 2	Describe the plan for security
CO 3	Analyze various security technology
CO 4	Describe intrusion detection and prevention.
CO 5	Understand the implementation of security and change management.
Pre-requisites	Basic Knowledge about Network and Computer Security.

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	3
		PO 3	4
CO 2	2	PO 4	4
		PO 5	2
		PO 6	3
CO 3	3	PO 7	2
		PO 8	4
		PO 9	2
CO 4	3	PO 10	3
		PO 11	3
		PO 12	4
CO 5	4	PO 13	4
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO2	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO3	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO4	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO5	2	2	3	3	1	2	1	3	1	2	2	3	3	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to Information Security	Periods	12
	The History of Information Security- Key Information Security Concepts -Critical Characteristics of Information- CNSS Security Model-Components of an Information System- Balancing Information Security and Access- The Systems Development Life Cycle- The Security Systems Development Life Cycle-Investigation.		
Unit - II	Need for Security	Periods	12
	Threats- Attacks- Secure Software Development - Ethics and Information security-Overview of Risk Management-Risk Identification-Risk Assessment - Risk Control Strategies- Selecting Risk Control Strategy - Qualitative versus Quantitative Risk Control Practices.		
Unit - III	Planning for Security	Periods	12
	Information Security Planning and Governance-Information Security Policy, Standards, and Practices -The Information Security Blueprint -Security Education, Training, and Awareness Program -Continuity Strategies.		
Unit - IV	Firewalls and VPNs	Periods	12
	Access Control -Firewalls -Firewall Processing Modes -Firewalls Categorized by Generation -Firewalls Categorized by Structure-Firewall Architectures -Selecting the Right Firewall -Configuring and Managing Firewalls-Content Filters -Protecting Remote Connections -Remote Access -Virtual Private Networks .		
Unit - V	Intrusion Detection And Prevention Systems	Periods	12
	Introduction-Intrusion Detection and Prevention Systems - Types of IDPS- IDPS Detection Methods- IDPS Response Behavior- Selecting IDPS Approaches and Products- Strengths and Limitations of IDPSs- Deployment and Implementation of an IDPS-Measuring the Effectiveness of IDPSs		
	Total Periods		60

Text Books	
1	Michael E.Whitman, and Herbert J.Mattord, Principles of Information Security 4th edition, Cengage Learning 2012.
References	
1	Nozaki, Micki Krause, Tipton, Harold F, Information Security Management Handbook - 6th Edition CRC Press,2012
2	Hossein Bidgoli, Handbook of Information Security-Information Warfare; Social,Legal, and International Issues;and Security Foundations,John Wiley& Sons Inc.2006
E-References	
1	https://onlinecourses.nptel.ac.in/noc15_cs03
2	https://onlinecourses.nptel.ac.in/noc16_cs01

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P3CAE10	Soft Computing	4	0	0	4	25	75	100

COURSE OBJECTIVES	To understand and brings the view of fundamentals of Neural Networks, back propagation networks, adaptive resonance theory, fuzzy logic and genetic algorithms.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as acomputing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these toones own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local andglobal contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth forthe betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	After completion of the course the student will get the knowledge about the fundamentals of Neural Networks.
CO 2	Able to realize the back propagation networks.
CO 3	Able to understand adaptive resonance theory
CO 4	Able to understand fuzzy logic concepts.
CO 5	Able to understand genetic algorithms concepts.
Pre-requisites	Basic Knowledge about Network and Computer Security.

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	3
		PO 3	4
CO 2	2	PO 4	4
		PO 5	2
		PO 6	3
CO 3	3	PO 7	2
		PO 8	4
		PO 9	2
CO 4	3	PO 10	3
		PO 11	3
		PO 12	4
CO 5	4	PO 13	4
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO2	2	2	1	1	3	2	1	1	3	2	2	1	1	3	2
CO3	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO4	3	3	2	2	2	3	2	2	2	3	3	2	2	2	3
CO5	2	2	3	3	1	2	1	3	1	2	2	3	3	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Fundamentals of Neural Networks	Periods	12
	Basic Concepts of Neural Network-Model of an Artificial Neuron-Neural Network Architectures-Characteristics of Neural Networks-Learning Methods-Taxonomy of Neural Network Architectures-History of Neural Network Research-Early Neural Network Architectures-some applications domain.		
Unit - II	Backpropagation Networks	Periods	12
	Architecture of Backpropagation Network-Backpropagation Learning -illustrations-applications-Effect of Tuning Parameters of the Backpropagation Neural Network-Selection of various parameters in Backpropagation rk-Variations of Standard Backpropagation algorithms.		
Unit - III	Adaptive Resonance Theory	Periods	12
	Introduction-classical ART networks-simplified ART architecture- ART1- Architecture of ART1-special features of ART1-ART1 algorithm.ART2- Architecture of ART2- ART2 algorithm -.Applications.		
Unit - IV	Fuzzy logic	Periods	12
	Fuzzy Set Theory- Fuzzy Sets-Fuzzy Relations. Fuzzy Systems: Fuzzy Logic-Fuzzy Rule based system - Defuzzification Methods-Applications. Fuzzy Backpropagation Networks: LR-Type Fuzzy Numbers-Fuzzy Neuron-Fuzzy Backpropagation Architecture.		
Unit - V	Genetic algorithms	Periods	12
	Fundaments of Genetic algorithms-Basic concepts-creation of Offsprings-encoding-reproduction. Genetic modeling: Cross Over-Inversion and Deletion-Mutation Operator-Bit Wise Operators - PSO: Particle Swam Optimization.		
Total Periods			60

Text Books	
1	Rajasekaran. S and Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, New Delhi-2005.
References	
1	Fakhreddine O. Karray, Clarence De Silva, Soft Computing and Intelligent Systems Design, Pearson, 2009.
2	Sivanandam. S. N and Deepa S. N, Principles of Soft Computing, Wiley India, 2008.
E-References	
1	www.myreaders.info
2	www.springer.com
3	www.sciencedirect.com
4	www.elsevier.com
5	www.cs.berkeley.edu

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P3CAE11	Cloud Compuging	4	0	0	4	25	75	100

COURSE OBJECTIVES	To understanding cloud computing and a systematic knowledge of the fundamental technologies,architecture, and security and to learn how to use Cloud Services.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiatedconclusions using fundamental principles of mathematics, computing sciences, and relevant domaindisciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis andinterpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms ofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to oneÃ¢â‚¬â„¢s own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems.
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects of marketdemands.

COs	COURSE OUTCOME
CO 1	Introduce the broad perceptive of cloud architecture and model
CO 2	Cloud computing fundamental issues, technologies, applications and implementations
CO 3	Understanding the key dimensions of the challenge of Cloud Computing
CO 4	Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications
CO 5	Provide sufficient knowledge foundation to enable further study and research
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	4
		PO 3	3
CO 2	3	PO 4	3
		PO 5	2
		PO 6	2
CO 3	3	PO 7	3
		PO 8	2
		PO 9	3
CO 4	2	PO 10	3
		PO 11	2
		PO 12	3
CO 5	3	PO 13	3
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	2	3	3	2	3	2	2	3	2	2	3	2
CO2	2	2	3	3	2	2	1	2	3	3	2	3	3	2	3
CO3	2	2	3	3	2	2	1	2	3	3	2	3	3	2	3
CO4	3	1	2	2	3	3	2	3	2	2	3	2	2	3	2
CO5	2	2	3	3	2	2	1	2	3	3	2	3	3	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Defining cloud computing-Characteristics cloud model - cloud services - examples- cloud based services and applications - cloud concepts and technologies - Benefits - Limitations .		
Unit - II	Cloud services and platforms	Periods	12
	Cloud services and platforms - Compute services - storage services - data base services - application services - content delivery services - analytic services- cloud application design.		
Unit - III	Cloud storage	Periods	12
	Cloud storage - overview- Cloud storage provider - standards- applications - client- infrastructures - services - challenges before native file system - storage types - popular cloud storage for developers - popular general purpose cloud storages..		
Unit - IV	Software as a service	Periods	12
	Software as a service - overview- driving forces - company offering - industries software plus services - overview - mobile device integration - providers - Microsoft online.		
Unit - V	Security issues	Periods	12
	Security issues - cloud security - threats to cloud security - infrastructure security - information security - cloud security design -principles - cloud security management frameworks - security as a service - privacy and compliance issues - popular cloud services - google cloud - mobile cloud computing - The Internet of Things.		
Total Periods			60

Text Books	
1	Arshdeep Bahga, Vijay Madisetti "Cloud Computing A Hands-on Approach", university press, 2014.
2	Anthony T.Velte Toby J.Velte, Robert Elsenpeter, "Cloud Computing A Practical Approach", Mc Graw Hill Education, reprint 2016
3	Sandeep Bhowmik,"Cloud Computing", Cambridge University press, 2017
References	
1	Barrie Sosinsky "Cloud Computing Bible ", Wiley Publications, 2015 Reprint .
2	Ricardo Puttini, Thomas Erl, and Zaigham Mahmood, "Cloud Computing: Concepts, Technology & Architecture", Prentice-Hall, 2013..
E-References	
1	www.sciencedirect.com
2	www.springer.com
3	www.webopedia.in
4	www.tutorialspoint.com
5	www.w3schools.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P3CAE12	INTERNET OF THINGS	4	0	0	4	25	75	100

COURSE OBJECTIVES	Students will be explored to the interconnection and integration of the physical world and the cyberspace. They are also able to design & develop IOT Devices.
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domainknowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiatedconclusions using fundamental principles of mathematics, computing sciences, and relevant domaindisciplines.
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis andinterpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms ofprofessional computing practice.
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to oneÃ¢â‚¬â„¢s own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations.
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems.
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects of marketdemands.

COs	COURSE OUTCOME
CO 1	Able to understand the application areas of IOT
CO 2	Able to realize the revolution of Internet in Mobile Devices, Cloud & SensorNetworks
CO 3	Able to understand building blocks of Internet of Things and characteristics
CO 4	Able to understand data analytics for IoT.
CO 5	Able to learn IoT by case studies.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	4
		PO 2	2
		PO 3	2
CO 2	2	PO 4	3
		PO 5	3
		PO 6	4
CO 3	3	PO 7	3
		PO 8	3
		PO 9	4
CO 4	3	PO 10	3
		PO 11	4
		PO 12	4
CO 5	4	PO 13	2
		PO 14	2
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	3	3	2	2	1	2	2	1	2	1	1	3	3	2
CO2	1	3	3	2	2	1	2	2	1	2	1	1	3	3	2
CO3	2	2	2	3	3	2	1	3	2	3	2	2	2	2	3
CO4	2	2	2	3	3	2	1	3	2	3	2	2	2	2	3
CO5	3	1	1	2	2	3	2	2	3	2	3	3	1	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Introduction to Internet of Things, Physical design of IoT, Logical Design of IoT, IoT enabling Technologies. - Domain Specifics of IoT, home automation, cities, Environment, Energy, Retails, Logistics, Agriculture, Industry,Health and Life style		
Unit - II	IoT and M2M	Periods	12
	IoT and M2M - Difference between IoT and M2M,SDN and NFV for IOT. IOT System management with NETCONF-YANG-Need for IOT system management, SNMP, Network operator environment, NETCONF, YANG		
Unit - III	Developing Internet of Things	Periods	12
	IOT Platforms design methodology, Introduction, IOT Design methodology, Case study on IoT System on weather monitoring. IoT Systems logical design using Python, Introduction, Installing python, Python data types and data structures, Control flow. Functions, Modules.		
	Packages	Periods	12
Unit - IV	Packages, File handling, Date time operations, classes, Python packages of interest for IoT. IoT physical devices and end points, what is an IoT Device, Exemplary device: Raspberry PI, about the board, Linux on Raspberry PI, Raspberry PI interfaces, Other IoT devices.		
	Data analytics for IoT-Introduction	Periods	12
Unit - V	Data analytics for IoT-Introduction, Apache Hadoop, Using Hadoop map reduce for batch data analysis. Case studies- Illustrating IoT design-Introduction, Home automation, cities, environment, agriculture.		
	Total Periods		60

Text Books	
1	Internet of Things - A Hands on Approach, Arsdeep Bahga & Vijay Mandisetti, 2014
2	Building the Internet of Things: Implement New Business Models, Disrupt, Maciej Kranz, Willey Publications, 2016
3	5. Designing the Internet of Things By Adrian McEwen, Hakim Cassimally, Willey Publications 2015.
References	
1	Internet of Things: Principles and Paradigmsby Rajkumar Buyya, Amir Vahid Dastjerdi morgan Kaufmann 2014.
E-References	
1	http://internetofthingsagenda.techtarget.com
2	http://www.businessinsider.com/what-is-the-internet-of-things

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P3CAE14	DATA MINING AND WAREHOUSING	4	0	0	4	25	75	100

COURSE OBJECTIVES	To introduce general techniques for analyzing computer algorithms To learn different algorithm design techniques To understand the limitations of Algorithm power
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization ofcomputing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domaindisciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components, or processes that meet specified needs with appropriate consideration for public health andsafety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysisandinterpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsofprofessional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as acomputing professional.
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinaryenvironments.
PO 9	Communicate effectively with the computing community, and with society at large, about complexcomputing activities by being able to comprehend and write effective reports, design documentation, makeeffective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local andglobal contexts, and the consequential responsibilities relevant to professional computing practice.
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinaryenvironments.
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth forthe betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands

COs	COURSE OUTCOME
CO 1	Demonstrate an understanding of the importance of data mining and the basic concepts of data mining
CO 2	Organize and Prepare the data needed for data mining using pre preprocessing techniques
CO 3	Understand the various data mining classification methods on large sets
CO 4	Implementing the appropriate clustering or Frequent Pattern mining on large data sets.
CO 5	Apply the data mining techniques in large databases and also learn about trends in data mining
Pre-requisites	Basic concepts of database

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	2
CO 2	3	PO 4	3
		PO 5	2
		PO 6	3
CO 3	2	PO 7	2
		PO 8	3
		PO 9	3
CO 4	3	PO 10	4
		PO 11	3
		PO 12	2
CO 5	2	PO 13	4
		PO 14	3
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	2	3	2	3	2	3	2	1	2	3	1	2	2
CO2	2	3	2	3	2	3	2	3	3	2	3	2	2	3	3
CO3	2	3	2	3	2	3	2	3	2	3	2	1	3	2	2
CO4	2	3	2	3	2	3	2	3	3	2	3	2	2	3	3
CO5	2	3	2	3	2	3	2	3	2	1	2	3	1	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Data mining - Data mining functionalities - kinds of patterns can be mined - classification - major issues. Data warehouse - A multidimensional data model - Data warehouse architecture - Data warehouse implementation - From data warehouse to data mining.		
Unit - II	Data pre-processing	Periods	12
	Data cleaning - Data Integration and Transformation - Data Reduction - Discredidation and concept hierarchy generation - Data mining primitives - Data mining Task.		
Unit - III	Association Rule Mining	Periods	12
	- Mining single dimensional Boolean association rules from transactional databases -. Classification and prediction - Issues regarding classification and prediction - Bayesian classification- Classification by Back propagation - classification based on concepts from association rule mining.		
Unit - IV	Cluster Analysis	Periods	12
	- A categorization of Major clustering methods - Partitioning methods- Hierarchical methods - Grid based methods -Model based clustering methods - Density - based methods.		
Unit - V	Applications and Trends in Data Mining	Periods	12
	- Data mining system products and Research prototypes - Additional themes on Data mining - Social Impacts of Data Mining - Trends in Data mining-Mining Spatial Databases - Mining Time-series and sequence data - Mining the World wide web.		
Total Periods			60

Text Books	
1	1. Jaiwei Han, Michelien Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers an Imprint of Elsevier, 2001
References	
1	5. Arun K.Pujari, "Data Mining Techniques", Universities Press (India) Limited, 2001
2	6. George M. Marakas, Modern Data warehousing, Mining and Visualization: core concepts, Printice Hall, First Edition, 2002.
3	7. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson, 2008.
4	8. Soman K. P, Shyam Diwakar, V. Ajay, Data Mining, Printice Hall, 2008.
E-References	
1	1. https://www.guru99.com/data-mining-tutorial.html
2	2. https://www.tutorialspoint.com/data_mining/
3	3. www.knowledge-management-tools.net/data-warehousing.html

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**		Regulations		**2020-2021**
Department	**M.C.A**		Semester				**3**
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
20P3CAE15	R PROGRAMMING	4	0	0	4	25	75	100

COURSE OBJECTIVES	To Understand Data Science and its applications, Introduce yourself to R Programming and To Explore how basic graphs and statistics works in R
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	The gain the knowledge in Overview of R and its installation
CO 2	To understand the concepts of Data In and Out of R
CO 3	To learn about the vectorized operations in R
CO 4	To understand the various control structures of R
CO 5	To acquire knowledge in scoping rules of R
Pre-requisites	Programming basics and Data Mining

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	2
CO 2	3	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	2
		PO 8	3
		PO 9	4
CO 4	4	PO 10	3
		PO 11	4
		PO 12	2
CO 5	3	PO 13	3
		PO 14	4
		PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	3	1	2	2	1	2	1	2	1	3	2	1	2
CO2	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3
CO3	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3
CO4	1	2	1	3	2	2	1	2	3	2	3	1	2	3	2
CO5	2	3	2	2	3	3	2	3	2	3	2	2	3	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	History and Overview of R	Periods	12
	What is R? What is S? The S Philosophy - Back to R - Basic Features of R - Free Software - Design of the R System - Limitation of R - R Resources Getting Started with R: Installation - Getting started with the R interface. R Nuts and Bolts: Entering Input - Evaluation - R Objects - Numbers - Attributes - Creating Vectors - Mixing Objects - Explicit Coercion - Matrices - Lists - Factors - Missing Values - Data Frames - Names		
Unit - II	Getting Data In and Out of R	Periods	12
	Reading and Writing Data-Reading Data Files with read.table()-Reading in Larger Datasets with read.table-alculating Memory-Requirements for R Objects-Using the readr Package-Using Textual and Binary Formats for Storing Data-Using dput() and dump()-Binary Formats-Interfaces to the Outside World-File Connections-Reading Lines of a Text File-Reading From a URL Connection-Subsetting R Objects-Subsetting a Vector-Subsetting a Matrix-Subsetting Lists-Subsetting Nested Elements of a List-Extracting Multiple Elements of a List-Partial Matching-Removing NA Values.		
Unit - III		Periods	12
	Vectorized Operations-Vectorized Matrix Operations -Dates and Times-Dates in R Times in R-Operations on Dates and Times-Summary-Managing Data Frames with the dplyr package-Data Frames-The dplyr Package-dplyr Grammar-Installing the dplyr package -select()-filter()-arrange()-rename()-mutate()-group_by().		
Unit - IV	Control Structures and functions	Periods	12
	Control Structures-if-else-for Loop-Nested for loops-while Loops-repeat Loops-next, break-Functions-Functions in R- our First Function - Argument Matching-Lazy Evaluation The ... Argument -Arguments Coming After the ... Argument.		
Unit - V		Periods	
	Scoping Rules of R-A Diversion on Binding Values to Symbol-Scoping Rules-Lexical Scoping: Why Does It Matter?-Lexical vs. Dynamic Scoping- Optimization- lotting the Likelihood. Coding Standards for R-Loop Functions-Looping on the Command Line-lapply()-sapply()-split()-Splitting a Data Frame-tapply apply()-Col or Row Sums and Means-Other Ways to Apply-mapply().		
Total Periods			60

Text Books	
1	Roger D. Peng, "R Programming for Data Science", LeanPub, 2015. (e-Book
References	
1	Tony Fischetti, "Data Analysis with R", Paperback, PACKT Publications, 2015
2	Grolemund, Garrett, "Hands on Programming with R", Oâ€™ Reilly Inc., 2015
E-References	
1	www.w3schools.com
2	www.tutorialspoint.com
3	www.geeksforgeeks.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2020-2021**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P3CAE16	PYTHON PROGRAMMING	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn a dynamic, interpreted (Byte code-Compiled) and high level programming language and understand the various concepts of Python programming
POs	PROGRAMME OUTCOME
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspectsof market demands

COs	COURSE OUTCOME
CO 1	
CO 2	
CO 3	
CO 4	
CO 5	
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	3
		PO 3	3
CO 2	3	PO 4	2
		PO 5	2
		PO 6	1
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	2
		PO 11	1
		PO 12	2
CO 5	3	PO 13	3
		PO 14	2
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	3	3	2	2	2	3	3	2	3	2	3	3
CO2	2	3	3	2	2	1	1	3	2	2	1	2	3	2	2
CO3	2	3	3	2	2	1	1	3	2	2	1	2	3	2	2
CO4	3	2	2	3	3	2	2	2	3	3	2	3	2	3	3
CO5	2	3	3	2	2	1	1	3	2	2	1	2	3	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to Python	Periods	12
	Python: Introduction - Python interpreter and interactive mode - Values & Types - Variable - Expressions and Statements - Assigning Values in Python, Variable Declaration, Multiple Assignment - Operators - Types of Operators, Operator Precedence - Modules and Functions: Modules, Function Definition and Use, Defining a Function, Calling Function, Uses of Function, Advantages of Functions - Flow of Execution.		
Unit - II	Python Conditionals, Parameters & Arguments	Periods	12
	Conditionals: Booleans Values and Operators - Operators - Operator Precedence - Decision Making - if, ifâ€¦ Else, Ifâ€¦Elifâ€¦ Else & Nested statements - Iteration - Fruitful Functions - Scope of Variable - Global and Local Variable in Function, Nonlocal Variable - Composition - Recursion. Parameters and Arguments: Functions with No Arguments, Functions with Arguments, Functions with Return Value.		
Unit - III	Strings in Python	Periods	12
	Strings: String Slices - String are Immutable - String Functions and Methods - String Module - Lists as Array. Lists: Accessing Elements in Lists Using Subscript Operator, List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters, Deleting List Elements, Python Functions for List Operations, List Comprehension.		
Unit - IV	Tuples & Dictionaries	Periods	12
	Tuples: Advantages of Tuple Over List, Accessing Values, Updating Tuples, Delete Tuple Elements, Tuple Assignment, Tuple Methods, Other Tuple Operations, Tuples As Return Values, Built-in Functions with Tuple, Variable Length Arguments Tuples - Dictionaries: Built-in Dictionary Functions and Methods, Access update and Add Elements, Delete and Remove Elements, Sorting, Iterating through, Reverse Lookup, Inverting a Dictionary, Memorization(Memos)		
Unit - V	Files & Packages	Periods	12
	Files: Reading and Writing, Format Operator, Command Line Arguments - Errors and Exceptions: Errors, Exceptions. Modules: Writing Modules, Locating Modules. Packages: Steps to create a Python Package.		
	Total Periods		60

Text Books	
1	Dr. S. Suresh kumar, "Problem Solving and Python Programming" Charulatha Publications, 2018.
References	
1	Python Essential Reference (4th Edition): David Beazley
2	Beginning Python: From Novice to Professional Beginning (Beginning From Novice to Professional) by Magnus Lie Hetland second edition)
3	Core Python Programming (2nd Edition): Wesley J Chun
E-References	
1	https://www.w3schools.com/python/
2	https://www.learnpython.org/
3	https://docs.python.org/3/tutorial/
4	http://www.tutorialspoint.com/python

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**			Regulations		**2020-2021**
Department	**M.C.A**				Semester			**3**
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
20P1CAJ01	SOFT SKILLS		4	0	0	4	25	75	100
COURSE OBJECTIVES	To emulate students to the current needs of Software Industries and to impart self awareness and self development to pace with the growth of IT field with hundred percent self confidence.								
POs	PROGRAMME OUTCOME								
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements								
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines								
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental								
PO 4	Use research-based knowledge and research methods including design of experiments, analysisand interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and normsof professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand								
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.								
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.								
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large								
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems								
PO 14	To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.								
PO 15	To develop scientific outlook that solves any problem, encompassing the expected aspects ofmarketdemands								

COs	COURSE OUTCOME
CO 1	Articulate and enunciate words and sentences clearly and efficiently
CO 2	Read and analyze text and be able to summarize ideas in writing
CO 3	Demonstrate the ability to research topics and present them using various mediums, including written reports, group presentations, and multimedia projects
CO 4	Analyze how communication models impact the sender/receiver in various formats
CO 5	Assess your strength and weaknesses to better assist you in career development
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	3
		PO 2	4
		PO 3	2
CO 2	3	PO 4	3
		PO 5	3
		PO 6	4
CO 3	3	PO 7	3
		PO 8	4
		PO 9	4
CO 4	4	PO 10	3
		PO 11	2
		PO 12	3
CO 5	2	PO 13	4
		PO 14	3
		PO 15	2

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	3	2	2	1	2	1	1	2	3	2	1	2	3
CO2	3	2	2	3	3	2	1	2	2	3	2	3	2	3	2
CO3	3	2	2	3	3	2	1	2	2	3	2	3	2	3	2
CO4	2	3	1	2	2	3	2	3	3	2	1	2	3	2	1
CO5	2	1	3	2	2	1	2	1	1	2	3	2	1	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	The Mind	Periods	5
	Positive thinking & Attitude, Motivation, Character Building, Self Esteem, Goal Setting.		
Unit - II	Effective Communication	Periods	5
	English Conversation, Pronunciation, Voice Modulation, Stressing and stretching, Accent Improvisation, Facial Expressions.		
Unit - III	Effective Communication	Periods	5
	Effective Communication Body language, Writing skills. Business Etiqu ettes -Business Etiquettes Office Etiquettes, Phone Etiquettes, Dining Etiquettes, Party Etiquettes Corporate Look - Office Wear, Meetings/Interviews, Business Presentations		
Unit - IV	Executive Skills	Periods	5
	Writing a profile (Personal/ Company), Group Discussion, Facing an Interview, Business Presentation Skills.		
Unit - V	Special Corporate Skills	Periods	5
	Interpersonal Relationship, Leadership Qualities, Time Management, Stress Management.		
	Total Periods		25

Text Books	
1	Enhancing Employability : Connecting Campus with Corporate : M.S. Rao
References	
1	Corporate Softskills : Sarvesh Gulati
2	The ACE of Soft Skills: Attitude, Communication and Etiquette for Success: Gopalaswamy Ramesh, Mahadevan Ramesh
E-References	
1	www.dupont.co.in/soft-skill-developmentâ€Ž.
2	www.wfskillscollege.org.
3	mass.educationalinnovation.org

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations	2020-21	
Department	**M.C.A**		Semester			I	
20P1CAP01	Design And Analysis of Algorithms Lab		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
			4	0	0	2	40	60	100
COURSE OBJECTIVES	• Apply different problem solving techniques to find a solution to a problem • Analysis of implementing the various algorithms • Propose an efficient algorithm for a problem						
	LIST OF PRACTICALS						
1	To implement operations on Stacks						
2	To implement operations on Queues						
3	To implement operations on Binary Trees						
4	To perform operations on Binary Search Trees						
5	Implementation of Breadth First Search methods						
6	Implementation of Depth First Search methods						
7	To implement Binary search using Divide and Conquer method						
8	Implementation of Merge sort using Divide and Conquer method						
9	To implement Travelling salesman problem						
10	To implement 8-Queens Problem						

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations		2020-21
Department	**M.C.A**		Semester				III
20P1CAP02	Web Technologies Lab		Periods per Week		Credit	Maximum Marks	
			L	T P	C	CA	ESE Total
			4	0 0	2	40	60 100
COURSE OBJECTIVES	• Creating simple web pages, forms & CSS • Implement working with cookies and sessions in PHP • Connecting PHP and MySQL in real time applications						
	LIST OF PRACTICALS						
1	To create a simple web page for your department						
2	To create simple forms using HTML						
3	To create a simple web page using Cascading Style Sheets						
4	Implementation of cookies						
5	Implementation of session tracking						
6	Implementation of Students Feedbacks System using PHP and MySQL						
7	Implementation of online registration form using PHP and MySQL						
8	Implementation of Library Management System using PHP and MySQL						
9	Implementation of Banking Transaction System using PHP and MySQL						
10	Webpage Kit Counters using Session						
11	To create Simple Shopping Application						
12	Implementation of Airline Reservation System PHP and MySQL.						

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations		2020-21
Department	**M.C.A**		Semester				II
20P2CAP03	Advanced Java Programming Lab		Periods per Week		Credit	Maximum Marks	
			L	T P	C	CA	ESE Total
			4	0 0	2	40	60 100
COURSE OBJECTIVES	• Design & develop core java applications such as packages, multithreading, exception handling, applets & event handling • Design and develop network communications, JDBC & simple server side scripting programs using Servlets & JSP • Design and develop database connectivity and simple web applications						
	LIST OF PRACTICALS						
1	Write a Program to prepare student mark list for at least 5 students and print the same using classes and objects						
2	Write a Program to implement packages and interfaces						
3	Write a Program to implement multithreading						
4	Write a program to implement the concept of Exception Handling by creating user defined exceptions						
5	Write a To implement applets						
6	Write a Program to implement event handling						
7	Write a Program to implement Swing						
8	Write a Program to implement RMI						
9	Write a HTML to Servlet Applications						
10	Write a Create a simple servlet program to display cookie's information						
11	Develop an application to perform insert, update, retrieve and delete the record from the database in JDBC						
12	Designing online applications with JSP						

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations		2020-21
Department	**M.C.A**		Semester				I
20P2CAP04	Advanced Database Management System Lab		Periods per Week		Credit	Maximum Marks	
			L	T P	C	CA	ESE Total
			4	0 0	2	40	60 100
COURSE OBJECTIVES	• To know the basic commands in SQL • To understand the DML ,DDL Statements • To familiarize in the Data Schemes • To understand and program in PL/SQL						
	LIST OF PRACTICALS						
1	Basic SQL Queries i) DDL Statements ii) DML Statements						
2	Simple Queries using built in functions						
3	Simple Queries Using set operations						
4	Database Schema for a customer-sale scenario Customer (Cust id : integer, cust_name: string) Item (item_id: integer, item_name: string, price: integer) Sale (bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer) For the above schema, perform the following: a. Create the tables with the appropriate integrity constraints b. Insert around 10 records in each of the tables c. List all the bills for the current date with the customer names and item numbers. d. List the details of the customer who have bought a product which has a price>200						
5	Database Schema for a Student Library scenario Student(Stud_no : integer, Stud_name: string) Membership (Mem_no: integer, Stud_no: integer) Book (book_no: integer, book_name:string, author: string) Iss_rec(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer) For the above schema, perform the following: a. Create the tables with the appropriate integrity constraints b. Insert around 10 records in each of the tables c. List all the student names with their membership numbers						

	d. List all the issues for the current date with student and Book names e. List the details of students who borrowed book whose author is CJDATE
6	Database Schema for a Employee-pay scenario employee(emp_id : integer, emp_name: string) department(dept_id: integer, dept_name:string) paydetails(emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date) payroll(emp_id : integer, pay_date: date) For the above schema, perform the following: a. Create the tables with the appropriate integrity constraints b. Insert around 10 records in each of the tables c. List the employee details department wise d. List all the employee names who joined after particular date e. List the details of employees whose basic salary is between 10,000 and 20,000 f. List the details for an employee_id=5
7	Write a PL/SQL program to implement trigger
8	Write a PL/SQL program to implement cursor
9	Write a PL/SQL program to prepare student mark list
10	Write a PL/SQL program to prepare employee pay bill

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations		2020-21
Department	**M.C.A**		Semester				III
20P3CAP05	C# and .NET Programming Lab		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
			4	0	0	2	40	60	100
COURSE OBJECTIVES	• Create the console applications • Create window applications • Create web applications using ASP .NET								
	LIST OF PRACTICALS								
1	Write a program to accept any character from keyboard and display whether it is vowel or not								
2	Write a program to Accept a character from console and check the case of the character								
3	Write a program to handle the exception								
4	Create a DLL and use the function which has the DLL in another program								
5	Develop a menu based .Net application to implement a text editor with cut, copy, paste, save and close operations								
6	Develop a .Net application to perform timer based quiz of 10 questions								
7	Develop a window based .Net application using Datagrid to display records								
8	Create an online bookstore that includes all validation controls available in .NET								
9	Create a component that receives two numbers from the user through a Web Form, and based on the user's selection add or subtract the two numbers and returns the result to the Web Form. The result should be displayed in the Web Form using ASP.NET								
10	Develop an online train ticket reservation system using .NET with the provision of insert, modify, update and delete operations								

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations		2020-21
Department	**M.C.A**		Semester				III
20P3CAP06	Scripting Languages Lab		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
			4	0	0	2	40	60	100
COURSE OBJECTIVES	• Create the JavaScript for creating dynamic web pages • Develop the AngularJS code for simple applications • Create the VBScript for creating webpages						
	LIST OF PRACTICALS						
1	Write a JavaScript code for Loan Calculation						
2	Write a JavaScript code for design a simple calculator						
3	Implement Client Side Scripts for Validating Web Form Controls using JavaScript						
4	Write a JavaScript code for Designing Quiz Application						
5	Use AngularJS to prepare student mark sheet						
6	Use AngularJS to implement Banking System						
7	Use AngularJS to implement online purchase order form						
8	Write a VBScript program for implementing simple registration form						
9	Write a VBScript program for student marks sheet						
10	Write a VBScript program employee payroll system						

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations	2020-21	
Department	**M.C.A**		Semester			III	
20P2CAPR01	Miniproject		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
			2	0	0	1	40	60	100
COURSE OBJECTIVES	• To develop simple application projects • To understand the importance of documentation • To gather knowledge about various UML diagrams						
	LIST OF PRACTICALS						

FIRST REVIEW: **(10 Marks)**

1. Problem Identification
2. Problem definition
3. Presentation

SECOND REVIEW: **(10 Marks)**

1. Project Analysis
2. Design & Module description

FINAL REVIEW: **(20 Marks)**

1. DFD / ERD / System Flow Diagram (Whichever Applicable)
2. Coding and Implementation
3. Presentation
4. Final Project Report (with executable format including complete source code)

The Passing minimum shall be 50% out of 60 marks (30 Marks)

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations	2020-21	
Department	**M.C.A**		Semester			IV	
20P4CAPR02	Core Course Project – 2 Dissertation and Viva Voce		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
			0	0	0	18	50	150	200
COURSE OBJECTIVES	• To develop simple application projects • To understand the importance of documentation • To gather knowledge about various UML diagrams								
	LIST OF PRACTICALS								

FIRST REVIEW: **(10 Marks)**

1. Problem Identification
2. Problem definition
3. Presentation

SECOND REVIEW: **(10 Marks)**

3. Project Analysis
4. Design & Module description

FINAL REVIEW: **(30 Marks)**

5. DFD / ERD / System Flow Diagram (Whichever Applicable)
6. Coding and Implementation
7. Presentation
8. Final Project Report (with executable format including complete source code)

The Passing minimum shall be 50% out of 60 marks (30 Marks)

Signature of BOS Chairman