VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN

[AUTONOMOUS]

MCA-MASTER OF COMPUTER APPLICATIONS

(Candidates admitted from 2021-2022 onwards)

College Vision & Mission

Vision

- To evolve into a center of excellence in higher education through creative and innovative practices to social equity for women.

Mission

- To provide sufficient learning infrastructure to the students to pursue their studies.
- To provide good opportunity for higher education and conducive environment to the students to acquire education.
- To provide quality academic programs training activities and research facilities.
- To facilitate industry-institute interaction.

DEPARTMENT OF MCA

Vision

- To generate groomed, technically competent and skilled intellectual professionals specifically from the rural area to meet the current challenges of the modern computing industry.

Mission

- Enable the student's to solve software engineering problems independently.
- To prepare the students for the diverse work place of the Global Environment
- Empowering the youth in rural communities with computer education.
- Our efforts are to impart quality and value based education to raise satisfaction level of all stakeholders.

Programme Educational Objectives

PEO 1: To develop the ability to plan, analyze, design, code, test, implement and maintain the software product for real time systems.

PEO 2: To excel in problem solving and programming skills in computing fields of IT industries.

PEO 3: To practice effectively as individuals and as team members in multidisciplinary projects involving technical, managerial, economical and social constraints.

PEO 4: To prepare the students to pursue higher studies in computing and related fields and to work in the fields of teaching and research.

After completion of the program the Graduates will be able to

PO1: An ability to use current techniques, skills, and modern tools necessary for computing practice.

PO2: An ability to analyze a problem, and identify and formulate the computing requirements appropriate to its solution.

PO3: An ability to analyze the local and global impact of computing on individuals, organizations, and society.

PO4: An ability to analyze the local and global impact of computing on individuals, organizations, and society.

REGULATIONS

I. SCOPE OF THE PROGRAMME

Master of Computer Applications can be considered to be one of the most prominent PG level programs in our country. It is also one of the professional degree. This program mainly deals with the development of computer applications for the purpose of updating computer programming languages. It also aims at creating strong knowledge of theoretical Computer Applications subjects who can be employed in software development and testing units of industries. The course has a time period of 2 years with 4 semesters.

II. SALIENT FEATURES

- Regular conduct of guest lectures and seminars
- Campus recruitment
- Provides facilities such as Internet Access and In-House Library
- Provides Career Guidance for Post Graduate Courses like M.Sc, and the Certifications in programming languages
- Conduct of Personality Development Program
- Visiting Faculties from Industries

III. OBJECTIVES OF THE COURSE

The Course Objective of the program is to provide advanced and in-depth knowledge of computer applications to enable students pursue a professional career in Information and Communication Technology in related industry, business and research. The course designed to impact professional knowledge and practical skills to the students.

IV. ELIGIBILITY FOR ADMISSION

Candidates who have secured 55 % of marks or above in any one of the following or equivalent are eligible to apply.

- Bachelor's degree(under 10+2+3/4) in any subject with mathematics at +2 level

or

- Bachelor's degree(under 10+2+3/4 or 10+3 year Diploma + 3 year later entry BE) in any subject with Mathematics / Business Mathematics / Statistics as one of the subjects.

V. DURATION OF THE COURSE

- The course shall extend over a period of two academic years consisting of four semesters. Each academic year will be divided into two semesters. The First semester will consist of the period from July to November and the Second semester from December to March.
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women with the approval of Periyar University.
- Each subject will have four to six hours of lecture per week apart from practical training at the end of each semester.

VI ASSESSMENT

Assessment of the students would be made through Continuous Internal Assessment (CIA) and External Assessment (EA) for passing each subject both theory and practical papers.

A candidate would be permitted to appear for the External Examination only on earning 75 % of attendance and only when her conduct has been satisfactory. It shall be open to grant exemption to a candidate for valid reasons subject to conditions prescribed.

A. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously by the teacher concern and the Internal Assessment Marks will be as follows:

Distribution Of Continuous Assesment Marks (25/40)

Theory	Marks (25)	Practical	Marks (40)
Attendance	5	Attendance	10
CA Test I	2.5	Observation & Record	10
CA Test II	2.5	Model	20
Model	5		
Assignment	5		
Seminar	5		
Total	**25**		**40**

Distribution of attendance mark

S. No.	Percentage	Marks	
		Theory	Practical
1	76-80	1	2
2	81-85	2	4
3	86-90	3	6
4	91-95	4	8
5	96-100	5	10

A. EXTERNAL ASSESSMENT (EA)

The performance of the students would be assessed by examination at the end of each semester with a written test for theory for three hours and practical examination at the end of even semesters for six hours. Question papers would be set by the selected external examiners in the prescribed format and valuated by the external examiners with the help of the teacher concern.

The pattern of assessment is as follows:

Distribution Of Final Assesment Marks (75/60)

Section	Theory	Marks (75)	Practical	Marks (60)
A	One mark questions	20	Experiment I	25
B	Five marks (Either or)	25	Experiment II	25
C	Ten marks (any three)	30	Viva Voce	10
Total		**75**	**Total**	**60**

VII. PASSING MINIMUM

INTERNAL

There is no passing minimum for CIA

EXTERNAL

In the EA, the passing minimum shall be 50% out of 75 Marks. (38 Marks)

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the examination of Core Courses (main and allied subjects) and securing marks:

a) 75 % and above shall be declared to have passed the examination in first class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
b) 60% and above but below 75 % shall be declared to have passed the examinations in first class without Distinction.
c) 50%and above but below 60% shall be declared to have passed the examinations in second class.
d) All the remaining successful candidates shall be declared to have passed the examinations in third class.
e) Candidates who pass all the examinations prescribed for the course at the first appearance itself and within a period of three consecutive academic years from the year of admission only will be eligible for University rank.

IX. ELIGIBILITY FOR AWARD OF THE DEGREE

A candidate shall be eligible for the award of the degree only if she has undergone the above degree for a period of not less than three/two(lateral entry) academic years comprising of six/four(lateral entry) semesters and passed the examinations prescribed and fulfilled such conditions have been prescribed therefore.

X. PROCEDURE IN THE EVENT OF FAILURE

If a candidate fails in a particular subject, she may reappear for the examination in the concerned subject in subsequent semesters and shall pass the examination**.**

XI. COMMENCEMENT OF THESE REGULATIONS

These regulations shall take effect from the academic year 2020-21 (i.e.,) for the students who are to be admitted to the first year of the course during the academic year 2020-21 and thereafter.

XII. TRANSITORY PROVISIONS.

Candidates who have undergone the PG Course of study before 2021-22 shall be permitted to appear for the examinations under those regulations for a period of two years i.e., upto and inclusive of the examination of April/May 2022-2023. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

Supplementary examination will be conducted within a month. In case of failure she has to complete within 5 years. (2+5).

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)
DEPARTMENT OF MCA
MCA CURRICULUM
(For candidates admitted from 2021-2022 onwards)

SEM	COURSE CODE	TITLE	HOURS	CREDIT	MARKS		
					CIA	EE	TOTAL
I	21P1CA01	Core Course- 1 Advanced Java Programming	4	4	25	75	100
	21P1CA02	Core Course - 2 Web Application Development	4	4	25	75	100
	21P1CA03	Core Course- 3 Design and Analysis of Algorithms	4	4	25	75	100
	21P1CA04	Core Course- 4 Advanced Operating System	4	4	25	75	100
	21P1CAE_	Elective I -	4	4	25	75	100
	21P1CAP01	Core Course Practical - 1 Advanced Java Programming Lab	4	2	40	60	100
	21P1CAP02	Core Course Practical - 2 Web Application Development Lab	4	2	40	60	100
	21P1CAJ01	Advance Excel	2	2	25	75	100
		Total	**30**	**26**	**230**	**570**	**800**
II	21P2CA05	Core Course - 5 .Net Programming	4	4	25	75	100
	21P2CA06	Core Course - 6 Python Programming	4	4	25	75	100
	21P2CA07	Core Course - 7 Software Testing & Automation Tools	4	4	25	75	100
	21P3CA08	Core Course - 8 Android Application Development	4	4	25	75	100
	21P2CAE_	Elective II –	4	2	25	75	100
	21P2CAP03	Core Course Practical - 3 .Net Programming Lab	4	2	40	60	100
	21P2CAP04	Core Course Practical - 4 Python Programming Lab	4	2	40	60	100
	21P2CAPR01	Mini Project I	2	2	40	60	100
		Total	**30**	**24**	**245**	**555**	**800**
III	21P3CA09	Core Course - 9 AngularJS	4	4	25	75	100
	21P3CA10	Core Course - 10 Data Science	4	4	25	75	100
	21P3CAE-	Elective Course – III	4	4	25	75	100
	21P3CAE_	Elective IV-	4	4	25	75	100
		EDC - Resource Management Techniques	4	2			
	21P3CAP05	Core Course Practical - 5 AngularJS Lab	5	2	40	60	100
	21P3CAPR02	Mini Project II	5	2	40	60	100
		Human Rights	-	1	25	75	100
		Total	**30**	**25**	**230**	**570**	**800**
IV	21P4CAPR03	Project Dissertation & Viva Voce	-	18	50	150	200
		Total	**0**	**18**	**50**	**150**	**200**

		Grand Total	**90**	**91**	**755**	**1845**	**2600**

Elective : I

	Course Code	Title
Semester I	21P1CAE01	Digital Marketing
	21P1CAE02	Block Chain Technologies
	21P1CAE03	Business Intelligence
	21P1CAE04	Multimedia Technologies

Elective II

	Course Code	Title
Semester II	21P2CAE05	Cloud Computing
	21P2CAE06	Advanced Networks
	21P2CAE07	Cryptography and Network Security
	21P2CAE08	Cyber Security

Elective III

	Course Code	Title
Semester III	21P3CAE09	Soft Computing
	21P3CAE10	Big Data Analysis
	21P3CAE11	Internet of Things
	21P3CAE12	Pervasive Computing

Elective IV

	Course Code	Title
Semester III	21P3CAE13	Artificial Intelligence and Machine Learning
	21P3CAE14	Data Mining and Warehousing
	21P3CAE15	R Programming
	21P3CAE16	MongoDB

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Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CA01	ADVANCED JAVA PROGRAMMING	4	0	0	4	25	75	100

COURSE OBJECTIVES	To impart the knowledge of core Java,To introduce advanced java concepts, To learn about basic concepts web applications and To 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	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 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	

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	2
		PO 3	3
CO 2	3	PO 4	2
		PO 5	3
		PO 6	3
CO 3	2	PO 7	2
		PO 8	1
		PO 9	2
CO 4	3	PO 10	3
		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	3	2	3	2	2	1	2	3	2	3	2	2	3	3
CO2	2	2	3	2	3	3	2	1	2	3	2	3	1	2	2
CO3	3	3	2	3	2	2	1	2	3	2	3	2	2	3	3
CO4	2	2	3	2	3	3	2	1	2	3	2	3	1	2	2
CO5	2	2	3	2	3	3	2	1	2	3	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 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		
Unit - II	Exception Handling & AWT	Periods	
	Exception Handling: Fundamentals - Types - Using try and catch - Built in Exceptions - Throwing our own Exception. The Applet Class- Event Handling-Introducing the AWT: Working with Windows, Graphics and Text-Using AWT Controls, Layout Manager and Menus.		
	Networking,RMI & Swing	Periods	12
Unit - III	Networking: Networking Basics-Java and The Net-INetAddress Class-INetAddress Example-TCP/IP-DataGrams-A simple network communication using TCP/IP & UDP-A tour of SWING- Buliding GUI Application using SWING-RMI: An Overview of RMI-Building a Simple Client/Server Application using RMI		
Unit - IV	Servlets	Periods	12
	Servlets: 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 - V	JSP	Periods	12
	JSP: Introduction to JSP- 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-Database Access with JDBC-Overview of JDBC-JDBC Drivers-Connecting to a Database with DriverManager-The Statement Interface-Result Sets- Creating a Simple JSP Web Application.		
Total Periods			60

Text Books	
1	H. Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.(Unit I,UnitII,Unit III,IV)
3	Phil Hanna ,JSP 2.0: The Complete Reference, Tata McGraw Hilll Edition,2003 New Delhi,(Unit V)
References	
1	Uttam K Roy Advanced Java Programming, OxFord University Press, 2015
2	Mahesh P.Matha JSP and Servlets - A Comprehensive Study, Prentice Hall India Pvt Limited, 2013.
3	J.McGovern, R.Adatia,Y.Fain,2003,J2EE 1.4 Bible, Wiley-Dreamtech India Pvt.Ltd, New Delhi.
E-References	
1	www.w3schools.com
2	www.javatpoint.com
3	https://java-made-easy.com
4	www.geeksforgeeks.com
5	www.tutorialspoint.com

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CA02	WEB APPLICATION DEVELOPMENT	4	0	0	4	25	75	100

COURSE OBJECTIVES	Understanding the basic concepts of web design with HTML and Cascading Style Sheets, ïf˜ Exposure on developing websites for any domain using PHP & MySQL Server Technologies & Exposure on designing databases using MySQL Server Technology
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	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 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 stylesheets.
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	

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	2
		PO 3	2
CO 2	3	PO 4	3
		PO 5	3
		PO 6	2
CO 3	2	PO 7	1
		PO 8	2
		PO 9	2
CO 4	3	PO 10	3
		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	3	3	2	2	3	2	3	3	2	3	2	2	3	3
CO2	2	2	2	3	3	2	1	2	2	3	2	3	1	2	2
CO3	3	3	3	2	2	3	2	3	3	2	3	2	2	3	3
CO4	2	2	2	3	3	2	1	2	2	3	2	3	1	2	2
CO5	2	2	2	3	3	2	1	2	2	3	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	HTML Basics	Periods	12
	HTML Basics : 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
	Introducing PHP: Why PHP and MySQL-Server-Side Scripting Overview - Getting Started with PHP - Learning PHP Syntax and Variables- PHP Control Structures and Functions.		
Unit - III	Introducing PHP	Periods	12
	Introducing PHP: Learning Passing Information with PHP- Learning PHP String Handling - Learning Arrays- Learning PHP Number Handling		
Unit - IV	More PHP	Periods	12
	More PHP: Working with the File System -Working with Cookies and Sessions - Learning PHP Types. MySQL Database Integration: Introducing Databases and MySQL.		
Unit - V	Learning Database Administration and Design	Periods	12
	Learning Database Administration and Design - Integrating PHP and MySQL Performing Database Queries - Integrating Web Forms and Databases-MySQL Gotchas. Developing a Simple Web Application.		
	Total Periods		60

Text Books	
1	Microsoft Step by Step â€“ HTML and XHTML", Faithe Wempen. PHI, 2009. (Unit I).
2	Steve Suehring, Tim Converse, and Joyce Park, "PHP6 and MySQL Bible", Wiley Publishing, Inc., 2010. (Units II, III, IV & V)
References	
1	Steve PrettyMan Learn PHP7: Object Oriented Modular Programming using HTML5, CSS3, JavaScript, XML, JSON and MySQL,Apress,2016.
2	W. Jason Gilmore, "Beginning PHP and MySQL from Novice to Professional", Apress, 4th Edition, 2010
3	Luke Welling, Laura Thomson, "PHP and MySQLÂ® Web Development", Pearson Education, Inc., 4th Edition, 2009
E-References	
1	www.w3schools.com
2	www.webopedia.org
3	https://www.guru99.com/php_tutorials.html
4	www.geeksforgeeks.com
5	www.tutorialspoint.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CA03	DESIGN AND ANALYSIS OF ALGORITHMS	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 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	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	

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	2
		PO 5	3
		PO 6	3
CO 3	2	PO 7	2
		PO 8	3
		PO 9	2
CO 4	3	PO 10	1
		PO 11	1
		PO 12	1
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	2	1	2	3	2	2	2	2	2	3
CO2	2	3	2	2	3	3	2	3	2	1	1	1	3	1	2
CO3	3	2	3	3	2	2	1	2	3	2	2	2	2	2	3
CO4	2	3	2	2	3	3	2	3	2	1	1	1	3	1	2
CO5	3	2	3	3	2	2	1	2	3	2	2	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	Introduction	Periods	12
	Introduction - Notion of Algorithm - Fundamentals of Algorithmic Solving - Important Problem types - Fundamentals of the Analysis of Algorithm Efficiency - Analysis Framework - Asymptotic Notations - and Mathematical Analysis of Recursive and Non-Recursive Algorithms.		
Unit - II	Divide and conquer methodology	Periods	12
	Divide and conquer methodology - Merge Sort - Quick Sort - Binary search - Binary Tree Traversal - Multiplication of large integers- Strassenâ€™s matrix multiplication Greedy method - Primâ€™s algorithm - Kruskalâ€™s algorithm - Dijkstraâ€™s Algorithm.		
Unit - III	Transform and Conquer	Periods	12
	Transform and Conquer - Presorting - Balanced Search Tree - AVL Tree - Heaps and Heap Sort - Dynamic Programming - Computing a binomial coefficient - Warshallâ€™s and Floydâ€™s algorithm.		
Unit - IV	Backtracking	Periods	12
	Optimal binary - search tree - Knapsack problem - Backtracking - N-Queens problem - Hamiltonian circuit problem - subset sum problem		
Unit - V	Branch & Bound	Periods	12
	Branch and bound: Assignment problem - Knapsack problem - Traveling salesman problem.		
	Total Periods		60

Text Books	
1	Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Publications, 3rd Edition, 2012.
References	
1	Horowitz Ellis, Sartaj Sahni and Sanguthevar Rajasekaran, â€˜Fundamentals of Computer Algorithmsâ€™, Second Edition Reprint 2012.
2	Vijayalakshmi Pai G.A, "Data Structures and Algorithms: Concepts, Techniques and Applications", Tata Mc Graw Hill. , 2009.
E-References	
1	https://www.cs.usfca.edu/~galles/visualization/Algorithms.html
2	https://onlinecourses.nptel.ac.in/noc16_cs04/preview
3	https://www.coursera.org/learn/introduction-to-algorithms
4	www.w3schools.com
5	www.tutorialspoint.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CA04	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, 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	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	2
		PO 2	3
		PO 3	2
CO 2	3	PO 4	2
		PO 5	3
		PO 6	3
CO 3	2	PO 7	2
		PO 8	3
		PO 9	2
CO 4	3	PO 10	1
		PO 11	1
		PO 12	1
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	2	1	2	3	2	2	2	2	2	3
CO2	2	3	2	2	3	3	2	3	2	1	1	1	3	1	2
CO3	3	2	3	3	2	2	1	2	3	2	2	2	2	2	3
CO4	2	3	2	2	3	3	2	3	2	1	1	1	3	1	2
CO5	3	2	3	3	2	2	1	2	3	2	2	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	An Overview of Operating System and Its Structures	Periods	12
	An Overview of Operating System and Its Structures: 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 and Dead Locks: 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
	Memory Management : 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
	I/O And File Systems: 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	Distributed Operating Systems	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 Layer.		
Total Periods			60

Text Books	
1	Silberschatz and Galvin, Operating System Concepts, 6th Edition, John Wiley & Sons, (Asia) Pvt Ltd , Tenth Edition, 2018
2	Andrew S. Tanenbaum , Distributed Operating System, 4th Edition, Pearsons Ltd, 2002.
3	Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", 3rd edition, Oâ€™Reilly, 2005
References	
1	H.M.Deitel, An Introduction to Operating Systems, 2nd Edition, Pearson Education, 2002.
2	Ann Mclever McHoes, Understanding Operating Systems,Course Tecxhnology, Cengage Learning, 2011.
E-References	
1	https://technet.microsoft.com
2	www.webopedia.org
3	www.geeksforgeeks.com
4	www.w3schools.com
5	www.tutorialspoint.com

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CAJ01	ADVANCE EXCEL	4	0	0	4	25	75	100

COURSE OBJECTIVES	To emulate students to the current needs of data analysis and business intelligence fundamental applications through advance excel.
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 understand the basics of Excel
CO 2	To explore the working of Data
CO 3	To acquire knowledge in creating & working with various charts
CO 4	To analyze data using Histograms & Distribution statistics.
CO 5	To apply Data using Pivot Tables
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	2
CO 2	3	PO 4	2
		PO 5	3
		PO 6	2
CO 3	3	PO 7	2
		PO 8	2
		PO 9	1
CO 4	3	PO 10	1
		PO 11	2
		PO 12	1
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	3	1	3	2	2	3	2	2	2	3
CO2	2	3	2	2	3	2	2	2	1	1	2	1	3	1	2
CO3	2	3	2	2	3	2	2	2	1	1	2	1	3	1	2
CO4	2	3	2	2	3	2	2	2	1	1	2	1	3	1	2
CO5	3	2	3	3	2	3	1	3	2	2	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	Getting started With Excel	Periods	6
	Excel & Spreadsheets-Excel workbooks & worksheets-Printing from Excel-Saving your work-Excel Add-Ins.		
Unit - II	Working with Data	Periods	6
	Data Entry-Data Formats-Formulas and Functions-Cell Reference-Range Names-Sorting Data-Querying in Data-Importing Data from Files-Importing Data from databases.		
	Working with Charts	Periods	6
Unit - III	Introducing Excel charts-Introducing scatter plots-Editing a chart-Identifying data points-Creating bubble plots-Breaking a Scatter plot into categories-Plotting several variables.		
	Describing your data	Periods	6
Unit - IV	Variables and Descriptive Statistics-Frequency Tables-Working with Histograms-Working with Stem and Leafplots-Distribution statistics.		
	Tables	Periods	6
Unit - V	PivotTables-Two-way Tables-Computing Expected counts-Tables with Ordinal Variables.		
	Total Periods		30

Text Books	
1	Data Analysis with Microsoft Excel â€“Berk & Carey, Cengage Learning, Third Edition , 2010
References	
1	Microsoft Excel 2016 step by step â€“Curtis Fyre, Microsoft Press, 2015.
2	Microsoft Excel â€“Essential Hints & Tips-Diane Griffiths, 2015.
E-References	
1	www.techopedia.com
2	www.webopedia.org
3	www.geeksforgeeks.com
4	www.w3schools.com
5	www.tutorialspoint.com

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	MCA	Programme Code	PCA		Regulations		2020-21
Department	**M.C.A**		Semester				I
20P1CAP01	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 a student mark list using classes and objects						
2	Write a program to implement packages and interfaces						
3	Write a Program to prepare a student mark list using swing						
4	Write a Program to perform event handling in Swing						
5	Write a Program to implement RMI						
6	Write a HTML to Servlet Applications						
7	Write a Create a simple servlet program to display cookie's information						
8	Write a simple program to implement the concept of JDBC						
9	Write a program to implement the concept of JDBC & Swing						
10	Write a program for simple registration form in JSP						

	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
20P1CAP02	Web Application Development 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 Students Feedbacks System using PHP and MySQL						
6	Implementation of online registration form using PHP and MySQL						
7	Implementation of Library Management System using PHP and MySQL						
8	Implementation of Banking Transaction System using PHP and MySQL						
9	Webpage Kit Counters using Session tracking						
10	To create Simple Shopping Application						

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P2CA05	.NET PROGRAMMING	4	0	0	4	25	75	100

COURSE OBJECTIVES	To emulate students to the current needs of application development through various .net technologies
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
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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	Understand the fundamentals of VB.Net
CO 2	Recognize the various windows controls
CO 3	Apply the database concepts to the application using ADO.Net
CO 4	Implement and apply the ASP.Net for web application development
CO 5	Implement and apply ASP.Net with database
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	3
CO 2	3	PO 4	1
		PO 5	2
		PO 6	2
CO 3	2	PO 7	3
		PO 8	1
		PO 9	2
CO 4	2	PO 10	2
		PO 11	1
		PO 12	2
CO 5	3	PO 13	3
		PO 14	1
		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	3	2	2	3	3	2	3	2	2	3
CO2	2	1	3	1	2	2	1	1	2	2	1	2	3	1	2
CO3	3	2	2	2	3	3	2	2	3	3	2	3	2	2	3
CO4	3	2	2	2	3	3	2	2	3	3	2	3	2	2	3
CO5	2	1	3	1	2	2	1	1	2	2	1	2	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	Getting Started With VB.NET	Periods	12
	Getting Started With VB.NET: The Integrated Development Environment-IDE Components-Environment Options.Visual Basic: The Language Variables-Constants-Arrays - Variables as Objects-Flow Control Statements.Working with forms: The appearance of Forms-Loading and Showing Forms-Designing Menus.		
Unit - II	Basic Windows Controls	Periods	12
	Textbox Control- ListBox, CheckedListBox-Scrollbar and TrackBar Controls-More Windows Control-The common Dialog Controls-The Rich TextBox Control - Handling Strings, characters and Dates. The TreeView and ListView Controls: Examining the Advanced Controls.		
Unit - III	Databases	Periods	12
	The Multiple Document Interface-Databases: Architecture and Basic Concepts-Building Database Application with ADO.NET-Programming with ADO.NET.		
Unit - IV	ASP.NET	Periods	12
	Goal of ASP.NET -ASP.NET Web Server Control-Validation Server Controls-Themes and Skins -Content Page Holder,ASP.NET - Web Forms, MVC, Core.		
Unit - V	Data Binding in ASP.Net	Periods	12
	Data source Controls - Configuring data source control caching - storing connection information-Using Bound list controls with Data Source Controls - Other Data bound Controls-Data Management with ADO.Net and Working with databases.		
Total Periods			60

Text Books	
1	EvangelosPetroutsos, Mastering Visual Basic.Net, BPB Publications, New Delhi,2002.
2	Bill Evjen, Scott Hanselman, Devin Rader, Farhan Muhammad and S.Srinivasa Sivakumar (2006), Professional ASP.net 2.0, Special Edition
References	
1	Dave Mercer, ASP.Net Beginnerâ€™s Gudie (2003), 2nd Edition McGraw Hill, New Delhi.
2	Duncan Mackenzie Kent Sharkey (2006), Sams Teach yourself Visual Basic.JNet, 1stEdtion, McGraw Hill, NewDelhi
3	Shirish Chavan. (2007), Visual Basic.Net, 1st Edition, Pearson Education, New Delhi.
4	Beginning ASP.NET 2.0 in C# 2005: From Novice to Professional (Beginning: From Novice to Professional). Matthew MacDonald (Author) publication: APress 2005.
E-References	
1	www.microsoft.com/NET/
2	www.en.wikipedia.org/wiki/.net
3	www.w3schools.com
4	www.tutorialspoint.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P2CA06	PYTHON PROGRAMMING	4	0	0	4	25	75	100

COURSE OBJECTIVES	To emulate students to the current needs of application development through various .net technologies
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.
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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.
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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
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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 acquire knowledge about overview of Python
CO 2	Recognize the various concepts such as functions, modules & control statements
CO 3	Apply the concepts of Strings & Text files
CO 4	Implement and apply List & Dictionaries
CO 5	Design applications with Graphical User Interface.
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	3	PO 4	1
		PO 5	3
		PO 6	1
CO 3	2	PO 7	2
		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	1
		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	3	2	2	2	1	2	3	3	2	3	2	2	3
CO2	2	1	2	1	3	1	2	3	2	2	1	2	3	1	2
CO3	3	2	3	2	2	2	1	2	3	3	2	3	2	2	3
CO4	3	2	3	2	2	2	1	2	3	3	2	3	2	2	3
CO5	2	1	2	1	3	1	2	3	2	2	1	2	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	Python Overview, Data Types, Expressions	Periods	12
	Python programming - variable, Datatype, Keywords, Literals, Operator, Expression, type conversion, Comments, input and output, Strings, Assignment and Comments - Numeric Data Types and Character Sets, Expressions.		
Unit - II	Functions, Modules and Control Statements	Periods	12
	Functions and Modules- Calling Functions, The math Module, The Main Module, Program Format and Structure and Running a Script from a Terminal Command Prompt - Iteration - for loop - Selection - Boolean Type, Comparisons, and Boolean Expressions, if-else Statements, One-Way Selection Statements, Multi-way if Statements, Logical Operators and Compound Boolean Expressions, Short- Circuit Evaluation and Testing Selection Statements - Conditional Iteration - while loop.		
Unit - III	Strings and Text Files	Periods	12
	Strings-Accessing Characters and Substrings in Strings - Data Encryption - Strings and Number Systems and String Methods- Text Files-Text Files and Format - Writing Text to a File - Writing Numbers to a File - Reading Text from a File - Reading Numbers from a File and Accessing and Manipulating Files and Directories on Disk.		
Unit - IV	Lists and Dictionaries	Periods	12
	Lists- List Literals and Basic Operators, Replacing an Element in a List, List Methods for Inserting and Removing Elements, Searching and Sorting a List, Mutator Methods and the Value None, Aliasing and Side Effects, Equality and Tuples - Defining Simple Functions - Syntax, Parameters and Arguments, return Statement, Boolean Functions and main function, Dictionaries-Dictionary Literals - Adding Keys and Replacing Values - Accessing Values, Removing Keys and Traversing a Dictionary.		
	Design with Functions and Classes, Graphical User Interface	Periods	12
Unit - V	Design with Functions and Design with Classes - Functions as Abstraction Mechanisms- Design with Recursive Functions and Managing a Programâ€™s Namespace - Data Modeling and Structuring Classes with Inheritance and Polymorphism - Behavior of terminal based programs and GUI based programs- Coding simple GUI based programs- Other useful GUI resources- Case Study: GUI based ATM.		
	Total Periods		60

Text Books	
1	Kenneth A. Lambert, Martin Osborne, "Fundamentals of Python: First Programs, Cengage Learning", second edition, 2018.
2	Paul Barry, "Head First Python 2e", Oâ€²Reilly, 2nd Revised edition, 2016
References	
1	Michal Jaworski, TarekZiade, "Expert Python Programming ", Packt Publishing, Second Revised edition, 2016.
2	Sam Washington, Dr. M. O. FaruqueSarker, "Learning Python Network Programming", Packt Publishing Limited, 2015.
3	Rick van Hattem, "Mastering Python", Packt Publishing, Second Edition, 2016
E-References	
1	www.python.org/about/gettingstarted/
2	www.realpython.com/python-beginner-tips/

3	www.w3schools.com
4	www.tutorialspoint.com/python/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		**2021-2022**
Department	**M.C.A**		Semester					**2**
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21P2CA07	SOFTWARE TESTING & AUTOMATION TOOLS		4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about software testing core concepts and understand the various software testing tools especially automation testing tools
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	Identify the Models in Software Life Cycle
CO 2	Clarify the Testing Methods
CO 3	Understand the concepts of System, Acceptance, Performance testing and its Practices
CO 4	Acquire knowledge about testing tools
CO 5	Learn about software testing automation tools
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	1	PO 4	3
		PO 5	2
		PO 6	3
CO 3	2	PO 7	2
		PO 8	3
		PO 9	2
CO 4	3	PO 10	2
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	2	3	2	1	2	3	3	2	3	2	2	3
CO2	2	3	2	1	2	1	2	1	2	2	3	2	1	3	2
CO3	3	2	3	2	3	2	1	2	3	3	2	3	2	2	3
CO4	2	1	2	3	2	3	2	3	2	2	1	2	3	1	2
CO5	3	2	3	2	3	2	1	2	3	3	2	3	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 Development Lifecycle Models	Periods	12
	Phases of Software Project - Life Cycle Models -Testing Concepts, Issues, and Techniques: Purposes, Activities, Processes, and Context -Questions about Testing - Functional vs. Structural Testing-Coverage Based vs. Usage Based Testing - Test Activities, Management, and Automation: Test Planning and Preparation - Test Execution, Result Checking, and Measurement - Analysis and Follow up-Activities, People, and Management - Test Automation		
Unit - II	White Box Testing	Periods	12
	Meaning - Static Testing - Structural Testing - Challenges - Black Box Testing: Meaning - When & How to do Black Box Testing - Integration Testing: Meaning -Integration Testing as type of Testing - As a Phase of Testing - Scenario Testing - Defect Bash		
Unit - III	System and Acceptance Testing	Periods	12
	Overview - Functional vs. Non-Functional Testing - Functional System Testing - Non-Functional Testing - Acceptance Testing - Summary of Testing Phases - Performance Testing: Introduction - Factors Governing Performance Testing - Methodology - Tools - Process - Regression Testing: Meaning - Types - When & How to do Regression - Testing - Best Practices		
Unit - IV	Software Testing Tools	Periods	12
	A Classification Scheme Scripting Tools -CppTest -SilkTest- Record-and-Replay Tools -TestComplete -Selenium IDE -Performance-Testing Tools -LoadRunner - Grinder -QF-Test - Appvance PerformanceCloud - JMeter .		
Unit - V	INTRODUCTION TO AUTOMATION TESTINGâ€“ SELENIUM	Periods	12
	Software TestAutomation: Fundamentals of Test Automation, Manual Testing Vs TestAutomation. Introduction to Selenium, Installation and configuration of Eclipse,Java and Selenium Learning, Introduction to Webdriver, How to run tests in IE,Firefox and Google Chrome. Introduction to Locators and object finding:Importance of Locator Identifiers in Selenium, Identifying locators(ID, Name,ClassName, LinkText). Overview of other automation Tools.		
Total Periods			60

Text Books	
1	Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing Principles and Practices, Pearson Education, 2007
2	Software testing Concepts and Operations â€“ Ali Mili & Fairouz Tchier , Wiley Publications, 2015.
References	
1	Software Test Automation Effective use of test execution tools- Mark Fewster & Dorathy Graham , Addision â€“Welsky Publication,
2	Software Testing â€“ A CraftManâ€™s Approach â€“ Paul C. Jorenson, CRC Press, Fourth Edition, 2014
E-References	
1	https://www.javatpoint.com/software-testing-tutorial
2	https://www.softwaretestingmaterial.com/software-testing/
3	https://www.softwaretestinghelp.com
4	https://www.testingxperts.com/blog/software-testing-tools-lis
5	https://www.selenium.dev/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P2CA08	ANDRIOD APPLICATION DEVELOPMENT	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about various concepts of android application development
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 acquire knowledge about basics of android programming
CO 2	Recognize Activities ,Fragments and Intents
CO 3	Understand Designing User Interface with Views
CO 4	Implement Data Persistence
CO 5	Gain knowledge about Location Based Services
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	1	PO 4	3
		PO 5	2
		PO 6	3
CO 3	2	PO 7	2
		PO 8	3
		PO 9	2
CO 4	3	PO 10	2
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	2	3	2	1	2	3	3	2	3	2	2	3
CO2	2	3	2	1	2	1	2	1	2	2	3	2	1	3	2
CO3	3	2	3	2	3	2	1	2	3	3	2	3	2	2	3
CO4	2	1	2	3	2	3	2	3	2	2	1	2	3	1	2
CO5	3	2	3	2	3	2	1	2	3	3	2	3	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	Getting Started With Android Programming	Periods	12
	What is Android? Obtaining the Required Tools - Launching your first Android Application - Using Android Studio for Android Development - Exploring the IDE - Using Code Completion - Debugging your Application - Publishing your Application.		
Unit - II	Activities ,Fragments and Intents	Periods	12
	Understanding Activities -Linking Activities using Intents - Fragments - Displaying Notification -Getting to know Android Users Interface : Understanding the Components of a Screen - Managing Changes to screen orientation - Creating user Interface Programmatically - Listening for UI Notification.		
Unit - III	Designing User Interface with Views	Periods	12
	Using Basic Views - Using Picker View - Using List View - Displaying Picture and Menus with Views Using Image View to Display Picture -Using Menus with Views - Using Web View.		
Unit - IV	Data Persistence	Periods	12
	Saving and Loading user Preference -Persisting Data to files -Creating and Using Databases - Messaging: SMS - Messaging -Sending Email.		
Unit - V	Location Based Services	Periods	12
	Displaying Maps - Getting Location Data - Monitoring a Location -Developing Android Services -Creating your own Services.		
Total Periods			60

Text Books	
1	Beginning Android Programming with Android Studio â€“ J.F.DiMarzio, Wrox , 2017
References	
1	Introduction to Android Application Development â€“ Developerâ€™s Library, Joseph Annuzi, Jr. Lauren Darcy & Shane Conder, Addision-Wesley, Fourth Edition
2	Prasanna Kumar Dixit, "Android", Vikas Publishing House Private Ltd., Noida, 2014.
3	Head First Android Development A Brain Friendly Guide â€“ Dawn Griffiths & David Griffiths, Oâ€™Rielly Publications, Second Edition
E-References	
1	https://developer.android.com/guide
2	https://www.tutorialspoint.com/android/index.htm
3	https://www.udemy.com/course/learn-android-application-development-y/
4	https://www.javatpoint.com/android-tutorial

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	.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	• Design & develop .net basic programs • Design and develop web services using VB.Net • Design and develop database connectivity and simple web applications using ASP.Net						
	LIST OF PRACTICALS						
1	Write a Program to perform various string manipulation functions						
2	Using windows application form, create a form, place controls and manipulate data						
3	Write a program to create inventory control using class library						
4	Write a program to create Web Services Using VB.Net.						
5	Write a program to create a screen saver using controls						
6	Create an ActiveX program with simple example.						
7	Using windows Application: Design Employee Details, use SQL Server as back end and also use checked list box.						
8	Write a program to create an on-line quiz using content page holder						
9	Write a program to retrieve Cookies information.						
10	Write a program for database connectivity to retrieve student information						

	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
20P1CAP04	Python 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 basic programs in Python • Design and develop Synchronization, GUI Programs • Design and develop classes and objects and simple applications in Python						
	LIST OF PRACTICALS						
1	Write a python program using Control statements						
2	Write a python program using Functions and String Operations						
3	Write a python program using List, Tuples and List comprehensions						
4	Write a python program using Inheritance						
5	Write a python program using Synchronization						
6	Write a python program using Text Files						
7	Write a python program using Graphical user Interfaces						
8	Write a python program using Exceptional Handling						
9	Write a python program using Classes and Objects						
10	Write a python program using Chat Applications						

	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 I		Periods per Week		Credit	Maximum Marks	
			L	T P	C	CA	ESE Total
			5	0 0	2	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. Project Title & Abstract
4. Presentation

SECOND REVIEW: **(10 Marks)**

1. Project Analysis
2. Design & Module description

THIRD REVIEW: **(10 Marks)**

1. Database & Code Design
2. System Testing & Implementation
3. DFD / Use Case Diagram/ System Flow Diagram (Whichever Applicable)

FINAL REVIEW: **(10 Marks)**

1. Documentation
2. Presentation
3. Final Project Report (with executable format including complete source code)

External Marks 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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CA09	ANGULARJS	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about various concepts of AngularJS
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 acquire knowledge about Javascript and Angular JS
CO 2	To Learn about MVC
CO 3	Understand Directives and HTML Forms
CO 4	Recognize about services
CO 5	Gain knowledge about AngularJS animation
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	1
CO 2	1	PO 4	2
		PO 5	3
		PO 6	1
CO 3	3	PO 7	2
		PO 8	3
		PO 9	2
CO 4	2	PO 10	2
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	2	2	1	2	3	3	2	3	2	2	3
CO2	2	3	3	2	1	3	2	1	2	2	3	2	1	3	2
CO3	2	1	1	2	3	1	2	3	2	2	1	2	3	1	2
CO4	3	2	2	3	2	2	1	2	3	3	2	3	2	2	3
CO5	3	2	2	3	2	2	1	2	3	3	2	3	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	Introduction	Periods	12
	JavaScript Introduction, The Basics of AngularJS Framework?, Downloading and Installing AngularJS, Browser pplication, Declarative vs. Procedural Programming, Directives and Expressions Directive?, What Are Expressions ? JavaScript Primer - Including Scripts on a Page, Statements, Functions, Parameters and Return Values, Types and Variables, Primitive Types and Null, JavaScript Operators, Equality vs. Identity, Pre Objects - Creating Objects, Reading and Modifying an Objects Properties, Adding M Objects, Enumerating PropertiesArrays - Array Literals, Enumerating and Modifying Array Values, Callbacks, JSON		
Unit - II	Introduction to MVC	Periods	12
	Design Patterns, Model View Controller Separation of Concerns, Why MVC Matters, MVC the AngularJS Way Introduction to Filters, Built-in Filters, The Number Filter AngularJS Modules - What Is a Module?		
Unit - III	Directives	Periods	12
	Directives - The Basics of Directives, Using Directives, Built ngInclude, ngShow and ngHide, ngRepeat, Event Documentation, Creating a Custom Directive link Option, Build Angular Forms, Controllers and Directives, filters, and scopes-time and run-time errors-Working with Forms - HTML Forms Overview, The form Element submit, text, checkbox, password, radio Element, Model Binding, AngularJS Forms, Validating Forms.		
Unit - IV	Server Communication	Periods	12
	Services and Server Communication Service, The $document Service, Why Use Services?Communication, Handling Returned Data Organizing Views - Installing the ngRoute Module, Using URL Routes Parameters, Eager vs. Conservative Routes, Route Configuration Options		
Unit - V	AngularJS Animation	Periods	12
	AngularJS Animation - Installing the Transforms, Transitions, Applying AnimationsTesting, Error Handling, Hide Unprocessed Templates, Minification and Bundling, Managinthe Build Process, Deployment		
Total Periods			60

Text Books	
1	AngularJS Essentials- Rodrigo Branas, Packt Publishing Ltd Open Source, 2010
References	
1	Learn AngularJS Learn in 24 Hours â€“ Alex Nordeen, 2020.
E-References	
1	https://www.tutorialspoint.com
2	https://www.javatpoint.com
3	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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CA10	DATA SCIENCE	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn and understand about the various concepts of data science
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 acquire knowledge about the basics of data science
CO 2	Recognize The data science process
CO 3	Learn about the fundamental components
CO 4	Implement Extracting Information
CO 5	To gain knowledge about Network Theory
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	1
CO 2	1	PO 4	2
		PO 5	3
		PO 6	1
CO 3	3	PO 7	2
		PO 8	3
		PO 9	2
CO 4	2	PO 10	2
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	2	2	1	2	3	3	2	3	2	2	3
CO2	2	3	3	2	1	3	2	1	2	2	3	2	1	3	2
CO3	2	1	1	2	3	1	2	3	2	2	1	2	3	1	2
CO4	3	2	2	3	2	2	1	2	3	3	2	3	2	2	3
CO5	3	2	2	3	2	2	1	2	3	3	2	3	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	Introduction	Periods	12
	Data science in a big data world- Benefits and uses of data science and big data-Facets of data - Structured data- Unstructured data-Natural language-Machine-generated data-Graph-based or network data-Audio, image, and video Streaming data.		
Unit - II	The data science process	Periods	12
	Setting the research goal -Retrieving data -Data preparation -Data exploration -Data modeling or model building -Presentation and automation - Cleansing, integrating, and transforming data - Exploratory data analysis.		
Unit - III	The Very Beginning: Got Math?	Periods	12
	Exponentials, Logarithms, and Compounding- Normal Distribution -Poisson Distribution - Moments of a continuous random variable - Combining random variables - Vector Algebra - Statistical Regression - Diversification - Matrix Calculus - Matrix Equations.		
	Extracting Information	Periods	12
Unit - IV	Framework - Algorithms - Extracting Data from Web Sources using APIs - Text Classification		
	Network Theory	Periods	12
Unit - V	Overview-Graph Theory -Features of Graphs -Searching Graphs - Strongly Connected Components- Dijkstraâ€™s Shortest Path Algorithm - Degree Distribution - Network Models of Systemic Risk		
	Total Periods		60

Text Books	
1	Davy Cielen, Arno D.B. Meysman, Mohamed Ali, "Introducing Data Science", Manning Publications, 2016
2	Sanjiv Ranjan Das, "Data Science: Theories, Models, Algorithms and Analytics", 2016.
References	
1	Avrim Blum, John Hopcroft, and Ravindran Kannan, "Foundations of Data Science", 2018
2	Joel Grus, "Data Science from Scratch", Oâ€™Reilly, 2015
E-References	
1	https://www.tutorialspoint.com
2	https://www.javatpoint.com
3	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	2021-22	
Department	**M.C.A**		Semester			II	
20P3CAP05	AngularJS 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 Simple AngularJS Programs • Design and develop simple applications like calculator, To Do List • Design and develop programs with validation						
	LIST OF PRACTICALS						
1	Write a simple program using AngularJS modules and controllers						
2	Create a page using AngularJS that will add two numbers						
3	Write a program to perform arithmetic operations using AngularJS expressions						
4	Create an automatic counter using AngularJS						
5	Create a simple calculator in AngularJS						
6	Implement TODO list using AngularJS						
7	Create a simple pages or tabs using AngularJS						
8	Create a Student Information form with submit and reset functionality						
9	Implement Client side validation in AngularJS						
10	Implement simple routing in AngularJS application						

	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	
20P3CAPR02	Miniproject II		Periods per Week		Credit	Maximum Marks	
			L	T P	C	CA	ESE Total
			5	0 0	2	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. Project Title & Abstract
4. Presentation

SECOND REVIEW: **(10 Marks)**

1. Project Analysis
2. Design & Module description

THIRD REVIEW: **(10 Marks)**

1. Database & Code Design
2. System Testing & Implementation
3. DFD / Use Case Diagram/ System Flow Diagram (Whichever Applicable)

FINAL REVIEW: **(10 Marks)**

1. Documentation
2. Presentation
3. Final Project Report (with executable format including complete source code)

External Marks 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	
20P4CAPR03	Core Course Project – 3 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. Project Title & Abstract
4. Presentation

SECOND REVIEW: **(10 Marks)**

1. Project Analysis
2. Design & Module description

THIRD REVIEW: **(10 Marks)**

1. Database & Code Design
2. System Testing & Implementation
3. DFD / Use Case Diagram/ System Flow Diagram (Whichever Applicable)

FINAL REVIEW: **(20 Marks)**

1. Documentation
2. Presentation
3. Final Project Report (with executable format including complete source code)

External Marks The Passing minimum shall be 50% out of 150 marks (75 Marks)

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CAE01	DIGITAL MARKETING	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about concepts and strategies of various social media marketing.
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 acquire knowledge Marketing in the Digital World
CO 2	Recognize Operational Digital Marketing
CO 3	To gain knowledge about ecommerce applications
CO 4	Implement Advertising Online
CO 5	Understand Marketing on Social Media
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	1	PO 4	2
		PO 5	3
		PO 6	2
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	3
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	3	2	2	3	2	2	3	2	2	3
CO2	2	3	2	2	1	2	1	1	2	1	3	2	1	3	2
CO3	2	1	2	2	3	2	1	3	2	3	1	2	3	1	2
CO4	3	2	3	3	2	3	2	2	3	2	2	3	2	2	3
CO5	3	2	3	3	2	3	2	2	3	2	2	3	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	Marketing in the Digital World	Periods	12
	Introduction-Digital Transformation-Programmatic Marketing-Artificial Intelligence. Digital Customers:Introduction-Online Buying Behaviour-Privacy. Marketing goes Digital: Personalization-Viral Marketing-Content Marketing-Influencers-Affiliate Marketing-Startegic Digital Marketing-Digital Marketing Objectives.		
Unit - II	Search Engine Optimization	Periods	12
	Introduction-How search engine works-Keyword selection-Onsite optimization-Off-site optimization-Strategic Search Engine Optimization-Third party search Engine Ranking. Website Development: The Basics-Content Development -B2B Website-The Global Web Presence.		
Unit - III	E-Commerce	Periods	12
	Introduction-Multichannel retailing-Fulfillment-Comparison shopping engines, e-market places, third-party shopping websites-Third party websites.		
Unit - IV	Advertising Online	Periods	12
	Introduction-Programmatic advertising-Objectives and management-online and formats-search advertising-network advertising-Landing pages. Email Marketing: Email is a direct medium for marketing-Email is a direct medium for marketing messages-Email newsletters.		
Unit - V	Marketing on Social Media	Periods	12
	Introduction-Blogging-Consumer Reviews and Rating-Social Networking-Social Sharing-Social Media Service and Support-Strategic Marketing on social media-Measure and Monitor. Metrics and Analytics: Introduction-How analytics presented and used.		
	Total Periods		60

Text Books	
1	Digital Marketing â€“ A Practical Approach , Alan Charlesworth, Third Edition,2018
References	
1	Understanding Digital Marketing Marketing strategies for engaging the digital generation-Damian Ryan & Calvin Jones, 2009
2	Digital Marketing Strategy,Implementation & Practices-Dave Chaffey & Fiona Ellis-Chadwick, Pearson Edition, 2016.
E-References	
1	https://www.tutorialspoint.com
2	https://www.javatpoint.com
3	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	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CAE02	BLOCK CHAIN TECHNOLOGIES	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about the various concepts of block chain technologies and understand the cryptocurrency
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 acquire knowledge introduction to cryptography and cryptocurrencies
CO 2	Recognize Bit coin Achieves Decentralization
CO 3	Apply Mechanics of Bit coin
CO 4	Understand How to Store and Use Bit coins
CO 5	To Learn about Community, Politics, and Regulation
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	1	PO 4	3
		PO 5	2
		PO 6	3
CO 3	2	PO 7	1
		PO 8	2
		PO 9	1
CO 4	3	PO 10	3
		PO 11	2
		PO 12	2
CO 5	2	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	3	2	3	2	2	3	2	2	3	3	2	3	3
CO2	2	3	2	1	2	1	1	2	3	1	2	2	1	2	2
CO3	3	2	3	2	3	2	2	3	2	2	3	3	2	3	3
CO4	2	1	2	3	2	3	1	2	1	3	2	2	3	2	2
CO5	3	2	3	2	3	2	2	3	2	2	3	3	2	3	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 Cryptography & Crypto currencies	Periods	12
	Cryptographic Hash Functions- Hash Pointers and Data Structures - Digital Signatures - Public Keys as Identities -A Simple Crypto currency.		
	How Bit coin Achieves Decentralization	Periods	12
Unit - II	Centralization vs. Decentralization Distributed consensus - Consensus without identity using a block chain-Incentives and proof of work.		
	Mechanics of Bit coin	Periods	12
Unit - III	Bit coin transactions - Bit coin Scripts - Applications of Bitcoin scripts - Bit coin blocks -The Bit coin network-Limitations and improvements.		
	How to Store and Use Bit coins	Periods	12
Unit - IV	Simple Local Storage - Hot and Cold Storage -Splitting and Sharing Keys - Online Wallets and Exchanges - Payment Services -Transaction Fees - Currency Exchange Markets.		
	Community, Politics, and Regulation	Periods	12
Unit - V	Consensus in Bit coin - Bitcoin Core Software - Stakeholders: Whos in Charge? - Roots of Bitcoin - Governments Notice Bitcoin - Anti Moneyâ€•Laundering - Regulation - New Yorks Bit License Proposal.		
	Total Periods		60

Text Books	
1	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
References	
1	PEDRO FRANCO, Understanding Bitcoin - Cryptography, engineering, and economics, First Edition, John Wiley & Sons Ltd, United Kingdom, 2015.
2	Tiana Laurence, Blockchain For Dummies, John Wiley & Sons, Inc., Hoboken, New Jersey, 2017
3	BikramadityaSinghal, GautamDhameja, PriyansuSekhar Panda, Beginning Blockchain-A Beginners Guide to Building Blockchain Solutions, Apress Media, LLC, New York, 2018
E-References	
1	https://www.edureka.co/blog/blockchain-tutorial/
2	https://blockgeeks.com/guides/what-is-blockchain-technology/
3	https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CAE03	BUSINESS INTELLIGENCE	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about the various concepts of business intelligence such as project planning, data extraction, transformation, enterprise reporting etc.
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
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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	1	PO 4	2
		PO 5	3
		PO 6	2
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	3
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	3	2	2	3	2	2	3	2	2	3
CO2	2	3	2	2	1	2	1	1	2	1	3	2	1	3	2
CO3	2	1	2	2	3	2	1	3	2	3	1	2	3	1	2
CO4	3	2	3	3	2	3	2	2	3	2	2	3	2	2	3
CO5	3	2	3	3	2	3	2	2	3	2	2	3	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	INTRODUCTION TO BUSINESS INTELLIGENCE	Periods	12
	Business Intelligence Definition- BI Decision Support Initiatives- Development Approaches: Traditional Development Approach, Cross Organizational Development Approach - ngineering 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- Deliverables		
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 DEVELOPMEN	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 ActivitiesETL Development: Source Data Transformation - Reconciliation- Peer Reviews- ETL Testing- Formal Test Plan ETL Development Activitie		
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://www.tutorialspoint.com
2	https://www.javatpoint.com
3	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	**2021-2022**
Department	**M.C.A**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CAE04	MULTIMEDIA TECHNOLOGIES	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn about various multimedia technologies
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 acquire knowledge Digital Multimedia
CO 2	Recognize Mobile Multimedia Communications
CO 3	Learn about Third Generation (3G) Cellular Mobile Networks
CO 4	Gain knowledge in Discovering Multimedia Services and Contents in Mobile Environments
CO 5	Analyze Current Status of Mobile Wireless Technology and Digital Multimedia Broadcasting
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	1	PO 4	2
		PO 5	3
		PO 6	2
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	3
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	3	2	2	3	2	2	3	2	2	3
CO2	2	3	2	2	1	2	1	1	2	1	3	2	1	3	2
CO3	2	1	2	2	3	2	1	3	2	3	1	2	3	1	2
CO4	3	2	3	3	2	3	2	2	3	2	2	3	2	2	3
CO5	3	2	3	3	2	3	2	2	3	2	2	3	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	Digital Multimedia	Periods	12
	Indexing and retrieval of Multimedia - Delivery of Multimedia - Streaming Multimedia - Archiving of Multimedia. Multimedia Instruction: Multimedia Instruction Design Method - conduct task analysis - Conduct Information analysis - Select Media - Media Selection Guidelines -Design the Presentation - Future trends.		
Unit - II	Introduction to Mobile Multimedia Communications	Periods	12
	Generations of Mobile Multimedia Networks- First Generation (1G) Cellular Mobile Networks-AMPS-TACS-NMT- Second Generation (2G) Cellular Mobile networks-GSM-DAMPS-PDC		
Unit - III	3G Networks	Periods	12
	Third Generation (3G) Cellular Mobile Networks- HCS- Global Roaming-Radio Spectrum- FMC- Sales Force Automation-VoIP Mobile-Mobile TV-Video Calling- Fourth Generation (4G) Cellular Mobile Networks-Key Challenges of Mobile Terminals-Key Challenges of a Network System-Key Challenges of Mobile Services		
Unit - IV	Discovering Multimedia Services and Contents in Mobile Environments	Periods	12
	Discovering Mobile Multimedia Services and Contents in Infrastructure Based Environments - Centralized Service Directory Model- SLP- JINI- INS- Distributed Service Directories Model - other Issues in service discovery- Asynchronous Service Discovery- Semantic Service Discovery- Discovering Multimedia Services and Contents in Ad Hoc Environments- Broadcast-based approaches - Geographic Service Location approaches - Cluster based Solutions - Scalability Issue in Service Location.		
Unit - V	Current Status of Mobile Wireless Technology and Digital Multimedia Broadcasting	Periods	12
	Wireless Mobile Technologies: Current Status and Concepts- Digital Multimedia Broadcasting: Current Status And Concepts		
Total Periods			60

Text Books	
1	Syed Mahbubur Rahman, "Multimedia Technologies: Concepts, Methodologies, Tools, and Applications", Vol.1, IGI Global-InformatIon ScIence 2008
References	
1	Ze-Nian Li and Mark S. Drew, "Fundamentals of Multimedia", Pearson Education International 2004
2	Margherita Pagani, "Encyclopedia of Multimedia Technology and Networking", Second Edition, Information Science reference, 2009.
E-References	
1	https://www.tutorialspoint.com
2	https://www.javatpoint.com
3	www.w3schools.com

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P2CAE05	Cloud Computing	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

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**		Regulations		**2021-2022**
Department	**M.C.A**		Semester				**2**
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
21P2CAE06	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

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P2CAE07	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

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Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P2CAE08	CYBER SECURITY	4	0	0	4	25	75	100

COURSE OBJECTIVES	To learn and understand about Cyber Security core concepts
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 acquire knowledge Cyber security Fundamentals
CO 2	Recognize Attackers Techniques and Motivations
CO 3	Apply Malicious Code
CO 4	Implement Malicious Code
CO 5	To gain knowledge about Defense and Analysis 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	1	PO 4	2
		PO 5	3
		PO 6	2
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	3
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	3	2	2	3	2	2	3	2	2	3
CO2	2	3	2	2	1	2	1	1	2	1	3	2	1	3	2
CO3	2	1	2	2	3	2	1	3	2	3	1	2	3	1	2
CO4	3	2	3	3	2	3	2	2	3	2	2	3	2	2	3
CO5	3	2	3	3	2	3	2	2	3	2	2	3	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	Cyber security Fundamentals	Periods	12
	Networks and Security Concepts - Basic Cryptography -Symmetric Encryption - Public key Encryption - The Domain Name System(DNS) - Firewalls- Virtualization -Radio -Frequency Identification - Microsoft Windows Security Principals - Windows Tokens - Window Messaging - Windows Firewalls.		
Unit - II	Attackers Techniques and Motivations	Periods	12
	How Attackers cover their Tracks - Tunneling Techniques - Fraud Techniques - Thread Infrastructure		
Unit - III	Malicious Code	Periods	12
	Self - Replication Malicious Code - Evading and Eliminating Privilege - Root kits -Spywares		
Unit - IV	Malicious Code	Periods	12
	Token Kidnapping - Virtual Machine Detection - Stealing Information and Exploitation.		
Unit - V	Defense and Analysis Techniques	Periods	12
	Memory Forensics -Honey pots - Malicious Coding Name - Automated Malicious Code Analysis System - Intrusion Detection System.		
	Total Periods		60

Text Books	
1	Cyber Security Essentials ,James Araham ,Richard Haward , Ryan dson â€“ CRC Press 2011
References	
1	Rick Howard, "Cyber Security Essentials", Auerbach Publications, 2011.
2	Richard A, Clarke, Robert Knake, "Cyber war: The Next Threat to National Security & What to Do About It", Ecco, 2010
3	Dan Shoemaker, "Cyber security The Essential Body Of Knowledge", First Edition, Cengage Learning, 2011.
E-References	
1	https://digitalguardian.com/blog/what-cyber-security
2	https://www.edureka.co/blog/cybersecurity-fundamentals-introduction-to-cybersecurity/
3	https://www.jigsawacademy.com/blogs/cyber-security/cyber-security-basics/
4	. https://www.udemy.com/course/certified-secure-netizen/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE09	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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE10	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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE11	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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE12	PERVASIVE COMPUTING	4	0	0	4	25	75	100

COURSE OBJECTIVES	Students gain the skills to exploit the capabilities of information security and Understand with modern security technologies such as firewalls, VPNs, intrusion detection 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, 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	Explain the various principles and services.
CO 2	Illustrate the various protocols and its functions
CO 3	Describe the various technologies of past and present in pervasive
CO 4	Describe the various technologies of past and present in pervasive computing
CO 5	Discuss the various applications based on pervasive computing
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	1	PO 4	2
		PO 5	3
		PO 6	2
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	3
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	3	2	2	3	2	2	3	2	2	3
CO2	2	3	2	2	1	2	1	1	2	1	3	2	1	3	2
CO3	2	1	2	2	3	2	1	3	2	3	1	2	3	1	2
CO4	3	2	3	3	2	3	2	2	3	2	2	3	2	2	3
CO5	3	2	3	3	2	3	2	2	3	2	2	3	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	Principle and Services	Periods	12
	Pervasive Computing- Principles, Characteristics- interaction transparency, context aware, automated experience capture. Architecture for pervasive computing- Pervasive devices-embedded controls.- smart sensors and actuators -Context communication and access services		
Unit - II	Protocols	Periods	12
	Open protocols- Service discovery technologies- SDP, JINI, SLP, UpnP protocols-data synchronization- SyncML framework - Context aware mobile services - Context aware sensor networks, addressing and communications- Context aware security.		
Unit - III	Technologies	Periods	12
	Past, Present and Future-Device Technology-Device Connectivity-Web application Concepts-WAP and Beyond-Voice Technologies-Personal Digital Assistants.		
Unit - IV	Architecture	Periods	12
	Server side programming in Java-Pervasive Web application Architecture-Example-Application- Access via PCs-Access via WAP-Access via PDA and Voice.		
Unit - V	Applications	Periods	12
	Smart Tokens, Heating Ventilation and Air Conditioning, Set Top Boxes, Appliances and Home Networking, Residential Gateway, Automotive Computing, On Board Computing Systems, In Vehicle networks, Entertainment Systems		
Total Periods			60

Text Books	
1	Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York, 2007.
2	Jochen Burkhardt, , Stefan Hepper, Klaus Rindtorff, Thomas Schaeck â€–Pervasive Computing-Technology and Architecture of Mobile Internet Applicationâ€–,Pearson Education,sixth Edition 2009.
References	
1	Uwe Hansmann etl , Pervasive Computing, Springer, New York,2001
E-References	
1	https://onlinecourses.nptel.ac.in/noc15_cs03
2	www.w3schools.com
3	www.tutorialspoint.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**MCA**	Programme Code	**PCA**	Regulations	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE13	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	4	0	0	4	25	75	100

COURSE OBJECTIVES	The students gain the knowledge of problems and search methods, Heuristic Search Techniques, Knowledge Representation Issues, Predicate Logic, fundamentals of machine learning and Bayesian network
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	Able to get the knowledge about Problem and searching techniques and space management
CO 2	Able to realize the Heuristic Search Techniques
CO 3	Able to understand Knowledge Representation Issues
CO 4	Understand the basics of Machine Learning
CO 5	Able to get the knowledge about Bayesian Decision Theory
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	3	PO 4	3
		PO 5	2
		PO 6	2
CO 3	2	PO 7	3
		PO 8	4
		PO 9	3
CO 4	3	PO 10	2
		PO 11	3
		PO 12	2
CO 5	3	PO 13	1
		PO 14	2
		PO 15	1

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	3	2	1	2	3	2	3	2	3	2
CO2	2	1	2	3	2	2	1	2	3	2	3	2	1	2	1
CO3	3	2	3	2	3	3	2	1	2	3	2	3	2	3	2
CO4	2	1	2	3	2	2	1	2	3	2	3	2	1	2	1
CO5	2	1	2	3	2	2	1	2	3	2	3	2	1	2	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	Artificial Intelligence	Periods	12
	The AI problems - The underlying Assumption - AI Technique - The level of the Model - Criteria for Success. Problems, Problem Space, and Search: Defining the problem as a state space search - Production systems - problem characteristics - Production system characteristics - Issues in the design of Search Programmes		
Unit - II	Heuristic Search Techniques	Periods	12
	Generate and Test - Hill Climbing - Best First Search - Problem Reduction - constraint Satisfaction - Means ends Analysis		
Unit - III	Knowledge Representation Issues	Periods	12
	Representations and Mappings - Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame problem. Using Predicate Logic: Representing Simple Facts in Logic - Representing Instance and ISA Relationships - Computable Functions and Predicates- Resolution		
Unit - IV	Introduction to Machine Learning	Periods	12
	Machine Learning - Examples of Machine Learning Applications - Learning Associations - classification - Regression -Unsupervised Learning - Reinforcement Learning - Supervised Learning: Learning a Class from Examples - Vapnik - Chervonenkis(VC) Dimension - Probably Approximately Correct (PAC) Learning - Noise - Learning Multiple Classes - Regression - Model Selection and Generalization - Dimensions of a Supervised Machine Learning Algorithm		
Unit - V	Bayesian Decision Theory	Periods	12
	Classification - Losses and Risks - Discriminant Functions - Association Rules - Parametric Methods: Introduction - Maximum Likelihood Estimation - Evaluating an Estimator: Bias and Variance - The Bayes Estimator - Parametric Classification - Regression		
Total Periods			60

Text Books	
1	Elaine Rich and Kevin Knight (2009). Artificial Intelligence, 3/e; New Delhi: Tata McGraw-Hill
2	Tom M. Mitchell, â€•Machine Learning, McGraw-Hill Education (India) Private Limited, 2013
References	
1	J. Nilsson (2001). Principles of Artificial Intelligence; New Delhi: Narosa Publishing
2	Stephen Marsland, â€•Machine Learning: An Algorithmic Perspective, CRC Press, 2009
E-References	
1	www.tutorialspoint.com
2	www.webopedia.org
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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE14	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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE15	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	**2021-2022**
Department	**M.C.A**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P3CAE16	MONGODB	4	0	0	4	25	75	100

COURSE OBJECTIVES	Students gain the skills to exploit the capabilities of information security and Understand with modern security technologies such as firewalls, VPNs, intrusion detection 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, 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 provide students the right skills and knowledge needed to develop ApplicationsmongoDB
CO 2	To provide students the right skills and knowledge needed to run on Applications
CO 3	Explain the detailed architecture, define objects, load data, query data and performance
CO 4	Understand replication and sharding in MongoDB
CO 5	To learn about deployment and administration
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	1	PO 4	2
		PO 5	3
		PO 6	2
CO 3	3	PO 7	3
		PO 8	3
		PO 9	2
CO 4	2	PO 10	3
		PO 11	1
		PO 12	2
CO 5	2	PO 13	3
		PO 14	1
		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	3	3	2	3	2	2	3	2	2	3	2	2	3
CO2	2	3	2	2	1	2	1	1	2	1	3	2	1	3	2
CO3	2	1	2	2	3	2	1	3	2	3	1	2	3	1	2
CO4	3	2	3	3	2	3	2	2	3	2	2	3	2	2	3
CO5	3	2	3	3	2	3	2	2	3	2	2	3	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	GETTING STARTED	Periods	12
	A database for the modern web - MongoDB through the JavaScript shell - Writing programsusing MongoDB- MongoDB Document Model		
	APPLICATION DEVELOPMENT	Periods	12
Unit - II	Document-oriented data - Principles of schema design - Designing an e-commerce data model - Nuts and bolts on databases, collections, and documents. Queries and aggregation - E-commerce queries - MongoDBâ€™s query language - Data Types in MongoDB -Aggregating orders -Aggregation in detail		
	UPDATES, ATOMIC OPERATIONS, AND DELETES	Periods	12
Unit - III	A brief tour of document updates - E-commerce updates - Atomic document processing - MongoDB updates and deletes. Indexing and query optimization: Indexing theory - Indexing in practice.		
	REPLICATION	Periods	12
Unit - IV	Overview - Replica sets - Master-slave replication - Drivers and replication. Shading: Overview - A sample shard cluster - Querying and indexing a shard cluster - Choosing a shard key		
	DEPLOYMENT AND ADMINISTRATION	Periods	12
Unit - V	Deployment - Monitoring and diagnostics - Maintenance - Performance troubleshooting		
	Total Periods		60

Text Books	
1	Kyle Banker. (2012). MongoDB in Action. Manning Publications Co
2	Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, Oâ€ŸReilly Media Inc.
References	
1	Gautam Rege (2012). Ruby and MongoDB Web Development Beginners Guide. Packt Publishing Ltd
2	Mike Wilson (2013). Building Node Applications with MongoDB and Backbone, OReilly Media Inc
3	David Hows (2009) The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485
E-References	
1	https://www.tutorialspoint.com
2	www.w3schools.com
3	www.javatpoint.com

Signature of BOS Chairman