

**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

**M.Sc., (COMPUTER SCIENCE)
(Candidates admitted from 2021-2022 Onwards)**

REGULATIONS

I. SCOPE OF THE PROGRAMME

Master of Computer Science can be considered to be one of the most prominent Master's level programs in our country. This program mainly deals with the development of computer applications for the purpose of updating computer programming languages. M.Sc.(CS) also aims at creating strong knowledge of theoretical computer science subjects who can be employed in research and development units of industries. The course has a time period of two years with four 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 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 M.Sc.Computer Science program is to provide advanced and in-depth knowledge of computer science and its 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

A Candidate who has passed B.Sc. Computer Science /BCA/B.Sc. Computer Technology / B.Sc. Information Science Degree of Periyar university or any of the Degree of any other university accepted by the syndicate as equivalent thereto subject to such conditions as may be prescribed therefore shall be permitted to appear and qualified for the M.Sc. Computer Science Degree Examinations of the Periyar University after a course of study of two academic years.

V. DURATION OF THE PROGRAMME

- 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 April.
- 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 (Autonomous) with the approval of Periyar University.

VI. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously and the Internal Assessment Marks will be as under:

1. Average of two Tests	-	10 Marks
2. Seminar	-	05 Marks
3. Assignment	-	05 Marks
4. Attendance	-	05 Marks

Total = 25 Marks

Internal Assessment Marks for Practical

1. Attendance	-	10 Marks
2. Observation	-	10 Marks
3. Test	-	20 Marks

Total = 40 Marks

PASSING MINIMUM (Theory) - EXTERNAL

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

PASSING MINIMUM (Practical) - EXTERNAL

In the Semester Examinations, the passing minimum shall be 50 % out of 60 Marks. (30 Marks)

DISTRIBUTION OF MARKS

Program writing	: 10 Marks
Debugging	: 10 Marks
For Results	: 05 Marks
Viva – voce	:05 Marks

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

VII. ELIGIBILITY FOR EXAMINATION

PERCENTAGE	MARKS	
	THEORY	PRACTICAL
75-80	1	2
81-85	2	4
86-90	3	6
91-95	4	8
96-100	5	10

A candidate will be permitted to appear for the Semester Examination only on earning 75 % of attendance and only when her conduct has been satisfactory. A candidate having 65% to 74% of attendance should pay condonation fees prescribed by the controller of Examination office.

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the examination of Core Courses (Main and Elective subjects) and securing marks

- 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.
- 60% and above but below 75% shall be declared to have passed the examinations in first class without Distinction.
- 50% and above but below 60% shall be declared to have passed the examinations in second class.

- d) Candidates who pass all the examinations prescribed for the course at the first appearance itself and within a period of two consecutive academic years from the year of admission only will be eligible for University rank.
- e) If she fails to complete her course within the specified period, she can extend for two year's to complete her course.

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 two academic years comprising of four 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 semester examination in the concerned subject in subsequent semesters and shall pass the examination.

XI. COMMENCEMENT OF THE REGULATIONS

- The regulations shall take effect from the academic year 2021-2022 (i.e.,) for the students who are to be admitted to the first year of the course during the academic year 2021-22 and thereafter.
- Candidates who were admitted to the PG course of study before 2018-19 shall be permitted to appear for the examinations under those regulations for the period of three years ie., upto and inclusive of the examinations of 2018-19. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

EVALUATION OF EXTERNAL EXAMINATIONS (EE) QUESTION PAPER PATTERN

External Evaluation (Theory)

Knowledge Level	Section	Marks	Description	Total
K1 ,K2,K3,K4	A (Answer All)	20 x 1 = 20 Marks	One Marks	75
K1 ,K2,K3,K4	B (Either or Pattern)	5 x 5=25 Marks	Short Answers	
K1 ,K2,K3,K4	C (3 out of 5)	3 x 10= 30 Marks	Descriptive Type	

Internal Evaluation (Theory)

Knowledge Level	Section	Marks
K1 ,K2,K3,K4	CIA -1 and CIA -2	5
K1 ,K2,K3,K4	Model	5
K1 ,K2,K3,K4	Seminar	5
K1 ,K2,K3,K4	Assignment	5
-	Attendance	5
Total		25

QUESTION PAPER PATTERN – PRACTICAL

Time duration: 3 Hours

Max. Marks: 60

1. One compulsory question from the given list of programs : 30 Marks
2. One Either / OR type question from the given list of programs : 30 Marks

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

Distribution of Marks

Problem Understanding : 05 Marks

Program writing : 10 Marks

Debugging & Result : 10 Marks

Viva voce : 05 Marks

QUESTION PAPER PATTERN – Project and Viva voce

Evaluation (External) : 150 Marks

Viva-voce (External) : 50 Marks

Continuous Assessment Test (CIA 1 and CIA 2)

Knowledge Level	Section	Marks	Description	Total
K1	A (Answer All)	10 x 1 = 10 Marks	MCQ/define	25
K2	B (Either or Pattern)	1x 5 = 5 Marks	Short Answers	
K3	C (Answer 4 out of 6)	1x 10 = 10 Marks	Descriptive	

**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCE FOR WOMEN
(AUTONOMOUS)
ELAYAMPALAYAM, TIRUCHENGODE, NAMAKKAL DT.**

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 favorable environment to the students to acquire education.
- To provide quality academic programs training activities and research facilities.
- To facilitate industry-institute interaction.

PG DEPARTMENT OF COMPUTER SCIENCE

VISION

To provide high academic goals to the students and make them the world leaders both in educational and research through effective teaching.

MISSION

- To create, share and apply knowledge in Computer Science including inter disciplinary areas that extends the scope of Computer Science and benefit humanity.
- To educate students to be successful, ethical and effective problem solvers.
- To prepare the students to contribute positively to the economic well being of our region and nation.

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE - M.Sc(CS) CURRICULUM (2021-2022 Onwards)

SEM	COURSE CODE	TITLE	CREDIT	HOUR	MARKS		
					CIA	EE	TOTAL
I	21P1CS01	Core Course- 1 - Advanced Computer Organization and Architecture	4	4	25	75	100
	21P1CS02	Core Course – 2 - Design and Analysis of Algorithms	4	4	25	75	100
	21P1CS03	Core Course- 3 - Web Technologies	4	4	25	75	100
	21P1CS04	Core Course- 4 - Advanced Database Management Systems	4	4	25	75	100
	21P1CS05	Core Course- 5 - Software Project Management and Quality Assurance	4	4	25	75	100
	21P1CSE_	Elective I -	4	2	25	75	100
	21P1CSP01	Core Course Practical - 1 - Advanced Database Management Systems lab	3	4	40	60	100
	21P1CSP02	Core Course Practical - 2 - Web Technologies Lab	3	4	40	60	100
		Total	30	30	230	570	800
II	21P2CS06	Core Course – 6 - Advanced Concepts in Operating System	4	4	25	75	100
	21P2CS07	Core Course – 7- Advanced Java Programming	4	4	25	75	100
	21P2CS08	Core Course - 8 - Data Mining and Warehousing	4	4	25	75	100
	21P3CS09	Core Course - 9 - Network Security	4	4	25	75	100
	21P2CSE_	Elective II -	3	4	25	75	100
	21P2CSE_	Elective III -	3	4	25	75	100
	21P2CSP03	Core Course Practical – 3- Advanced Java Programming Lab	2	4	40	60	100
	21P2CSPR01	Mini Project-I-Domain Study	2	2	40	60	100
		Total	26	30	230	570	800
III	21P3CS10	Core Course – 10-Soft Computing	4	4	25	75	100
	21P3CS11	Core Course – 11-Python Programming	4	4	25	75	100
	21P3CS12	Core Course – 12 - Cloud computing	4	4	25	75	100
	21P3CSE-	Elective Course – IV	4	4	25	75	100
		EDC - Resource Management Techniques	4	4	25	75	100
	21P3CSP04	Core Course Practical – 4 – Python Programming Lab	2	5	40	60	100
	21P3CSPR02	Mini Project II	3	5	40	60	100
		Human Rights	1	-	25	75	100
		Total	26	30	230	570	800
IV	21P4CSPR03	Project	9	-	50	150	200
		Total	9	-	50	150	200
		Grand Total	91	90	740	1860	2600

Elective I

	Course Code	Title
Semester I	21P1CSE01	Theory of Computation
	21P1CSE02	Mobile Communication
	21P1CSE03	Client Server Technology
	21P1CSE04	Internet of Things

Elective II

	Course Code	Title
Semester II	21P2CSE05	Big Data Analytics
	21P2CSE06	Multimedia and Virtual Reality
	21P2CSE07	AI and Expert System
	21P2CSE08	Compiler Design

Elective III

	Course Code	Title
Semester II	21P3CSE09	Ad-Hoc Sensor Network
	21P3CSE10	Object Oriented Analysis and Design
	21P3CSE11	Embedded Systems
	21P3CSE12	Wireless Application Protocol

Elective IV

	Course Code	Title
Semester III	21P3CSE13	Cyber Security and Computer Forensics
	21P3CSE14	Digital Image Processing
	21P3CSE15	Distributed Computing
	21P3CSE16	Professional Ethics

EDC-EXTRA DISCIPLINARY COURSE

Students are expected to opt EDC (Non Major Elective) offered by other departments.

I.A. – INTERNAL ASSESSMENT**E.E. – END SEMESTER EXAMINATIONS**

The content of the syllabus and regulations may be followed for at least two sets of students from 2021-22 and it passed in the academic year 2023-2024.



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester			1			
Course Code	Course Name			Periods per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
21PICS01	ADVANCED COMPUTER ORGANIZATION AND ARCHITECTURE			4	0	0	4	25	75	100
COURSE OBJECTIVES	To know Structure and functions of Computer architecture and organizations. Observe the characteristics of various computer memory concepts. To understand the computer arithmetic and machine instructions. Understand the parallel processing 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 & environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									

PO 15	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
COs	COURSE OUTCOME
CO 1	Recognize the operation of functional units of a computer and chip
CO 2	Compare the performance of different types of memory
CO 3	Describe the computational operation of hardware units associated with a computing device
CO 4	Demonstrate the operation of processing unit
CO 5	Recognize the operation of parallel processing
Pre-requisites	Computer Organization and Architecture

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	5	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	2	2	1	1	1	3	3	2	2	2	2	2	2

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Structure and Function-Computer Evaluation and Performance: History of computers- Designing for Performance: Microprocessor speed-performance balance-Improvement in chip organization and architecture. Computer Function and Interconnection: Computer Components-Computer Function: Instruction Fetch and Execute. Interconnection structures.		
Unit - II	Cache Memory	Periods	12
	Characteristics of Memory Systems-Memory hierarchy-Cache memory principles- Elements of cache design: Cache size-Mapping function. Internal Memory: Semi-conductor main memory: Organization- DRAM & SRAM. External Memory: Magnetic Disk: read and write mechanism		
Unit - III	Computer Arithmetic	Periods	12
	ALU-Integer Representation: Sign magnitude representation-Two's complement Representation-Fixed point Representation. Integer Arithmetic: Negation-Addition & Subtraction. Instruction Sets: Characteristics & Functions: Machine Instruction characteristics: Elements of Machine Instruction. Instruction Sets: Addressing Modes and Formats: Addressing: Immediate- Direct- Indirect		
Unit - IV	Processor structure & Function	Periods	12
	Processor Organization- Register organization- Instruction cycle. Control Unit Operations: Micro Operations: The fetch cycle- The Indirect Cycle- The Interrupt cycle- The Execute Cycle- The instruction Cycle. Control of the Processor: Functional Requirements-Control Signals		
Unit - V	Parallel Processing	Periods	12
	Multiple Processor Organizations: Types of parallel processor Systems- Parallel Organizations. Symmetric Multiprocessors: Organization-Multiprocessor Operating System Design considerations. Cache Coherence and the MESI Protocol: Software Solutions-Hardware Solutions-Snoopy Protocols-The MESI Protocol-Read Miss-Read Hit-Write Miss-Write Hit.		
Total Periods			60

Text Books	
1	Computer Organization & Architecture - Designing for Performance by William Stallings, 10th Edition, 2016, PEARSON Prentice Hall Publication. (Unit I: Chapter 1,2 &3 Unit-II : Chapter 4,5&6 Unit-III : Chapter 9,10&11 Unit IV: Chapter 12 &16 Unit V: Chapter 18)

References	
1	Computer Systems Organizations & Architecture by John D. Carpinelli, First Edition, 2007, PEARSON Prentice Hall Publication.
2	Computer Architecture: Concepts and Evaluation by Gerrit A. Blaauw, First Edition, 2008, PEARSON Prentice Hall Publication.
3	Computer System Architecture and Parallel Processing by Kai Hwang, Faye A. Briggs, 2009, McGraw-Hill Publications.
4	Computer organization & Design by David A Peterson and John L Hennessy, 2013, Fifth Edition.

E-References	
1	www.tutorialspoint.com/computer_organization/index.asp
2	en.wikipedia.org/wiki/Computer_architecture
3	www.slideshare.net/kumar_vic/computer-system-architecture
4	www.cs.ucr.edu/~bhuyan/Lecture1-2
5	ece752.ece.wisc.edu/lect01-intro.ppt

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester			1			
Course Code	Course Name			Periods per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
21P1CS02	DESIGN AND ANALYSIS OF ALGORITHMS			4	0	0	4	25	75	100
COURSE OBJECTIVES	To Know the Fundamentals of the Analysis of Algorithm Efficiency. Understand the divide and conquer methodology. Analysis search and boundary algorithm									
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 & environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									
PO 15	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
COs	COURSE OUTCOME
CO 1	Summarize the relevance of algorithms for computational problems
CO 2	Differentiate different algorithmic approaches, techniques and methods.
CO 3	Apply optimization techniques for improving the efficiency of algorithms.
CO 4	Analyze each and every algorithm techniques
CO 5	Analyze a given algorithm for its efficiency based on time and space it occupies.
Pre-requisites	Data Structures

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	4
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	5	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	2	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	3	3	3	3	3	3	3
CO5	1	1	2	2	1	1	1	3	2	2	2	2	2	2	2

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	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
	Merge Sort - Quick Sort - Binary search - Binary Tree Traversal - Multiplication of large integers - Strassen's matrix multiplication Greedy method - Prim's algorithm - Kruskal's algorithm - Dijkstra's Algorithm		
Unit - III	Transform and Conquer	Periods	12
	Balanced Search Tree - AVL Tree - Heaps and Heap Sort - Dynamic Programming - Computing a binomial coefficient - Warshall's and Floyd's algorithm.		
Unit - IV	Optimal binary search tree	Periods	12
	Knapsack problem - Backtracking - N-Queens problem - Hamiltonian circuit problem - subset sum problem.		
Unit - V	Branch and bound	Periods	12
	Assignment problem - Knapsack problem - Traveling salesman problem.		
Total Periods			60

Text Books	
1	Anany Levitin, Introduction to the Design and Analysis of Algorithm, 3rd Edition, Pearson Education Asia, 2012. (Unit-I: Chapter 1,2 Unit-II: Chapter 4,9 Unit-III: Chapter 6,8 Unit-IV:Chapter 8,11 Unit-V: Chapter 11)
References	
1	T.H.Cormen, C.E.Leiserson, R.L. Rivest and C.Stein, Introduction to Algorithms, PHI Pvt. Ltd.,2001.
2	Sara Baase and Allen Van Gelder, Computer Algorithms " Introduction to Design and Analysis, Pearson Education Asia, 2003
3	A.V.Aho, J.E. Hopcroft and J.D.Ullman, The Design and Analysis of Computer Algorithms, Pearson Education Asia 2003.
E-References	
1	www.cs.cornell.edu
2	www.cs.duke.edu
3	www.slideshare.net/gayuuuuuu
4	slideplayer.com/slide/10050190/
5	myonlinetext.blogspot.com/2015/12

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022	
Department	Computer Science		Semester			1		
Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CS03	WEB TECHNOLOGIES	4	0	0	4	25	75	100
COURSE OBJECTIVES	Understanding the basic concepts of web design with HTML and Cascading Style Sheets.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 &environmental consideration							
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 one 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.							
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.							
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.							
PO 15	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
COs	COURSE OUTCOME
CO 1	Understand the basics of web design using HTML and cascading style sheets.
CO 2	Understand the basics of PHP.
CO 3	Learn about PHP control structures, functions, string handling and arrays
CO 4	Acquire knowledge in file system, cookies and sessions and understand PHP types
CO 5	Implement connecting database with PHP and MySQL.
Pre-requisites	-

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	1	PO 4	4
		PO 5	3
		PO 6	3
CO 3	2	PO 7	5
		PO 8	5
		PO 9	4
CO 4	3	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO4	1	2	2	2	3	3	1	1	2	2	2	2	2	2	2
CO5	1	1	3	3	2	2	2	2	3	3	3	3	3	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	HTML Basics	Periods	12
	Understanding HTML - Formatting text by Using Tags - Creating Lists and Backgrounds - Creating Hyperlinks and Anchors. Creating Tables- Creating simple Forms. Style Sheets and Graphics: Introduction to Style Sheets - Cascading Style sheets- -Formatting Text using Style Sheets - Formatting Paragraphs using Style Sheets.		
Unit - II	Introducing PHP	Periods	12
	Why PHP and MySQL-Server-Side Scripting Overview - Getting Started with PHP - Learning PHP Syntax and Variables- PHP Control Structures and Functions.		
Unit - III	Learning Passing Information with PHP	Periods	12
	Learning PHP String Handling - Learning Arrays- Learning PHP Number Handling		
Unit - IV	More PHP	Periods	12
	Working with the File System -Working with Cookies and Sessions - Learning PHP Types. MySQL Database Integration: Introducing Databases and MySQL		
	Learning Database Administration and Design	Periods	12
Unit - V	Integrating PHP and MySQL Performing Database Queries - Integrating Web Forms and Databases-MySQL Gotchas.		
Total Periods			60

Text Books	
1	Microsoft Step by Step HTML and XHTML, Faithe Wempen. PHI, 2009 (Unit-I) Steve Suehring, Tim Converse, and Joyce Park, PHP6 and MySQL Bible, Wiley Publishing, Inc., 2010. (Units II, III, IV & V)
References	
1	Jay Greenspan and Brad Bulger, MySQL/PHP Database Applications, M & T Books, 2001.
2	Adam Trachtenberg and David Sklar, PHP Cookbook , OReilly, 2nd Edition, 2006.
3	W. Jason Gilmore, Beginning PHP and MySQL from Novice to Professional, Apress, 4th Edition, 2010.
4	Luke Welling, Laura Thomson, PHP and MySQL® Web Development, Pearson Education, Inc., 4th Edition, 2009.
E-References	
1	www.w3schools.com/php/
2	www.geeksforgeeks.org/html-basics/
3	www.tutorialspoint.com/php/
4	www.studytonight.com/php/introduction-to-php
5	www.guru99.com/php_tutorials.html

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			1			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
21P1CS04	ADVANCED DATABASE MANAGEMENT SYSTEMS		4	0	0	4	25	75	100
COURSE OBJECTIVES	To know the basics of Data base management system.To understand advanced and object oriented database concepts.Analyze the principles of web and mobile databases.								
POs	PROGRAMME OUTCOME								
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements								
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines								
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems,components,or processes that meet specified needs with appropriate consideration for public health and safety,cultural,societal &environmental consideration								
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 one 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.								
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.								
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.								
PO 15	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
COs	COURSE OUTCOME
CO 1	Summarize the basics of advance data modeling and Advance SQL
CO 2	Differentiate different Database concepts and Concurrency Control.
CO 3	Apply various databases and data models in the different kind
CO 4	Analyze each and every databases and database systems
CO 5	Analyze different information systems and multimedia and spatial databases
Pre-requisites	Database Management Systems

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	Relational Databases	Periods	12
	Object oriented databases - Complex data types, Object-oriented data model, Object-oriented languages, Persistent programming languages - Object relational databases - Nested relations, Complex types, Inheritance, Reference types, Querying with complex types, Functions and procedures, Object-oriented versus object-relational.		
Unit - II	Distributed databases	Periods	12
	Homogeneous and heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases.		
Unit - III	Directory systems	Periods	12
	Parallel databases - I/O parallelism, Inter query parallelism, Intra query parallelism, Intra operation parallelism, Interoperation parallelism, Design of parallel systems.		
Unit - IV	Spatial databases and spatial, Geographic data	Periods	12
	Representation of geometric information - Design databases, Geographic data, Spatial queries, Indexing of spatial data - Temporal and time series databases - Time in databases- Time specification in SQL, Temporal query language.		
Unit - V	Multimedia databases	Periods	12
	Multimedia data formats, Continuous media data, Similarity-based retrieval - Web databases - Web fundamentals, URL, HTML, Client side scripting and Applets, Web servers and sessions, Servlets, Server side scripting, Improving performance.		
Total Periods			60

Text Books	
1	Henry Korth, F., Abraham Silberchatz, Sudarshan, S. Database System Concepts, 6th Edition , Mc Graw Hill International Editions, 2011.
2	Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems , Pearson Education, 7th Edition , 2016.
References	
1	Gary Hanson, W., James Hanson, V., Database Management and Design, Prentice Hall of India Pvt. Ltd., 1999.
2	Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, TataMcGraw-Hill, 2000
3	Stefano Ceri, Giuseppe Pelagatti, Distributed Databases: Principles and Systems , Mc Graw-Hill Computer Science Series.
E-References	
1	onlinecourses.nptel.ac.in/noc16_cs04/preview
2	www.coursera.org/learn/database-management-systems
3	www.astera.com/type/blog/database-management-software
4	www.nibusinessinfo.co.uk/content/types-database-system
5	www.slideshare.net/vikasjagtap3

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FORWOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022	
Department	Computer Science		Semester			1		
Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21P1CS05	SOFTWARE PROJECT MANAGEMENT AND QUALITY ASSURANCE	4	0	0	4	25	75	100
COURSE OBJECTIVES	Use of different Life cycle Model for software development. Have the mathematical foundation in finding of project cost of algorithms. Understand different algorithmic design strategies.							
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 <u>computing models from defined problems and requirements</u> .							
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain <u>disciplines</u> .							
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 <u>and safety, cultural, societal & environmental consideration</u> .							
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and <u>interpretation of data, and synthesis of the information to provide valid conclusions</u> .							
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex <u>computing activities, with an understanding of the limitations</u> .							
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of <u>professional computing practice</u> .							
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a <u>computing professional</u> .							
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to one own work, as a member and leader in a team, to manage projects and in multidisciplinary <u>environments</u> .							
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 <u>effective presentations</u> .							
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and <u>global contexts, and the consequential responsibilities relevant to professional computing practice</u> .							
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary <u>environments</u> .							
PO 12	Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for <u>the betterment of the individual and society at large</u> .							
PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems. To <u>identify, analyse and synthesize scholarly literature relating to the field of Computer Science</u> .							
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market <u>demands</u> .							
PO 15	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of							

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
	Product Life cycle - Project life cycle models - Water fall model - Prototyping model - RAD model - Spiral Model - Process Models -The ISO-9001 Model-The Capability Maturity Model- Metrics		
Unit - II	Software Configuration Management	Periods	12
	Definitions and terminology - The processes and activities - Configuration Audit - Metrics -Tools and Automation- Software Quality Assurance - Define Quality - Quality Control and Assurance - SQA Analysts Functions - QA Tools - Organizational Structures - Profile of a successful SQA-Measures of SQA success.		
Unit - III	Project Initiation	Periods	12
	Project Planning and Tracking - What, Cost, When and How - Organizational Processes - Assigning Resources - Activities to specific to Project Tracking - Project Closure - When and How.		
Unit - IV	Quality Management	Periods	12
	Software Quality, Software Quality Dilemma-Achieving Software Quality-Software Testing Strategies-Strategic Approach-Test Strategies for Conventional Software and Object Oriented Software.		
Unit - V	Project Management	Periods	12
	The People, The Product, The Process - Project Scheduling - Risk Management -Maintenance and Reengineering - Business Process Reengineering - Software Re Engineering - Reverse Engineering - Restructuring - Forward Engineering.		
Total Periods			60

Text Books	
1	Gopaldaswamy Ramesh, Managing Global Software Projects Tata McGraw Hill.Publishing Company Ltd, New Delhi, 2006
2	Pressman, Roger, Software Engineering , A Practitioners approach, 7th edition, Tata Mc Graw Hill, 2006. 6th Edition

References	
1	Philip B Crosby, Quality is Free: The Art of Making Quality Certain MassMarket, 2004.
2	Bob Hughes and Mike Cotterell Software Project Management,2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002.

E-References	
1	wikipedia.org
2	www.tutorialspoint.com
3	www.slideshare.net
4	www.slidegeeks.com
5	www.slideteam.net/

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-22		
Department	M.Sc CS		Semester			I			
20P1CSP01	Core Course Practical - 1 Advanced Database Management System Lab		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
			0	0	4	3	40	60	100
COURSE OBJECTIVES	<ol style="list-style-type: none"> To know the basic commands in SQL To understand the DML ,DDL Statements To familiarize in the Data Schemes To understand and program in PL/SQL 								
	LIST OF PRACTICALS								
1	Basic SQL Queries i) DDL Statements ii) DML Statements								
2	Simple Queries using built in functions								
3	Simple Queries Using set operations								
4	Database Schema for a customer-sale scenario Customer (<u>Cust id</u> : integer, cust_name: string) Item (<u>item id</u> : integer, item_name: string, price: integer) Sale (<u>bill no</u> : integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer) For the above schema, perform the following: <ol style="list-style-type: none"> Create the tables with the appropriate integrity constraints Insert around 10 records in each of the tables List all the bills for the current date with the customer names and item numbers. List the details of the customer who have bought a product which has a price>200 								
5	Database Schema for a Student Library scenario Student(<u>Stud no</u> : integer, Stud_name: string) Membership (<u>Mem no</u> : integer, Stud_no: integer) Book (<u>book no</u> : integer, book_name:string, author: string) Iss_rec(<u>iss no</u> :integer, iss_date: date, Mem_no: integer, book_no: integer) For the above schema, perform the following: <ol style="list-style-type: none"> Create the tables with the appropriate integrity constraints Insert around 10 records in each of the tables List all the student names with their membership numbers List all the issues for the current date with student and Book names List the details of students who borrowed book whose author is CJDATE 								
6	Database Schema for a Employee-pay scenario employee(<u>emp id</u> : integer, emp_name: string) department(<u>dept id</u> : integer, dept_name:string) paydetails(emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date) payroll(emp_id : integer, pay_date: date) For the above schema, perform the following: <ol style="list-style-type: none"> Create the tables with the appropriate integrity constraints Insert around 10 records in each of the tables List the employee details department wise List all the employee names who joined after particular date List the details of employees whose basic salary is between 10,000 and 20,000 List the details for an employee_id=5 								

7	Write a PL/SQL program to implement trigger
8	Write a PL/SQL program to implement cursor
9	Write a PL/SQL program to prepare student mark list
10	Write a PL/SQL program to prepare employee pay bill

Signature of BOS Chairman

		VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.						
Programme	M.Sc	Programme Code	PCS		Regulations	2021-22		
Department	M.Sc CS		Semester			III		
21P1CSP02	Core Course Practical - 2 Web Technologies Lab	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
		0	0	4	3	40	60	100
COURSE OBJECTIVES	1. Creating simple web pages, forms & CSS 2. Implement working with cookies and sessions in PHP 3. 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							

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester			2			
Course Code	Course Name			Periods per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
21P2CS06	Advanced Concepts in Operating System			4	0	0	4	25	75	100
COURSE OBJECTIVES	On successful completion of this course we learn the fundamentals of Operating Systems architecture, Algorithms for Implementing DSM components and management aspects of Real time and Mobile operating Systems.									
POs	PROGRAMME OUTCOME									
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements									
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.									
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal & environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									
PO 15	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
COs	COURSE OUTCOME
CO 1	Understand the concepts of Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms and Multiprocessor System Architecture
CO 4	To implement distributed database operating system in various places
CO 5	Design and Establish the Operating system to apply in various places
Pre-requisites	Operating System Concepts

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	4	PO 7	5
		PO 8	5
		PO 9	5
CO 4	5	PO 10	4
		PO 11	4
		PO 12	4
CO 5	6	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO4	1	1	2	2	1	1	1	3	3	2	2	2	2	2	2
CO5	1	1	1	1	1	1	2	2	2	1	1	1	1	1	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	Introduction to Operating System	Periods	12
	Overview: Introduction- Functions of operating systems - Design Approaches - Types of Advanced Operating Systems. Synchronization Mechanisms: Introduction - Concept of Process - Concurrent Process - The critical section Problem. Process Deadlocks: Introduction - Preliminaries - Models of Deadlocks - Models of Resources - A Graph-Theoretic Model of a System State - Necessary and Sufficient Conditions for a Deadlock.		
Unit - II	Architectures of Distributed Systems	Periods	12
	Architectures of Distributed Systems: Introduction - Motivation - System Architecture Types - Distributed operating Systems - Issues in Distributed operating System - Communication Network - Communication Primitives. Distributed Shared Memory: Introduction - Architecture and Motivation - Algorithms for Implementing DSM - Memory Coherence - Coherence Protocols - Design Issues.		
Unit - III	Multiprocessor System Architectures	Periods	12
	Multiprocessor System Architectures: Introduction - Motivations - Basic Multiprocessor System Architecture - Interconnection networks for Multiprocessor System - Caching - Hypercube Architecture. Multiprocessor Operating Systems: Introduction - Structures - Operating System Design Issues - Threads - Process Synchronization - Process Scheduling - Memory Management - Reliability/Fault Tolerance.		
Unit - IV	Database Operating Systems	Periods	12
	Database Operating Systems: Introduction - Concurrency Control: Database Systems - Serializability Theory - Distributed database systems - Lock based and Timestamp based algorithm - Concurrency control algorithms.		
Unit - V	CASE STUDY	Periods	12
	CASE STUDY: Linux History- Design Principles-Kernel Modules- Process Management -Scheduling - Memory Management - File Systems- Input and Output - Interprocess Communication -Network Structure-SecurityiOS: About iPhone iOS 4 App Development Essentials-The Anatomy of an iPhone 4 - iOS 4 Architecture and SDK Frameworks - iOS Media Layer		
Total Periods			60

Text Books	
1	1.Advanced Concepts in Operating Systems", Mukesh Singhal, Niranjana G.Shivarathr, 2017
2	2.Operating System Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Ninth Edition, John Wiley and Sons Inc, 2018.
3	3.Neil Smyth, "iPhone iOS 4 Development Essentials – Xcode", Fourth Edition, Payload media, 2011
References	
1	1.Operating System in depth: Design & Programming, Thomas.W,Doepfner, First Edition 2010.
2	2.The Linux Programming Interface: A Linux and Unix System Programming handbook, Michal Kerisk, First Edition, 2010.
E-References	
1	1. https://books.google.co.in/books/.../Advanced_Concepts_InOperatingSystems.html
2	2. https://www.bookdepository.com/Advanced-Concepts-Operating-Systems
3	3. https://www.sfitengg.org/.../CSC201-advanced%20operating%20systems

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science		Semester				2			
Course Code	Course Name		Periods per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21P2CS07	ADVANCED JAVA PROGRAMMING		4	0	0	4	25	75	100	
COURSE OBJECTIVES	To introduce advanced java concepts .To learn about basic concepts web applications. 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 & environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									
PO 15	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									

COs	COURSE OUTCOME
CO 1	To revisit the important concepts of Core Java Programming.
CO 2	To understand the concepts of creating software components using BDK 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	Basic Java Programming Concepts

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	3	PO 4	4
		PO 5	3
		PO 6	3
CO 3	2	PO 7	5
		PO 8	5
		PO 9	5
CO 4	5	PO 10	4
		PO 11	4
		PO 12	4
CO 5	6	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO3	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO4	1	1	2	2	1	1	1	3	3	2	2	2	2	2	2
CO5	1	1	1	1	1	1	2	2	2	1	1	1	1	1	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	Networking	Periods	12
	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- Building GUI Application using SWING-RMI: An Overview of RMI-Building a Simple Client/Server Application using RMI.		
Unit - II	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 - III	JSP	Periods	12
	JSP - Elements of JSP-JSP Syntax and Semantics- Expressions and Scriptlets-Declarations- Request Dispatching.		
Unit - IV	The Page directive	Periods	12
	The Page directive--Session and Thread Management-JSP Tag Extensions: Introduction to Custom Tag-Developing your first Custom Tag.		
Unit - V	JSP Applications	Periods	12
	JSP Applications: -Database Access with JDBC-Overview of JDBC-JDBC Drivers-Connecting to a Database with DriverManager-The Statement Interface-Result Sets-Using Metadata-JSP and XML-JSP Testing and Debugging-Deploying Web Applications.		
Total Periods			60

Text Books	
1	H. Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.(Unit I,UnitII,Unit III).
2	Joseph Oâ€™Neil, 1998, Java Beans Programming from the ground Up, Tata McGraw Hill, New Delhi(Unit II).
3	Phil Hanna ,JSP 2.0: The Complete Reference, Tata McGraw Hill Edition,2003 New Delhi(Unit IV, Unit V).
References	
1	James Koegh,2003, J2Me: The complete Reference, Tata McGraw Hill, Ne Delhi.
2	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

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester			2			
Course Code	Course Name			Periods per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
21P2CS08	Data Mining and Warehousing			4	0	0	4	25	75	100
COURSE OBJECTIVES	Learn the concepts of database technology. Understand the need for data mining and its applications. To examine the types of the data to be mined. To present a general classification of tasksto integrate a data mining 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 &environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									
PO 15	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
COs	COURSE OUTCOME
CO 1	Evaluate and implement a wide range of emerging and newly-adopted methodologies and technologies to facilitate the knowledge discovery
CO 2	Assess raw input data, and process it to provide suitable input for a range of data mining algorithms
CO 3	Discover and measure interesting patterns from different kinds of databases
CO 4	Characterize and discriminate data summarization forms and determine data mining functionalities
CO 5	Design and implement of a data-mining application using sample, realistic data sets and modern tools
Pre-requisites	Database Concepts

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	4	PO 7	5
		PO 8	5
		PO 9	5
CO 4	3	PO 10	4
		PO 11	4
		PO 12	4
CO 5	5	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO4	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO5	1	1	2	2	1	1	1	3	3	2	2	2	2	2	2

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

Content of the Syllabus			
Unit - I	Introduction to Data Mining	Periods	12
	Introduction: Data Mining - Data Mining Functionalities - Kinds of Patterns can be Mined - Classification - Data Mining Task Primitives - Major Issues. Data pre-processing: Descriptive Data Summarization - Data Cleaning - Data Integration and Transformation - Data Reduction - Data Discretization and concept Hierarchy Generation.		
Unit - II	Data warehouse and OLAP Technology	Periods	12
	Data warehouse and OLAP Technology: Data Warehouse - A Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation - From data warehouse to data mining.		
	Mining Frequent Patterns, Associations, and Correlations	Periods	12
Unit - III	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts - Efficient and Scalable Frequent Itemset Mining Methods - Mining various kinds of Association Rules- From Association Mining to Correlation Analysis -. Constraint Based Association Mining. Classification and prediction: Issues regarding classification and prediction - Decision Tree Induction - Bayesian classification - Rule Based Classification - Classification by Back propagation - Prediction.		
Unit - IV	Cluster Analysis	Periods	12
	Cluster Analysis: Types of Data in Cluster Analysis - A categorization of Major Clustering Methods - Partitioning Methods - Hierarchical Methods - Density Based Methods - Grid Based Methods - Model Based Clustering Methods - Outlier Analysis - Mining Time-Series Data - Mining Sequence Patterns in Biological Data.		
Unit - V	Spatial Data Mining, Applications and Trends in Data Mining	Periods	12
	Spatial Data Mining - Multimedia Data Mining - Text Mining -Mining the World Wide Web. Applications and Trends in Data Mining: Applications - Data Mining System Products and Research Prototypes - Additional Themes on Data Mining - Social Impacts of Data Mining - Trends in Data mining.		
Total Periods			60

Text Books	
1	Jiwei Han, Michelen Kamber, "Data Mining Concepts and Techniques",Morgan Kaufmann Publishers an Imprint of Elsevier, 3rd Edition, 2012.(Unit I: Chapter 1,2, Unit II: Chapter 3, Unit III: Chapter5, 6, Unit IV: Chapter 7,8 Unit V: Chapter 10,11)
References	
1	Arun K.Pujari, "Data Mining Techniques", Universities Press (India) Limited, 2014.
2	Pang-NingTan,Michael Steinbach,Vipin Kumar, Introduction to Data Mining, Pearson, 2014
E-References	
1	freevideolectures.com ° Computer Science ° IIT Madras
2	videolectures.net/is2011_grobelnik_warehouses
3	www.learnerstv.com/video/Free-video-Lecture-1636-Computer-Science
4	mydatamine.com/2011/04/top-10-data-mining-video-sites
5	www.slideshare.net/vivekjv/data-warehouse-modeling-presentation

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester			2			
Course Code	Course Name			Periods per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
21P2CS09	NETWORK SECURITY			4	0	0	4	25	75	100
COURSE OBJECTIVES	To learn about the Security architecture security types and security mechanisms..To learn about the Network security has four objectives: confidentiality, integrity, availability, and non repudiation.. To gain the knowledge of Securing inform									
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 &environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									
PO 15	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
COs	COURSE OUTCOME
CO 1	To understand the concept of security and Encryption algorithms
CO 2	To analyze public key cryptography and Message Authentication algorithms
CO 3	To Describe and learn about the Electronic mail Security concepts
CO 4	To Demonstrate about the web security considerations
CO 5	To learn about the intruders and virus protections
Pre-requisites	Computer Network Concepts

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	6	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	1	1	1	1	2	2	2	1	1	1	1	1	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	Introduction to Security	Periods	12
	Introduction: Security Trends-The OSI Security Architecture - Security Attacks - Security Services- Security Mechanisms- Model for Network Security - Symmetric Encryption and Message Confidentiality: Symmetric Encryption Principles - Symmetric Block Encryption Algorithms - Stream Ciphers and RC4 - Cipher Block Modes of Operations - Location of Encryption Devices-Key Distribution.		
	Public Key Cryptography and Message Authentication	Periods	12
Unit - II	Public Key Cryptography and Message Authentication: Approaches to Message Authentication - Secure Hash Functions and HMAC - Public Key Cryptography Principles - Public Key Cryptography Algorithms - Digital Signatures - Key Management. Authentication Applications: Kerberos - X.509 Authentication service - Public Key Infrastructures		
Unit - III	Electronic Mail Security	Periods	12
	Electronic mail Security: Pretty Good Privacy (PGP) - S/MIME. IP Security: IP Security Overview - IP Security Architecture - Authentication Header - Encapsulating Security Payload - Combining security Associations .		
Unit - IV	Web Security	Periods	12
	Web Security: Web Security Considerations- Security Sockets Layer (SSL) and Transport Layer Security (TLS) - Secure Electronic Transaction. Network Management Security: Basic Concepts of SNMP - SNMPV1 Community facility - SNMPV3.		
Unit - V	Intruders	Periods	12
	Intruders: Intruders - Intrusion Detection - Password Management - Malicious Software: Viruses and Related Threats - Virus Countermeasures - Distributed Denial of Service Attacks. Firewalls: Firewall Design Principles - Trusted Systems - Common Criteria for IT Security Evaluation.		
Total Periods			60

Text Books	
1	William Stallings, "Network Security Essentials – Applications and Standards", 6th Edition, Global Edition Pearson Education, 2017. EditionUnit I : Chapter 1 & 2 , Unit II : Chapter 3 & 4, Unit III : Chapter 5 & 6, Unit IV : Chapter 7 & 8, Unit-V (Chapter 9, 10 & 11)
References	
1	V.K.Pachghare , "Cryptography and Information Security" , PHI 2013.
2	William Stallings, "Cryptography and Network Security", Pearson Education – 2008.
3	Behrouz A Forouzan, Sophia Chung Fegan, "Data Communications and Networking", TMH-2013.
E-References	
1	https://www.edx.org/learn/network-security
2	https://www.udemy.com/courses/it-and-software/network-and-security/
3	https://www.edureka.co/blog/what-is-network-security/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	MSc	Programme Code	PCS		Regulations	2020-21			
Department	M.Sc CS		Semester			II			
21P2CSP03	ADVANCED JAVA PROGRAMMING LAB		Periods per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
			0	0	4	2	40	60	100
COURSE OBJECTIVES	<ol style="list-style-type: none"> 1. Design & develop core java applications such as packages, multithreading, exception handling, applets & event handling 2. Design and develop network communications, JDBC & simple server side scripting programs using Servlets & JSP 3. Design and develop database connectivity and simple web applications 								
LIST OF PRACTICALS									
1	Write a Program to prepare a student mark list using swing								
2	Write a Program to perform event handling in Swing								
3	Write a Program to implement RMI								
4	Write a HTML to Servlet Applications								
5	Write a Create a simple servlet program to display cookie's information								
6	Write a simple program to implement the concept of JDBC								
7	Write a program to implement the concept of JDBC & Swing								
8	Write a program for simple registration form in JSP								

Signature of BOS Chairman

Subject Title	MINI PROJECT-DOMAIN STUDY	Semester	II
Subject Code	2IP2CSPR01	Specialization	NA
Type	Mini Project - 1	L:T:P:C	2:0:2:0
<p>Total Marks : 40 Marks The Passing minimum shall be 40% out of 60 marks (24 Marks)</p> <p>FIRST REVIEW: (15 Marks)</p> <ol style="list-style-type: none"> 1. Project Title 2. Project Platform 3. Details of Guide 4. Problem Description / Modules 5. Presentation (PPT) <p>FINAL REVIEW: (25 Marks)</p> <ol style="list-style-type: none"> 1. Documentation 2. Screens Shots 3. DFD / ERD / System Flow Diagram (Whichever Applicable) 4. Presentation (PPT) 5. Final Project Report (with executable format including complete source code) 			

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester	3					
Course Code	Course Name			Periods per Week	Credit	Maximum Marks				
	SOFT COMPUTING			L	T	P	C	CA	ESE	Total
21P3CS10				4	0	0	4	25	75	100
COURSE OBJECTIVES	To familiarize with neural network concepts. To introduce the ideas of Neural Networks, fuzzy logic and use of heuristics based on human experience. To introduce the concepts of Genetic algorithm and its applications to soft computing using									
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 & environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									
PO 15	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

COs	COURSE OUTCOME
CO 1	Know the primitive functions of Neural network concepts.
CO 2	Understand the Back propagation
CO 3	Implement various Adaptive Resonance Theory
CO 4	Perform Fuzzy Set Theory operations
CO 5	Implement Genetic algorithms
Pre-requisites	we have to know about neural network and gentic algorithm

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	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 Neural Network - Variations of Standard Backpropagation Algorithms.		
Unit - III	Adaptive Resonance Theory (ART):	Periods	12
	Introduction - Classical ART networks - Simplified ART Architecture - ART1 - Architecture of ART1 - Special Features of ART1 Models - ART1 Algorithm - ART2 - Architecture of ART2 - ART2 Algorithm -Applications.		
Unit - IV	Fuzzy Set Theory:	Periods	12
	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	Fundaments of Genetic algorithms:	Periods	12
	Basic Concepts - Creation of Offsprings - Encoding - Reproduction. Genetic Modeling: Cross Over - Inversion and Deletion - Mutation Operator - Bit Wise Operators.		
Total Periods			60

Text Books	
1	Rajasekaran. S and Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, New Delhi-2012.
References	
1	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
2	George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
3	James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003
E-References	
1	rkala.in/lectures.php
2	https://en.wikipedia.org/wiki/Soft_computing
3	https://www.slideshare.net/pkabhijithnair/introduction-to-soft-computing-17433519
4	https://www.myreaders.info/html/body_soft_computing.html
5	https://studymafia.org/soft-computing-seminar-and-ppt-with-pdf-report

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester			3			
Course Code	Course Name			Periods per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
21P3CS11	PYTHON PROGRAMMING			4	0	0	4	25	75	100
COURSE OBJECTIVES	Analyze the efficiency of algorithmic problem solving Techniques.Acquire the mathematical foundation in analysis of algorithms.Understand different control logic in design strategies.Applydesign principles and concepts to write source code.									
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 &environmental consideration									
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 one 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.									
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.									
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.									
PO 15	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
COs	COURSE OUTCOME
CO 1	Recognize the operation of algorithmic problem solving Technique.
CO 2	Identify and handle basic tokens of python programs and practice to write small coding in python.
CO 3	Describe the computational operation of conditionals , function and string modules.
CO 4	Demonstrate the operation list and advanced list operations and applications.
CO 5	Recognize the operation of files and exceptions and illustrative programs.
Pre-requisites	basoc knowledge of any programming language concepts loop, if else , how operators used etc.

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	Python:	Periods	12
	Introduction - Python interpreter and interactive mode - Values & Types - Variable - Expressions and Statements - Assigning Values in Python, Variable Declaration, Multiple Assignment - Operators - Types of Operators, Operator Precedence - Modules and Functions: Modules, Function Definition and Use, Defining a Function, Calling Function, Uses of Function, Advantages of Functions - Flow of Execution.		
Unit - II	Parameters and Arguments:	Periods	12
	Functions with No Arguments, Functions with Arguments, Functions with Return Value. Conditionals: Booleans Values and Operators - Operators - Operator Precedence - Decision Making - if, ifâ€¦ Else, Ifâ€¦Elifâ€¦ Else & Nested statements - Iteration - Fruitful Functions - Scope of Variable - Global and Local Variable in Function, Nonlocal Variable - Composition - Recursion.		
Unit - III	Strings:	Periods	12
	String Slices - String are Immutable - String Functions and Methods - String Module - Lists as Array. Lists: Accessing Elements in Lists Using Subscript Operator, List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters, Deleting List Elements, Python Functions for List Operations, List Comprehension.		
Unit - IV	Tuples:	Periods	12
	Advantages of Tuple Over List, Accessing Values, Updating Tuples, Delete Tuple Elements, Tuple Assignment, Tuple Methods, Other Tuple Operations, Tuples As Return Values, Built-in Functions with Tuple, Variable Length Arguments Tuples - Dictionaries: Built-in Dictionary Functions and Methods, Access update and Add Elements, Delete and Remove Elements, Sorting, Iterating through, Reverse Lookup, Inverting a Dictionary, Memorization(Memos)		
Unit - V	Files:	Periods	12
	Reading and Writing, Format Operator, Command Line Arguments - Errors and Exceptions: Errors, Exceptions. Modules: Writing Modules, Locating Modules. Packages: Steps to create a Python Package.		
Total Periods			60

Text Books	
1	Dr. S. Suresh kumar Problem Solving and Python Programming Charulatha Publications 2018
References	
1	Kenneth A. Lambert The Fundamentals of Python First Programs 2011 Cengage Learning ISBN: 978-1111822705. Python Essentials Reference
2	Hitchhikers Guide to Python (http://docs.python-guide.org/en/latest): Under active development and still somewhat incomplete but there is good stuff.
3	Writing Idiomatic Python (Focused on not just getting the code to work, but how to write it in a really "Pythonic" way.
E-References	
1	www.tutorialspoint.com/python programs
2	en.wikipedia.org/wiki/python programmes
3	www.slideshare.net/kumar_vic/pythan for better programming.
4	www.slideshare.net/ShivamGupta276/python-seminar-ppt

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES
FOR WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			3			
Course Code	Course Name	Periods per Week		Credit	Maximum Marks				
		L	T	P	C	CA	ESE	Total	
21P3CS12	CLOUD COMPUTING		4	0	0	4	25	75	100
COURSE OBJECTIVES	To know the basics of Cloud Computing. Understand the Models and Services of Cloud Computing. Identify the purpose of Cloud Storage.. Evaluate cloud services with companys.								
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 & environmental consideration								
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 one 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.								
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. To identify, analyse and synthesize scholarly literature relating to the field of Computer Science.								
PO 14	To develop scientific outlook that solves any problem, encompassing the expected aspects of market demands.								
PO 15	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								

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	Cloud Computing Basics:	Periods	12
	Cloud Computing Overview-Applications-Intranets and the Cloud. Your Organization and Cloud Computing: When you can use Cloud computing-Benefits-Limitations-Security Concerns.		
Unit - II	Cloud Computing Technology:	Periods	12
	Cloud Hardware and Infrastructure-Clients-Security-Network-Services. Accessing the Cloud: Platforms-Web Applications-Web APIs-s-Web Browsers.		
Unit - III	Cloud Storage:	Periods	12
	Overview- Cloud Storage Providers. Standards: Applications-Client-Infrastructure-Service.		
Unit - IV	Software as a Service:	Periods	12
	Overview-Driving forces-Company offerings-Industries. Software plus Services: Overview-Mobile Device Integration-Providers-Microsoft Online.		
Unit - V	Local Clouds and Thin Clients:	Periods	12
	Virtualization in Your Organization-Server Solutions-Thin Clients. Migrating to the Cloud: Cloud Services for Individuals-Enterprise-Class Cloud Offerings-Migration.		
Total Periods			60

Text Books	
1	Anthony T.Velte Toby J.Velte Robert Elsenpeter Cloud Computing –A Practical Approach Tata McGraw Hill Education Pvt. Ltd
References	
1	Michael Miller," Cloud Computing: Web based Applications that change the way you work and Collaborate online", Que Publishing, August 2010.
2	Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for on demand computing, Applications and Data Centers in the Cloud with SLAs",Emereo Pvt. Ltd, July 2011.
E-References	
1	www.learnerstv.com/video/Free-video-Lecture-18965-Computer-Science...
2	nptel.ac.in/courses/106105033/41
3	freevideolectures.com – Computer Science – UC Berkeley
4	class.coursera.org/massiveteaching-001/lecture/33
5	www.south.cattellecom.com/Technologies/CloudComputing/lec01.pdf

Signature of BOS Chairman

		VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	M.Sc	Programme Code	PCS		Regulations	2021-22			
Department	Computer Science		Semester			3			
21P3CSP04	Core Course Practical – 4 PYTHON PROGRAMMING LAB		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
			0	0	5	2	40	60	100
COURSE OBJECTIVES	1. Creating simple programs GCD 2. Implement a python program from files 3. Implement a python program using Pygame								
	LIST OF PRACTICALS								
1	To compute the GCD of Two Numbers.								
2	Find square root of a Number.								
3	To find the exponentiation of a given positive Number.								
4	To perform Linear search from the list of Elements								
5	List the first N prime Numbers.								
6	Find the Maximum of a list of Numbers.								
7	Implementation Insertion Sort								
8	Remove all the duplicate elements in a list								
9	Implement a python program find the most frequent words in a text read from a file								
10	Simulate bouncing ball using Pygame								

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Subject Title	MINI PROJECT - II	Semester	III
Subject Code	21P3CSPR02	Specialization	NA
Type	Mini Project - II	L:T:P:C	0:0:3:5
<p>Total Marks : 40 Marks The Passing minimum shall be 40% out of 60 marks (24 Marks)</p> <p>FIRST REVIEW: (15 Marks)</p> <ol style="list-style-type: none"> 6. Project Title 7. Project Platform 8. Details of Guide 9. Problem Description / Modules 10. Presentation (PPT) <p>FINAL REVIEW: (25 Marks)</p> <ol style="list-style-type: none"> 6. Documentation 7. Screens Shots 8. DFD / ERD / System Flow Diagram (Whichever Applicable) 9. Presentation (PPT) 10. Final Project Report (with executable format including complete source code) 			

Signature of BOS Chairman

Subject Title	Major Project	Semester	IV
Subject Code	21P4CSPR03	Specialization	NA
Type	Major Project	L:T:P:C	0 : 0 : 0 : 9
FIRST REVIEW:			(10 Marks)
<ol style="list-style-type: none"> 1. Problem Identification 2. Problem definition 3. Presentation 			
SECOND REVIEW:			(10 Marks)
<ol style="list-style-type: none"> 1. Project Analysis 2. Design & Module description 			
FINAL REVIEW:			(20 Marks)
<ol style="list-style-type: none"> 1. DFD / ERD / System Flow Diagram (Whichever Applicable) 2. Coding and Implementation 3. Presentation 4. Final Project Report (with executable format including complete source code) 			
The Passing minimum shall be 40% out of 60 marks (24 Marks)			

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations		2021-2022	
Department	Computer Science		Semester			1			
Course Code	Course Name	Periods per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
21PICSE01	THEORY OF COMPUTATION	2	0	0	4	25	75	100	
COURSE OBJECTIVES	To provide the knowledge on Learning about automata, grammar, language, and their relationships. To give an understanding of the power of Turing machine, and the decidable nature of a problem. To give the idea on new trends and 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 & environmental consideration								
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 one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
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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 aspects of market demands.								

COs	COURSE OUTCOME
CO 1	Summarize of Automa Theory, Non Deterministic Automata
CO 2	Context Free Grammar and Pushdown Automata
CO 3	Apply various Closure Properties
CO 4	Analyze the Undecidable problems
CO 5	Analyze a given grammar type and characteristics
Pre-requisites	Compiler Design

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	Regular Languages	Periods	12
	Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - Finite Automata with Epsilon transitions - Regular Expression - FA and Regular Expressions - Pumping lemma for Regular languages - Equivalence and minimization of Finite Automata.		
Unit - II	Context Free Languages	Periods	12
	Context-Free Grammar (CFG) - Parse Trees - Ambiguity in grammars and languages - Equivalence of Parse trees and derivation - Normal forms for CFG - Definition of the Pushdown automata - Languages of a Pushdown Automata - Equivalence of Pushdown automata and CFG - Pumping lemma for CFL.		
Unit - III	Closure Properties	Periods	12
	Turing machines 8 Closure properties of Regular Sets: Complement and Intersection - Closure properties of CFL: Union, Concatenation, Kleene Closure, Intersection and Complement - Turing Machines - Language of a Turing machine - Turing machine as a computing device - Various techniques for construction of TMs - Equivalence of one tape and multi-tape Turing machines.		
Unit - IV	Undecidability	Periods	12
	A language that is not Recursively Enumerable (RE) - An undecidable problem that is RE - Undecidable problems about Turing Machine - Rice theorem for Recursive and Recursively enumerable languages - Post's Correspondence Problem		
Unit - V	Recent Trends & Applications	Periods	12
	Matrix grammar - Programmed grammar - Random context grammar - Regular Control grammar - Lindenmayer systems - A glance on DNA computing and Membrane computing.		
Total Periods			60

Text Books	
1	John E. Hopcroft and Jeffery D. Ullman, Introduction to Automata Theory, Languages and Computations, 3rd Edition, Pearson Education, Delhi, 2007.
2	Kamala Krithivasan and R. Rama, Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, Delhi, 2009.
References	
1	Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd, 2003.
2	J. Martin, Introduction to Languages and the Theory of Computation, Third Edition, Tata Mc Graw Hill, New Delhi, 2003.
3	Micheal Sipser, Introduction of the Theory and Computation, Thomson Learning, 1997.
E-References	
1	www.geeksforgeeks.org/regular-expressions-regular-grammar-and-regular-languages/
2	brilliant.org/wiki/context-free-languages/
3	infolab.stanford.edu/~ullman/ialc/spr10/slides/rs2.pdf
4	www.javatpoint.com/introduction-to-undecidability
5	slideplayer.com/slide/11239479/

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations			2021-2022
Department	Computer Science		Semester			1			
Course Code	Course Name		Periods per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
21P1CSE02	MOBILE COMMUNICATION		2	0	0	4	25	75	100
COURSE OBJECTIVES	To make students familiar with fundamentals of mobile communication systems. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties 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 & environmental consideration								
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 one 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.								
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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
	Applications - A Short history of wireless communication - A market for mobile communication - A short history of wireless communication - Some open research topics - A simplified reference model. Wireless transmission: Frequencies for radio transmission - Signals - Antennas - Signal propagation - Multiplexing - Modulation - Spread spectrum - Cellular systems		
Unit - II	Medium Access Control	Periods	12
	Motivation for a specialized MAC - SDMA - FDMA - TDMA - CDMA - Comparison of S/T/F/CDMA. Telecommunications systems: GSM-DECT-TETRA-UMTS and IMT-2000		
	Satellite systems	Periods	12
Unit - III	History - Applications - Basics - Routing - Localization - Handover - Examples. Broadcast systems - Overview - Cyclical repetition of data - Digital Audio Broadcasting - Digital Video Broadcasting - Convergence of broadcasting and mobile communications		
Unit - IV	Wireless LAN	Periods	12
	Infra red vs radio transmission - Infrastructure and ad-hoc network -IEEE 802.11 - HIPERLAN - Bluetooth		
	Mobile Network Layer	Periods	12
Unit - V	Mobile IP - Dynamic host configuration protocol - Mobile ad-hoc networks. Mobile Transport Layer: Traditional TCP - Classical TCP improvements - TCP over 2.5/3G wireless networks		
	Total Periods		60

Text Books	
1	Jochen Schiller, Mobile Communications, Pearson Education, Second Edition, 2003.
References	
1	William Stallings, Wireless Communications and Networks, Pearson Education, 2015.
2	Asoke K Talukder http://www.amazon.com/Mobile-Computing-Applications-McGraw-Hill-Communications/dp/0071477330 Mobile Computing: Technology, Applications, and Service Creation, TataMcGraw-Hill Communications Engineering, 2012.
E-References	
1	www.readorrefer.in/article/Mobile-Computing
2	www.readorrefer.in/article/Characteristics-of-Mobile-Computing
3	www.slideshare.net/manishreddy27/mobile-communication-72543084
4	www.powershow.com/view0/7841ea-NjI3N/Fundamentals_of_Mobile_communication_powerpoint_ppt_presentation
5	cs.wmich.edu/~llilien/teaching/Sec.1--...

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS	Regulations	2021-2022				
Department	Computer Science		Semester		1				
Course Code	Course Name		Periods per Week	Credit	Maximum Marks				
			L	T	P	C	CA	ESE	Total
21P1CSE02	MOBILE COMMUNICATION		2	0	0	4	25	75	100
COURSE OBJECTIVES	To make students familiar with fundamentals of mobile communication systems. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties 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 & environmental consideration								
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 one 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.								
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 of market demands.								

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
	Applications - A Short history of wireless communication - A market for mobile communication - A short history of wireless communication - Some open research topics - A simplified reference model. Wireless transmission: Frequencies for radio transmission - Signals - Antennas - Signal propagation - Multiplexing - Modulation - Spread spectrum - Cellular systems		
Unit - II	Medium Access Control	Periods	12
	Motivation for a specialized MAC - SDMA - FDMA - TDMA - CDMA - Comparison of S/T/F/CDMA. Telecommunications systems: GSM-DECT-TETRA-UMTS and IMT-2000		
	Satellite systems	Periods	12
Unit - III	History - Applications - Basics - Routing - Localization - Handover - Examples. Broadcast systems - Overview - Cyclical repetition of data - Digital Audio Broadcasting - Digital Video Broadcasting - Convergence of broadcasting and mobile communications		
Unit - IV	Wireless LAN	Periods	12
	Infra red vs radio transmission - Infrastructure and ad-hoc network -IEEE 802.11 - HIPERLAN - Bluetooth		
	Mobile Network Layer	Periods	12
Unit - V	Mobile IP - Dynamic host configuration protocol - Mobile ad-hoc networks. Mobile Transport Layer: Traditional TCP - Classical TCP improvements - TCP over 2.5/3G wireless networks		
	Total Periods		60

Text Books	
1	Jochen Schiller, Mobile Communications, Pearson Education, Second Edition, 2003.
References	
1	William Stallings, Wireless Communications and Networks, Pearson Education, 2015.
2	Asoke K Talukder http://www.amazon.com/Mobile-Computing-Applications-McGraw-Hill-Communications/dp/0071477330 Mobile Computing: Technology, Applications, and Service Creation, TataMcGraw-Hill Communications Engineering, 2012.
E-References	
1	www.readorrefer.in/article/Mobile-Computing
2	www.readorrefer.in/article/Characteristics-of-Mobile-Computing
3	www.slideshare.net/manishreddy27/mobile-communication-72543084
4	www.powershow.com/view0/7841ea-NjI3N/Fundamentals_of_Mobile_communication_powerpoint_ppt_presentation
5	cs.wmich.edu/~llilien/teaching/Sec.1--...

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.										
Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022				
Department	Computer Science			Semester			1				
Course Code	Course Name			Periods per Week			Credit		Maximum Marks		
				L	T	P	C	CA	ESE	Total	
21PICSE03	CLIENT / SERVER TECHNOLOGY			2	0	0	4	25	75	100	
COURSE OBJECTIVES	Know the basics of client /server technology. Understand the client server hardware and software components. Analyze the impact of client/server technology in business. Development and deployment of client server platform.										
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 & environmental consideration										
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 one 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.										
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 of market demands.										

COs	COURSE OUTCOME
CO 1	Understand the concepts of client /server technology
CO 2	To learn about s/w and h/w components of C/S technology
CO 3	To analyze the basics of business in client server technology
CO 4	To implement distributed client server system in various places
CO 5	Design and Establish the client server system to apply in various environments.
Pre-requisites	Computer Networks

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	4	PO 7	5
		PO 8	5
		PO 9	5
CO 4	3	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO4	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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 Client Server Computing	Periods	12
	Benefits of Client Server Computing-Hardware Trends-Components of Client Server Applications-Categories of Client Server Applications-Dispelling the Myths-Obstacles-Upfront and Hidden-Open Systems and Standards-Setting Organization-Factors for Success.		
Unit - II	Client Hardware and Software	Periods	12
	Client Components-Client Operating System-GUI-X Window Vs Windowing-Database Access-Application Logic-Client Server Products-Requirements-GUI Design Standards-Open GUI Standards.		
Unit - III	Server Hardware	Periods	12
	Benchmarks-Categories of Server-Features of Server Machines-Classes of Server Machines-Server Environment-Eight layers of Software-Network Management Environment-Network Computing Environment-Server Requirements-Platform Independence-Transaction Processing-Connectivity-Intelligent Database-Stored Procedures-Triggers-Load Leveling-Optimizer-Testing and Diagnostic Tools-Reliability-Backup and Recovery Mechanisms- Server Data Managements and Access Tools.		
Unit - IV	Overview of Networking	Periods	12
	Layers, Interfaces and protocols-Standard Architectures-Network Characteristics-Network Management Standards-LAN Hardware and Software-LAN Hardware-Network Operating System.		
Unit - V	Development and Deployment	Periods	12
	Development Methodology-Convert Existing Screen Interfaces-Application Development Tools-Managing the Production Environment-Production Requirements-Future Trends.		
Total Periods			60

Text Books	
1	Dawna Travis Dewire, Client/Server computing, 11th Reprint 2009, Tata McGraw Hill. (Unit-I:Chapter 1,2,3&4, Unit-II: Chapter 5,6&7,Unit-III :Chapter 8,9,10,11&12) Unit - IV:Chapter 15 &16, Unit -V:Chapter 18,18 &19)
References	
1	Jafferey D. Schank, Novell's guide to Client/Server Application and Architecture, 2005 Edition, BPB Publications.
2	Robert Orfali, Dan Harkey and Jeri Edwards, Client/Server Survival Guide, 3rd Edition, 2009 John Wiley & Sons, Inc.
E-References	
1	oer.nios.ac.in/wiki/index.php/Client_-_Server_Technology
2	www.tutorialspoint.com/Client-Server-Computing
3	isaacomputerscience.org/concepts/net_internet_client_server_model
4	www.springer.com/productFlyer
5	www.britannica.com/technology/client-server-architecture

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
	Programme	M.Sc	Programme Code	PCS	Regulations	2021-2022				
Department	Computer Science			Semester			1			
Course Code	Course Name			Periods per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
21PICSE04	INTERNET OF THINGS			2	0	0	4	25	75	100
COURSE OBJECTIVES	To know the Fundamentals, characteristics of Internet Of Things.Understand the IoT Enabling Technologies.Implementing IoT in whether forecasting.Compare IoT and M2M. Synthesis Commercial IoT.									
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 &environmental consideration									
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 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 of market demands.									

COs	COURSE OUTCOME
CO 1	Knowledge on IoT
CO 2	Understand IoT enabling Technologies.
CO 3	Apply IoT techniques for improving the efficiency of algorithms.
CO 4	Analyze each and every algorithm techniques IN IoT with M2M
CO 5	Analyze a given algorithm for its efficiency based on IoT management.
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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	Periods	12
	Introduction to Internet of Things - Definition & Characteristics of IoT - Things in IoT - IoT Protocols - Logical Design of IoT: IoT functional Blocks - IoT Communication Models - IoT Communication APIs.		
Unit - II	IoT Enabling Technologies	Periods	12
	Wireless Sensor Networks - Cloud computing - Bigdata Analytics - Communication Protocols - Embedded Systems. Domain Specific IoTs: Home Automation - cities - Retail - Health & Monitoring.		
Unit - III	Developing IoT	Periods	12
	Introduction - IoT Design Methodology - Case Study on IoT System for Weather Monitoring.		
Unit - IV	IoT and M2M	Periods	12
	Introduction - M2M - Difference between IoT and M2M - SDN and NFV for IoT: Software defined Networking - Network Function Virtualization.		
Unit - V	IoT System Management with NETCONF-YANG	Periods	12
	Need for IoT System Management - SNMP - NETCONF - YANG. Tools for IoT: Introduction - Chef - Puppet.		
Total Periods			60

Text Books	
1	Arshdeep Bahga, Vijay Madisetti, Internet of Things, A Hands on Approach, Universities Press 2015.
References	
1	Oliver Hersent, David Boswarthick, Omar Elloumi. The Internet of Things – Key applications and Protocols, Wiley, 2012.
E-References	
1	internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT
2	www.oracle.com/internet-of-things/what-is-iot/
3	www.theinternetofthings.eu
4	www.cisco.com/c/en_in/solutions/internet-of-things/overview.html
5	en.wikipedia.org/wiki/Internet_of_things

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science			Semester			2			
Course Code	Course Name			Periods per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
21P2CSE05	BIG DATA ANALYTICS			4	0	0	3	25	75	100
COURSE OBJECTIVES	Understand the Big Data Platform and its Use cases. Provide an overview of Mining Data Stream To learn the concept of Hadoop.									
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 & environmental consideration									
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 one 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.									
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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 aspects of market demands.									

COs	COURSE OUTCOME
CO 1	Understand the basic concept of Big Data
CO 2	Illustrates about Mining Data stream and its application
CO 3	Learn and apply about Hadoop in real time application
CO 4	Develop Big Data Solutions using Hadoop Eco System
CO 5	Learn different techniques and to know about how it is applied on Big Data Using Pig and Hive
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	4
CO 2	3	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	6	PO 13	4
		PO 14	4
		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	1	1	2	2	1	1	1	1	1	1	1	1	1
CO2	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	1	1	1	1	2	2	2	1	1	1	1	1	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	Introduction To Big Data	Periods	12
	Introduction to Big Data Platform - Challenges of Conventional Systems - Intelligent data analysis - Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.		
Unit - II	Mining Data Streams	Periods	12
	Introduction To Streams Concepts - Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream - Filtering Streams - Counting Distinct Elements in a Stream - Estimating Moments - Counting Oneness in a Window - Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.		
Unit - III	HADOOP	Periods	12
	History of Hadoop- The Hadoop Distributed File System - Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort - Task execution - Map Reduce Types and Formats- Map Reduce Features.		
Unit - IV	HADOOP Environment	Periods	12
	Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop - HDFS - Monitoring-Maintenance Hadoop benchmarks- Hadoop in the cloud.		
Unit - V	Frameworks	Periods	12
	Applications on Big Data Using Pig and Hive - Data processing operators in Pig - Hive services - HiveQL - Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.		
Total Periods			60

Text Books	
1	Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2	Tom White,Hadoop: The Definitive Guide, Third Edition, Oreilly Media, 2012.
References	
1	Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012
2	Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
E-References	
1	www.greatlearning.in
2	www.edx.org
3	www.slideshare.net/nasrinhussain1/big-data-ppt-31616290
4	resources.sei.cmu.edu/asset_files/Presentation/2014_017_101_89659.pdf
5	www.snia.org/sites/default/orig/DSI2014

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS	Regulations	2021-2022				
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week			Credit		Maximum Marks	
			L	T	P	C	CA	ESE	Total
21P2CSE06	MULTIMEDIA AND VIRTUAL REALITY		4	0	0	3	25	75	100
COURSE OBJECTIVES	To understand fundamental trends and evolution of Multimedia Technology. Have hands-on knowledge in developing simple Audio and Video technology. Be able to plan, design, and develop Multimedia devices. To learn about multimedia skills & 3D modeling.								
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 <u>computing models from defined problems and requirements</u>								
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain <u>disciplines</u> .								
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 <u>and safety, cultural, societal & environmental consideration</u>								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and <u>interpretation of data, and synthesis of the information to provide valid conclusions</u> .								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex <u>computing activities, with an understanding of the limitations</u> .								
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PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a <u>computing professional</u> .								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary <u>environments</u> .								
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 <u>effective presentations</u> .								
PO 10	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and <u>global contexts, and the consequential responsibilities relevant to professional computing practice</u> .								
PO 11	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary <u>environments</u> .								
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 market demands.								

COs	COURSE OUTCOME
CO 1	To understand the concept of Multimedia skills
CO 2	To know the audio concepts in multimedia
CO 3	To Describe and learn about the hardware tools used.
CO 4	To learn about the hardware tools used.
CO 5	To learn about the virtual reality 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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	Periods	12
	what is multimedia - making multimedia - multimedia skills - Text.		
Unit - II	Sound	Periods	12
	Digital Audio-MIDI-Music CDs. Images: Making Still Images-Color-Image File Formats. Animation-Video.		
Unit - III	Hardware	Periods	12
	Macintosh versus Windows-Networking-Connections-Memory and Storage devices-Input devices- Output Hardware- Communication Devices.		
Unit - IV	Basic Software Tools	Periods	12
	Text Editing and Word Processing Tools - OCR Software - Painting and Drawing Tools. 3D Modeling and Animation Tools - Image Editing Tools - Animation, Video and Digital Movie Tools - Multimedia Authoring Tools.		
Unit - V	Virtual Reality	Periods	12
	Introduction - A Generic VR System: VirtualEnvironment -VR Technology-Modes Of Interaction-VR Hardware: Sensor Hardware, Head Coupled Displays - Acoustic Hardware-Integrated VR - VR Software: Modeling Virtual Worlds- Physical Simulations - VR Application		
Total Periods			60

Text Books	
1	Tay Vaughan , Multimedia making it work , 2014, TMH.(Unit-I :Chapter-1,2,3& 4, Unit-II :Chapter-5,6,7& 8, Unit-III :Chapter-9,Unit-IV :Chapter-10 & 11)
2	John Vince, Virtual Reality Systems, Addison Wesley, 4th Edition
References	
1	Free T. Hofstetter, Multimedia LITERACY, TMH, 1995
2	Simoin j.,Gibbs, Dionysios C and Tsichriziz, Multimedia Programming ,Addison Wesley, 2010.
3	John F.Koegel Buford, Mutimedia Systems, Addison Wesley, 2014.
4	Ralf steinmetz and klaranahrstedt,Multimedia : Computing, communications Applications, 2013.
E-References	
1	www.richardbrice.net/chap01.htm
2	www.slideshare.net/suprabhabhadran
3	www.slideshare.net/saishanesarikar
4	www.slideserve.com/cana/multimedia-and-virtual-reality
5	slideplayer.com/slide/12781832/

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**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
21P2CSE07	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS		4	0	0	3	25	75	100
COURSE OBJECTIVES	To introduce the basic principles, techniques, and applications of AI. To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.								
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 & environmental consideration								
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 one 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								
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 of market demands								

COs	COURSE OUTCOME
CO 1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations
CO 2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
CO 3	Demonstrate a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models, Robotics
CO 4	Apply scientific method to models of machine learning and Robotics
CO 5	Evaluate Knowledge representation in Expert System by applying Expert System 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	1
		PO 2	2
		PO 3	4
CO 2	3	PO 4	4
		PO 5	3
		PO 6	3
CO 3	2	PO 7	5
		PO 8	5
		PO 9	5
CO 4	6	PO 10	4
		PO 11	4
		PO 12	4
CO 5	6	PO 13	4
		PO 14	4
		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	1	1	2	2	1	1	1	1	1	1	1	1	1
CO2	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO3	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1
CO5	1	1	1	1	1	1	2	2	2	1	1	1	1	1	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	Introduction to AI	Periods	12
	What is AI - Foundations of AI - History of AI - The State of the art. Solving Problems by Searching: Problem Solving Agents - Example Problems - Searching for Solution - Uninformed Search Strategies - Informed Search Strategies - Heuristics Functions - Beyond Classical Search: Local search algorithms and optimization problems - Local Search in continuous spaces - Searching with nondeterministic actions - Searching with Partial Observations		
Unit - II	Logical Agents	Periods	12
	Knowledge based Agents - Logic - Propositional Logic - Propositional Theorem Proving - Effective Propositional model checking - Constraint Satisfaction problems (CSP): Defining CSP- Constraint Propagation - Backtracking Search for CSPs - Local Search for CSPs - First Order Logic: Syntax and Semantics - Using First order Logic - Knowledge Engineering - Inference in First Order Logic: Unification and Lifting - Forward Chaining - Backward Chaining - Resolution		
Unit - III	Knowledge Representation	Periods	12
	Ontological Engineering - Categories and Objects - Events - Reasoning Systems for Categories - Reasoning with Default Information. Quantifying Uncertainty: Acting under Uncertainty - Basic Probability Notation - Bayesâ€™ Rule. Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain -The Semantics of Bayesian Networks - Exact Inference in Bayesian Networks - Approximate Inference in Bayesian Networks - First order Probability Models		
Unit - IV	Making Simple Decisions	Periods	12
	The Basis of Utility Theory - Utility Functions - Decision Networks - Decision Theoretic Expert Systems. Making Complex Decision: Game theory. Learning from Examples: Forms of Learning - Supervised Learning - Decision Trees - Regression and Classification with Linear Models - ANN - SVM - Ensemble Learning - Practical Machine Learning.		
Unit - V	Expert System	Periods	12
	Definition - Features of an expert system - Organization - Characteristics - Prospector - Knowledge Representation in expert systems - Expert system tools - MYCIN - EMYCIN		
Total Periods			60

Text Books	
1	Stuart Russel, Peter Norvig, Artificial Intelligence : A Modern Approach 3 Edition, Pearson Education 2014
2	Donald A. Waterman, A Guide to Expert Systems, Pearson Education
References	
1	George F. Luger, Artificial Intelligence â€™ Structures and Strategies for Complex Problem Solving, Fourth Edition, Pearson Education, 2002
2	Elaine Rich, Kevin Knight, Artificial Intelligence 2 Edition, TMH, 1991
3	Dan W. Patterson, Introduction to Artificial Intelligence & Expert Systems, EEE, PHI, 1999
E-References	
1	www.javatpoint.com
2	www.tutorialspoint.com
3	www.mygreatlearning.com
4	www.umsl.edu/~joshik/msis480/chapt11.htm
5	krazytech.com/technical-papers/artificial-intelligence

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**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
21P2CSE08	COMPILER DESIGN		4	0	0	3	25	75	100
COURSE OBJECTIVES	To introduce the major concept areas of language translation and compiler design. To enrich the knowledge in various phases of compiler and its use. Understand code optimization techniques, code generation, and use of symbol table.								
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 & environmental consideration								
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 one's 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								
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 of market demands.								

COs	COURSE OUTCOME
CO 1	Understand the concepts of Compilers
CO 2	To learn about context free grammars
CO 3	To analyze the basics of syntax directed translations.
CO 4	To implement lexical phase and syntactic phase concepts.
CO 5	Design and establish the compiler optimization process.
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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	4	PO 7	5
		PO 8	5
		PO 9	5
CO 4	3	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO4	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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			
	Introduction to Compilers	Periods	12
Unit - I	Compilers and Translator - Need of Translator - The structure of a Compiler - Lexical analysis - Syntax analysis - Intermediate code generation - Optimization - Code generation - Compiler writing tools. Finite automata and lexical Analysis: The role of the lexical analysis - A simple approach to the design of lexical analyzers- Regular expressions to finite automata - Minimizing the number of states of a DFA.		
	The Syntactic specification of programming languages	Periods	12
Unit - II	Context free grammars -Derivations and parse trees - Capabilities of context free grammars. Basic parsing techniques: Parsers - Shift reduce parsing - Operator precedence parsing - Top down parsing - Predictive parsers.		
	Syntax directed translation	Periods	12
Unit - III	Intermediate code - Postfix notation - Parse trees and syntax trees - 3 address code - Quadruples and triples - Boolean expressions - Statements that alter the flow of control. Symbol tables: The contents of a symbol table - Data structures for symbol table - Representing scope		
	Run time storage administration	Periods	12
Unit - IV	Implementation of a simple stack allocation scheme -Implementation of block-structured languages. Error deduction and recovery: Errors - Lexical phase errors - Syntactic phase errors - Semantic errors.		
	Introduction of code optimization	Periods	12
Unit - V	The principle sources of optimization - Loop optimization - The DAG representation of basic blocks -Global data flow analysis. Code generation: Object programs - Problems in code generation-A simple code generator - Register allocation and assignment -Code generation from DAG's-Peeholes optimization.		
	Total Periods		60

Text Books	
1	Principles of Compiler Design by Alfred V.Aho, Jeffrey D.Ullman , Narosa Publications House, 5th or later edition, 2002.
References	
1	Modern Compiler Design by David Galles, Fifth Edition 2012.
2	S.Godfrey Winster, S. Arunadevi, R.Sujatha, "Compiler Design," Yesdee Pub., 2016
3	Alfred V. Aho, Ravi Sethi, Jeffery D. Ullman, "Compiler Principles Techniques and Tools", Pearson Education, 2008.
4	Kenneth C. Loudon, "Compiler Construction, Principles and Practice", Thomson Learning Inc, 2007.
E-References	
1	https://www.tutorialspoint.com/compiler_design/index.htm
2	https://www.javatpoint.com/compiler-tutorial
3	https://www.geeksforgeeks.org/introduction-of-compiler-design/
4	https://www.guru99.com/compiler-design-tutorial.html
5	www.youtube.com playlist

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name	Periods per Week		Credit	Maximum Marks				
		L	T	P	C	CA	ESE	Total	
21P2CSE09	ADHOC SENSOR NETWORKS		4	0	0	3	25	75	100
COURSE OBJECTIVES	To study the protocols and the functionalities of Adhoc networks.To understanding the various applications developed based on Adhoc network.Identify and addressing issues and challenges created.To know about the challenges in establish infrastructure								
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 evaluatesystems,components,or processes that meet specified needs with appropriate consideration for public health and safety,cultural,societal & environmental consideration								
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, andnorms 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 one 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,make effective 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 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 of market demands.								

COs	COURSE OUTCOME
CO 1	Understand the concepts of Adhoc networks
CO 2	To learn about Routing protocols
CO 3	To analyze the basics of secure routing protocols.
CO 4	To compare sensor networks and networking sensors
CO 5	Design and Establish the topology control in networks
Pre-requisites	Computer Networks

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	4	PO 7	5
		PO 8	5
		PO 9	5
CO 4	3	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO4	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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			
	Introduction And Mac Protocols	Periods	12
Unit - I	Cellular And Ad Hoc Networks - Issues in Ad hoc Networks - Design Issues and Design Goals of MAC protocol for Ad hoc Networks - Classification of MAC protocols - Contention Based Protocols - Reservation and Scheduling Mechanisms - Other Protocols.		
	Routing Protocols	Periods	12
Unit - II	Design Issues and Classifications of unicast and multicast Routing Protocols - Proactive, Reactive and Hybrid routing protocol - Tree based and Mesh based multicast protocols, Energy Efficient and QoS guaranteed multicast protocols.		
	Transport Layer And Security Issues	Periods	12
Unit - III	Design Issues, Design Goals and Classifications of Transport layer protocols - TCP over Ad Hoc - Security in Adhoc Networks - Network Security Requirements - Network Security Attacks - Key Management - Secure Routing in Ad hoc Networks		
	Sensor Networks And Networking Sensors	Periods	12
Unit - IV	Unique Constraints and Challenges - Advantages and Applications - Collaborative Processing - Key Definitions - Localization and Tracking - Networking Sensors - MAC - Geographic, Energy Aware and Attribute based Routing.		
	Infrastructure Establishment And Network Database	Periods	12
Unit - V	Topology Control - Clustering - Time Synchronization - Localization and Localization Services - Task Driven Sensing - Roles of Sensor Nodes and Utilities - Network Database		
	Total Periods		60

Text Books	
1	C. Siva Ram Murthy and B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2nd Edition, 2005.
2	Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks – An Information Processing Approach" Elsevier Publications, 2004.
References	
1	C.K.Toth, "Ad hoc Mobile Wireless Networks – Protocols and Systems", Pearson Education, 1st Edition, 2007.
2	George Aggelou, "Mobile Ad hoc Networks – From Wireless LANs to 4G Networks", Tata McGraw Hill, 2009.
3	Holger Karl and Andreas Willing, "Protocols and Architectures for Wireless Sensor Networks" Wiley Publications, 2005.
E-References	
1	https://nptel.ac.in/courses/106/105/106105160/
2	https://www.slideshare.net/ayyakathir/cs6003-ad-hoc-and-sensor-networks-63703390
3	https://www.corsi.univr.it/documenti/OccorrenzaIns/matdid/matdid473708.pdf
4	http://www.tfb.edu.mk/amarkoski/WSN/Kniga-w03.pdf
5	https://lewisgroup.uta.edu/ee5369/Karl%20slides/sensys-ch3-network-architecture.pdf

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester				2		
Course Code	Course Name		Periods per Week			Credit		Maximum Marks	
			L	T	P	C	CA	ESE	Total
21P2CSE10	OBJECT ORIENTED ANALYSIS AND DESIGN		4	0	0	3	25	75	100
COURSE OBJECTIVES	To learn the basics of object oriented system development. To understand the OOAD methodologies. Apply UML Language. Understand different design strategies in OOAD5. Apply design principles and concepts to software designing.								
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 & environmental consideration								
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 one's 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								
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 of market demands.								

COs	COURSE OUTCOME
CO 1	Summarize the relevance of software project management
CO 2	Differentiate different software configuration and OOAD tools
CO 3	Apply UML language techniques.
CO 4	Analyze each and every design techniques
CO 5	Analyze a given software for its efficiency based on the object oriented design
Pre-requisites	Programming in C++

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	An Overview of Object Oriented Systems Development	Periods	12
	Object Basics - object oriented systems development life cycle.		
	Object Oriented Methodologies	Periods	12
Unit - II	Introduction - Rumbaugh Object Modeling Technique - The Booch Methodology - The Jacobson Methodologies - Patterns - Frameworks - The Unified Approach.		
Unit - III	Unified Modeling Language	Periods	12
	Introduction - static and dynamic models - why modeling? - UML diagrams - UML class diagram - use-case diagram - UML dynamic modeling - UML extensibility.		
	Object Analysis	Periods	12
Unit - IV	Classification - Introduction - Classification Theory - Approaches for Identifying Classes - Noun Phrase Approach - Common Class Patterns Approach - Use Case Driven Approach - Classes, Responsibilities And Collaborators - Naming Classes.		
	Object Oriented Design Process and Design Axioms	Periods	12
Unit - V	Introduction - The Object Oriented Design Process - Object oriented design axioms - corollaries - design patterns - Designing Classes: UML object constraints language - class visibility: designing well defined public, private and protected protocols -designing classes: refining attributes.		
	Total Periods		60

Text Books	
1	Ali Bahrami, "Object Oriented Systems Development", Tata McGRAW Hill Editions, computer science series
References	
1	Grady Booch, Robert A. Maksimchuk, Michael W. Engel, and Bobbi J. Young, "Object-Oriented Analysis and Design with Applications", 3rd Edition
2	Simon Bennett, Steve McRobb, and Ray Farmer, " Object-oriented Systems Analysis and Design Using UML".
E-References	
1	https://www.tutorialspoint.com/object_oriented_analysis_design/index.htm
2	https://www.geeksforgeeks.org/object-oriented-analysis-and-design/
3	https://nptel.ac.in/courses/106/105/106105153/
4	http://g.oswego.edu/dl/oosdw3/
5	https://www.umsl.edu/~sauterv/analysis/488_f01_papers/quillin.htm

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**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**
Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week			Credit		Maximum Marks	
			L	T	P	C	CA	ESE	Total
21P2CSE11	EMBEDDED SYSTEMS		4	0	0	3	25	75	100
COURSE OBJECTIVES	Understand Embedded Systems, Processor and memory organization, Software engineering practices, RTOS, EDLC. Enable the students to understand embedded-system programming and apply that knowledge to design and develop embedded solutions.								
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 & environmental consideration								
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 one's 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								
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 of market demands.								

COs	COURSE OUTCOME
CO 1	Understand the concept of embedded system, microcontroller, different components of microcontroller and their interactions.
CO 2	Get familiar with Processor and Organization
CO 3	Acquire knowledge of Software Engineering practices in the Embedded software development
CO 4	Acquire knowledge about Real time operating system based on embedded system design
CO 5	Know the basic concepts of embedded system design with vx works and MicroC/OS-II RTOS
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	4
CO 2	1	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	3	PO 10	4
		PO 11	4
		PO 12	4
CO 5	3	PO 13	4
		PO 14	4
		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	1	1	2	2	1	1	1	1	1	1	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO5	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model			
2. Assignment			
3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
	Introduction to Embedded Systems	Periods	12
Unit - I	Categories of embedded Systems-specialties of embedded systems- requirements of embedded systems -challenges and issues in embedded software development - recent trends in embedded systems-Architecture of embedded systems: Hardware architecture - software architecture-application software - Communication software -Embedded systems on a Chip (SoC) and the use of VLSI designed circuits.		
	Processor and memory organization	Periods	12
Unit - II	Devices and buses for Device Network Device drivers and Interrupt servicing mechanism.-program modeling concepts in single and multiprocessor systems software-development process.		
	Software Engineering Practices in the Embedded software development	Periods	12
Unit - III	Inter-process communication and synchronization of process, tasks and threads- Hardware-software co-design in an embedded system.		
	Hardware software co-design and program modeling	Periods	12
Unit - IV	Embedded hardware design and development-embedded firmware design and development-Real-time operating system (RTOS) based embedded system design-		
	Introduction to embedded system design with vx works and MicroC/OS	Periods	12
Unit - V	II RTOS- Integration and Testing of embedded hardware and firmware-embedded system development environment-embedded product development life cycle(EDLC)		
	Total Periods		60

Text Books	
1	Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw- Hill, Twelfth Reprint 2007. (Unit- I: Chapter 1, Unit -II: Chapter 2,3,4 &6, Unit- III: Chapter 7,8 &12)
2	Introduction to Embedded systems - SHIBU K V TATA McGraw- Hill 2009(Unit - IV: Chapter 8,9&10, Unit-V: Chapter 11,12,13 & 15)
References	
1	Embedded system design, ARNOLD S.BERGER ,south Asian edition -2005
2	Embedded system design ,Frank Vahid/Tony givargis-reprint-2009
E-References	
1	https://en.wikipedia.org/wiki/Embedded_system
2	https://en.wikibooks.org/wiki/Embedded_Systems/Atmel_AVR
3	https://internetofthingsagenda.techtarget.com/definition/embedded-system
4	https://www.tutorialspoint.com/embedded_systems/es_overview.htm
5	https://www.codrey.com/embedded-systems/embedded-systems-introduction/

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022			
Department	Computer Science		Semester			2				
Course Code	Course Name		Periods per Week			Credit		Maximum Marks		
			L	T	P	C	CA	ESE	Total	
21P2CSE12	WIRELESS APPLICATION PROTOCOL		4	0	0	3	25	75	100	
COURSE OBJECTIVES	To understand fundamental trends of technological evolution of Wireless technology. Have hands-on knowledge in developing simple and comprehensive Wireless WAP contents. Be able to plan, design, and develop WAP pages and contents.									
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 & environmental consideration									
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 one's 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									
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 of market demands.									

COs	COURSE OUTCOME
CO 1	To understand the concept of security and Encryption algorithms
CO 2	To analyze public key cryptography and Message Authentication algorithms
CO 3	To Describe and learn about the Electronic mail Security concepts
CO 4	To demonstrate about the web security considerations
CO 5	To learn about the intruders and virus protections
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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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			
	Introduction	Periods	12
Unit - I	Key Services for the Mobile Internet - Business Opportunities. Making the Internet "Mobile": Challenges and Pitfalls - The Origins of WAP - WAP Architecture - Components of the WAP Standard - Network Infrastructure services Supporting WAP Clients.		
	The Wireless Markup Language	Periods	12
Unit - II	Overview - The WML Document Model - WML Authoring - URLs Identify Content - Markup Basics - WML Basics - Basic Content - Events, Tasks and Bindings - Variables - Other Contents - Controls - Miscellaneous Markup - Sending Information - Application Security - Document Type Declaration - Errors and Browser Limitations.		
	User Interface Design	Periods	12
Unit - III	Making wireless Application easy to use: Web Site Design: Computer Terminals versus Mobile Terminals - Designing a usable WAP Site - Structured Usability Methods - User Interface Design Guidelines.		
	Tailoring Content to the Client-Push Messaging	Periods	12
Unit - IV	Overview of WAP Push - Push Access Protocol - WAP Push Addressing - Push Message - MIME media types for Push -Messages - Push Proxy Gateway - Push Over - the - Air Protocol - Push Initiator Authentication and Trusted Content.		
	Wireless Telephony Applications	Periods	12
Unit - V	Overview of the WTA Architecture - The WTA Client Framework - Design Considerations.		
	Total Periods		60

Text Books	
1	Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Daniel Mauney, Jari Alvinen, David Bevis, Jim Chan., "The Wireless Application Protocol " Writing Application for the mobile internet ", Pearson Education, 2010. (UNIT-I :Chapter - 1 to 6, UNIT-II :Chapter - 7, UNIT-III :Chapter - 10, UNIT-IV: Chapter - 11&12, UNIT-V :Chapter - 13 to 15).
References	
1	Charless Arehare, Nirmal Chidambaram, and others, "Professional WAP", Wrox Press Ltd., Shroff publ. And Dist " Pvt. Ltd., 2001.
2	Ryan Sean Younger , "WAP & WML : Designing Usable Mobile Sites", 2011.
E-References	
1	www.en.wikipedia.org/wiki/Wireless_Application_Protocol
2	www.readorrefer.in/article/Wireless-Application-Protocol-Overview
3	https://www.slideshare.net/OECLIBOdishaElectron/wireless-application-protocol-ppt-79474516
4	https://slideplayer.com/slide/3754972/
5	www.en.wikipedia.org/wiki/Wireless_Application_Protocol

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
21P2CSE13	CYBER SECURITY AND COMPUTER FORENSICS		4	0	0	4	25	75	100
COURSE OBJECTIVES	To create a secure cyber ecosystem in the country. To create an assurance framework for design of security policies. To strengthen the Regulatory framework for ensuring a Secure Cyberspace ecosystem. To identify, collect, preserve, and analyze 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 & environmental consideration								
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 one's 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								
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 of market demands.								

COs	COURSE OUTCOME
CO 1	Understand the basic concepts of Computer Security and cryptography
CO 2	To know the types of attacks occur in user or website data
CO 3	Explore networking in cyber forensics
CO 4	Understand about the computer investigation in forensics
CO 5	Be familiar with forensic tools and case studies
Pre-requisites	Computer Networks

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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	2	PO 7	5
		PO 8	5
		PO 9	5
CO 4	2	PO 10	4
		PO 11	4
		PO 12	4
CO 5	3	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO4	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO5	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model			
2. Assignment			
3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	Introduction	Periods	10
	What is Computer Security? - Threats -Harm - Vulnerabilities - Controls. Tool box Authentication - Access Control and Cryptography: Authentication - Access Control-Cryptography.		
Unit - II	The Web's User Side	Periods	10
	Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks. Operating System: Security in Operating Systems - Security in the Design of Operating Systems - Rootkit.		
Unit - III	Networks	Periods	13
	Network Concepts - Threats to Network Communications - Wireless Network Security - Denial-of-Service - Distributed Denial-of-Service. Legal Issues and Ethics: Protecting Programs and Data - Information and the law - Rights of Employees and Employers - Redress for Software Failures - Computer Crime - Ethical issues in Computer Security - Incident Analysis with Ethics.		
Unit - IV	Computer Forensics and Investigations as a Profession	Periods	13
	Understanding Computer Forensics - Preparing for Computer Investigation - Maintaining Professional Conduct. Understanding Computer Investigations: Preparing a Computer Investigation - Taking a Systematic Approach - Procedures for Corporate High-Tech Investigation - Understanding Data Recovery Workstations and Software - Conducting an Investigation - Completing the case.		
Unit - V	Data Acquisition	Periods	14
	Understanding Storage Formats for Digital Evidence - Determining the Best Acquisition Method - Contingency Planning for Image Acquisitions - Using Acquisitions tools -Validating Data Acquisitions - Performing RAID Data Acquisitions. Current Computer Forensics Tool: Evaluating Computer Forensics Tool Needs - Computer Forensics Software Tools - Computer Forensics Hardware Tools - Validating and Testing Forensics Software.		
Total Periods			60

Text Books	
1	Charles P.Pfleeger, Shari Lawrence Pfleeger & Jonathan Margulies, "Security in Computing", 5th Edition, Prentice Hall, 2015.
2	Bill Nelson, Amelia Phillips & Christopher Steuart, "Guide to Computer Forensics and Investigations", 3rd Edition, 2010, Course Technology.
References	
1	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley.
2	Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier.
3	Angus M.Marshall, "Digital Forensics: Digital evidence in criminal investigation", John-Wiley and Sons, 2008.
E-References	
1	https://www.edureka.co/blog/what-is-cybersecurity
2	https://www.helpnetsecurity.com/2020/04/07/threats-web-security/
3	https://www.bestcomputersciencedegrees.com/lists/5-legal-and-ethical-issues-in-it/
4	https://slideplayer.com/slide/8300584/
5	https://www.gmercyu.edu/academics/learn/computer-forensics-career-guide

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**
Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week			Credit		Maximum Marks	
			L	T	P	C	CA	ESE	Total
21P2CSE14	DIGITAL IMAGE PROCESSING		4	0	0	4	25	75	100
COURSE OBJECTIVES	To develop experience with using computers to process images. To understand the basic principles and methods of digital image processing. To formulate solutions to general image processing problems.								
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 & environmental consideration								
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 one 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								
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 of market demands.								

COs	COURSE OUTCOME
CO 1	Understand the concept of Digital Image Processing
CO 2	Learn arithmetic and logic operations on images.
CO 3	Learn about image restoration and color processing
CO 4	Identify object recognition concepts
CO 5	Learn about the Wireless Telephony System
Pre-requisites	-

Knowledge Levels

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

CO / PO / KL Mapping

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

COs	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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			
	Introduction	Periods	12
Unit - I	What is Digital Image Processing? - Examples of Fields that Use Digital Image Processing - Fundamental Steps in Digital Image Processing - Components of an Image Processing System - Digital Image Fundamentals: Elements of Visual Perception - Light and Electro Magnetic Spectrum - Image Sensing and Acquisition - Image Sampling and Quantization - Some Basic Relationships between Pixels.		
	Image Enhancement in the Spatial Domain	Periods	12
Unit - II	Background. Some Basic Gray Level Transformations - Histogram Processing- Enhancement Using Arithmetic/Logic Operations- Basics of Spatial Filtering- Smoothing Spatial Filters. Image Enhancement in the Frequency: Background - Introduction to the Fourier Transform and the Frequency Domain- Smoothing Frequency-Domain Filters- Sharpening Frequency Domain Filters- Homomorphism Filtering- Implementation.		
	Image Restoration	Periods	12
Unit - III	A Model of the Image Degradation / Restoration Process- Noise Models- Restoration in the Presence of Noise Only-Spatial Filtering - Estimating the Degradation Function- Inverse Filtering- Minimum Mean Square Error (Wiener) Filtering. Color Image Processing: Color Fundamentals- Color Models- Pseudo color Image Processing- Basics of Full-Color Image Processing- Color Transformations- Smoothing and Sharpening- Image Segmentation Based on Color - Noise in Color Images- Color Image Compression.		
	Object Recognition	Periods	12
Unit - IV	Knowledge Representation - Statistical Pattern Recognition - Neural Nets - Syntactic Pattern Recognition - Optimization Techniques - Fuzzy Systems - Mathematical Morphology - Basic Morphological Concepts - Binary Dilation and Erosion.		
	Image Data Compression	Periods	12
Unit - V	Image Data Properties - Discrete Image Transforms in Image Data Compression - Predictive Compression Methods - Vector Quantization - Hierarchical and Progressive Compression Methods - Comparison of Compression Methods - Coding - JPEG and MPEG Image Compression - Texture		
	Total Periods		60

Text Books	
1	Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Prentice Hall, Third Edition, 2008. (Unit I to III : Chapter-1,2,3,4,5&6)
2	Sonka, Hlavac, Boyle, "Digital Image Processing and Computer Vision", Cengage Learning, Fourth Indian Reprint 2011. (Unit-IV:Chapters: 9&13,Unit-V:Chapters: 14&15)
References	
1	Anil.K.Jain, "Fundamentals of Digital Image Processing ", Prentice Hall, 1989.
2	Chanda & Majumdar, "Digital Image Processing and Analysis", Prentice Hall 3rd Edition.
E-References	
1	www.nptel.ac.in
2	www.imageprocessingplace.com/
3	https://www.slideshare.net/sahilbiswas/image-processing-27960248
4	https://slideplayer.com/slide/6920911/
5	https://www.seminarstopics.com/seminar/5804/digital-image-processing-seminar-ppt

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name	Periods per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
21P2CSE15	DISTRIBUTED COMPUTING		4	0	0	4	25	75	100
COURSE OBJECTIVES	This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission. The structure of distributed systems using multiple levels of software is emphasized.								
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 & environmental consideration								
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 one's 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								
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 of market demands.								

COs	COURSE OUTCOME
CO 1	Demonstrate knowledge of the basic elements and concepts related to distributed system technologies.
CO 2	Demonstrate knowledge of the core architectural aspects of distributed systems
CO 3	Design and implement distributed applications
CO 4	Demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems)
CO 5	Use and apply important methods in distributed systems to support scalability and fault tolerance
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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
		PO 5	3
		PO 6	3
CO 3	3	PO 7	5
		PO 8	5
		PO 9	5
CO 4	4	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO4	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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	Periods	12
	Definition Of distributed system- goals - Types of Distributed Systems Architectures: Architectural Styles - System Architectures - Architectures Vs Middleware - Self-Management in Distributed Systems. Processes: Threads - Virtualization - Clients Servers - Code Migration.		
Unit - II	Communication	Periods	12
	Fundamentals - Remote Procedure Call - Message-Oriented Communication - Stream-Oriented Communications - Multicast Communication. Naming: Names, Identifiers and Addresses - Flat Naming - Structured Naming -Attribute-Based Naming.		
Unit - III	Synchronization:	Periods	12
	Clock Synchronization - Logical Clocks - Mutual Exclusion -Global Positioning of Nodes - Election Algorithms. Consistency and Replication: Introduction - Data-Centric Consistency Models - Client-Centric Consistency Models-Replica Management - Consistency Protocols.		
Unit - IV	Fault Tolerance	Periods	12
	Introduction to Fault Tolerance - Process Resilience - Reliable Client-Server Communication - Reliable Group Communication - Distributed Commit- Recovery. Security: Introduction to Security - Secure Channels - Access Control -Security Management.		
Unit - V	Distributed Object-Based Systems	Periods	12
	Architecture - Processes - Communication -Naming - Synchronization - Consistency and Replication - Fault Tolerance -Security. Distributed file system: Architecture -Processes-communication-Naming-Synchronization-Consistency and Replication - Fault Tolerance - Security - Distributed Web-Based Systems.		
Total Periods			60

Text Books	
1	Andrew S.Tanenbaum, Maarten Van Steen, "Distributed Systems" Principles and Paradigms. Second Edition, PHI Publications, New Delhi -2008.
References	
1	Birman, Kenneth P, "Reliable Distributed Systems - Technologies, Web Services, and Applications" , Springer Publications, 2005..
2	G.coulouris, Jean Dollimore & Tim Kindberg,Distributed Systems: Concepts and Design (4th Edition) Addison Wesley Publications, 2005 Edition.
E-References	
1	www.dezyre.com
2	www.techtarget.com
3	https://slideplayer.com/slide/6189779/
4	https://www.powershow.com/viewht/75c10a-ODdjM/DISTRIBUTED_COMPUTING_powerpoint_ppt_presentation
5	https://www.powershow.com/viewht/75c10a-ODdjM/DISTRIBUTED_COMPUTING_powerpoint_ppt_presentation

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR
WOMEN (AUTONOMOUS)**
Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2021-2022		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week			Credit		Maximum Marks	
			L	T	P	C	CA	ESE	Total
21P2CSE16	PROFESSIONAL ETHICS		4	0	0	4	25	75	100
COURSE OBJECTIVES	To provide the philosophical foundation of ethics.To provide Values based decision making and behavior.To aid the students in professional code of ethics.To understand how to apply them in their own work place.								
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 evaluatesystems,components,or processes that meet specified needs with appropriate consideration for public health and safety,cultural,societal & environmental consideration								
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, andnorms 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 one 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,make effective 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 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 of market demands.								

COs	COURSE OUTCOME
CO 1	Know the Nature and Scope of Business Ethics
CO 2	Understanding Professional ethics
CO 3	To analyze the basics of Corporate Social Responsibility
CO 4	To apply Ethical values in India
CO 5	Design and Establish the dimension of ethics.
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	1	PO 1	1
		PO 2	2
		PO 3	4
CO 2	2	PO 4	4
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		PO 9	5
CO 4	3	PO 10	4
		PO 11	4
		PO 12	4
CO 5	4	PO 13	4
		PO 14	4
		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	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	1	1	1	1	1
CO3	1	1	3	3	2	2	2	2	2	3	3	3	3	3	3
CO4	1	2	2	2	3	3	1	1	1	2	2	2	2	2	2
CO5	1	1	3	3	2	2	2	2	2	3	3	3	3	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			
	Nature and Scope of Business Ethics	Periods	12
Unit - I	Introduction - Scope of Business Ethics - Religion and Ethics - Types of Ethics - Sources of Business Ethics - Factors Influencing Business Ethics - Importance of Business Ethics.		
	Professional Ethics	Periods	12
Unit - II	Introduction - professional ethics - ethical problems faced by managers - new skill required for managers - managing ethical conduct in modern times.		
	Corporate Governance and CSR	Periods	12
Unit - III	Principles of corporate governance - issues involved in corporate governance - theories of corporate governance - CSR - introduction - Various dimensions - argument for and against CSR.		
	Ethics in India	Periods	12
Unit - IV	Religious foundations of ethics - Hinduism - Buddhism - Jainism - Ethical Values of Gandhi, Vivekananda, Aurobindo and Tagore.		
	Dimensions of Ethics	Periods	12
Unit - V	Personal ethics - marketing ethics - technology ethics - environmental ethics.		
	Total Periods		60

Text Books	
1	R.Nandagopal, Ajithsankar.R.N, "Indian Ethos and Values in Management", Tata Mac Graw Hill education Private Ltd, New Delhi, 2011.
2	S.Prabakaran, "Business Ethics and Corporate Governance", Excel books (2010), First Edition.
References	
1	Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2	Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
3	John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4	Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2001.
5	Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi 2013.
E-References	
1	www.onlineethics.org
2	www.nspe.org
3	www.globlethics.org
4	www.ethics.org
5	https://www.slideshare.net/SethuramanPlayMankatha/professional-ethics-15084927

Signature of BOS Chairman