

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN

(AUTONOMOUS)

M.Sc., (COMPUTER SCIENCE)

(Candidates admitted from 2020-2021 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 condination 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

- a) 75% and above shall be declared to have passed the examination in first class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
- b) 60% and above but below 75% shall be declared to have passed the examinations in first class without Distinction.
- c) 50% and above but below 60% shall be declared to have passed the examinations in second class.
- d) 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 Universityrank.
- 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 2020-2021 (i.e.,) for the students who are to be admitted to the first year of the course during the academic year 2020-21 and thereafter.
- 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 x1= 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

Sem	Course Code	Courses	Credits	Hours	Marks		
					I.A.	E.E.	Total
					Marks	Marks	Marks
I	20P1CSC01	Core Course-I - Advanced Computer Organization and Architecture	4	4	25	75	100
	20P1CSC02	Core Course-II -Design and Analysis of Algorithms	4	4	25	75	100
	20P1CSC03	Core Course-III –Web Technologies	4	4	25	75	100
	20P1CSC04	Core Course-IV- Advanced Database Management Systems	4	4	25	75	100
	20P1CSE__	Elective Course- I	4	4	25	75	100
	20P1CSP01	Core Course-II Design and Analysis of Algorithms Lab	2	4	40	60	100
	20P1CSP02	Core Course-III- Web Technologies Lab.	2	4	40	60	100
		Library		1			
		Net Lab.		1			
TOTAL			24	30	205	495	700
II	20P2CSC05	Core Course-V –Advanced Concepts in Operating System	4	4	25	75	100
	20P2CSC06	Core Course-VI – Java Server Programming	4	4	25	75	100
	20P2CSC07	Core Course-VII – Dot Net Programming	4	4	25	75	100
	20P2CSC08	Core Course-VIII – Mobile Computing	4	4	25	75	100
	20P2CSE__	Elective Course -II	4	4	25	75	100
	20P2CSP03	Core Course-VI - Java server programming Lab	2	4	40	60	100
	20P2CSPR01	Core Course-VII-Mini Project	2	4	40	60	100
		Library		1			
		Net Lab		1			
TOTAL			24	30	205	495	700
III	20P3CSC09	Core Course-IX – Soft Computing	4	4	25	75	100
	20P3CSC10	Core Course-X - Python programming	4	4	25	75	100
	20P3CSC11	Core Course-XI – Data Mining and Warehousing	4	4	25	75	100
	20P3CSE__	Elective Course III	4	4	25	75	100
		EDC- I Resource Management Techniques	4	4	25	75	100
	20P3CSP04	Core Course-X - Python Programming Lab	2	4	40	60	100
	20P3CSP05	Core Course-XI - Data Mining Lab	2	4	40	60	100
		Human Rights	1	-	25	75	100
		Library		1			
	Net Lab		1				
TOTAL			24	30	230	570	800
IV	20P4CSC12	Core Course-XII – Cloud Computing	4	5	25	75	100
	20P4CSC13	Core Course-XIII – Digital Image Processing	4	5	25	75	100
	20P4CSE__	Elective Course -IV	4	5	25	75	100
	20P4CSPR02	Core Course-XVI – Project Lab	6	-	40	60	100
TOTAL			18	15	115	285	400
Total No. of credits (Core + EDC + HR + Elective)			70+4+1+16=91	105	675	1825	2600

ELECTIVE COURSES

Elective-I:

Course Code	Course Name
20P1CSE01	Theory of Computing
20P1CSE02	Software Project Management and Quality Assurance
20P1CSE03	Client Server Technology
20P1CSE04	Internet of Things

Elective-II:

Course Code	Course Name
20P2CSE05	Network Security
20P2CSE06	Wireless Application Protocol
20P2CSE07	Multimedia and Virtual Reality
20P2CSE08	AI and Expert System

Elective-III:

Course Code	Course Name
20P3CSE09	Compiler Design
20P3CSE10	Object Oriented Analysis and Design
20P3CSE11	Embedded Systems
20P3CSE12	Professional Ethics

Elective-IV:

Course Code	Course Name
20P4CSE13	Big Data Analytics
20P4CSE14	Cyber Forensics
20P4CSE15	Distributed Computing
20P4CSE16	Ad Hoc Sensor Network

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 2020-21 and it passed in the academic year 2022-2023.



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



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science			Semester			1			
Course Code	Course Name			Periods per Week		Credit	Maximum Marks			
				L	T	P	C	CA	ESE	Total
20P1CSC01	ADVANCED COMPUTER ORGANIZATION AND ARCHITECTURE			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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Advanced Concepts in Operating Systems lays down all the concepts and mechanisms involved in the design of advanced operating systems. The discussion is reinforced by many examples and cases



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					3				
								PO 2					2				
								PO 3					5				
CO 2	2							PO 4					4				
								PO 5					2				
								PO 6					6				
CO 3	3							PO 7					3				
								PO 8					5				
								PO 9					1				
CO 4	4							PO 10					2				
								PO 11					3				
								PO 12					2				
CO 5	5							PO 13					3				
								PO 14					4				
								PO 15					6				
CO / PO Mapping																	
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																	
COs	Programme Outcome (POs)																
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15		
CO1	1	2	1	1	2	1	1	1	3	2	1	2	1	1	1		
CO2	2	3	1	1	3	1	2	1	2	3	2	3	2	1	1		
CO3	3	2	1	2	2	1	1	1	1	2	3	2	3	2	1		
CO4	2	1	2	3	1	1	2	2	1	1	2	1	2	3	1		
CO5	1	1	3	2	1	2	1	3	1	1	1	1	1	2	2		

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

Content of the Syllabus			
Unit – I	Overview	Periods	12
	Introduction: 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	Architectures of Distributed Systems	Periods	12
	Cache Memory: 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	Multiprocessor System Architectures	Periods	12
	Computer Arithmetic: 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	Database Operating Systems	Periods	12
	Processor structure & Function: 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	CASE STUDY	Periods	12
	Parallel Processing: 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	<p>Computer Organization & Architecture - Designing for Performance by William Stallings, 9th Edition, 2012, PEARSON Prentice Hall Publication.</p> <p>(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)</p>
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	https://www.tutorialspoint.com/computer_organization/index.asp
2	https://en.wikipedia.org/wiki/Computer_architecture
3	https://www.slideshare.net/kumar_vic/computer-system-architecture

Signature of BOS Chairman

		VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.				 <small>ISO 9001:2008 www.tvr.com ID: 9105079407</small>		
Programme	M.Sc	Programme Code	PCS		Regulations	2020-2021		
Department	Computer Science		Semester			1		
Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CSC02	DESIGN AND ANALYSIS OF ALGORITHMS	4	0	0	4	25	75	100
COURSE OBJECTIVES	Demonstrate a familiarity with major algorithms and data structures. Apply important algorithmic design paradigms and methods of analysis. Synthesize efficient algorithms in common engineering design situations.							
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							
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.							
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations							
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.							
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.							
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.							
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations							
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Design and Analysis of Algorithm lays down all the concepts and mechanisms involved in the Algorithms. The discussion is reinforced by many examples and cases

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit – I	Overview	Periods	12
	Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations - and Mathematical Analysis of Recursive and Non-Recursive Algorithms.		
Unit – II	Architectures of Distributed Systems	Periods	12
	Divide and conquer methodology – 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		
	Multiprocessor System Architectures	Periods	12
Unit – III	Transform and Conquer – Presorting - Balanced Search Tree – AVL Tree - Heaps and Heap Sort - Dynamic Programming - Computing a binomial coefficient – Warshall’s and Floyd’s algorithm.		
	Database Operating Systems	Periods	12
Unit – IV	Optimal binary - search tree – Knapsack problem – Backtracking – N-Queens problem – Hamiltonian circuit problem – subset sum problem.		
Unit – V	CASE STUDY	Periods	12
	Branch and bound: Assignment problem – Knapsack problem – Traveling salesman problem.		
Total Periods			60

Text Books	
1	Computer Organization & Architecture - Designing for Performance by William Stallings, 9th Edition, 2012, 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	https://www.tutorialspoint.com/computer_organization/index.asp
2	https://en.wikipedia.org/wiki/Computer_architecture
3	https://www.slideshare.net/kumar_vic/computer-system-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	2020-2021			
Department	Computer Science			Semester			1			
Course Code	Course Name			Periods per Week		Credit	Maximum Marks			
				L	T	P	C	CA	ESE	Total
20P1CSC03	WEB TECHNOLOGIES			4	0	0	4	25	75	100
COURSE OBJECTIVES	Identify and correct problems related to concurrency in server-side programs. Explain common security threats such as cross-site scripting and misformed HTTP requests and demonstrate avoidance techniques for each.									
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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System									

CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Go for web development and designing, you only need to learn basic scripting languages and some server side languages such as HTML, CSS, JAVASCRIPT, PHP, SQL

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

CO / PO Mapping

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



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

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

Content of the Syllabus			
Unit - I	Overview	Periods	12
	The internet: Basics of Internet – Addresses and Names for the Internet, Objects and sites – E-mail - World Wide Web – File Transfer – The Telnet – The Usenet – Gopher- Wais - Archie -Veronica – Internet Chat.		
Unit - II	Architectures of Distributed Systems	Periods	12
	Web Servers, Browsers and Security: The Web server – The Proxy Server – The fast ready connections on the web – Web Browsers – Netscape Communication Suite – Microsoft Internet Explorer – The Virus Menace in the Internet – Firewalls – Data Security.		
Unit - III	Multiprocessor System Architectures	Periods	12
	Client Side Programming: The JavaScript Language: Introduction to JavaScript - JavaScript in Perspective – Basic Syntax – Variables & Data types – Statements – Operators – literals – Functions – Objects – Arrays – Built-in Objects – JavaScript Debuggers.		
Unit - IV	Database Operating Systems	Periods	12
	Server-Side Programming: Java Servlets: Servlet Architecture Overview – Servlet Generating Dynamic contents – Servlet Life Cycle – Parameter Data – sessions – Cookies		
Unit - V	CASE STUDY	Periods	12
	Web Services: JAX – RPC, WSDL, XML Schema and soap, Web Service Concepts – Writing a Java Web Service Client – Describing web Services: WSDL – Related Technologies.		
Total Periods			60

Text Books	
1	Rajkamal, “ Internet and Web Technologies”, Tata McGraw Hill, 2002. [UNIT – I & II]
2	Jeffrey C.Jackson, “Web Technologies – A Computer Science Perspective”- Pearson Education 2012
References	
1	R.N. Srivastava, “Web Technology” – Global academic Publishers & Distributors, 2015.
2	Ramesh Nagappan, Robert Skoczylas, Rima Patel Sriganesh, “ Developing Java Web Services” - Wiley-India edition 2012
E-References	
1	https://differential.com/.../14-technologies-every-web-developer-should-be-able-to-ex...
2	https://usersnap.com/blog/best-web-development-trends-2018/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.				 <small>ISO 9001:2008 www.tuv.com ID: 910079407</small>			
Programme	M.Sc	Programme Code	PCS		Regulations	2020-2021		
Department	Computer Science		Semester			1		
Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P1CSC04	ADVANCED DATABASE MANAGEMENT SYSTEMS	4	0	0	4	25	75	100
COURSE OBJECTIVES	On successful completion of this course we learn DBMS provides a lot benefits in all spheres of human activity the objectives are manifold. The main objectives of database management system are data availability, data integrity, data security, and data independence.							
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							
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.							
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations							
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.							
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.							
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.							
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations							
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Basic knowledge of DBMS and its 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	3
		PO 2	2
		PO 3	5
CO 2	2	PO 4	4
		PO 5	2
		PO 6	6
CO 3	3	PO 7	3
		PO 8	5
		PO 9	1
CO 4	4	PO 10	2
		PO 11	3
		PO 12	2
CO 5	5	PO 13	3
		PO 14	4
		PO 15	6

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Overview	Periods	12
	Advanced Data Modeling: Extended Entity Relationship Model, Entity Clustering, Entity Integrity, Design Cases. - Advanced SQL: Relational Set Operators, SQL Join Operators, Sub queries and Correlated Queries, SQL Functions, Views, Procedural SQL, Embedded SQL - Database design: SDLC, DBLC.		
Unit - II	Architectures of Distributed Systems	Periods	12
	Advanced Database concepts: Transaction Management and Concurrency Control - Database Performance Tuning and Query optimization - Distributed Database Management Systems.		
Unit - III	Multiprocessor System Architectures	Periods	12
	Object Oriented Databases – Introduction – Evolution of Object Oriented Concepts- Object Oriented Concepts – Characteristics of an Object Oriented Data Models – OODM and Previous Models - OODBMS – How Object Orientation affects Database Design – Advantages and Disadvantages of OODBMS. Databases in Electronic Commerce.		
Unit - IV	Database Operating Systems	Periods	12
	Web Databases: Internet Technologies and Databases - Uses of Internet Databases - Web to Database Middleware - Server Side Extensions - The Web Browser - Internet Database Systems: Special Considerations - Database Administration.		
Unit - V	CASE STUDY	Periods	12
	Mobile Database – Geographic Information Systems – Genome Data Management – Multimedia Database – Spatial Databases.		
Total Periods			60

Text Books	
1	Peter Rob and Carlos Coronel, “Database Systems – Design, Implementation and Management”, Cengage Learning, 7th Edition, 2007. (Unit- I : Chapter6, 8 &9, Unit-II : Chapter 10,11&12).
2	Peter Rob and Carlos Coronel, “Database Systems – Design, Implementation and Management”, Thompson Learning, Course Technology, 5th Edition, 2003. (Unit – III :Chapter11&14, Unit –IV : Chapter15.1, 15.2, 15.3,15.4,15.6&16).
3	Ramez Elmasri, Shamkant B.Navathe, “Fundamentals of Database Systems” 5/E,Pearson Education, (Unit-V : Chapter 24&30).

References	
1	Thomas M. Connolly, Carolyn E. Begg, “Database Systems - A Practical Approach to Design , Implementation , and Management”, 5th Edition , Pearson Education, 2009.
2	C.S.R.Prabhu, “Object Oriented Database Systems: Approaches & Architecture”, PHI, 3rd Edition , 2010.
3	M.Tamer Ozsu , Patrick Ualduriel, “Principles of Distributed Database Systems”, 3rd Edition, Pearson Education, 2007.

E-References	
1	1. www.itportal.in/2011/09/advance-database-management-systems-be.html

Signature of BOS Chairman

2020-2021 Onwards	DESIGN AND ANALYSIS OF ALGORITHM LAB	M.Sc. Computer Science
I Semester	20P1CSP01	Core: Practical – I
Hours: 60	Practical –I	Credit : 2

COURSE OBJECTIVE

- To implement the fundamental concepts of sorting , merging, backtracking and branch and bound algorithms using C++ Programming
- To implement real time problem using C++ Programming

COURSE OUTCOME

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

CO Number	CO Statement
CO1	Demonstrate algorithms using divide and conquer approach
CO2	Solve problems using greedy method.
CO3	Employ dynamic programming techniques.
CO4	Problem solving Using backtracking techniques
CO5	Problem solving Using Branch and Bound techniques

LAB EXERCISE LIST

Apply the Divide and Conquer technique to arrange a set of numbers using Merge Sort method.

1. Perform Strassen's matrix multiplication using Divide and Conquer method.
2. Solve the Knapsack problem using Dynamic Programming.
2. Construct a Minimum Spanning Tree using Greedy method.
3. Perform Warshall's Algorithm using Dynamic Programming.
4. Solve Dijkstra's Algorithm using Greedy Technique.
5. Solve Subset Sum problem using Backtracking
6. Implement the 8-Queens Problem using Backtracking.
7. Implement Knapsack Problem using Backtracking.
8. Find the solution of Traveling Salesperson Problem using Branch and Bound technique.

Mapping with Programme Outcome

	PS01	PS02	PS03	PS04
CO1		S	S	S
CO2			S	S
CO3			S	S
CO4		S	S	S
CO5		S	S	S

S – Strong , M- Medium , L - Low

2020-2021 Onwards	WEB TECHNOLOGIES LAB	M.Sc. Computer Science
I Semester	20P1CSP02	Core: Practical – II
Hours: 60	Practical –II	Credit : 2

On the successful completion of the course the student will be able to develop various kind of web pages.

CO Number	CO Statement
CO1	Demonstrate basic skill needed for surfing internet.
CO2	Develop HTML coding for web features.
CO3	Employ java script programming techniques.
CO4	Program coding using ASP, JSP for authentication and commercial purpose.
CO5	Web page designing for database connection with application.

Programme Specific Outcomes

PS01: know the essential skill for developing simple web page.

PS02: Have the ability to design static web pages.

PS03: implement the programming principles of java script.

PS04: Apply JSP and ASP concept to develop dynamic web pages.

2020-2021 Onwards	WEB TECHNOLOGIES LAB	M.Sc. Computer Science
I Semester	20P1CSP02	Core: Practical – II
Hours: 60	Practical –II	Credit : 2

COURSE OBJECTIVE

- To familiar the students to the effective use of web pages.
- To implement web page development using java script, JSP and ASP.



Web technologies Practical Listing:

1. Write a XML program for job listing in HTML
2. Write a JavaScript code block, which checks the contents entered in a form's text element. If the text entered is in the lower case, convert to upper case
3. Write a JavaScript code block, which validates a username and password
 - a) If either the name or password field is not entered display an error message
 - b) The fields are entered do not match with default values display an error message
 - c) If the fields entered match, display the welcome message
4. Write a JavaScript code to display the current date and time in a browser
5. Write a JSP Program for user authentication
6. Write a JSP Program for a simple shopping cart
7. Write a JSP Program to prepare a bio data and store it in database
8. Write an ASP Program using Response and Request Object
9. Write an ASP Program using Ad Rotator Component
10. Write an ASP program using database connectivity for student's record

Mapping with Programme Outcome

	PS01	PS02	PS03	PS04
CO1	S	S	S	S
CO2	M	S	S	S
CO3	M	S	S	S
CO4	M	S	S	S
CO5		S	S	S

S – Strong, M- Medium, L - Low

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Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			2			
Course Code	Course Name	Periods per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
20P2CSC05	ADVANCED CONCEPTS IN OPERATING SYSTEMS	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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Advanced Concepts in Operating Systems lays down all the concepts and mechanisms involved in the design of advanced operating systems. The discussion is reinforced by many examples and cases

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Overview	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 - Serviceability 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 - Inter process Communication -Network Structure-Security		
Total Periods			60

Text Books	
1	Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjana G.Shivarathr, 2011.
2	Operating System Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Ninth Edition, John Wiley and Sons Inc, 2012.
References	
1	Operating System in depth: Design and Programming, Thomas.W,Doepfner, First Edition 2010.
2	The Linux Programming Interface: A Linux and Unix System Programming handbook, Michal Kerisk, First Edition, 2010.
E-References	
1	https://books.google.co.in/books/.../Advanced_Concepts_InOperatingSystems.html
2	https://www.bookdepository.com/Advanced-Concepts-Operating-Systems
3	https://www.sfitengg.org/.../CSC201-advanced%20operating%20systems

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Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
20P2CSC06	JAVA SERVER PAGE		4	0	0	4	25	75	100
COURSE OBJECTIVES	The application object is direct wrapper around the ServletContext object for the generated Servlet and in reality an instance of a javax. servlet. ServletContext object. This object is a representation of the JSP page through its entire lifecycle.								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 java JSP,RMI,Servers,Servlets and Hibernnet.
CO 2	To know about Advance concept In EJB.
CO 3	To analyze the concepts of RMI.
CO 4	To apply RMI concepts in various networks.
CO 5	To Design and Establish the server pages with client interaction.
Pre-requisites	Basics of java, web development using HTML

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

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

Content of the Syllabus			
Unit - I	AWT	Periods	12
	AWT: Using AWT Controls, Layout Managers and Menus. SWING: A Tour of SWING - Event Handling-Java Database Connectivity (JDBC).		
Unit - II	Java Servlets	Periods	12
	Java Servlets: Life cycle of Servlet - constituents of javax.servlet.package Constituents of javax.servlet.http.package-Cookies- Session Tracking. Java Server Pages: Introducing Java Server Pages-Basic Elements-Actions Elements-Implicit Objects.		
Unit - III	Remote method Invocation	Periods	12
	Remote method Invocation: Remote Interface-java.rmi.server package-The Naming Class - RMI Security Manager Class -RMI Exceptions - Steps involved in creating RMI Client and Server Classes. Java Bean: Advantages of Java Bean -Application Builder Tools-JAR files-Introspection - Developing a Simple Java Bean using BDk- Persistence - Customizers - Java Mail.		
Unit - IV	Understanding EJB	Periods	12
	Understanding EJB: EJB Architecture-Session Bean-Developing Session Beans-Entity Beans - Bean managed persistence in Entity Beans. Understanding Struts: Introduction-MVC Framework- Struts Control flow - Building Model Components - Building View Components - Building Control Components.		
Unit - V	Hibernate	Periods	12
	Hibernate: Features of Hibernate-Hibernate Architecture - Understanding Hibernate O/R Mapping - Hibernate Query Language. Spring: Introduction to the Spring Framework - Features of the Spring-Spring Architecture-Spring AOP-Testing-Data Access using JDBC.		
Total Periods			60

Text Books	
1	Dr C.Muthu programming with Java, Vijay Nicole Imprints Private Ltd 2008
2	Herbert Schildt, The complete Reference-Java2, fifth Edition 2002 TMH
References	
1	Enterprise JavaBeans-Developing component based distributed Applications-Pearson Education, 2004.
2	Deitel H.M. & Deitel P.J, Java How to Program, Prentice-Hall of India, 10th Edition , 2014.
E-References	
1	www.dreamtechpress.com/programming/java.../java-server-programming-j2ee
2	https://www.amazon.com/Professional-Java-Server-Programming-

Signature of BOS Chairman



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



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			2			
Course Code	Course Name	Periods per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
20P2CSC07	DOT NET PROGRAMMING	5	0	0	5	25	75	100	
COURSE OBJECTIVES	Learn .net framework and c# fundamentals, Understand Web form concepts, Familiarize with rich controls and Cookies, Implement ADO.NET and XML.								
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								
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	Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 .NET framework (CLR, CTS, CLS etc.,) and its components
CO 2	Express the Web Form Fundamentals and Web Control Events
CO 3	To analyze the basics of ADO.NET Fundamentals
CO 4	To apply ADO.NET connection and Data Binding
CO 5	Design and Establish the Web based Software using ASP.NET and XML
Pre-requisites	Basic knowledge of java and HTML

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	1
		PO 3	2
CO 2	2	PO 4	2
		PO 5	3
		PO 6	3
CO 3	3	PO 7	3
		PO 8	4
		PO 9	4
CO 4	3	PO 10	4
		PO 11	5
		PO 12	5
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	3	2	2	1	1	1	1	1	1	1	1	1	1	1
CO2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	1
CO3	1	1	2	2	3	3	1	2	2	2	1	1	2	2	2
CO4	1	1	2	2	3	3	1	2	2	2	1	1	2	2	2
CO5	1	1	2	2	3	3	1	2	2	2	1	1	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 the .NET Framework	Periods	12
	Introduction the .NET Framework: .NET Framework - C#, VB.NET and .NET Languages - CLR- .NET Class library. Learning the C# languages: C# language Basics- Variables- Data types - Variable Operations -Object based Manipulation - Objects and Namespaces.		
Unit - II	Web Form Fundamentals	Periods	12
	Web Form Fundamentals: HTML Control classes - Page class - Web Controls: Web Control classes - AutoPostBack and Web control events. Tracing, Logging and Error Handling: Exception Handling - Handling Exceptions -Throwing your own exception - Logging exceptions - Error Pages - Page Tracing.		
Unit - III	Validation and Rich Controls	Periods	12
	Validation and Rich Controls: Validation - Examples - Understanding Regular Expression - Rich Controls - State Management: View state - Custom cookies - Session state - Application state. ADO.NET Fundamentals: ADO.NET and Data Management - ADO.NET Basics.		
Unit - IV	ADO.NET	Periods	12
	ADO.NET: Direct Data Access - Creating a Connection - Disconnected data access. Data binding: Introducing Data Binding - Single Value Data Binding - Repeated value Data Binding - Data Source Controls. The Data Controls: The Grid View -The Details View-The Form View.		
Unit - V	XML	Periods	12
	XML: XMLS hidden role in .NET-.XML Explained - XML Classes - XML validation-XML display & transforms XML Data Binding - XML in ADO.NET. Getting Started with ASP.NET Ajax - Understanding the ASP.NET Ajax Architecture - Working with the XML Http Request Object - JSON		
Total Periods			60

Text Books	
1	Beginning ASP.NET 2.0 in C# 2005: From Novice to Professional (Beginning: From Novice to Professional). Matthew MacDonald (Author) publication: APress 2005.
2	Joydip Kanjilal and Sriram Putrevu, Sams Teach Yourself ASP.NET Ajax in 24 Hours, SAMS, 2008.
References	
1	William Sander, ASP. NET 3.5 A Beginner's Guide, 2008.
2	2. Pro ASP.NET 4.0 in C# 2012-Matthew Macdonald and Mario Szpuszta-Apress.
E-References	
1	www.learningtree.com
2	www.slideshare.net

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.					 <small>ISO 9001:2008 www.viv.com ID: 9155078407</small>		
Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021	
Department	Computer Science		Semester			2		
Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
20P2CSC08	MOBILE COMPUTING	5	0	0	5	25	75	100
COURSE OBJECTIVES	Introduce Mobile Communication Understand Mobile computing Standards Evaluate Mobile data and Adhoc network Implement Mobile data network.							
POs	PROGRAMME OUTCOME							
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.							
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.							
PO 3	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration							
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	Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.							
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.							
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations							
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 .NET framework (CLR, CTS, CLS etc.,) and its components
CO 2	Express the Web Form Fundamentals and Web Control Events
CO 3	To analyze the basics of ADO.NET Fundamentals
CO 4	To apply ADO.NET connection and Data Binding
CO 5	Design and Establish the Web based Software using ASP.NET and XML
Pre-requisites	Basic knowledge of java and HTML

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	1
		PO 3	2
CO 2	2	PO 4	2
		PO 5	3
		PO 6	3
CO 3	3	PO 7	3
		PO 8	4
		PO 9	4
CO 4	3	PO 10	4
		PO 11	5
		PO 12	5
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	3	2	2	1	1	1	1	1	1	1	1	1	1	1
CO2	2	2	3	3	2	2	2	1	1	1	1	1	1	1	1
CO3	1	1	2	2	3	3	1	2	2	2	1	1	2	2	2
CO4	1	1	2	2	3	3	1	2	2	2	1	1	2	2	2
CO5	1	1	2	2	3	3	1	2	2	2	1	1	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 Mobile Computing	Periods	12
	Introduction - Introduction to Telephone Systems - Mobile communication: Need for mobile communication - Requirements of mobile communication - History of mobile communication - Introduction to Cellular Mobile Communication.		
Unit - II	Mobile Communication Standards	Periods	12
	Mobile Communication Standards - Mobility Management: Handoff Techniques - Handoff Detection and Assignment - Types of Handoffs - Radio Link Transfer - Roaming Management - Frequency Management - Cordless Mobile Communication Systems.		
Unit - III	History of data Networks	Periods	12
	Mobile Computing: History of data Networks - Classification of Mobile data networks - CDPD System. Satellites in Mobile Communication - Global Mobile Communication - Mobile Internet - Wireless Network Security - Wireless Local Loop Architecture - Wireless Application Protocol.		
Unit - IV	WCDMA Technology	Periods	12
	WCDMA Technology and Fiber Optic Microcellular Mobile Communication - Ad Hoc Network and Bluetooth Technology - Intelligence Mobile Communication System - Fourth Generation Mobile Communication Systems.		
Unit - V	Mobile network layer	Periods	12
	Mobile network layer: Mobile IP - Dynamic host configuration protocol - Mobile Ad-Hoc networks. Mobile transport layer: Traditional TCP - Classical TCP Improvement - TCP over 2.5/3G Wireless networks - Performance enhancing proxies - Support for Mobility: File Systems - World Wide Web.		
Total Periods			60

Text Books	
1	1. T.G. Palanivelu & R.Nakkeeran, Wireless and Mobile Communication, PHI Learning Private Limited , 2013.(Unit-I: Chapters 1,2,3,4. Unit-II: Chapters 5,6,7,8. Unit-III:Chapters 9,10,11,14,15,16,17.Unit-IV:Chapter 18,19,20,21.)
2	2. Jochen Schiller, Mobile Communications, Pearson Education, Second Edition, 2012.(Unit-V : Chapters-8,9 &10)
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

Signature of BOS Chairman

Subject Title	JAVASERVER PROGRAMMING LAB	Semester	III
Subject Code	20P2CSP03	Specialization	NA
Type	Practical – III	L:T:P:C	4:0:0:2

Objective:

- 1. To develop the online program using JAVA.**
- 2. Implement JSP in real time processes.**

On the successful completion of the course the student will be able to develop various kind of web pages.

CO Number	CO Statement
CO1	Demonstrate basic skill needed for surfing internet.
CO2	Develop HTML coding for web features.
CO3	Employ java script programming techniques.
CO4	Program coding using ASP, JSP for authentication and commercial purpose.
CO5	Web page designing for database connection with application.

Subject Title	JAVASERVER PROGRAMMING LAB	Semester	III
Subject Code	20P2CSP03	Specialization	NA
Type	Practical – III	L:T:P:C	4:0:0:2

Practical programme list :

<ol style="list-style-type: none"> 1. To Develop Student Information using AWT 2. To Prepare Electricity Bill Using Swing 3. To implement Library information using JDBC 4. To maintain Employee information using Servlets 5. To implement Session and Cookies concepts using Servlets 6. To develop Online Job Registration using JSP 7. Create an application using JSP and Java Beans 8. To develop Arithmetic Operation Using RMI 9. To create an application using Session Bean 10. To Implement Banking Operations using Entity Bean

Mapping with Programme Outcome

	PS01	PS02	PS03	PS04
CO1	S	S	S	S
CO2	M	S	S	S
CO3	M	S	S	S
CO4	M	S	S	S
CO5		S	S	S

S – Strong , M- Medium , L - Low

Subject Title	Mini Project	Semester	II
Subject Code	20P2CSPR01	Specialization	NA
Type	Project	L:T:P:C	4 : 0 : 0 : 2

FIRST REVIEW:

(15 Marks)

1. Project Title
2. Project Platform
3. Details of Guide
4. Problem Description / Modules
5. Presentation (PPT)

FINAL REVIEW:

(25 Marks)

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)

The Passing minimum shall be 40% out of 60 marks (24 Marks)



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



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			3			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P3CSC09	SOFT COMPUTING		4	0	0	4	25	75	100
COURSE OBJECTIVES	Develop the skills to gain a basic understanding of neural network theory and fuzzy logic								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Soft computing is the use of approximate calculations to provide imprecise but usable solutions to complex computational problems

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit – I	Overview	Periods	12
	Fundamentals of Neural Networks: 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
	Backpropagation Networks: 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
	Adaptive Resonance Theory (ART): 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 Set Theory: Fuzzy Sets - Fuzzy Relations. Fuzzy Systems: Fuzzy Logic - Fuzzy Rule based system - Defuzzification Methods - Applications. Fuzzy Backpropagation Networks: LR-type Fuzzy Numbers - Fuzzy Neuron - Fuzzy Backpropagation Architecture.		
Unit – V	Fundamentals of Genetic algorithms	Periods	12
	Fundamentals of Genetic algorithms: 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. (Unit I-Chapters: 2.1, 2.3-2.10, Unit-II- Chapters: 3.1-3.7, Unit-III- Chapters: 5.1- 5.4, Unit-IV- Chapters: 6.3, 6.5, 7.3-7.6, 12.1-12.3, Unit-V: Chapters: 8.2,8.3, 8.5,8.7, 9.2,9.3,9.4,9,5)..
E-References	
1	rkala.in/lectures.php
2	https://en.wikipedia.org/wiki/Soft_computing

Signature of BOS Chairman



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



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			3			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P3CSC10	PYTHON PROGRAMMING		4	0	0	4	25	75	100
COURSE OBJECTIVES	Set up Python and develop a simple application. Declare and perform operations on simple data types , including strings, numbers, and dates. Declare and perform operations on data structures, including lists, ranges, tuples, dictionaries, and sets. Write conditional statements and loops.								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Basic knowledge of any programming language concepts like what is a loop, what if and else does, how operators are used, etc. will be helpful. If you have strong command over the basics of any programming language, you can learn Python quickly.

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

CO / PO Mapping

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



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

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

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

Text Books	
1	Dr. S. Suresh kumar, “Problem Solving and Python Programming” Charulatha Publications, 2018..
References	
1	Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705. Python Essentials Reference (http://www.dabeaz.com/per.html): The definitive reference for both Python and much of the standard library
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 (https://www.jeffknupp.com/writing-idiomatic-python-ebook): Focused on not just getting the code to work, but how to write it in a really "Pythonic" way
E-References	
1	https://www.tutorialspoint.com/python programs
2	https://en.wikipedia.org/wiki/python programmms
3	https://www.slideshare.net/kumar_vic/pythan for better programming.

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.					 ISO 9001:2008 www.viv.com ID: 9105078407			
Programme	M.Sc	Programme Code	PCS			Regulations		2020-2021	
Department	Computer Science		Semester			3			
Course Code	Course Name	Periods per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
20P3CSC11	Data Mining and Warehousing		4	0	0	4	25	75	100
COURSE OBJECTIVES	Data quality and methods and techniques for preprocessing of data. ... Algorithms for classification, clustering and association rule analysis. Practical use of software for data analysis.								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Data mining is carried by business users with the help of engineers. Data warehousing is the process of pooling all relevant data together. Data mining is considered as a process of extracting data from large data sets.

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

CO / PO Mapping

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

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

Course Assessment Methods	
Direct	4. Continuous Assessment Test I, II & Model 5. Assignment 6. End Semester Examinations
Indirect	1. Course End Delivery

Content of the Syllabus			
Unit – I	Introduction	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.		
Unit – III	Mining Frequent Patterns, Associations, and Correlations	Periods	12
	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	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, 2008. (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	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	videlectures.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/vivekjh/data-warehouse-modeling-presentation

Signature of BOS Chairman

Subject Title	Data Mining lab	Semester	III
Subject Code	20P3CSP05	Specialization	NA
Type	Core Practical-V	L:T:P:C	0:0:6:2

Objectives

- To develop the program in WEKA to get knowledge on data mining concepts
- To familiarize with R programming to implement the process.
- Implement real world problems

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Know the primitive functions of numerical operations	K1
CO2	Understand the matrix operations	K2
CO3	Implement various statistical operations with R script.	K3
CO4	Perform K-Means clustering operations	K4
CO5	Implement real world problems.	K4

Subject Title	Data Mining Lab	Semester	III
Subject Code	20P3CSP05	Specialization	NA
Type	Core Practical V	L:T:P:C	0:0:6:2

Lab Exercise List :

1. To get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND).
2. To perform data import/export (.CSV, .XLS, .TXT) operations using data frames.
3. To get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept.
4. To perform statistical operations (Mean, Median, Mode and Standard deviation).
5. To perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization
6. To perform dimensionality reduction operation using PCA.
7. To perform Simple Linear Regression and Multi Linear Regression.
8. To perform K-Means clustering operation and visualize it.
9. Write R script to diagnose any disease using KNN classification.
10. To perform market basket analysis using Apriori algorithm.

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO \ PSO	PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	L
CO2	S	M	S	M
CO3	S	S	L	M
CO4	M	M	L	M
CO5	M	S	L	L

2020-2021 Onwards	PYTHON PROGRAMMING LAB	M.Sc. Computer Science
Semester III	20P3CSP04	Core: Practical - IV
Hours: 60	Practical –IV	Credit : 2

COURSE OBJECTIVE

- To familiar the students to the effective use of statements and syntax in python
- To implement various problems in python.

COURSE OUTCOME

On the successful completion of the course the student will be able to develop various kind of web pages.

CO Number	CO Statement
CO1	Recognize the operation of algorithmic problem solving Technique.
CO2	Identify and handle basic Statements of python programs and practice to write small coding in python.
CO3	Describe the computational operation of conditionals , function and string modules.
CO4	Demonstrate the operation list and advanced list operations and applications.
CO5	Recognize the operation of files and exceptions and illustrative programs.

2020-2021 Onwards	PYTHON PROGRAMMING LAB	M.Sc. Computer Science
Semester III	20P1CSP04	Core: Practical – IV
Hours: 60	Practical -IV	Credit : 2

List of Programs:

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 program that take command line Arguments.
10. Implement a python program find the most frequent words in a text read from a file.
11. Simulate bouncing ball using Pygame

Mapping with Programme Outcome

	PS01	PS02	PS03	PS04
CO1	S	S	S	S
CO2	M	S	S	S
CO3	M	S	S	S
CO4	M	S	S	S
CO5	-	S	S	S

S – Strong , M- Medium , L – Low



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science		Semester			4				
Course Code	Course Name		Periods per Week			Credit		Maximum Marks		
			L	T	P	C	CA	ESE	Total	
20P4CSC12	CLOUD COMPUTING		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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Advanced Concepts in Operating Systems lays down all the concepts and mechanisms involved in the design of advanced operating systems. The discussion is reinforced by many examples and cases

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit – I	Cloud Computing Basics	Periods	12
	Cloud Computing Basics: Cloud Computing Overview-Applications-Intranets and the Cloud.YourOrganization and Cloud Computing: Whenyou can use Cloud computing-Benefits-Limitations-Security Concerns.		
Unit – II	Cloud Computing Technology	Periods	12
	Cloud Computing Technology: Cloud Hardware and Infrastructure-Clients-Security-Network-Services. Accessing the Cloud: Platforms-WebApplications-Web API's-Web Browsers.		
Unit – III	Cloud Storage	Periods	12
	Cloud Storage: Overview- Cloud Storage Providers. Standards:Applications-Client-Infrastructure-Service.		
Unit – IV	Software as a Service	Periods	12
	Software as a Service: 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
	Local Clouds and Thin Clients: 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	Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjana G.Shivarathr, 2011.
2	Operating System Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Ninth Edition, John Wiley and Sons Inc, 2012.
References	
1	Operating System in depth: Design and Programming, Thomas.W,Doepfner, First Edition 2010.
2	The Linux Programming Interface: A Linux and Unix System Programming handbook, Michal Kerisk, First Edition, 2010.
E-References	
1	https://books.google.co.in/books/.../Advanced_Concepts_InOperatingSystems.html
2	https://www.bookdepository.com/Advanced-Concepts-Operating-Systems
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	2020-2021			
Department	Computer Science		Semester			4				
Course Code	Course Name		Periods per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
20P4CSC13	Digital Image Processing									
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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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PO 13	To apply knowledge of computing to create effective designs and solutions for complex problems.									
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Cos	COURSE OUTCOME
CO 1	Understand the concepts of Operating System
CO 2	To learn about DSM
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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	Advanced Concepts in Operating Systems lays down all the concepts and mechanisms involved in the design of advanced operating systems. The discussion is reinforced by many examples and cases

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit – I	Introduction	Periods	12
	Introduction: 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 ElectroMagnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Some Basic Relationships between Pixels.		
Unit – II	Image Enhancement in the Spatial Domain	Periods	12
	Image Enhancement in the Spatial Domain: 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		
Unit – III	Image Restoration	Periods	12
	Image Restoration: 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.		
Unit – IV	Object Recognition	Periods	12
	Object Recognition: Knowledge Representation Statistical Pattern Recognition Neural Nets Syntactic Pattern Recognition Optimization Techniques - Fuzzy Systems Mathematical Morphology Basic Morphological Concepts Binary Dilation and Erosion.		
Unit – V	Image Data Compression	Periods	12
	Image Data Compression: 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	www.slideshare.net/sahilbiswas/image-processing

Signature of BOS Chairman

Subject Title	Project Lab	Semester	IV
Subject Code	20P4CSPR02	Specialization	NA
Type	Major Project	L:T:P:C	2 : 0 : 6 : 2

FIRST REVIEW: (10 Marks)

1. Problem Identification
2. Problem definition
3. Presentation

SECOND REVIEW: (10 Marks)



1. Project Analysis
2. Design & Module description

FINAL REVIEW: (20 Marks)

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

The Passing minimum shall be 40% out of 60 marks (24 Marks)

ELECTIVE - I

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.					 ISO 9001:2008 www.tvr.com ID: 9105079407			
Programme	M.Sc	Programme Code	PCS		Regulations	2020-2021			
Department	Computer Science		Semester			1			
Course Code	Course Name		Periods per Week			Credit		Maximum Marks	
			L	T	P	C	CA	ESE	Total
20P1CSE01	THEORY OF COMPUTING		4	0	0	4	25	75	100
COURSE OBJECTIVES	To provide the knowledge on Learning about automata, grammar, language, and their relationships. To gives an understanding of the power of Turing machine, and the decidable nature of a problem. To gives 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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	The theory of computation is a branch of computer science and mathematics combined that "deals with how efficiently problems can be solved on a model of computation, using an algorithm". It studies the general properties of computation which in turn, helps us increase the efficiency at which computers solve problems.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	REGULAR LANGUAGES	Periods	12
	REGULAR LANGUAGES : 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 LANGUAGES : 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
	CLOSURE PROPERTIES: and 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
	UNDECIDABILITY: 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 Posts Correspondence Problem.		
Unit - V	RECENT TRENDS & APPLICATIONS	Periods	12
	RECENT TRENDS & APPLICATIONS :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, Narosa Publishing House, Delhi, 1989.
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.

Signature of BOS Chairman



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



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science			Semester			1		
Course Code	Course Name			Periods per Week		Credit	Maximum Marks		
				L	T	P	C	CA	ESE
20P1CSE02	SOFTWARE PROJECT MANAGEMENT AND QUALITY ASSURANCE								
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 Apply design principles and concepts to reengineering and reverse engineering								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	SQA encompasses the entire software development process, including requirements engineering, software design, coding, code reviews, source code control, software configuration management, testing, release management and software integration.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Introduction – Product Life cycle – Project life cycle models - Water fall model – Prototyping model – RAD model – Spiral Model – Process Models –The ISO-9001Model-The Capability Maturity Model- Metrics.		
Unit - II	Software Configuration Management	Periods	12
	Software Configuration Management – 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 Initiation – 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
	Quality Management-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
	Project Management -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, 2002. (Unit-I :Chapter 1,2,3,4&5, Unit-II: Chapter 6,7, Unit-III: Chapter 10,11 & 12)
2	Pressman, Roger, "Software Engineering ", A Practitioner's approach, 7th edition, Tata Mc- Graw Hill, 2006. 6 th Edition (Unit-IV: Chapter 25,26, Unit-V: 21,31
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" 2 nd Edition, TataMcGraw Hill Publishing Company Ltd., New Delhi, 2002.
3	Software Project Management, Ashfaque Ahmed 2013
E-References	
1	https://en.wikipedia.org/wiki/Software quality management https://en.wikipedia.org/wiki/Software quality control

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science		Semester				I			
Course Code	Course Name		Periods per Week			Credit		Maximum Marks		
			L	T	P	C	CA	ESE	Total	
20P1CSE03	CLIENT / SERVER TECHNOLOGY		4	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									
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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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
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	Even though most people use the term "client/server" when talking about group computing with PC's on networks, PC network computing evolved before the client/server model

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Introduction to Client Server Computing-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 Hardware and Software-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
	Server Hardware-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
	Overview of Networking-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 and Deployment-Development Methodology-Convert Existing Screen Interfaces-Application Development Tools-Managing the Production Environment-Production Requirements-Future Trends		
Total Periods			60

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Text Books	
1	Dawna Travis Dewire, "Client/Server computing, 11 th 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	www.opengroup.org/comsource/techref2/NCH1222X.HTM
2	www.springer.com/productFlyer

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester				I		
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P1CSE04	Internet of Things		4	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								
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 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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Having a basic conceptual understanding of electric circuits is very helpful, so students can better understand how to correctly connect the parts in their IoT electronics kit (and how to troubleshoot connection issues)

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Introduction: 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
	IoT Enabling Technologies: 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
	Developing IoT: Introduction – IoT Design Methodology – Case Study on IoT System for Weather Monitoring.		
Unit - IV	IoT and M2M	Periods	12
	IoT and M2M: 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
	IoT System Management with NETCONF-YANG: Need for IoT System Management – SNMP – NETCONF – YANG. Tools for IoT: Introduction - Chef – Puppet.		
Total Periods			60

Text Books	
1	Arshdeep Bahga, Vijay Madiseti “ 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	www.theinternetofthings.eu

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			2			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P2CSE05	Network security		4	-	-	4	25	75	100
COURSE OBJECTIVES	1. To learn about the Security architecture security types and security mechanisms.2. To learn about the Network security has four objectives: confidentiality, integrity, availability, and non repudiation.3. To gain the knowledge of Securing inform								
POs	PROGRAMME OUTCOME								
PO 1	Train by Fundamental knowledge in problem solving, general computing, and in depth knowledge in Information Technology.								
PO 2	Prepare to be creators of new knowledge leading to innovation and entrepreneurship employable in various sectors such as private								
PO 3	Proficient to evolve upcoming technologies in their own discipline								
PO 4	Groom to engage in lifelong learning process by exploring their knowledge independently.								
PO 5	Understand and provide analytical solutions to real life problems in Data Science with thrust in lifelong Learning								
PO 6	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.								
PO 7	Evaluate and use appropriate tools and techniques in developing application activities.								
PO 8	Ability to identify, analyze, design, optimize and implement system solutions using suitable computing techniques leading to propulsion towards employability.								
PO 9	Frame to design and conduct experiments /create models to analyze and interpret data.								
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and Graphical								
PO 11	Ability to collaborate the findings of Biological sciences incorporating with existing knowledge.								
PO 12	Ability to analyze a given real-time problems and propose feasible computing solutions								
PO 13	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice								
PO 14	Updating themselves through e-learning and self-study courses								
PO 15	Apply ethical principles and responsibilities during professional practice								

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	The majority of entry-level cybersecurity jobs do not require coding skills. However, being able to write and understand code may be necessary for some mid-level and upper-level cybersecurity positions that you will become qualified for after you've built a few years of experience.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Security Trends-The OSI Security Architecture - Security Attacks - Security Services- Security Mechanisms- Model for networkSecurity - 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.		
Unit - II	Public Key Cryptography and Message Authentication	Periods	12
	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
	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 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 - 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	1. William Stallings, "Network Security Essentials – Applications and Standards", 3rd Edition, Pearson Education, 2009 Edition.
References	
1	1. V.K.Pachghare , "Cryptography and Information Security" , PHI 2013.
2	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://laptrinhx.com/network-security-essentials-application-and-standards-6th-edition-4052395665/
2	https://developer.mozilla.org/en-US/docs/Web/Security
3	http://mercury.webster.edu/aleshunascosc%20130/chapter-20.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	2020-2021		
Department	Computer Science		Semester				II		
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P2CSE06	WIRELESS APPLICATION PROTOCOL								
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. Acquire creative skills in design, layout, and interactivity of WAP pages.								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Wireless application protocol (WAP) is an application environment and set of communication protocols for wireless devices designed to enable manufacturer-, vendor-, and technology-independent access to the Internet and advanced telephony services.

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

CO / PO Mapping

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

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

Course Assessment Methods	
Direct	7. Continuous Assessment Test I, II & Model 8. Assignment 9. End Semester Examinations
Indirect	1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Introduction – 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.		
Unit - II	The Wireless Markup Language	Periods	12
	The Wireless Markup Language: 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.		
Unit - III	User Interface Design	Periods	12
	User Interface Design: 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.		
Unit - IV	Tailoring Content to the Client	Periods	12
	Tailoring Content to the Client-Push Messaging: 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.		
Unit - V	Wireless Telephony Applications	Periods	12
	Wireless Telephony Applications: 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).
Reference Books	
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



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science		Semester			2				
Course Code	Course Name		Periods per Week			Credit		Maximum Marks		
			L	T	P	C	CA	ESE	Total	
20P2CSE07	Multimedia And Virtual Reality		4	0	0	4	25	75	100	
COURSE OBJECTIVES	<p>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. Acquire creative skills in design, layout, and interactivity of 3D modeling and Animation. To learn about multimedia skills, 3D modeling and animation tools.</p>									
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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Requirements for Multimedia are Sound and Image. * They also contain animations, and GIFs along with sound and images. * By using multimedia, one can easily explain all the information pictorially.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Introduction – what is multimedia – making multimedia – multimedia skills – Text.		
Unit - II	Sound	Periods	12
	Sound : Digital Audio-MIDI-Music CDs. Images: Making Still Images-Color-Image File Formats. Animation-Video.		
Unit - III	Hardware	Periods	12
	Hardware: Macintosh versus Windows-Networking-Connections-Memory and Storage devices-Input devices- Output Hardware- Communication Devices		
Unit - IV	Basic Software Tools	Periods	12
	Basic Software Tools: 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
	Virtual Reality: Introduction – A Generic VR System: Virtual Environment –VR Technology-Modes Of Interaction-VR Hardware: Sensor Hardware, Head Coupled Displays – Acoustic Hardware-Integrated VR – VR Software: Modeling Virtual Worlds- Physical Simulations – VR Applications		
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, 4 th Edition 2014. (Unit- V)
References	
1	Free T. Hofstetter, “Multimedia LITERACY”, TMH, 1995.
2	Simoin j.,Gibbs, Dionysios C and Tsuchriziz “ 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

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester				2		
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P2CSE08	AI AND EXPERT SYSTEMS		4	0	0	4	25	75	100
COURSE OBJECTIVES	To enable the students to learn the concepts of Artificial Intelligence								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	<p>Strong knowledge of Mathematics.</p> <p>Good command over programming languages.</p> <p>Good Analytical Skills.</p> <p>Ability to understand complex algorithms.</p> <p>Basic knowledge of Statistics and modeling.</p>

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

CO / PO Mapping

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



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

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

Content of the Syllabus			
	Introduction	Periods	10
Unit - I	Introduction to artificial intelligences - semantic nets and description matching: semantic nets: good representation are the key to good problem solving-good representation support explicit, exposing description - a representation has four fundamental parts - the describe and match methods and analogy problem - the describe – and - match method and recognition of abstractions		
	The Problem-Reduction Method	Periods	10
Unit - II	Generate and test, means - ends analysis, and problem reduction: the generate – and - test method - the means - ends analysis method – the problem - reduction method		
	Blind methods	Periods	10
Unit - III	Blind methods: net search is really tree search-search trees explode exponentially – depth - first search dives into the search tree – breadth - first search pushes uniformly into the search tree - the right search depends on the tree - nondeterministic search moves randomly into the search tree - heuristically informed methods: quality measurements turn depth - first search into hill climbing - foothills, plateaus, and ridges make hill hard to climb - beam search expands several partial paths and purges the rest – best - first search expands the best partial path-search may lead to discovery - search alternatives form a procedure family - nets and optimal search: the best path - redundant paths		
	Trees and adversarial search	Periods	10
Unit - IV	Trees and adversarial search: algorithmic methods-heuristic method-rules and rule chaining: rule-based deducting system - procedures for forward and backward chaining - rules, substrates, and cognitive modeling: rule - based system Viewed as substrate-rule-based system Viewed as models for human problem solving		
	Biological Actions and Studies	Periods	10
Unit - V	Fuzziness as Multivalence - Neurons as functions- signal Monotonicity - Biological Actions and signals – Common Signal Functions – Additive Neuronal Dynamics Learning as Encoding Change and quantization		
Total Periods			50

Text Books	
1	Patrick Henry Winston, " <i>Artificial Intelligence</i> ", Addison Wesley Third Edition.
2.	. Bart Kosko " <i>Neural Networks and Fuzzy Systems</i> " Second Edition , 2004
References	
1	Nils J. Wilson " <i>Artificial Intelligence</i> ", Morgan Kaufmann Publishers, Reprinted 2009
2	Elaine Rich ,Kevin knight, Sivasangaran B Nair " <i>Artificial Intelligence</i> " ,TMH, Third Edition, Fourth Reprint 2010
3	V.S. Janakiraman, K. Sarukesi, P.Gopalakrishnan, "Foundations of artificial intelligence and expert systems" Macmillan Publications, 2005.
4	Er. Rajiv Chopra, S. Chand, "Artificial Intelligence: A Practical Approach" S. Chand & Company Pvt. Ltd., 2nd edition 2014

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science		Semester			3				
Course Code	Course Name		Periods per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
20P3CSE09	COMPILER DESIGN		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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System									
CO 2	To learn about DSM									
CO 3	To analyze the basics of Operating System Algorithms									
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	This tutorial requires no prior knowledge of compiler design but requires basic understanding of at least one programming language such as C.
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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	3
		PO 2	2
		PO 3	5
CO 2	2	PO 4	4
		PO 5	2
		PO 6	6
CO 3	3	PO 7	3
		PO 8	5
		PO 9	1
CO 4	4	PO 10	2
		PO 11	3
		PO 12	2
CO 5	5	PO 13	3
		PO 14	4
		PO 15	6

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Overview	Periods	12
	Introduction to Compilers: 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.		
Unit - II	Architectures of Distributed Systems	Periods	12
	The Syntactic specification of programming languages: 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.		
Unit - III	Multiprocessor System Architectures	Periods	12
	Syntax directed translation: 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		
Unit - IV	Database Operating Systems	Periods	12
	Run time storage administration: 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.		
Unit - V	CASE STUDY	Periods	12
	Introduction of code optimization: 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 – Peephole optimization.		
Total Periods			60

Text Books	
1	Principles of Compiler Design by Alfred V.Aho, Jeffrey D.Ullman , Narosa Publications House.
References	
1	Modern Compiler Design by David Galles, Fifth Edition 2012.
E-References	
1	www.tutorialspoint.com
2	https://en.wikipedia.org
3	www.faadooengineers.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	2020-2021		
Department	Computer Science		Semester			3			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P3CSE10	OBJECT ORIENTED ANALYSIS AND DESIGN		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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System								
CO 2	To learn about DSM								
CO 3	To analyze the basics of Operating System Algorithms								

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	No former experience with object-oriented analysis and design is required, but knowledge about the elementary object-oriented concepts (classes, objects, inheritance) is useful.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Overview	Periods	12
	An overview of object oriented systems development – Object Basics - object oriented systems development life cycle.		
Unit - II	Architectures of Distributed Systems	Periods	12
	Object Oriented Methodologies: Introduction - Rumbaugh Object Modeling Technique – The Booch Methodology – The Jacobson Methodologies – Patterns – Frameworks – The Unified Approach.		
Unit - III	Multiprocessor System Architectures	Periods	12
	Unified Modeling Language: Introduction – static and dynamic models – why modeling? – UML diagrams – UML class diagram – use-case diagram – UML dynamic modeling – UML extensibility.		
Unit - IV	Database Operating Systems	Periods	12
	Object Analysis: 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.		
Unit - V	CASE STUDY	Periods	12
	Object Oriented Design Process and Design Axioms: 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”, McGRAW – Hill international 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	www.uml-diagrams.org
2	www.utdallas.edu

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			3			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P3CSE11	EMBEDDED SYSTEMS		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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Basic electronics, digital electronics, knowledge of microcontrollers and C programming. Since you are from computer science background you would need a development board of any 8-bit microcontroller (students of EE and ECE have enough knowledge and background to build it on breadboard or pcb).

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Overview	Periods	12
	Introduction to Embedded Systems-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.		
Unit - II	Architectures of Distributed Systems	Periods	12
	Processor and memory organization-Devices and buses for Device Network Device drivers and Interrupt servicing mechanism.-program modeling concepts in single and multiprocessor systems software-development process.		
Unit - III	Multiprocessor System Architectures	Periods	12
	Software Engineering Practices in the Embedded software development process- Inter-process communication and synchronization of process, tasks and threads- Hardware-software co-design in an embedded system.		
Unit - IV	Database Operating Systems	Periods	12
	Hardware software co-design and program modeling-Embedded hardware design and development-embedded firmware design and development-Real-time operating system (RTOS) based embedded system design-		
Unit - V	CASE STUDY	Periods	12
	Introduction to embedded system design with vx works and MicroC/OS-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

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021		
Department	Computer Science		Semester			3			
Course Code	Course Name		Periods per Week		Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total
20P3CSE12	Professional ethics		4	0	0	4	25	75	100
COURSE OBJECTIVES	The Objectives of Ethics are to evaluate the human behaviors and calling up on the moral standards. The ethical standards also prescribe how to act morally in specified situations								
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								
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.								
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations								
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.								
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.								
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.								
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations								
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 Operating System								
CO 2	To learn about DSM								
CO 3	To analyze the basics of Operating System Algorithms								

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	Professionals and those working in acknowledged professions exercise specialist knowledge and skill. How the use of this knowledge should be governed when providing a service to the public can be considered a moral issue and is termed professional ethics

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Overview	Periods	12
	Nature and Scope of Business Ethics: Introduction – Scope of Business Ethics - Religion and Ethics - Types of Ethics – Sources of Business Ethics - Factors Influencing Business Ethics – Importance of Business Ethics.		
Unit - II	Architectures of Distributed Systems	Periods	12
	Professional Ethics: Introduction – professional ethics – ethical problems faced by managers – new skill required for managers – managing ethical conduct in modern times.		
Unit - III	Multiprocessor System Architectures	Periods	12
	Corporate Governance and CSR: Principles of corporate governance – issues involved in corporate governance - theories of corporate governance – CSR – introduction – Various dimensions – argument for and against CSR..		
Unit - IV	Database Operating Systems	Periods	12
	Ethics in India: Religious foundations of ethics - Hinduism - Buddhism – Jainism - Ethical Values of Gandhi, Vivekananda, Aurobindo and Tagore.		
Unit - V	CASE STUDY	Periods	12
	Dimensions of Ethics : Personal ethics - marketing ethics – technology ethics – environmental ethics		
Total Periods			60

Text Books	
1	R.Nandagopal, Ajithsankar.R.N, "Indian Ethos and ValuE Management", Tata McGraw Hill education Private Ltd, New Delhi, 2010
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.
6	World Community Service Centre, ,, Value Education", Vethathiri
E-References	
1	www.onlineethics.org
2	www.nspe.org
3	www.globalethics.org

Signature of BOS Chairman



VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.



Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science		Semester			4				
Course Code	Course Name		Periods per Week			Credit		Maximum Marks		
			L	T	P	C	CA	ESE	Total	
20P4CSE13	Big Data Analytics		4	0	0	4	25	75	100	
COURSE OBJECTIVES	Big Data analytics is a process used to extract meaningful insights, such as hidden patterns, unknown correlations, market trends, and customer preferences. Big Data analytics provides various advantages—it can be used for better decision making, preventing fraudulent activities, among other things.									
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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	SQL. SQL, or Structured Query Language, is the ubiquitous industry-standard database language and is possibly the most important skill for data analysts to know.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I		Periods	12
	. INTRODUCTION TO BIG DATA 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		Periods	12
	MINING DATA STREAMS 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		Periods	12
	HADOOP HADOOP: 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		Periods	12
	HADOOP ENVIRONMENT HADOOP ENVIRONMENT: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenanc Hadoop benchmarks- Hadoop in the cloud.		
Unit - V		Periods	12
	FRAMEWORKS FRAMEWORKS : 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, O’reilly 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

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science		Semester			4				
Course Code	Course Name		Periods per Week			Credit		Maximum Marks		
			L	T	P	C	CA	ESE	Total	
20P4CSE14	CYBER FORENSICS		4	0	0	4	25	75	100	
COURSE OBJECTIVES	On successful completion of this course we learn the fundamentals of From a technical standpoint, the main goal of computer forensics is to identify, collect, preserve, and analyze data in a way that preserves the integrity of the evidence collected so it can be used effectively in a legal case.									
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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	'Computer Forensics' rolls in the modern technological world, efficiently engaging authorities whose purpose is to research and investigate criminal activities of organizations and individuals that are not in compliance with the rule of law.

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

CO / PO Mapping

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

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

Course Assessment Methods	
Direct	10. Continuous Assessment Test I, II & Model 11. Assignment 12. End Semester Examinations
Indirect	1. Course End Delivery

Content of the Syllabus			
	v	Periods	12
Unit - I	INTRODUCTION TO COMPUTER FORENSICS: Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. Forensics Technology and Systems- Computer Investigation- Data Acquisition.		
		Periods	12
Unit - II	E-MAIL SECURITY & FIREWALLS : PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions.		
	EVIDENCE COLLECTION AND FORENSICS TOOLS	Periods	12
Unit - III	EVIDENCE COLLECTION AND FORENSICS TOOLS: Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.		
	DATA RECOVERY	Periods	12
Unit - IV	DATA RECOVERY: Data Recovery Defined Data Backup and Recovery, The Role of Backup in Data Recovery, The Data-Recovery Solution, Hiding and Recovering Hidden Data		
	DUPLICATION AND PRESERVATION OF DIGITAL EVIDENCE	Periods	12
Unit - V	DUPLICATION AND PRESERVATION OF DIGITAL EVIDENCE : Preserving the Digital Crime Scene, Computer Evidence Processing Steps .Computer Image Verification and Authentication, Special Needs of Evidential Authentication, Practical Considerations.		
Total Periods			60

Text Books	
1	1. . Dr.L.Aruna, “Cyber Forensics”, Published by Charulatha Publications, Chennai, First edition, 2019. (Units - I to III).
2	John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles,River Media, 2005 (Units - IV,V).
References	
1	Michael G. Noblett; Mark M. Pollitt; Lawrence A. Presley (October 2000). "Recovering and examining computer forensic evidence"
2	A.Yasinsac,R.F.Erbacher,D.G.Marks,M.M.Pollitt(2003)."Computer forensics education". IEEE Security & Privacy.
3	Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series:Computer Forensics), 2010
4	Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts, Ali Jahangiri, 2009
E-References	
1	https://en.wikipedia.org/wiki/Computer_forensics
2	https://forensiccontrol.com/resources/beginners-guide-computer-forensics/
3	https://www.us-cert.gov/sites/default/files/publications/forensics.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	2020-2021			
Department	Computer Science			Semester			4			
Course Code	Course Name			Periods per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
20P4CSE15	Distributed Computing			4	0	0	4	25	75	100
COURSE OBJECTIVES	An important goal of a distributed system is to make it easy for users (and applications) to access and share remote resources. Resources can be virtually anything, but typical examples include peripherals, storage facilities, data, files, services, and networks, to name just a few.									
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									
PO 4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.									
PO 5	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations									
PO 6	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.									
PO 7	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.									
PO 8	Demonstrate knowledge and understanding of the computing and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.									
PO 9	Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations									
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 Operating System
CO 2	To learn about DSM
CO 3	To analyze the basics of Operating System Algorithms
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	Resource sharing, Openness, Concurrency. Scalability, Fault Tolerance, Transparency.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	. Introduction: 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
	Communication: 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: Clock Synchronization	Periods	12
	Synchronization: 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
	Fault Tolerance: 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
	Distributed Object-Based Systems: 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 Systemsv		
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 Edition
2	G.coulouris, Jean Dollimore & Tim Kindberg,Distributed Systems: Concepts and Design (4 th Edition) , Addison Wesley Publications, 2005 Edition.
E-References	
1	www.dezyre.com
2	www.techtarget.com

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VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)



Elayampalayam, Tiruchengode-637 205.

Programme	M.Sc	Programme Code	PCS			Regulations	2020-2021			
Department	Computer Science		Semester			4				
Course Code	Course Name		Periods per Week			Credit		Maximum Marks		
			L	T	P	C	CA	ESE	Total	
20P4CSE16	Adhoc Sensor Networks		4	0	0	4	25	75	100	
COURSE OBJECTIVES	The main objective of these protocols is to efficiently disseminate observations gathered by individual sensor nodes to all the sensor nodes in the network. Simple protocols such as flooding and gossiping are commonly proposed to achieve information dissemination in WSNs.									
POs	PROGRAMME OUTCOME									
PO 1	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.									
PO 2	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.									
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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
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	Ad hoc networks are multi-hop networks consisting of wireless autonomous hosts, where each host may serve as a router to assist traffic from other nodes. Sensors provide service to monitoring stations.

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

CO / PO Mapping

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

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

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

Content of the Syllabus			
Unit - I	INTRODUCTION AND MAC PROTOCOLS	Periods	12
	. INTRODUCTION AND MAC PROTOCOLS: 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.		
Unit - II	ROUTING PROTOCOLS	Periods	12
	ROUTING PROTOCOLS: 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.		
Unit - III	TRANSPORT LAYER AND SECURITY ISSUES	Periods	12
	TRANSPORT LAYER AND SECURITY ISSUES : Design Issues, Design Goals and Classifications of Transport layer protocols - TCP over Ad Hoc – Security in Ad hoc Networks - Network Security Requirements - Network Security Attacks - Key Management - Secure Routing in Ad hoc Networks		
Unit - IV	SENSOR NETWORKS AND NETWORKING SENSORS	Periods	12
	SENSOR NETWORKS AND NETWORKING SENSORS: Unique Constraints and Challenges – Advantages and Applications – Collaborative Processing – Key Definitions – Localization and Tracking – Networking Sensors – MAC – Geographic, Energy Aware and Attribute based Routing.		
Unit - V	INFRASTRUCTURE ESTABLISHMENT AND NETWORK DATABASE	Periods	12
	INFRASTRUCTURE ESTABLISHMENT AND NETWORK DATABASE 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.Toh, “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	www.uta.edu
2	www.oldcitypublishing.com

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