

**RAJAH SERFOJI GOVERNMENT COLLEGE**  
**(AUTONOMOUS)**  
**THANJAVUR-613 005**



**SYLLABUS**

(With LOCF and CBCS)

**FOR**  
**MSc (Computer Science)**

**(Applicable to the candidates admitted from the  
academic year 2022-2023 onwards)**

**RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)**  
**THANJAVUR 613 005**

**PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE**  
**BOARD OF STUDIES MEETING**

**VENUE** : COMPUTER SCIENCE DEPARTMENT  
**DATE** : 18/08/2022  
**TIME** : 10.30 PM

**AGENDA**

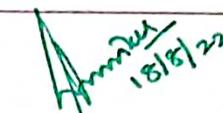
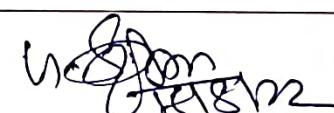
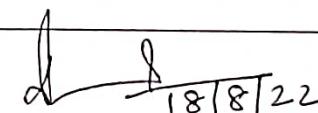
Approval of new syllabus for BSc(Computer Science), MSc(Computer Science) and MPhil(Computer Science) students who admitted in the academic year 2022-23 onwards.

**MEMBERS IN BOARD OF STUDIES**

NAME	ADDRESS
<b>Dr. K. Mohan Kumar</b> Chairman, Board of studies	HOD of Computer Science Rajah Serfoji Govt. College (Autonomous) Thanjavur
<b>Dr. S. Kumaravel</b> University Nominee	Associate Professor of Computer Science AVVM Sri Pushpam College Poondi, Thanjavur District.
<b>Dr. A. Padmapriyaa</b> Subject Expert-1	Professor of Computer Science Alagappa University Karaikudi 630003
<b>Dr. P. Thiagarajan</b> Subject Expert-2	Assistant Professor of Computer Science Central University Tiruvarur
<b>Dr. Ravikumar Ramadoss</b> Industrial Expert	Director PIXMonks Solutions Thanjavur
<b>Mr. V. Srividhya</b> Alumni	Programmer TUK Arts College, Karanthai Thanjavur
<b>Dr. M. Chidambaram</b> Member	Asst. Professor in Computer Science Rajah Serfoji Govt. College (Autonomous) Thanjavur
<b>Dr. V.S. Suresh Kumar</b> Member	Asst. Professor in Computer Science Rajah Serfoji Govt. College (Autonomous) Thanjavur
<b>Mr. N. Suresh Babu</b> Member	Asst. Professor in Computer Science Rajah Serfoji Govt. College (Autonomous) Thanjavur
<b>Dr. D.J. Evanjaline</b>	Asst. Professor in Computer Science Rajah Serfoji Govt. College (Autonomous) Thanjavur
<b>Dr. J.Gnana Jayanthi</b>	Asst. Professor in Computer Science Rajah Serfoji Govt. College (Autonomous) Thanjavur
<b>Mr. C. Muruganandam</b>	Asst. Professor in Computer Science Rajah Serfoji Govt. College (Autonomous) Thanjavur

**Resolution Passed:**

Resolved to approve the syllabus for BSc (Computer Science), MSc (Computer Science) and MPhil (Computer Science) from the academic year 2022-23 onwards

NAME	SIGNATURE
<b>Dr. K. Mohan Kumar</b> Chairman, Board of studies	
<b>Dr. S. Kumaravel</b> University Nominee	 18/8/22
<b>Dr. A. Padmapriyaa</b> Subject Expert-1	
<b>Dr. P. Thiyagarajan</b> Subject Expert-2	
<b>Dr. Ravikumar Ramadoss</b> Industrial Expert	
<b>Mrs. B. Srividhya</b> Alumni	 18/8/22
<b>Dr. M. Chidambaram</b> Member	 18/8/22
<b>Dr. V.S. Suresh Kumar</b> Member	 18/8/22
<b>Mr. N. Suresh Babu</b> Member	
<b>Dr. D.J. Evanjaline</b> Member	 18/8/22
<b>Dr. J.Gnana Jayanthi</b> Member	
<b>Mr. C. Muruganandam</b> Member	

## **VISION**

Creation of globally capable, committed, empathetic and holistic persons promoting the society.

## **MISSION**

1. Nurturing effective learning environment to the students of diverse background, developing their inherent skills and competencies through reflection and creation of knowledge and service.
2. Cultivating comprehensive learning and best practices through innovative and value driven pedagogy.
3. Contributing significantly to Higher Education through Teaching, Learning, and Research and Extension activities.

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

1. Graduates will be able to accomplish professional standards in the global environment.
2. Graduates will be able to uphold integrity and human values.
3. Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

## **MSc- COMPUTER SCIENCE PROGRAMME OUTCOMES (POs)**

Upon completion of this PG Degree Programme, the students will be able to

1. Be capable of demonstrating advanced levels of knowledge and understanding and intellectual attainment of the discipline that forms a part of the post-graduate program of study and applying the knowledge in real-life situations through critical thinking and analytical reasoning with an aptitude for research and development.
2. Become employable, entrepreneurs, or pursue higher levels of education and further knowledge with scientific reasoning, problem-solving capacity, communication, and other generic skills and global competencies like digital literacy, and the ability to work in cooperation as a team.
3. Be a good citizen with multicultural competence, moral and ethical awareness, reflective thinking, and leadership qualities to make progressive efforts to sustain the environment, socio-cultural and economic fabric, and human values at the national and global level.
4. Proceed with a sense of inquiry and demonstrate capability for exploring specific areas of knowledge, asking relevant/appropriate questions, problematizing, synthesizing, and articulating; and to demonstrate an ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships and to demonstrate an ability to plan, execute and report the results of an experiment or investigation in the fields of research and development.
5. Become a lifelong learner through self-paced and self-directed learning aimed at intellectual development, meeting economic, social, and cultural objectives, and adapting to changing trades and demands of the workplace through knowledge/skill development/reskilling.

## **MSc- COMPUTER SCIENCE PROGRAM SPECIFIC OUTCOMES (PSOs)**

On completion of this Programme, the M.Sc.(Computer Science) students will be able to:

1. Integrate and employ the programming skills for various real time computer applications like business, engineering, government etc.

2. Analyse, the existing manual or computerized applications which are used at present and find the difficulties in quality of service and provide a solution to overcome these issues.
3. Evaluate the proposed systems cost-wise and performance-wise and develop new systems which are suitable for the changing environment.
4. Apply statistical and forecasting techniques in their software tools to manage any kind of change occur in dynamic needs of the society.
5. Develop analytical interpretative and presentation skill regarding research in computer science field.

**RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS), THANJAVUR-613005**  
**M.Sc. COMPUTER SCIENCE COURSE STRUCTURE**  
**(For the Candidates admitted from the academic year 2022 -2023 onwards)**

Semester	Part	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam. Hrs.	Marks		Total
								Int.	Ext.	
I	III	CC1	A1PCS1	Design and Analysis of Algorithm	6	4	3	25	75	100
	III	CC2	A1PCS2	Cryptography and Network Security	6	4	3	25	75	100
	III	CC3	A1PCS3	Advanced Python Programming	5	4	3	25	75	100
	III	CC4	A1PCSP1	Practical- Python Lab	6	4	3	40	60	100
	III	EC1	A1PCSEL1A	Object Oriented System Development	5	4	3	25	75	100
			A1PCSEL1B	WAP and XML						
			A1PCSEL1C	Statistical computing						
	III	GEC1			2	2	3	25	75	100
<b>Total</b>					<b>30</b>	<b>22</b>				<b>500</b>
II	III	CC5	A2PCS4	Mobile Communications	6	4	3	25	75	100
	III	CC6	A2PCS5	Cloud Computing	6	4	3	25	75	100
	III	CC7	A2PCS6	PHP and MySQL	5	4	3	25	75	100
	III	CC8	A2PCSP2	Practical-PHP and MySQL Lab	6	4	3	40	60	100
	III	EC2	A2PCSEL2A	Data Mining	5	4	3	25	75	100
			A2PCSEL2B	Dot Net programming						
			A2PCSEL2C	Theory of Computation						
		GEC2			2	2				
<b>Total</b>					<b>30</b>	<b>22</b>				<b>500</b>

Semester	Part	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam. Hrs.	Marks		Total
								Int.	Ext	
III	III	CC9	A3PCS7	Compiler Design	6	5	3	25	75	100
	III	CC10	A3PCS8	Distributed Operating System	6	5	3	25	75	100
	III	CC11	A3PCS9	Advanced Web Technology	6	5	3	25	75	100
	III	CC12	A3PCSP3	Practical-Web Technology Lab	6	4	3	40	60	100
	III	EC3	A3PCSEL3A	Software Project Management	6	4	3	25	75	100
			A3PCSEL3B	Embedded systems						
			A3PCSEL3C	Optimization Techniques						
		ECC1*	A3PCSEC1	Advanced Computer Network	-	4	3	-	100	100
					Total	30	23			500
IV	III	CC13	A4PCS10	Internet of Things	6	5	3	25	75	100
	III	CC14	A4PCSP4	Practical-Internet of Things Lab	6	5	3	40	60	100
	III	CC15	A4PCSPW	Project Work	6	5	-	20	80	100
	III	EC4	A4PCSEL4A	Big data analytics	6	4	3	25	75	100
			A4PCSEL4B	Digital Image processing						
			A4PCSEL4C	Web Services						
	III	EC5	A4PCSEL5A	Machine Learning	6	4	3	25	75	100
			A4PCSEL5B	Soft Computing						
			A4PCSEL5C	Advanced Java Programming						
		ECC2*	A4PCSEC2	Advanced Database Management Systems	-	4	3	-	100	100
					Total	30	23			500
					Grand Total		90			2000

\*Not considered for CGPA

	No of Papers	Total Credit
<b>Core Courses</b>	15	70
<b>Elective Course</b>	5	20
<b>Total</b>	20	90

**Separate passing minimum is prescribed for Internal and External**

- a) The passing minimum for CIA shall be 50% out of 25 Marks(ie. 12 Marks)
- b) The passing minimum for Autonomous Examinations shall be 50% out of 75 Marks(ie. 38 Marks)
- c) The passing minimum not less than 50 in the aggregate

**SOURCE OF THE CONTENT OF EACH TITLE:**

Semester	Title	Syllabus from
I	Design and Analysis of Algorithm	tnsche.tn.gov.in
	Cryptography and Network Security	19-21 Syllabus
	Advanced Python Programming	Prepared by us
	Practical- Python Lab	Prepared by us
	Object Oriented System Development	tnsche.tn.gov.in
II	Mobile Communications	19-21 Syllabus
	Cloud Computing	19-21 Syllabus
	PHP and MySQL	19-21 Syllabus
	Practical-PHP and MySQL Lab	19-21 Syllabus
	Data Mining	tnsche.tn.gov.in
III	Compiler Design	tnsche.tn.gov.in
	Distributed Operating System	tnsche.tn.gov.in
	Advanced Web Technology	tnsche.tn.gov.in
	Practical-Web Technology Lab	tnsche.tn.gov.in
	Software Project Management	19-21 Syllabus
	Advanced Computer Network(Extra Credit course 1)	tnsche.tn.gov.in
IV	Internet of Things	tnsche.tn.gov.in
	Practical-Internet of Things Lab	Prepared by us
	Big data analytics	19-21 Syllabus
	Machine Learning	tnsche.tn.gov.in
	Advanced Database Management Systems(Extra Credit course 2)	tnsche.tn.gov.in

Change of percentage of syllabus:  $53+14 = 67\%$

Syllabus From	No of courses taken	Total Number of courses	%
Tamil Nadu Govt.	11	21	53
Current Syllabus	7	21	33
New preparation by us	3	21	14

## CONTENT

### M.Sc (Computer Science)

Semester	Paper Code	Title	Page No.
1	A1PCS1	Design and Analysis of Algorithm	PG-1
	A1PCS2	Cryptography and Network Security	PG-3
	A1PCS3	Advanced Python Programming	PG-5
	A1PCSP1	Practical- Python Lab	PG-7
	A1PCSEL1A	Object Oriented System Development	PG-9
	A1PCSEL1B	WAP and XML	PG-12
	A1PCSEL1C	Statistical computing	PG-14
2	A2PCS4	Mobile Communications	PG-16
	A2PCS5	Cloud Computing	PG-18
	A2PCS6	PHP and MySQL	PG-21
	A2PCSP2	Practical-PHP and MySQL Lab	PG-24
	A2PCSEL2A	Data Mining	PG-26
	A2PCSEL2B	Dot Net programming	PG-28
	A2PCSEL2C	Theory of Computation	PG-31
3	A3PCS7	Compiler Design	PG-33
	A3PCS8	Distributed Operating System	PG-35
	A3PCS9	Advanced Web Technology	PG-37
	A3PCSP3	Practical-Web Technology Lab	PG-39
	A3PCSEL3A	Software Project Management	PG-41
	A3PCSEL3B	Embedded systems	PG-44
	A3PCSEL3C	Optimization Techniques	PG-46
	A3PCSEC1	Advanced Computer Network	PG-48
4	A4PCS10	Internet of Things	PG-50
	A4PCSP4	Practical-Internet of Things Lab	PG-53
	A4PCSPW	Project Work	PG-55
	A4PCSEL4A	Big data analytics	PG-56
	A4PCSEL4B	Digital Image processing	PG-58
	A4PCSEL4C	Web Services	PG-61
	A4PCSEL5A	Machine Learning	PG-63
	A4PCSEL5B	Soft Computing	PG-65
	A4PCSEL5C	Advanced Java Programming	PG-67
	A4PCSEC2	Advanced Database Management Systems	PG-70
<b>For other departments</b>			
		Basic concepts in Computer Science	PG-72
		Programming in C++	PG-74

Credits : 5

Hours/Week : 6

Medium of instruction: English

Code: A1PCS1

**M.Sc(Computer Science) - Semester: 1**  
(For students admitted from 2022-2023 onwards)

## DESIGN AND ANALYSIS OF ALGORITHMS

### COURSE OBJECTIVES:

- To learn effective problem solving in computing applications.
- To analyze the algorithmic procedure to determine the computational complexity of algorithms.
- To learn about various kinds problem solving methods and analyze their merits and demerits.

### COURSE OUTCOMES:

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the specification of algorithms and elementary data structure	K1
CO-2	Compare the performance of searching and sorting techniques	K2
CO-3	Solve the problems using greedy methods and storage on tapes.	K3
CO-4	Get clear idea dynamic programming for shortest paths, travelling salesman problem, basic traversal and search techniques.	K4
CO-5	Familiar with the backtracking methods for problems.	K5

### UNIT - I

**Introduction:** Algorithm Definition – Algorithm Specification – Performance Analysis- Asymptotic Notations. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

### UNIT - II

**Divide and Conquer:** The General Method – Defective Chessboard – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen’s Matrix Multiplication.

### UNIT - III

**The Greedy Method:** General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

### UNIT - IV

**Dynamic Programming:** The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

### UNIT - V

**Backtracking:** The General Method – The 8-Queens Problem -- Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searchhod - 0/1 Knapsack Problem.

#### BOOK FOR STUDY:

Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

#### BOOKS FOR REFERENCE:

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcroft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniemi- TMH.
4. Carlos A. Coello Coello, Gary B. Lamont, David A. VanVeldhuizen, "Evolutionary Algorithms for Solving Multi-Objective Problems", Springer 2nd Edition, 2007.

#### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
<b>CO1</b>	2	2	3	2	2	3	2	3	1	2	2.75
<b>CO2</b>	3	2	2	3	1	2	3	1	2	3	2.75
<b>CO3</b>	3	2	3	3	2	3	2	1	3	3	3.13
<b>CO4</b>	2	2	2	3	3	1	2	3	2	2	2.75
<b>CO5</b>	1	2	3	2	3	3	2	2	3	1	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.83

#### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவா  
கணினி அறிவியல் துறை  
மன்ற சபோசி அரசுக் கல்லூரி  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 5  
Hours/Week : 6  
Medium of instruction: English

Code: A1PCS2

**M.Sc(Computer Science) - Semester: 1**  
(For students admitted from 2022-2023 onwards)

## **CRYPTOGRAPHY AND NETWORK SECURITY**

### **COURSE OBJECTIVES:**

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.
- To know about the malicious software & firewalls.

### **COURSE OUTCOMES:**

<b>CO's</b>	<b>CO-Statements</b>	<b>Cognitive Levels</b>
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities.	K1
CO-2	Gain knowledge about different cryptographic operations of symmetric cryptographic algorithms.	K2
CO-3	Apply the different cryptographic operations of public key cryptography.	K3
CO-4	Grasp the various Authentication schemes to simulate different applications.	K4
CO-5	Understand various Security practices and System security standards.	K5

### **UNIT I**

Overview: Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services – Security Mechanism – A Model for Network Security. Symmetric Ciphers: Classical Encryption Techniques - Symmetric Cipher Model – Substitution Techniques – Transposition Techniques - Rotor Machines – Steganography.

### **UNIT II**

Block Ciphers and the Data Encryption Standard: Block Ciphers Principles – DES – The Strength of DES – Block Ciphers Design Principles. Advanced Encryption Standard: – AES Structure – AES Round Functions – AES Key Expansion

### **UNIT III**

Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems – The RSA Algorithm. Other Public-Key Cryptosystems: Diffie-Hellman Key Exchange – ElGamal Cryptographic System – Ellitic Curve Cryptography – Pseudorandom Number Generation Based on an Asymmetric Cipher.

### **UNIT IV**

Network and Internet Security: Transport Level Security: Web Security Issues – Secure Socket Layer - Transport Layer Security – HTTPS – Secure Shell(SSH). Electronic Mail security: Pretty Good Privacy- S/MIME – Domain Keys Identified Mail.

### **UNIT V**

System Security: Intruders: Intruders - Intrusion detection - Password management - Malicious software: Types of Malicious Software - Viruses -Virus Counter Measures – worms – Distributed Denial of Service Attacks. Firewall: The need for Firewalls - Firewall Characteristics – Types of Firewall

#### **BOOKS FOR STUDY:**

1. William Stallings, "Cryptography and Network Security - Principles and Practice 2017.
2. William Stallings, "Network Security Essentials Applications and Standards "Third Edition, Pearson Education, 2008.

#### **BOOKS FOR REFERENCE:**

1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms And Protocols", Wiley Publications, 2003.
2. Charles Pfleeger, "Security In Computing", 4th Edition, Prentice Hall Of India, 2006.
3. Ulysses Black, "Internet Security Protocols", Pearson Education Asia, 2000.
4. Charlie Kaufman And Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication In Public World", PHI 2002.
5. Bruce Schneier And Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
6. Douglas R Simson "Cryptography – Theory And Practice", First Edition, CRC Press, 1995.
7. Http://Nptel.Ac.In/.

#### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
<b>CO1</b>	2	3	3	2	2	3	2	3	1	2	2.88
<b>CO2</b>	3	2	2	3	1	2	3	3	2	3	3.00
<b>CO3</b>	3	3	3	3	2	3	2	1	3	3	3.25
<b>CO4</b>	2	2	3	3	3	1	2	3	2	2	2.88
<b>CO5</b>	1	2	3	2	1	3	2	2	3	1	2.50
Mean Overall Score (High Level Relationship between COs and POs)											2.90

#### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

<b>Section A</b> -Answer All Questions (Two questions from each unit)	10x2=20
<b>Section B</b> - Answer All questions (Either or Type – Two questions from each unit)	5x5=25
<b>Section C</b> - Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவா  
கணினி அறிவியல் துறை  
உணர் சுபோசி அரசுக் கல்லூரி  
(கன்ஸாட்டி)  
தஞ்சாவூர் - 613 005.

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4  
Hours/Week : 6  
Medium of instruction: English

Code: A1PCS3

**M.Sc(Computer Science) - Semester: 1**  
(For students admitted from 2022-2023 onwards)

**ADVANCED PYTHON PROGRAMMING**

**COURSE OBJECTIVES:**

- To understand basic concepts of Python programming.
- To learn about use of functions and exception handling
- To know about database connectivity of Python.

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand strings, list tuples and dictionaries.	K1
CO-2	Gain knowledge about how to write a program with functions and exceptions.	K2
CO-3	Apply the class and object concepts in Python programming.	K3
CO-4	Grasp the knowledge about file oriented programming and network programming in Python.	K4
CO-5	Acquire the skills to develop GUI based web programming.	K5

**UNIT - I**

**Introduction to Python:** Introduction – Python Overview – Control Statements – Iteration – Input from Keyboard- **Strings and Lists:** Strings – Compound Data type – String Formatting Operator – String Formatting Functions - Lists – Values and accessing elements – Lists are Mutable – Built-in list operators – Built-in List methods - **Tuples and Dictionaries:** Tuples – Creating Tuples – Basic Tuple Operations – Built-in Tuple Functions - Dictionaries

**UNIT - II**

**Functions:** Introduction – Built-in Functions – User Defined Functions – Python Recursive functions – The anonymous functions – Writing python scripts-**Files and Exceptions:** Text Files – File creation – Reading from a file – Writing to a file – Renaming a file – Deleting a file – File related methods. - Directories –**Exceptions:** Built-in Exceptions – Handling Exceptions - Exception with arguments – User defined Exceptions

**UNIT - III**

**Classes and Objects:** Overview of OOP – Class Definition – Creating Objects – Objects as Arguments – Objects as Return values – Built-in class attributes – Inheritance – Method Overriding – Data Encapsulation – Data Hiding

## **UNIT – IV**

**Database Programming:** Python DB-API-Object Relational Mappers-Non Relational Database –  
**Network Programming:** Client Server Architecture – Sockets-Network programming in Python –  
 Socket Server Module

## **UNIT- IV**

**GUI Programming :**TKinter Programming – Tkinter Examples - **Web Programming:** Building CGI Application – using UNICODE with CGI – Advanced CGI

### **BOOKS FOR STUDY:**

1. Balagurusamy E, “Introduction to Computing and Problem Solving Using Python”, 1<sup>st</sup> Edition, McGraw Hill Education(India) Private Limited, 2017.
2. Wesley J.Chun, “Core Python Applications Programming”, 3<sup>rd</sup> Edition, Prentice Hall, 2012.

### **BOOKS FOR REFERENCE:**

1. Reema Thareja, “Python Programming using Problem Solving Approach”, Oxford University Press, 2017.
2. Ashok Namdev Kamthane and Amit Ashok Kamthane, “Programming and Problem Solving with Python”, McGrawHill Education, November 2017.
3. Mark Lutz, “Learning Python”, O'Reilly, Shroff Publishers & Distributors Private Ltd., June 2017.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
<b>CO1</b>	2	3	2	2	2	3	2	2	2	3	2.88
<b>CO2</b>	2	2	2	1	2	2	3	2	2	3	2.63
<b>CO3</b>	2	3	3	3	2	3	2	2	2	2	3.00
<b>CO4</b>	1	4	3	3	2	3	2	2	2	2	3.00
<b>CO5</b>	2	3	2	3	3	2	3	2	3	3	3.25
Mean Overall Score (High Level Relationship between COs and POs)											2.95

### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்

கணினி அறிவியல் துறை

PG மாநிதங்களும் போன்ற அரசுக் கல்லூரி

(தன்னாட்சி)

தஞ்சாவூர் - 613 005.

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 5  
Hours/Week : 6  
Medium of instruction: English

Code: A1PCS2

**M.Sc(Computer Science) - Semester: 1**  
(For students admitted from 2022-2023 onwards)

### **PRACTICAL-PYTHONLAB**

#### **COURSE OBJECTIVE:**

- To enrich programming skills in various application areas with python programming.

#### **LIST OF PROGRAMS:**

1. Program to demonstrate basic operations.
2. Program using control statement.
3. Program using user defined functions.
4. Program to demonstrate string manipulation.
5. Program using lists.
6. Program using tuples.
7. Program using Dictionaries
8. Program using File Manipulations
9. Program to demonstrate exception handling.
10. Programs using classes and objects
11. Program using databases
12. Program to implement Socket programming
13. Program to demonstrate GUI programming
14. Program to demonstrate web programming

#### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
<b>CO1</b>	2	2	1	2	2	3	2	3	1	2	2.50
<b>CO2</b>	3	2	2	1	1	2	1	1	2	3	2.25
<b>CO3</b>	3	2	3	2	2	3	2	1	3	2	2.88
<b>CO4</b>	2	2	2	1	3	1	2	3	2	2	2.50
<b>CO5</b>	1	2	3	2	3	3	1	1	3	2	2.63
Mean Overall Score (High Level Relationship between COs and POs)											2.55

## Semester Question paper Pattern:

Maximum Marks: 60

Exam Duration: Three Hours

One question from the list of exercises.	25
--	----

Another question not in the list but relevant to the list of exercises.	35
---	----

For correct Program: 60% Typing the program: 20% Execution 20%

  
Signature of the HOD

துறைத்தலைவா  
கணினி அறிவியல் துறை  
மன்னர் சுபோதி அரசுக் கல்லூரி  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

  
COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

**M.Sc(Computer Science) - Semester: 1**  
(For students admitted from 2022-2023 onwards)

**OBJECT ORIENTED SYSTEMS DEVELOPMENT**

**COURSE OBJECTIVES:**

- Introduce the concept of Object-oriented design and understand the fundamentals of OOSD life cycle.
- Familiar with evolution of object-oriented model, classes and its notations
- Practice UML in order to express the design of software projects.
- Specify, analyze and design the use case driven requirements for a particular system.
- Enrich knowledge about DBMS, designing classes and object oriented testing.

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Show how the object-oriented approach differs from the traditional approach to systems analysis and design.	K1
CO-2	Analyze, design, document the requirements through use case driven approach	K2
CO-3	Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.	K3
CO-4	Recognize the difference between various object relationships: inheritance, association and aggregation.	K4
CO-5	Show the role and function of test cases, testing strategies and test plans in developing object-oriented software.	K5

**UNIT - I**

**Fundamentals of OOSD** - Overview of Object Oriented Systems Development: Two orthogonal view of the software - OOSD methodology - Why an object oriented orientation. Object basics: Object Oriented Philosophy- Objects – Attributes – Objects respond to messages – Encapsulation and information hiding – class hierarchy – Polymorphism – Object relationship and associations. OOSD life cycle: Software development process – Building high quality software - OOSD Use case Driven Approach – Reusability.

**UNIT – II**

**Methodology, Modeling and UML** - Object Oriented Methodologies: Rumbaugh et al.'s object modeling technique – The Booch methodology – The Jacobson et al. methodology – Patterns – Frameworks - The Unified approach. Unified Modeling Language : Static and dynamic models – Why modeling - UML diagrams – UML class diagram – Use case diagram - UML dynamic modeling – packages and model organization.

### **UNIT – III**

**Object Oriented Analysis** - Object Oriented Analysis process : Business Object Analysis - Use case driven object oriented analysis – Business process modeling – Use-Case model – Developing effective documentation . Classification: Classifications theory – Approaches for identifying classes – Noun phrase approach – Common class patterns approach – Use-Case Driven approach – Classes, Responsibilities, and Collaborators - Naming classes. Identifying object relationships, attributes, and methods: Association – Super-Sub class relationship – Aggregation – Class responsibility – Object responsibility.

### **UNIT – IV**

**Object Oriented Design** - Object Oriented Design Process and Design Axioms - OOD process – OOD axioms – Corollaries – Design patterns. Designing classes: Designing classes – Class visibility – Refining attributes – Designing methods and protocols – Packages and managing classes. Access layer: Object Store and persistence – DBMS – Logical and physical Database Organization and access control – Distributed Databases and Client Server Computing.

### **UNIT – V**

**Software Quality** - Software Quality Assurance: Quality assurance tests – Testing strategies – Impact of Object Orientation on Testing - Test Cases- Test Plan – Continuous testing. System Usability and Measuring User satisfaction: Usability Testing – User satisfaction test – A tool for analyzing user satisfaction. System Usability and Measuring User satisfaction: Introduction – Usability Testing.

#### **BOOK FOR STUDY:**

Ali Bahrami, “Object Oriented Systems Development using UML”, McGraw-Hill, 2008

#### **BOOKS FOR REFERENCE:**

1. Booch Grady, Rumbaugh James, Jacobson Ivar, “The Unified modeling Language – User Guide, Pearson Education, 2006
2. Brahma Dathan, Sarnath Ramnath, “Object Oriented Analysis, Design and Implementation”, Universities Press, 2010.
3. Mahesh P.Matha, “Object-Oriented Analysis and Design Using UML”, PHI Learning Private Limited, 2012.
4. RachitaMisra, Chhabhi Rani Panigrahi, Bijayalaxmi Panda, “Principles of Software Engineering and System Design”, Yesdee Publishing 2019.

#### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	3	2	2	3	2	3	1	2	2.88
CO2	2	2	2	3	1	2	3	2	2	3	2.75
CO3	3	3	3	3	2	3	2	1	3	2	3.13
CO4	2	2	3	2	3	1	2	3	2	2	2.75
CO5	2	2	3	2	1	3	2	2	3	1	2.63
Mean Overall Score (High Level Relationship between COs and POs)											2.83

## Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

  
Signature of the HOD

துறைத்தலைவர்  
கணினி அறிவியல் துறை  
மன்னர் சுரபோசி அரசுக் கல்லூரி  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

  
COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Hours/Week : 6

Medium of instruction: English

Code: A1PCSEL2

M.Sc(Computer Science) - Semester: 1

(For students admitted from 2022-2023 onwards)

## WAP and XML

### COURSE OBJECTIVES:

- To know about the basics of WAP.
- To know about WAP gateways and how to interact with the user
- The purpose of the course is to impart knowledge one Xtensible Markup Language (XML) and to achieve secured, messaging through web services

### COURSE OUTCOMES:

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the architecture of WAP	K1
CO-2	Gain the knowledge of WAP gateways	K2
CO-3	Apply XML concepts to develop Web application.	K3
CO-4	Develop SOA application using XML and Web Services.	K4
CO-5	Extract information from the websites using XML programming.	K5

### UNIT I

Overview of WAP: WAP and the wireless world—WAP application architecture—WAP internal structure—WAP versus the Web—WAP1.2 WTA and push features. Setting up WAP: Available software products—WAP resources—The Development Toolkits.

### UNIT II

WAP gateways: Definition – Functionality of a WAP gateway – The Web model versus the WAP model – Positioning of a WAP gateway in the network – Selecting a WAP gateway Basic WML: Extensible markup language – WML structure – A basic WML card – Text formatting – navigation – Advanced display features.

### UNIT III

Interacting with the user: Making a selection – Events – Variables – Input and parameter passing. WML Script: Need for WML script – Lexical Structure – Variables and literals – Operators - Automatic datatype conversion – Control Constructs Functions–Using the standard libraries – programs – Dealing with Errors.

### UNIT IV

XML: Introduction XML: An Eagle's Eye view of XML – XML Definition – List of an XML Document – Related Technologies – An introduction to XML Applications – XML Applications – XML for XML – First XML Documents Structuring Data: Examining the Data XMLizing the data – The advantages of the XML format – Preparing a style sheet for Document Display.

## UNIT V

Attributes, Empty Tags and XSL: Attributes – Attributes Versus Elements – Empty Tags – XSL – Well formed XML documents – Foreign Languages and Non Roman Text – Non Roman Scripts on the Web Scripts, Character sets, Fonts and Glyphs – Legacy character sets – The Unicode Character set – Procedure to Write XML Unicode.

### BOOKS FOR STUDY:

- For Unit I, II, III Charles Are hart and Others. "Professional WAP with WML, WML script, ASP, JSP, XML, XSLT, WTA Push and Voice XML"  
ShroffPublishersandDistributersPvt.Ltd2000.
- For Unit IV & V Elliotte Rusty Harlod "XMLTM Bible", Books India(P)Ltd,2000

### BOOKS FOR REFERENCE:

Heather Williamson, "XML:TheCompleteReference", TataMcGraw-HillEducationIndia.

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	3	2	1	3	2	3	2	2	2.88
CO2	2	2	2	3	1	2	3	2	3	3	2.88
CO3	3	3	3	1	2	3	2	1	2	2	2.75
CO4	2	2	3	2	3	1	2	2	2	1	2.50
CO5	2	2	2	2	1	3	2	2	2	2	2.50
Mean Overall Score (High Level Relationship between COs and POs)											2.70

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
கனினி அறிவியல் துறை  
மன்ற சபோசி அரசுக் கல்லூரி  
(தாண்டாட்ட  
ஏன்டெக்னிக் கே

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

**M.Sc(Computer Science) - Semester: 1**  
(For students admitted from 2022-2023 onwards)

**STATISTICAL COMPUTING**

**COURSE OBJECTIVES:**

- To understand the applications of various correlation methods
- To study and model the sampling concepts
- To acquire knowledge on Hypotheses test

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the use of correlation and its types.	K1
CO-2	Gain the knowledge about regression and its difference with correlation.	K2
CO-3	Know about probability distribution.	K3
CO-4	Understand sampling and its distributions.	K4
CO-5	Predict the exact reason for there all time issues.	K5

**UNIT-I**

**Correlation**-Definition of Correlation-Scatter Diagram-Kari Pearson's Coefficient of Linear Correlation- Coefficient of Correlation and Probable Error of r-Coefficient of Determination-Merits and Limitations of Coefficient of Correlation-Spearman's Rank Correlation(7.1-7.9.4).

**UNIT-II**

**Regression Analysis** - Regression and Correlation (Intro) - Difference between Correlation and Regression Analysis – Linear Regression Equations – Least Square Method – Regression Lines – Properties of Regression Coefficients – Standard Error of Estimate.(8.1-8.8)

**UNIT-III**

**Probability Distribution and mathematical Expectation**- Random Variable – Defined - Probability Distribution a Random Variable - Expectation of Random Variable - Properties of Expected Value and Variance(12.2-12.4).

**UNIT-IV**

**Sampling and Sampling Distributions** - Data Collection – Sampling and Non –Sampling Errors – Principles of Sampling – Merits and Limitations of Sampling – Methods of Sampling – Parameter and Statistic - Sampling Distribution of a Statistic - Examples of Sampling Distributions – Standard Normal, Student's t, Chi-Square( $\chi^2$ ) and Snedecor's F-Distributions (14.1-14.16).

## **UNIT-V**

**Statistical Inference – Estimation and Testing of Hypothesis** – Statistical Inference - Estimation – Point and interval – Confidence interval using normal,  $t$  and  $x^2$  Distributions - Testing of Hypothesis – Significance of a mean – Using  $t$  Distribution(15.1-15.10.2).

### **BOOK FOR STUDY:**

K.L.Sehgal, “Quantitative Techniques and Statistics”, First Edition, Himalaya Publishing House, 2011.

### **BOOKS FOR REFERENCE:**

1. N. P. Bali, P. N. Gupta, C. P. Gandhi, “A Textbook of Quantitative Techniques”, First Edition, Laxmi Publications, 2008.
2. U.K.Srivastava, G.V.Shenoy, S.C.Sharma, “Quantitative Techniques for Managerial Decisions”, Second Edition, New Age International Publishers, 2005.
3. David Makinson, “Sets, Logic and Maths for Computing”, Springer, 2011.
4. Christopher Chat field,” Statistics for Technology – A Course in Applied Statistics, Third Edition”, CRC Press, 2015.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	3	2	1	3	2	3	2	1	2.75
CO2	2	2	2	2	1	2	3	2	1	3	2.50
CO3	3	3	3	1	2	3	2	1	2	3	2.88
CO4	2	2	3	2	3	1	2	1	2	1	2.38
CO5	2	2	2	2	1	3	2	3	2	2	2.63
Mean Overall Score (High Level Relationship between COs and POs)											2.63

### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
கலெக்டரி அறிவியல் துறை  
மன்றார் சபோர்டி அரசுக் கல்லூரி  
(குண்ணாட்சி)  
தஞ்சாவூர் - 613 005.

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits :5  
Hours/Week : 6  
Medium of instruction: English

Code: A2PCS4

**M.Sc(Computer Science) - Semester: 2**  
(For students admitted from 2022-2023 onwards)

**MOBILE COMMUNICATIONS**

**COURSE OBJECTIVES:**

- To study the Mobile and Wireless devices, Satellite systems, Mobile network layer of mobile communications
- To learn about access control mechanisms used in mobile communications.
- To understand the usage of satellite for mobile communications.
- To know about the various layers used in mobile communications.

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the basic physical and technical settings functioning of mobile communications systems.	K1
CO-2	Know the new trends in mobile/wireless communications networks.	K2
CO-3	Recognize multiple radio access techniques.	K3
CO-4	Describe the development and implementation of mobile communication systems	K4
CO-5	Test mobile communication equipment for the technical functionality.	K5

**UNIT - I**

Mobile and Wireless devices – Simplified Reference Model – Wireless transmission – Frequencies for radio transmission – Signals –Antennas –Signal propagation – Multiplexing – Modulation – Spread Spectrum – Cellular systems.

**UNIT - II**

Medium Access Control – Motivation for a specialized MAC – SDMA – FDMA- TDMA- CDMA- Telecommunications systems – GSM – DECT.

**UNIT - III**

Satellite systems – Applications – Basic – Routing – Localization – Handover – Broadcast systems – Cyclical repetition of data – Digital audio broadcasting – digital video broadcasting- convergence of broadcasting and mobile communications.

**UNIT - IV**

Wireless LAN – Infra red Vs Radio transmission - Infrastructure and ad-hoc network – IEEE 802.11 – HYPERLAN – Bluetooth - Architecture – Radio layer – Base band layer – Link management protocol.

## UNIT - V

Mobile network layer - Mobile IP - Dynamic host configuration protocol – Mobile ad-hoc networks- Mobile transport layer – Traditional TCP – Classical TCP improvements.

### BOOK FOR STUDY:

Jochen H. Schiller "Mobile communications" — Second Edition

Unit- I: Chapter 1 & 2

Unit –II: Chapter 3 & 4

Unit –III: Chapter 5 & 6

Unit –IV: Chapter 7

Unit - V: Chapter 8 & 9

### BOOK FOR REFERENCE:

Sandeep Singhal. "The Wireless Application Protocol: Writing Application for the Mobile Internet"

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

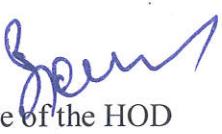
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	3	3	2	3	2	3	1	2	3.00
CO2	2	1	2	3	1	2	3	2	2	3	2.63
CO3	3	3	3	3	2	3	2	1	3	2	3.13
CO4	3	2	3	2	3	1	2	3	2	2	2.88
CO5	2	2	3	2	1	3	2	3	3	1	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.88

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

  
Signature of the HOD

துறைமுகத்தலைவர்  
கணினி அறிவியல் துறை  
மன்ற சபோரி அரசுக் கல்லூரி  
(தங்னாட்சி)  
தஞ்சாவூர் - 613 005.

PG -17 | Page

  
COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005

Credits : 5  
Hours/Week : 6  
Medium of instruction: English

Code: A2PCS5

**M.Sc(Computer Science) - Semester: 2**  
(For students admitted from 2022-2023 onwards)

## **CLOUD COMPUTING**

### **COURSE OBJECTIVES:**

- To Understand the use of Cloud
- To Know about the structure of Cloud
- To learn the cloud deployment models
- To Understand the characteristics of web 2.0 and 3.0

### **COURSE OUTCOMES:**

<b>CO's</b>	<b>CO–Statements</b>	<b>Cognitive Levels</b>
	<i>On successful completion of this course, students will be able to</i>	
CO–1	Understand the cloud computing fundamentals	K1
CO–2	Know the architecture and services of cloud.	K2
CO–3	Recognize cloud models and their features	K3
CO–4	Describe the technological drivers of cloud computing	K4
CO–5	Differentiate the features or development in the web OS and applications	K5

### **UNIT - I**

Computing Paradigms: High-Performance Computing - Parallel Computing - Distributed Computing - Cluster Computing -Grid Computing – Bio computing - Mobile Computing- Quantum Computing- Optical Computing- Nano computing- Network Computing. Cloud computing fundamentals: Motivation for Cloud Computing- Defining Cloud Computing-5-4-3 Principles of Cloud computing- Cloud Ecosystem- Requirements for Cloud Services- Cloud Application- Benefits and Drawbacks

### **UNIT - II**

Cloud computing architecture and management: Cloud Architecture- user layer – network layer – cloud management layer – hardware resource layer – Anatomy of cloud – Network connectivity in cloud - Public Cloud Access Networking - Private Cloud Access Networking- Intracloud Networking for Public Cloud Services - Private Intracloud Networking - New Facets in Private Networks- Path for Internet Traffic - Applications on the Cloud - Managing the Cloud- Managing the Cloud Infrastructure - Managing the Cloud Application - Migrating Application to Cloud - Phases of Cloud Migration- Approaches for Cloud Migration.

### **UNIT - III**

Cloud Deployment Models: Private Cloud- Public Cloud - Community Cloud - Hybrid Cloud – Characteristics, Suitability, Issues, Advantages, Disadvantages. Cloud Service Models: Infrastructure as a Service- Platform as a Service- Software as a Service – Characteristics – Suitability- Pros and Cons.

## **UNIT - IV**

Technological Drivers for Cloud Computing: SOA and Cloud - SOA and SOC- Benefits of SOA- Technologies Used by SOA - Similarities and Differences between SOA and Cloud Computing – CCOA- Virtualization- Approaches in Virtualization - Full Virtualization – Para virtualization - Hardware-Assisted Virtualization - Types of Virtualization - Multicore Technology-memory and storage technologies – network technologies

## **UNIT - V**

Web 2.0 characteristics – applications – Web 3.0 – components – characteristics – convergence of cloud and web 3.0 – Software process models for cloud – Programming models for cloud – how pervasive computing helps cloud – Operating system – Role – features – Cloud OS requirements – Application environment - Need for Effective ADE - Application Development Methodologies - Power of Cloud Computing in Application- Cloud Application Development Platforms- Cloud Computing APIs.

### **BOOK FOR STUDY:**

K. Chandrasekaran. '*Essentials of cloud computing*' CRC Press, Taylor & Francis Group, 2015

Unit I: Chapter 1 & Chapter 2

Unit II: Chapter 3

Unit III: Chapter 4 & Chapter 5

Unit IV: Chapter 6 – Sections 6.1 – 6.6

Unit V: Chapter 6 – Sections 6.7 – 6.13

### **BOOKS FOR REFERENCE:**

- Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw Hill.
- Kris Jamsa, " Cloud Computing" Jones and Barlett Student Edition 2014.
- RajkumarByya, James Broberg, AndrzejGoscinski, " Cloud Computing Principles and Paradigms", Wiley & sons

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	3	2	3	2	3	1	2	2.88
CO2	2	1	2	3	1	2	3	1	2	3	2.50
CO3	3	3	3	3	2	1	2	1	3	2	2.88
CO4	3	2	3	2	3	1	2	2	2	2	2.75
CO5	2	2	3	2	1	3	2	3	1	1	2.50
Mean Overall Score (High Level Relationship between COs and POs)											2.70

## Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

<b>Section A</b> -Answer All Questions (Two questions from each unit)	10x2=20
<b>Section B</b> - Answer All questions (Either or Type – Two questions from each unit)	5x5=25
<b>Section C</b> - Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
கலீனி அறிவியல் துறை  
மன்னர் சுரபோசி அரசுக் கல்லூரி  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits :4  
Hours/Week : 6  
Medium of instruction: English

Code: A2PCS6

**M.Sc(Computer Science) - Semester: 2**  
(For students admitted from 2022-2023 onwards)

**PHP & MYSQL**

**COURSE OBJECTIVES:**

- To Understand the features of PHP and MySQL
- To Know about how to develop simple web applications
- To learn the linking of web application with database.
- To develop new applications with their learned skills.

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Analyze the basic structure of a PHP web application.	K1
CO-2	List the major elements of the PHP & MySQL work and explain why it is good for web development.	K2
CO-3	Learn how to take a static website and turn it into a dynamic website run.	K3
CO-4	Gain knowledge about how database work and how to design and use PHP MyAdmin to work with MySQL.	K4
CO-5	Understand different ways of connecting to MySQL through PHP and other data sources.	K5

**UNIT - I**

**Essential PHP:** Development environment-Creating and running PHP page-Mixing HTML and PHP- Printing-Echo Power- ‘Here’ Documents-Command Line PHP- Adding comments-Variables-Strings-Constants-Internal data types. **Operator and flow control:** Math, Assignment, String, Bitwise, Execution operators- Operator precedence -Incrementing and decrementing values- If, else, else if statements- Comparison operators-Logical operators- Ternary operator-Switch statement-Loop statements.

**UNIT - II**

**Strings and arrays:** String functions-Conversion-formatting text strings-Building arrays-Modifying data in arrays-Deleting array elements- Arrays with loops- Array functions-Arrays using implode and explode-Extracting data from arrays-sorting arrays-array operators- Multidimensional arrays. **Creating functions:** Function creation-Passing data-Passing array-Passing by reference-Using default arguments-Passing variable-Returning data-Returning array-Returning List-Returning References-Variable scope-Global data-Conditional, variable and nesting functions –creating include files-Returning error from functions.

### **UNIT - III**

**Reading data in web pages:** Setting up web page-Handling text fields-Text areas-Check boxes, Radio buttons-List boxes-Password controls-Hidden controls-Image maps-File uploads-Handling buttons.  
**PHP Brower handling power :** Server variables-HTTP headers-Getting browser type-Redirecting browsers-Dumping a form's data –Putting all in one page-data validation –Checking the entry of required data, numbers, text – Persisting user data – Client side data validation – Handling HTML tags.

### **UNIT - IV**

**Object oriented programming:** Creating classes and objects – Setting access – constructors – destructors – Inheritance – Overloading and Overriding methods – Auto loading classes. **File handling:** Opening file – Looping over a file – Reading text – closing – Reading file character – Reading a whole file – Reading a file into array – Checking the file existence – Getting file size – Parsing files – Parsing .ini files – Getting file information – Setting file pointer – Copying, Deleting, Reading and Writing files – Appending and locking files.

### **UNIT - V**

**Working with data base:** Database – Essential SQL- creating MySQL Database-Creating a new table-Putting data- Accessing data – Updating databases – Inserting new data items- Deleting records- Creating new tables – Creating new database-Sorting data. **Sessions, cookies and FTP:** Setting and Reading Cookie-Cookie expiration – Deleting Cookies-Working with FTP-Downloading and uploading with FTP-Deleting files with FTP-Sending E-mail – Adding attachments – storing data in sessions-Writing Hit counter.

### **BOOK FOR STUDY:**

The Complete Reference: PHP, Steven Holzner, McGraw Hill education(India) Edition 2008.

- Unit I : Chapter 1, Chapter 2
- Unit II : Chapter 3, Chapter 4
- Unit III : Chapter 5, Chapter 6
- Unit IV : Chapter 7, Chapter 9
- Unit V : Chapter 10, Chapter 11

### **BOOKS FOR REFERENCE:**

1. ‘Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together”, Eric Rosebrock, Eric Filson, Published by John Wiley and Sons, 2004
2. Rasmus Lerdorf “*Programming PHP*” , 2<sup>nd</sup> edition, O'Reilly publishers.
3. Brad Bulger, Jay Greenspan, David Wall *Introduction part of MySQL/PHP database applications* , 2<sup>nd</sup> edition, Wiley publishers.

## Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	3	2	3	3	3	1	2	3.00
CO2	2	1	2	1	1	2	2	2	2	3	2.25
CO3	3	3	3	3	2	1	2	1	2	2	2.75
CO4	3	2	3	2	3	1	2	3	2	2	2.88
CO5	2	2	3	2	1	3	2	3	1	3	2.38
Mean Overall Score (High Level Relationship between COs and POs)											2.65

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துயற்றுவை  
கணினி அறிவியல் துறை  
மன்னர் சுரபோசி அரசுக் கல்லூரி  
(தங்கள்டு)  
தஞ்சாவூர் - 613 005

  
COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4  
Hours/Week : 6  
Medium of instruction: English

Code: A2PCSP2

**M.Sc(Computer Science) - Semester: 2**  
(For students admitted from 2022-2023 onwards)

**PHP & MySQL LAB**

**COURSE OBJECTIVES:**

- To Understand the basic structures of PHP and MySQL
- To write scripts for simple applications without using database
- To develop web applications using database connectivity.

**COURSE OUTCOMES:**

<b>CO's</b>	<b>CO-Statements</b>	<b>Cognitive Levels</b>
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Analyze how to create basic PHP scripts.	K1
CO-2	Understand how to send data to the Web browser.	K2
CO-3	Learn about how to handle HTML forms using PHP scripts.	K3
CO-4	Gain knowledge about how Send email from a PHP script.	K4
CO-5	Understand how to create and populate a database in MySQL.	K5

**LIST OF PROGRAMS:**

1. Create the website to enter your Bio-Data using HTML controls
2. Write a simple PHP Program to output all the even numbers that are lesser than or equal to N numbers using Functions.
3. Write a Program to find the odd and even numbers in an array.
4. Write a PHP Script access a base class constructor in derived class.
5. Write a PHP Code to find the remote address.
6. Write a PHP script to read the data from sample.txt and write it into another file named example.txt.
7. Write a Program to declare three variables such as \$x, \$y, \$radius and define them five different functions to store and process values.
8. Write a program to create an E-mail using HTML & PHP
9. Write a Program to print the input given by the users while log in to the system, for example, username and password (authentication mechanism).
10. Write a program to connect the MySQL database using PHP and apply appropriate Queries

## Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	2	1	2	2	3	2	3	2	2	2.63
CO2	3	2	2	1	1	2	3	1	2	3	2.50
CO3	3	2	3	2	2	3	2	2	3	1	2.88
CO4	2	2	2	1	2	1	2	3	2	1	2.25
CO5	1	2	3	2	3	2	1	1	3	1	2.38
Mean Overall Score (High Level Relationship between COs and POs)											2.53

### Semester Question paper Pattern:

Maximum Marks: 60

Exam Duration: Three Hours

One question from the list of exercises.	25
--	----

Another question not in the list but relevant to the list of exercises.	35
---	----

For correct Program: 60% Typing the program: 20% Execution 20%

  
Signature of the HOD

துறைமுகவர்  
கலெக்டரி அறிவியல் துறை  
மன்றாளர் குபிபாளி அரசுக் கல்லூரி  
(கல்லூரிப்பு)  
தஞ்சாவூர் - 613 005.

  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4  
Hours/Week : 6  
Medium of instruction: English

Code: A2PCSEL2A

**M.Sc(Computer Science) - Semester: 2**  
(For students admitted from 2022-2023 onwards)

## **DATA MINING**

### **COURSE OBJECTIVES:**

- To introduce the fundamental concepts of Data Mining Techniques and various Algorithms used for Information Retrieval from Datasets.
- To know the use of Datawarehouse and its functioning
- To learn about classification and clustering

### **COURSE OUTCOMES:**

<b>CO's</b>	<b>CO–Statements</b>	<b>Cognitive Levels</b>
	<i>On successful completion of this course, students will be able to</i>	
CO–1	Perform the data preparation tasks and understand the implications.	K1
CO–2	Know about data warehouse architecture and implementation.	K2
CO–3	Demonstrate an understanding of decision trees, and Bayesian networks.	K3
CO–4	Understand the clustering techniques and grid-based methods.	K4
CO–5	Recognize the spatial, multimedia, text and web data.	K5

### **UNIT - I**

**Data Mining And Data Preprocessing:** Data Mining – Motivation – Definition – Data Mining on Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

### **UNIT - II**

**Data Warehousing:** Multidimensional Data Model –Data Warehouse Architecture – Data Warehouse Implementation –From data Warehousing to Data Mining – On Line Analytical Processing - On Line Analytical Mining.

### **UNIT - III**

**Frequent Patterns, Associations And Classification:** The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

### **UNIT - IV**

**Cluster Analysis:** Definition – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods – Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.

## UNIT - V

**Spatial, Multimedia, Text And Web Data:** Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

### BOOK FOR STUDY:

1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems) 3rd Edition, July 6, 2011.
2. Ian H. Witten, Eibe Frank, Mark A. Hall, "Data Mining: Practical Machine Learning Tools and Techniques", Elsevier; Third edition, 2014.

### BOOKS FOR REFERENCE:

1. Margret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.
2. M. Awad, Latifur Khan, Bhavani Thuraisingham, Lei Wang, "Design and Implementation of Data Mining Tools", CRC Press-Taylor & Francis Group, 2015.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining-Instructor's Solution Manual", Pearson Education, First Edition, 2016.
4. Mohammed J.Zaki, Wagner Meira JR, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge India, 2016.

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	3	2	2	3	2	3	2	2	3.00
CO2	2	2	2	3	1	2	3	2	3	3	2.88
CO3	3	3	3	2	2	3	2	1	2	2	2.88
CO4	2	2	3	2	3	1	2	2	2	2	2.63
CO5	2	2	2	2	1	3	2	2	2	2	2.50
Mean Overall Score (High Level Relationship between COs and POs)											2.78

### Semester Question paper Pattern:

Maximum Marks: 75

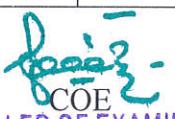
Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
கணினி அறிவியல் துறை  
மன்றார் சபையில் அரசுக் கல்லூரி  
(துண்டாட்சி)

தஞ்சாவூர் - 613 005.

  
COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Hours/Week : 6

Medium of instruction: English

Code: A2PCSEL2B

**M.Sc(Computer Science) - Semester: 2**  
(For students admitted from 2022-2023 onwards)

**DOT NET PROGRAMMING**

**COURSE OBJECTIVES:**

- To explore the backbone of webpage creation by developing .NET skill.
- To familiar with Application, session and view state management.
- To Provide depth knowledge about ADO.NET
- To understand the need of usability, evaluation methods for web services.
- To acquire knowledge on the usage of recent platforms in developing web applications

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Learn major programming paradigms and techniques involved in design and implementation of modern programming languages	K1
CO-2	Learn about Microsoft.NET framework	K2
CO-3	By the end students can develop, implement and creating Applications with C#.VB.NET and ASP.NET	K3
CO-4	Create ASP.Net applications using standard.net controls	K4
CO-5	An ability to use current techniques, skills, and tools necessary for computing practice	K5

**UNIT-I**

**The .NET Framework** - Learning the .NET languages - Introduction - Net revolution - .Net framework and its architecture – CLR – What is Assembly – Components of Assembly – DLL hell and Assembly Versioning - Objects and Name spaces - Setting Up ASP.NET and IIS

**UNIT-II**

**Developing VB.NET Applications** - Introduction to VB.Net, The .Net Frame work and Common language runtime, Building VB. Net Application, VBIDE, forms, properties, events, VB language – console application and 46 windows application, data type, declaring variable, scope of variable, operators and statements - Windows Applications-forms, adding controls to forms, handling events, MsgBox, Input Box, multiple forms, handling mouse and Keyboard events, object oriented programming creating and using classes and objects, Handling Exceptions – on Error Goto.

### **UNIT-III**

**Developing ASP.NET Applications** - ASP.NET Applications – Understanding ASP.NET Controls – Overview of ASP.NET framework, Web Form fundamentals - Web control classes – Using VisualStudio.NET - Validation and Rich Controls -State management – Tracing, Logging, and Error Handling.

### **UNIT-IV**

**Developing C#.NET Applications** - Introducing C# - overview of C# -Literals, Variables –Data Types – Operators - checked and unchecked operators – Expressions – Branching – Looping - *Object Oriented Aspects Of C#:* Class – Objects - Constructors and its types - inheritance, properties, indexers, index overloading – polymorphism - sealed class and methods – interface – abstract class, operator overloading -delegates, events, errors and exception - Threading.

### **UNIT-V**

**ADO.NET** - Overview of ADO.NET - ADO.NET data access – Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class Data binding – Data list – Data grid – Repeater – Files, Streams and Email – Using XML.

### **BOOKS FOR STUDY:**

1. Struts: The Complete Reference, James Holmes 2<sup>nd</sup> Edition 2007 McGrawHill Professional
2. Mathew Mac Donald, “ASP.NET Complete Reference”, TMH 2005.
3. HerbertS childt, “The Complete Reference: C#4.0”, Tata McGrawHill, 2012.
4. Christian Nageletal. “Professional C# 2012 with .NET 4.5”, Wiley India, 2012.
5. ASP.NET Unleashed, C# programming – Wroxpublication.
6. Visual Basic.NET Black Book, by Steven Holzner.

### **BOOKS FOR REFERENCE:**

1. Jesse Liberty, ‘Programming C#’, 4thEdition, O'ReillyMedia.
2. Mario Szpuszta, Matthew MacDonald, “Pro ASP.NET 4 in C#” 2010: Includes Silver light 2, A press, Third Edition.
3. J.Liberty, D.Hurwitz, “Programming ASP.NET”, Third Edition, O'REILLY, 2006.
4. Visual Basic.Net programming in easy steps by TimAnderson, Dream tech Press

## Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

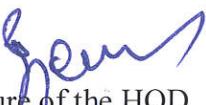
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	3	2	2	2	2	3	2	2	2.88
CO2	2	2	2	3	1	2	3	2	3	2	2.75
CO3	3	3	3	2	2	3	2	1	2	2	2.88
CO4	2	2	3	2	3	1	2	2	2	2	2.63
CO5	2	2	2	2	1	1	2	2	1	2	2.13
Mean Overall Score (High Level Relationship between COs and POs)											2.65

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

  
Signature of the HOD

துறைமுதலைவர்  
கல்வியின் அறிவியல் துறை  
மன்றாங்கியோள் அரசுக் கல்லூரி  
(தங்களாட்சி)  
தஞ்சாவூர் - 613 005.

  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

**M.Sc(Computer Science) - Semester: 2**  
(For students admitted from 2022-2023 onwards)

**THEORY OF COMPUTATION**

**COURSE OBJECTIVES:**

- To understand the mathematical foundations of computation.
- To learn about automata theory, the theory of formal languages and grammars.
- To understand the notions of algorithm, decidability, complexity, and computability.
- To understand and conduct mathematical proofs for computation and algorithms.

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars	K1
CO-2	Demonstrate their understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving	K2
CO-3	Prove the basic results of the Theory of Computation, state and explain the relevance of the Church-Turing thesis	K3
CO-4	Understand the functions of Turing machines	K4
CO-5	Learn about un decidable problems	K5

**UNIT-I**

Introduction to formal proof—Additional forms of proof – Inductive proofs – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata(NFA) – Finite Automata with Epsilon transitions.

**UNIT-II**

Regular Expression— FA and Regular Expressions – Proving languages not to be regular— Closure properties of regular languages –Equivalence and minimization of Automata.

**UNIT-III**

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata –Equivalence of Pushdown automata and CFG – Deterministic Pushdown Automata.

**UNIT-IV**

Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM. A language that is not Recursively Enumerable (RE).

## **UNIT-V**

An un decidable problem RE – Un decidable problems about Turing Machine –Post's Correspondence Problem – The classes P and NP.

### **BOOK FOR STUDY:**

1. Peter Linz, "An Introduction to Formal Languages and Automata", Third Edition, Narosa, 2005.
2. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.

### **BOOKS FOR REFERENCE:**

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. Thomas A. Sudkamp" An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education, 2007.
3. Raymond Greenlaw and H. James Hoover, "Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
4. Michael Sipser, "Introduction of the Theory and Computation", Thomson Books, 1997.
5. J. Martin, "Introduction to Languages and the Theory of computation," Third Edition, Tata McGrawHill, 2007.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
<b>CO1</b>	2	3	3	2	2	1	2	1	2	2	2.50
<b>CO2</b>	2	2	2	3	1	2	3	2	3	2	2.75
<b>CO3</b>	3	3	3	2	3	3	2	1	2	2	3.00
<b>CO4</b>	2	2	3	2	2	1	2	2	2	2	2.50
<b>CO5</b>	2	2	2	1	1	1	2	2	1	2	2.00
Mean Overall Score (High Level Relationship between COs and POs)											2.55

### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

துறை மாநில பொறுப்பு

நடவடிகார துறை  
எனர் சர்போசி அரசுக் கல்லூரி  
(தண்ணாட்சி)

தங்களும் - 613 005

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS),  
THANjavur - 613 005.

Credits : 5

Code: A3PCS7

Hours/Week : 6

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 3**  
(For students admitted from 2022-2023 onwards)

**COMPILER DESIGN**

**COURSE OBJECTIVES:**

- Discover principles, algorithms and techniques that can be used to construct various phases of compiler.
- Acquire knowledge about finite automata and regular expressions
- Learn context free grammars, compiler parsing techniques.
- Explore knowledge about Syntax Directed definitions and translation scheme
- Understand intermediate machine representations and actual code generation

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Design various phases of compiler, a lexical analyzer	K1
CO-2	Write a scanner, parser, and semantic analyzer without the aid of automatic generators	K2
CO-3	Discuss intermediate code generation	K3
CO-4	Discuss the various storage allocation strategies and implement a code generator	K4
CO-5	Apply the various optimization techniques	K5

**UNIT – I**

**Lexical analysis** - Language Processors, The Structure of a Compiler, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata - Regular expression to automata.

**UNIT – II**

**Syntax Analysis** - The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.

**UNIT – III**

**Semantic Analysis** - Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S-attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.

**UNIT – IV**

**Intermediate Code Generation** - Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements - Procedure calls.

## UNIT – V

**Code Generation and Code Optimization** - Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks - A simple code generator – Peephole Optimization.

### BOOK FOR STUDY:

Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers- Principles, Techniques and Tools”, Second Edition, Pearson Education Asia, 2009.

### BOOKS FOR REFERENCE:

1. A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers - Principles, Techniques and Tools, Addison-Wesley, 2003.
2. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
3. Kenneth C. Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.
5. S. Godfrey Winster, S. Aruna Devi, R. Sujatha, “Compiler Design”, yesdee Publishers, Third Reprint 2019.

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	1	2	2	2.38
CO2	2	2	2	3	1	2	3	2	3	1	2.63
CO3	3	3	3	2	3	3	2	1	2	2	3.00
CO4	2	4	3	2	2	1	2	2	2	1	2.63
CO5	2	2	2	1	1	1	2	2	1	2	2.00
Mean Overall Score (High Level Relationship between COs and POs)											2.53

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்

கணினி அறிவியல் துறை

மன்றாங்க மாபோளி அரசுக் கல்லூரி

(கன்ஸாட்சி)

துறையுர் - 613 005.

GOE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 5

Hours/Week : 6

Medium of instruction: English

Code: A3PCS8

### M.Sc(Computer Science) - Semester: 3

(For students admitted from 2022-2023 onwards)

## DISTRIBUTED OPERATING SYSTEM

### COURSE OBJECTIVES:

- To study Distributed operating system concepts
- To understand hardware, software and communication in distributed OS
- To learn the distributed resource management components.
- Practices to learn concepts of OS and Program the principles of Operating Systems

### COURSE OUTCOMES:

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Elucidate the foundations and issues of distributed systems	K1
CO-2	Understand the various synchronization issues and global state for distributed systems	K2
CO-3	Comprehend the Mutual Exclusion and Deadlock detection algorithms in distributed systems	K3
CO-4	Show the use of agreement protocols and fault tolerance mechanisms in distributed systems	K4
CO-5	Interpret the real-time distributed system applications	K5

### UNIT - I

Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources , Reusable Resources.

### UNIT - II

Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport’s Logical Clock , Vector Clock, Global State , Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport’s Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

### UNIT - III

Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

### UNIT - IV

Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and

Recovery – Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

## UNIT - V

Multiprocessor and Database Operating Systems – Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

### BOOKS FOR STUDY:

1. Mukesh Singhal N.G.Sivaratri, "Advanced Concepts in Operating Systems", McGraw Hill 2000.
2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

### BOOKS FOR REFERENCE:

1. Abraham Silberschatz, Peter B.Galvin, G.Gagne, "Operating Concepts", 6th Edition Addison Wesley publications 2003.
2. Andrew S.Tanenbaum, "Modern Operating Systems", 2nd Edition Addison Wesley 2001

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	2	2	2	2.50
CO2	2	2	2	3	1	2	3	2	3	1	2.63
CO3	3	3	3	2	3	3	2	3	2	2	3.25
CO4	2	4	3	2	2	1	2	3	2	1	2.75
CO5	2	2	2	1	1	1	2	2	2	2	2.13
Mean Overall Score (High Level Relationship between COs and POs)											2.65

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
கணினி அறிவியல் துறை  
மன்றார் கருபோளி அரசுக் கல்லூரி  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

PG -36 | Page

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 5  
Hours/Week : 6  
Medium of instruction: English

Code: A3PCS9

**M.Sc(Computer Science) - Semester: 3**  
(For students admitted from 2022-2023 onwards)

### **ADVANCED WEB TECHNOLOGY**

#### **COURSE OBJECTIVES:**

- Explore the backbone of web page creation by developing .NET skill.
- Enrich knowledge about HTML control and web control classes
- Provide depth knowledge about ADO.NET
- Understand the need of usability, evaluation methods for web services

#### **COURSE OUTCOMES:**

<b>CO's</b>	<b>CO–Statements</b>	<b>Cognitive Levels</b>
	<i>On successful completion of this course, students will be able to</i>	
CO–1	Design a web page with Web form fundamentals and web control classes.	K1
CO–2	Recognize the importance of validation control, cookies and session.	K2
CO–3	Apply the knowledge of ADO.NET data access and SQL to develop a client server model.	K3
CO–4	Apply the knowledge of ADO.NET data access and SQL to develop a client server model.	K4
CO–5	Know about the advanced concepts of ASP.NET.	K5

#### **UNIT - I**

**OVERVIEW OF ASP.NET** - The .NET framework – Learning the .NET languages Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces: The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS.

#### **UNIT – II**

**Developing ASP.NET Applications** - ASP.NET Applications: ASP.NET applications– Code behind- The Global.asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals: A simple page applet- Improving the currency converter- HTML control classes- The page class- Accessing HTML server controls. Web controls: Web Control Classes – Auto PostBack and Web Control events- Accessing web controls. Using Visual Studio.NET: Starting a Visual Studio.NET Project- Web form Designer- Writing code- Visual studio.NET debugging. Validation and Rich Controls: Validation- A simple Validation example- Understanding regular expressions- A validated customer form. State management - Tracing, Logging, and Error Handling.

#### **UNIT – III**

**Working with Data** - Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access : SQL basics– Select , Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a

DataReader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data.  
 Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases.  
 Data list – Data grid – Repeater – Files, Streams and Email – Using XML

#### UNIT - IV

**Web Services** - Web services Architecture: Internet programming then and now- WSDL-SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The Stock Quote web service – Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with Terra Service.

#### UNIT – V

**Advanced ASP.NET** - Component Based Programming: Creating a simple component – Properties and state- Database components- Using COM components. Custom controls: User Controls- Deriving Custom controls. Caching and Performance Tuning: Designing and scalability- Profiling- Catching- Output catching- Data catching. Implementing security: Determining security requirements- The ASP.NET security model- Forms authentication- Windows authentication.

#### BOOK FOR STUDY:

- Mathew Mac Donald, “ASP.NET Complete Reference”, TMH 2005.

#### BOOKS FOR REFERENCE:

- Crouch Matt J, “ASP.NET and VB.NET Web Programming”, Addison Wesley 2002.
- J.Liberty, D.Hurwitz, “Programming ASP.NET”, Third Edition, O'REILLY, 2006.

#### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	2	2	2	2.50
CO2	2	2	2	1	1	2	3	2	3	1	2.38
CO3	3	3	3	2	3	3	2	1	2	1	2.88
CO4	2	4	3	2	2	1	2	3	2	1	2.75
CO5	2	2	2	1	1	1	2	2	2	2	2.13
Mean Overall Score (High Level Relationship between COs and POs)											2.53

#### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
 கல்வினி அறிவியல் துறை  
 வன்னா சரபோசி அரசுக் கல்லூரி  
 (தன்னாட்சி)  
 தஞ்சாவூர் - 613 005.

CONTROLLER OF EXAMINATIONS  
 RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
 THANJAVUR - 613 005.

Credits : 4

Code: A3PCSP3

Hours/Week : 6

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 1**  
(For students admitted from 2022-2023 onwards)

**ADVANCED WEB TECHNOLOGY-LAB**

**COURSE OBJECTIVES:**

- Explore the backbone of ASP.net programming.
- Enrich knowledge about the controls in ASP.Net
- Provide depth knowledge in the implementation of ASP.Net programming

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Develop simple programs using simple logics	K1
CO-2	Recognize how to develop programs for real time applications.	K2
CO-3	Apply the knowledge using various data controls	K3
CO-4	Apply the knowledge to get the values remotely.	K4
CO-5	Know about the database connectivity in ASP.NET.	K5

**LIST OF PROGRAMS:**

1. Write a ASP.Net program to do arithmetic operations.
2. Write an ASP.Net Program using Response and Request Object.
3. Write an ASP.Net Program using AdRotator Component
4. Write an ASP.Net program for currency converter
5. Write a ASP.Net Program for a simple shopping cart.
6. Write an ASP.Net program for multiple select list control.
7. Write an ASP.Net program using check box, list box controls.
8. Write ASP.Net Program for user authentication.
9. Write ASP.Net program for online application form
10. Write delegates function program using C#.
11. Write ASP.Net Program to prepare a bio data and store it in database.
12. Write an ASP.Net program using database connectivity for student's record.

## Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	1	2	2	2	1	2	2	2	2	2.25
CO2	2	2	2	1	2	2	3	2	2	2	2.50
CO3	2	1	3	1	2	3	2	3	2	2	2.63
CO4	1	4	3	3	2	3	2	2	1	3	3.00
CO5	2	1	2	3	3	2	3	2	1	3	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.63

### Semester Question paper Pattern:

Maximum Marks: 60

Exam Duration: Three Hours

One question from the list of exercises.	25
--	----

Another question not in the list but relevant to the list of exercises.	35
---	----

For correct Program: 60% Typing the program: 20% Execution 20%

Signature of the HOD

துறைத்தலைவர்  
 கல்வியியல் துறை  
 மன்னர் சபோதி அரசுக் கல்லூரி  
 (தன்னாட்சி)  
 தஞ்சாவூர் - 613 005.

  
 COE  
 CONTROLLER OF EXAMINATIONS  
 RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
 THANJAVUR - 613 005.

Credits : 4  
Hours/Week : 6  
Medium of instruction: English

Code: A3PCSEL3A

**M.Sc(Computer Science) - Semester: 3**  
(For students admitted from 2022-2023 onwards)

**SOFTWARE PROJECT MANAGEMENT**

**COURSE OBJECTIVES:**

- To identify various phases of Software project Management
- To learn about how to do project planning
- To evaluate the cost of entire project development
- To learn the risky factors in project development and overcome those factors

**COURSE OUTCOMES:**

CO's	CO–Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO–1	Analyze and design the software architecture	K1
CO–2	Develop the model from the conventional software product to the modern	K2
CO–3	Have an exposure for organizing and managing a software project	K3
CO–4	Design various estimation levels of cost and effort.	K4
CO–5	Sketch various artifacts sets for better understanding of software development	K5

**UNIT I**

Introduction to Software Project Management: Introduction - Why is SPM important - Why is a project – software projects Vs other types of project – Contract Management and Technical Project Management - Plans, Methods and Methodologies –Categorizing software projects- stakeholders – setting objectives- Business case – Project success and failures- Management.

Project Evaluation and Programme Management: Introduction – Business Case-Project portfolio Management- Evaluation of individual projects – Cost – Benefit Evaluation Techniques- Risk Evaluation – Programme Management- Managing the Allocation of Resources within Programmes- Strategic Programme Management- Creating a Programme – Aids to programme management- Benefits Management.

**UNIT II**

Overviews of Project Planning : Introduction to steps wise Planning - Steps.Selection of an Appropriate Project Approach: Introduction – Build or Buy – Choosing Methodologies and Technologies – Software Processes and Process Models - Choice of Process Models - Structure Versus Speed of Delivery – Water fall Model – Spiral Model – Software Prototyping – Rapid Application Development – Agile Methods – Extreme Programming.

**UNIT III**

Software Effort Estimation: Introduction – Where are estimation done? – Problem with Over – and Under Estimates – Basis for Software Estimating – Software Effort Estimation Techniques – Bottom

–up Estimating – Top – Down Approach and Parametric Models – Expert Judgement – Estimating by Analog – Albrecht Function Point Analysis – Function Point Mark II - COSMIC Full Function Points – COCOMO II : A Parametric Productivity Model – Cost Estimation – Staffing Pattern. Activity Planning : Introduction – Objectives of Activity Planning - Where to plan – Project Schedules- Project and Activities – Sequence and scheduling Activities- Network Planning Models- Formulating a Network Models – Adding the Time Dimension – Forward Pass – Backward Pass –Critical Path Activity Float – Shortening the Project Duration – Identifying Critical Activities – Activities –on- Arrow Networks.

#### **UNIT IV**

Risk Management: Introduction – Risk – Categories of Risk – Frame work for dealing with Risk- Risk Identification – Risk Assessment – Risk Planning – Risk Management – Evaluating Risks to the schedule – Applying the PERT Technique – Monte Carlo simulation - Critical Chain Concepts.

Resource Allocation: Introduction – Natures of Resources – Identifying Resource Requirements – Scheduling Resources – Crating Critical Paths – Counting the Cost – Being Specific Publishing the resource schedule – Cost schedules – Scheduling Sequence.

#### **UNIT V**

Monitoring and Control: Introduction – Creating the Framework – Collecting the Data- Review – Software Configuration Management. Managing Contracts: Introduction – types of contracts -- Contract Management – Managing people in software environment.

#### **BOOK FOR STUDY:**

Bob Hughes , Mike Cotterel and Rajib Mall “Software Project Management” -- Fifth Edition

Unit I– Chapter 1 & 2,

Unit II – Chapter 3& 4,

Unit III – Chapter 5& 6,

Unit IV – Chapter 7 &8 ,

Unit V – Chapter 9 & 10

#### **BOOK FOR REFERENCE:**

Walker Royce “Software Project Management”– Pearson Education – Fifth Edition

#### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
<b>CO1</b>	2	3	2	3	2	1	2	2	2	2	2.63
<b>CO2</b>	2	2	2	1	3	2	3	2	3	1	2.63
<b>CO3</b>	3	3	3	2	3	3	2	1	2	3	3.13
<b>CO4</b>	2	4	3	2	2	3	2	3	2	1	3.00
<b>CO5</b>	2	2	2	1	3	1	2	2	2	2	2.38
Mean Overall Score (High Level Relationship between COs and POs)											2.75

**Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

<b>Section A</b> -Answer All Questions (Two questions from each unit)	10x2=20
<b>Section B</b> - Answer All questions (Either or Type – Two questions from each unit)	5x5=25
<b>Section C</b> - Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
கணினி அறிவியல் துறை  
மன்னர் கருபோசி அரசுக் கல்லூரி  
(தங்னாட்சி)  
தஞ்சாவூர் - 613 005.

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code: A3PCSEL3B

Hours/Week :

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 3**  
(For students admitted from 2022-2023 onwards)

## EMBEDDED SYSTEMS

### **COURSE OBJECTIVES:**

- Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
- Describe the hardware software co-design and firmware design approaches
- Know the RTOS internals, multitasking, task scheduling, task communication and synchronization
- Learn the development lifecycle of embedded system

### **COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.	K1
CO-2	Understand the elements of embedded system	K2
CO-3	Learn about various types of embedded system and the functioning	K3
CO-4	Become aware of interrupts, hyper threading and software optimization	K4
CO-5	Design real time embedded systems using the concepts of RTOS	K5

### **UNIT I**

Introduction to Embedded system – Embedded system vs General computing systems – History – Classification – Major Application Areas – Purpose of Embedded systems – Smart running shoes: The innovative bonding of lifestyle with embedded technology. Characteristics and Quality Attributes of Embedded systems.

### **UNIT II**

Elements of an Embedded system –core of the embedded system: General purpose and domain specific processors, ASICs, PLDs, COTS Memory – Sensors and Actuators – Communication Interface: Onboard and External Communication Interfaces – Embedded Firmware - Reset circuit, Brown - out protection circuit, Oscillator unit, Real-time clock, and Watch dog timer – PCB and Passive Components.

### **UNIT III**

Embedded Systems – Washing machine: Application – specific - Automotive: Domain specific. Hardware Software Co-Design - Computational Models – Embedded Firmware Design Approaches – Embedded Firmware Development Languages – Integration and testing of Embedded Hardware and firmware.

## **UNIT IV**

RTOS based Embedded System Design: Operating System Basics – Types of operating Systems - Tasks, process and Threads – Multiprocessing and Multitasking – Task Scheduling – Task Communication - Task Synchronization - Device Drivers - choosing an RTOS.

## **UNIT V**

Components in embedded system development environment, File generated during compilation, simulators, emulators and debugging –Objectives of Embedded product Development Life Cycle – Different Phases of EDLC-EDLC Approaches –Trends in Embedded Industry Case Study: Digital Clock.

### **BOOK FOR STUDY:**

K. V. Shibu, "Introduction to embedded systems", TMH educationPvt.Ltd.2009.

### **BOOKS FOR REFERENCE:**

1. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", TMH. Second Edition 2009
2. Frank Vahid, TonyGivargis, "Embedded System Design", John Wiley. Third Edition 2006
3. Cliff Young, Faraboschi Paolo, and Joseph A. Fisher, "Embedded Computing: AVLIW Approach to Architecture, Compilers and Tools", Morgan Kaufmann Publishers, Anim print of Elsevier, 2005.
4. DavidE.Simon,"AnEmbeddedSoftwarePrimer" PearsonEducation,1999

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	3	2	1	2	2	2	2	2.63
CO2	2	2	2	1	3	2	3	2	3	2	2.75
CO3	3	3	3	2	3	3	2	1	2	3	3.13
CO4	2	4	3	2	2	3	2	3	2	1	3.00
CO5	2	2	2	1	3	2	2	2	2	2	2.50
Mean Overall Score (High Level Relationship between COs and POs)											2.80

### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

கலைஞர் அமைவியல் துறை  
மன்றாங்கள் சபோகி அரசுக்கு கல்லூரி  
(தன்னாட்சி)  
தாங்காலப்பர் - 613 005

Signature  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code: A3PCSEL3C

Hours/Week :

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 3**  
(For students admitted from 2022-2023 onwards)

**OPTIMIZATION TECHNIQUES**

**COURSE OBJECTIVES:**

- To understand the concept of optimization
- To develop mathematical model of real-life cases
- To study Optimization algorithms

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Describe clearly a problem, identify its parts and analyze the individual functions. Feasibility study for solving an optimization problem	K1
CO-2	Understand the LPP problem and its algorithms	K2
CO-3	Evaluate and measure the performance of an algorithm, Discovery, study and solve optimization problems	K3
CO-4	Learn the concepts of transportation model and assignment model	K4
CO-5	Understand optimization techniques using algorithms, and investigate, study, develop, organize and promote innovative solutions for various applications	K5

**Unit-I**

Linear Programming Problem (LPP): Formulations and graphical solution of (2variables) canonical and standard terms of linear programming problem. Simplex method, two phase simplex method.

**Unit-II**

Duality in LPP – dual problem to primal - primal to dual problem – duality simplex method –Revised simplex method – revised simplex algorithm – revised simplex method versus simplex method.

**Unit-III**

Transportation Model: North West corner Method, Least cost method, andvogel's approximation method. Determining Net evaluation - Degeneracy in TP - Assignment Model : Hungarian assignment model – Travelling salesman problem.

**Unit-IV**

Replacement Problem: Replacement policy for equipment that deteriorate gradually, Replacement of item that fail suddenly – Individual and group replacement, Problems in mortality and staffing.

## **Unit-V**

Project Scheduling PERT/CPM Networks – Fulkerson's Rule – Measure Of Activity–  
PERT Computation–CPM Computation – Resource Scheduling.

### **BOOK FOR STUDY:**

1. KantiSwarup, P.K.Gupta & Manmohan – Operation Research 1996.
2. S.Kalavathy: Operations Research – Second Edition – Vikas Publishing House Pvt.Ltd., S.Godfrey Winster, S.Aruna Devi, R.Sujatha, "CompilerDesign", Yesdee Publishing.

### **BOOKS FOR REFERENCE:**

1. D.Shanthi,N.UmaMaheswari,S.Jeyanthi,"Theory ofComputation",Yesdee Publishing.
2. JohnW.Cinneck,"FeasibilityandInfeasibilityinOptimization-AlgorithmsandComputationalMethods",Springer,2015.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	2	2	2	2.50
CO2	2	2	2	1	3	2	3	2	3	2	2.75
CO3	3	3	3	2	3	3	2	1	2	2	3.00
CO4	2	4	3	3	2	3	2	3	2	1	3.13
CO5	2	2	2	3	3	2	2	2	2	2	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.83

### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

கலைஞர் அறிவியல் துறை  
மனவள முபை அரசுக் கல்லூரி  
(தாங்காட்டி)  
தஞ்சாவூர் - 613 005.

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code: A3PCSEC1

Hours/Week :

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 3**  
(For students admitted from 2022-2023 onwards)

## **ADVANCED COMPUTER NETWORKS**

### **COURSE OBJECTIVES:**

- To study communication network protocols, different communication layer structure
- To learn security mechanism for data communication.

### **COURSE OUTCOMES:**

<b>CO's</b>	<b>CO-Statements</b>	<b>Cognitive Levels</b>
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Master in the terminology and concepts of the OSI reference model and the TCP-IP reference model	K1
CO-2	Know how reliable data communication is achieved through data link layer	K2
CO-3	Suggest appropriate network model for data communication	K3
CO-4	Propose appropriate routing algorithm for data routing	K4
CO-5	Connect internet to the system and knowledge of trouble shooting	K5

### **UNIT - I**

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

### **UNIT - II**

Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

### **UNIT - III**

Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

### **UNIT - IV**

Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

## UNIT - V

Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

### BOOK FOR STUDY:

S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

### BOOKS FOR REFERENCE:

1. B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.
2. F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.
3. D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.
4. Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.
5. Teresa C.Piliouras, "Network Design Management and Technical Perspectives, Second Edition", Auerbach Publishers, 2015.

### WEB RESOURCE:

<http://pearsonhighered.com/tanenbaum>

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	2	2	2	2.50
CO2	2	2	2	1	3	2	3	2	2	2	2.63
CO3	2	3	3	2	3	3	2	3	2	1	3.00
CO4	1	4	3	3	2	3	2	3	1	1	2.88
CO5	2	2	2	3	3	2	2	2	1	2	2.63
Mean Overall Score (High Level Relationship between COs and POs)											2.73

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANjavur - 606006

Credits : 4

Code: A4PCS10

Hours/Week : 6

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 4**  
(For students admitted from 2022-2023 onwards)

**INTERNET OF THINGS (IoT)**

**COURSE OBJECTIVES:**

- To understand the fundamental concepts of IOT
- To study about IoT architecture, protocols, security, privacy and challenges
- To know the IoT application areas and cloud IoT
- To learn Arduino programming
- To understand various kinds of sensors using simple sketches

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the application areas of IOT	K1
CO-2	Analyze basic protocols in wireless sensor network	K2
CO-3	Design IoT applications in different domain and be able to analyze their performance	K3
CO-4	Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks	K4
CO-5	Understand the structure of Arduino programming and able to create new applications	K5

**UNIT - I**

Fundamentals of the Internet of things: Introduction-Characteristics of IoT-The physical design of IoT-IoT architecture and components-Logical design of IoT-Communication models-IoT communication APIs-Evaluating business impact and economics for IoT

**UNIT - II**

IoT architecture and protocols: Introduction-Taxonomy-Three- and Five-layer architecture of IoT-Cloud and Fog based architecture of IoT-Representative architecture- Near field communication (NFC)-Wireless sensor network-IoT network protocol stack-IoT technology stack-Bluetooth Zigbee and 6LowPAN

Security, Privacy and challenges in IoT: Design Challenges-Development Challenges-Security Challenges-Privacy Challenges-Other challenges-Trust management

**UNIT - III**

IoT application Areas: Emerging application area of IoT: Smart home- Health care-Agriculture- Military application- Internet of Things (IoT) and politics - Internet of Things (IoT) and constructions- Internet of Things (IoT) and other applications areas – Brief overview of key challenges of IoT implementation

Integration of Cloud and IoT: Introduction -Type of cloud models -Difference between cloud computing and IoT-The role of cloud computing in the IoT-cloud IoT Architecture-Challenges of cloudIoT

#### **UNIT - IV**

Programming for IoT: Arduino overview- Board description- Installation - Program structure – Data types – Variables & constants – operators – control statements – Loop statements – functions – string – Time functions – Arrays-Arduino I/O functions- Advanced I/O functions- Character functions -- Math library – Trigonometric functions – Interrupts – Communications

#### **UNIT - V**

Arduino Projects: Blinking two LEDs- Fading LED – Choosing LED to blink – implementing traffic signal using LEDs- Simple Sketches to understand the function of touch sensor, Vibratıon sensor, Ultrasonic sensor, gas sensor, water level sensor, PIR sensor, IR sensor, Sound sensor, humidity sensor – Motor Control

#### **BOOK FOR STUDY:**

1. Kamlesh Lakhwani, Hemant Kumar Gianey, Joseph Kofi Wireko, Kamal Kant Hiran, "Internet of Things (IoT)", BPB publications
2. Yogesh Misra, Programming and interface with Arduino, CRC Press
3. Tianhong Pan, Designing Embedded system with Arduino, Springer
4. Brian Evans, Beginning Arduino Programming, 2<sup>nd</sup> Edition, O'Reilly

#### **BOOKS FOR REFERENCE:**

1. The Future and IoT: Building the Internet of Things, Author: Jesse Tate, Elliott Dianm, Sold by: Amazon Asia-Pacific Holdings Private Limited
2. Programming Arduino: Getting Started with Sketches, Second Edition (Tab) 2nd Edition, Author: Simon Monk, Sold by: Amazon Asia-Pacific Holdings Private Limited
3. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick

#### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	2	2	2	2.50
CO2	2	2	2	1	3	2	3	2	2	2	2.63
CO3	2	3	3	2	2	3	3	2	2	1	2.88
CO4	1	4	3	3	2	3	3	2	1	3	3.13
CO5	2	2	2	3	3	2	3	2	1	2	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.78

**Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துறைத்தலைவர்  
கணினி அறிவியல் துறை  
மன்னர் சபோகி அரசுக் கல்லூரி  
(தான்னாட்சி)  
தஞ்சாவூர் - 613 005.

COE

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code: A4PCSP4

Hours/Week : 6

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 4**  
(For students admitted from 2022-2023 onwards)

**PRACTICAL: INTERNET OF THINGS (IOT) LAB**

**COURSE OBJECTIVES:**

- To know about the use of IoT
- To learn about the areas of IoT
- To understand the implementation of IoT and its benefits

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the importance of internet of things in present scenario	K1
CO-2	Describe the functions of various sensors and its connections	K2
CO-3	Design the circuits for Arduino programming	K3
CO-4	Analyze the circuit diagram of various sensors using Arduino sketch	K4
CO-5	Develop Arduino sketch for home and industrial applications	K5

**LIST OF PROGRAMS:**

1. Blinking two LEDs
2. Fading LED
3. Choosing LED to blink
4. Implementing traffic signal using LEDs
5. Sketch to use touch sensor
6. Sketch to use Vibration sensor
7. Sketch to use Ultrasonic sensor
8. Sketch to use gas sensor
9. Sketch to use water level sensor
10. Sketch to use PIR sensor
11. Sketch to use IR sensor
12. Sketch to use Sound sensor
13. Sketch to use humidity sensor
14. Sketch to control Motor to move both forward and reverse direction

**Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	3	2	2	2	3	2.88
CO2	2	2	2	1	2	2	3	2	2	3	2.63
CO3	2	3	3	3	2	3	2	3	3	2	3.25
CO4	1	4	3	3	2	3	2	2	1	3	3.00
CO5	2	3	2	3	3	2	3	2	3	3	3.25
Mean Overall Score (High Level Relationship between COs and POs)											3.00

**Semester Question paper Pattern:** Maximum Marks: 60

Exam Duration: Three Hours

One question from the list of exercises.

25

Another question not in the list but relevant to the list of exercises.

35

For correct Program: 60% Typing the program: 20% Execution 20%

Signature of the HOD

துறைத்துறைவா  
கணினி அறிவியல் துறை  
மன்னர் சுரபோசி அரசுக் கல்லூரி  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code: A4PCSPW

Hours/Week : 6

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 4**  
(For students admitted from 2018 -2019 onwards)

**PROJECT WORK**

Dissertation : 75 Marks

Viva voce : 25 Marks

Signature of the HOD

துயற்றக்கணைவர்  
கல்வினி அமைச்சர் துயற்ற  
மண்ணா சுப்பானி அரசுக்கு கல்லூரி  
(கண்ணட்சி)  
தஞ்சாவூர் - 613 005.  
தஞ்சாவூர் - 613 005.

  
**COE**  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4  
Hours/Week : 6  
Medium of instruction: English

Code: S4PCSEL4A

**M.Sc(Computer Science) - Semester:4**  
(For students admitted from 2022-2023 onwards)

**BIG DATA ANALYTICS**

**COURSE OBJECTIVES:**

- *To introduce, what Big Data is.*
- *To teach the limitations of the traditional solutions for Big Data problems*
- *To teach how Hadoop solves those Big Data problems,*
- *To Introduce Hadoop Ecosystem, Hadoop Architecture, HDFS, Anatomy of File Read and Write & how MapReduce works.*

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Express the fundamental concepts of big data	K1
CO-2	Know about big data analytics and data science	K2
CO-3	Understand NoSQL, NewSQL and Mongo DB	K3
CO-4	Able to apply Hadoop ecosystem components	K4
CO-5	Able to do MAP reduce programming for big data analysis	K5

**UNIT I**

Types of digital data: Unstructured, Semi-structured and Structured Data, Introduction to Big Data: Characteristics of data, Evolution and Definition of big data, Challenges of big data , What is Big data?, Other characteristics of Data, Why Big Data?, Traditional Business Intelligence versus big data.

**UNIT II**

Big data analytics: What is Big Data Analytics?, What is Big Data Analytics isn't?, Classification of analytics,Greatest and Top Challenges to big data analytics, Data science ,Data Scientist, Terminologies in big data environment.

**UNIT III**

Big data technology Landscape: Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB:What is MongoDB?, Why MongoDB?, Introduction of apache cassandra , Features of Cassandra.

**UNIT IV**

Introduction to Hadoop: Distributed Computing Challenges, History, Hadoop Overview, HDFS, Processing Data with Hadoop,Hadoop YARN, Interacting with Hadoop Ecosystem..

## UNIT V

Introduction to MAP REDUCE Programming, Introduction to HIVE: Hive Architecture, Datatypes, File Format, Introduction to PIG: PIG LATIN overview, Data Types in PIG.

### BOOK FOR STUDY:

- Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., 2<sup>nd</sup> Edition, 2019.

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	1	2	2	2	1	2	2	2	2	2.25
CO2	2	2	2	1	3	2	3	2	2	2	2.63
CO3	2	1	3	1	2	3	3	2	2	1	2.50
CO4	1	4	3	3	2	3	3	2	1	3	3.13
CO5	2	1	2	3	3	2	3	2	1	2	2.63
Mean Overall Score (High Level Relationship between COs and POs)											2.63

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

  
Signature of the HOD

துறைத்தலைவர்  
கணினி அறிவியல் துறை  
மன்னர் சுரபோசி அரசுக் கல்லூரி  
(தாங்காட்டி)  
தஞ்சாவூர் - 613 005.

  
COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4  
Hours/Week : 6  
Medium of instruction: English

Code: A4PCSEL4B

**M.Sc(Computer Science) - Semester: 4**  
(For students admitted from 2022-2023 onwards)

## DIGITAL IMAGE PROCESSING

### COURSE OBJECTIVES:

- To provide complete knowledge on Digital Image Processing methods
- To learn about image processing methods in Spatial domain and Frequency domain
- To understand about Edge detection, Compression, Segmentation, and Morphological concepts.,.

### COURSE OUTCOMES:

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms	K1
CO-2	Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques	K2
CO-3	Interpret Image compression standards, and Interpret image segmentation and representation techniques	K3
CO-4	Gain idea to process various image used in various fields such as weather forecasting, Diagnosis of various disease using image such as tumor, cancer etc.	K4

### UNIT-I

**Fundamentals:** Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field,  $\sigma$ -field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models.

**Color Models:** Color Fundamentals, Color Models, Pseudo-color Image Processing, Full Color Image Processing, Color Transformation, Noise in Color Images.

### UNIT-II

**Spatial Domain:** Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods.

**Frequency Domain:** Image transforms: FFT, DCT, Karhunen - Loeve transform, Hotelling's T<sup>2</sup>transform, Wavelet transforms and their properties. Image filtering infrequency domain.

## **UNIT-III**

**Edge Detection:** Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.

## **UNIT-IV**

**Image Compression:** Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform based coding; Lossy Compression: FFT; DCT; KLT; DPCM; MRFM based compression; Wavelet transform based; Image Compression standards.

## **UNIT-V**

**Image Segmentation:** Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region – Based Segmentation. Segmentation by Morphological water sheds. The use of motion in segmentation, Image Segmentation based on Color.

**Morphological Image Processing:** Erosion and Dilation, Opening and Closing, Hit – Or - Miss Transformation, Basic Morphological Algorithms, Gray – Scale Morphology.

### **BOOKS FOR STUDY:**

1. Rafael Gonzalez, RichardE. Woods, “Digital Image Processing”, Fourth Edition, PHI/Pearson Education, 2013.
2. A.K.Jain, Fundamentals of Image Processing, Second Ed., PHI, New Delhi, 2015.

### **BOOKS FOR REFERENCE:**

1. B.Chanla, D.Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003.
2. Nick Elford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004.
3. Todd R.Reed, “Digital Image Sequence Processing, Compression, and Analysis”, CRC Press, 2015.
4. L.Prasad, S.S.Iyengar, “Wavelet Analysis with Applications to Image Processing”, CRC Press, 2015.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	3	2	2	2	3	2.88
CO2	2	2	2	1	2	2	3	2	2	3	2.63
CO3	2	3	3	3	2	3	2	2	2	2	3.00
CO4	1	4	3	3	2	3	2	2	2	2	3.00
CO5	2	3	2	3	3	2	3	2	3	3	3.25
Mean Overall Score (High Level Relationship between COs and POs)											2.95

Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

  
Signature of the HOD

திரும்புத்துறையில்வா  
கணினி அறிவியல் துறை  
மன்னர் சுரபோசி அரசுக் கல்லூரி  
(தான்டர்)  
தஞ்சாவூர் - 613 005.



COE

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code:A4PCSEL4C

Hours/Week : 6

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 4**  
(For students admitted from 2022-2023 onwards)

## WEB SERVICES

### **COURSE OBJECTIVES:**

- To enable the student to be familiar with distributed services, XML and web services
- To study the use of web services in B2C and B2B applications

### **COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms	K1
CO-2	Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques	K2
CO-3	Interpret Image compression standards, and Interpret image segmentation and representation techniques	K3
CO-4	Understand how to develop real world applications.	K4
CO-5	Gain idea to process various image used in various fields such as weather forecasting, Diagnosis of various disease using image such as tumor, cancer etc.	K5

### **Unit-I**

Overview of Distributed Computing. Introduction to web services – Industry standards, Technologies and concepts underlying web services – their support to web services. Applications that consume web services.

### **Unit-II**

XML – its choice for web services – network protocols to backend databases – technologies – SOAP, WSDL – exchange of information between applications in distributed environment – locating remote web services – its access and usage. UDDI specification – an introduction.

### **Unit-III**

A brief outline of web services – conversation – static and interactive aspects of system interface and its implementation, workflow – orchestration and refinement, transactions, security issues – the common attacks – security attacks facilitated with in web services quality of services – Architecting of systems to meet users requirement with respect to latency, performance, reliability, QOS metrics, Mobile and wireless services – energy consumption, network band width utilization, portals and services management.

### **Unit-IV**

Building real world enterprise applications using web services – sample source codes to develop web services – steps necessary to build and deploy web services and client applications to meet customers requirement – Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.

## **Unit-V**

Deployment of Web services and applications onto Tomcat application server and axis SOAP server (both are free wares – Web services platform as a set of enabling technologies for XML based distributed computing.

### **BOOKS FOR STUDY:**

1. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services: An Architects Guide, Prentice Hall, Nov 2003.
2. Heather Williamson, "XML: The Complete Reference", Tata McGraw – Hill Education India.

### **BOOK FOR REFERENCE:**

Martin Kalin, "Java Web Services: Up and Running", O'Reilly Publishers.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	3	2	2	1	3	2.75
CO2	2	2	2	3	2	2	3	2	2	3	2.88
CO3	2	3	3	3	2	3	2	1	2	2	2.88
CO4	1	4	3	3	2	3	2	2	1	2	2.88
CO5	2	3	2	3	3	2	3	2	1	3	3.00
Mean Overall Score (High Level Relationship between COs and POs)											2.88

### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

உயிரூத்தியலோ  
கணினி அறிவியல் துறை  
மன்ற சபோகி அரசுக் கல்லூரி  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code: A4PCSEL5A

Hours/Week : 6

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 4**  
(For students admitted from 2022-2023 onwards)

**MACHINE LEARNING**

**COURSE OBJECTIVES:**

- To Learn about Machine Intelligence and Machine Learning applications
- To implement and apply machine learning algorithms to real-world applications.
- To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
- To understand how to perform evaluation of learning algorithms and model selection.

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.	K1
CO-2	Know the strengths and weaknesses of many popular machine learning approaches	K2
CO-3	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning	K3
CO-4	Design and implement various machine learning algorithms in a range of real-world applications	K4
CO-5	To make learning by a model to construct a learning model	K5

**UNIT - I**

INTRODUCTION: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

**UNIT - II**

NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

**UNIT - III**

BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

**UNIT - IV**

INSTANT BASED LEARNING: K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

## UNIT - V

ADVANCED LEARNING: Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

### BOOK FOR STUDY:

Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

### BOOKS FOR REFERENCE:

1. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, “Genetic Algorithms and Genetic Programming”, CRC Press Taylor and Francis Group.

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	3	2	2	1	3	2.75
CO2	2	2	2	1	2	2	3	2	2	3	2.63
CO3	2	3	3	3	2	3	2	1	2	2	2.88
CO4	1	4	3	1	2	1	2	2	1	2	2.38
CO5	2	3	2	3	3	2	3	2	1	3	3.00
Mean Overall Score (High Level Relationship between COs and POs)											2.73

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

கணினி அறிவியல் துறை  
மன்னர் சுரபோசி அரசுக் கல்லூரி  
(தங்னாட்சி)  
தஞ்சாவூர் - 613 005.

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

## SOFTCOMPUTING

### COURSE OBJECTIVES:

- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.

### COURSE OUTCOMES:

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.	K1
CO-2	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic	K2
CO-3	To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations	K3
CO-4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications	K4
CO-5	Reveal different applications of these models to solve engineering and other problems	K5

### UNITI

Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics – Applications – Artificial Neural Network(ANN): Fundamental Concept – Application Scope – Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch - Pitts Model – Hebb Network – Linear Separability.

### UNITII

Supervised Learning Networks: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM – Hopfield Network – Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

### UNITIII

Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation – Membership Functions: Features – Fuzzification – Methods of Membership value assignments – De fuzzification – Methods.

#### **UNIT IV**

Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.

#### **UNIT V**

Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm – Elements of GA-Encoding – Fitness Function – Genetic Operators: Selection – Cross Over – Inversion and Deletion – Mutation – Simple and General GA – The Schema Theorem – Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

#### **BOOK FOR STUDY:**

- S.N. Sivanandam, S.N.Deepa, “Principles of Soft Computing”, Wiley India, 2007.

#### **BOOK FOR REFERENCE:**

- S.Rajasekaran, G.A.V.Pai, “Neural Networks, Fuzzy Logic, Genetic Algorithms”, Prentice Hall India, 2004.

#### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	3	2	2	1	3	2.75
CO2	2	2	2	1	2	2	3	2	2	3	2.63
CO3	2	3	1	3	2	3	3	1	2	2	2.75
CO4	1	4	1	1	2	1	2	2	1	2	2.13
CO5	2	3	2	3	3	2	3	1	1	3	2.88
Mean Overall Score (High Level Relationship between COs and POs)											2.63

#### **Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

~தித்தவைல்~

PG -66 | புதுவீசு அறிவியல் துறை

ஞன்னர் சரபோசி அரசுக் கல்லூரி

(தன்னாட்சி)

தஞ்சாவர் - 613 005

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

## ADVANCED JAVA PROGRAMMING

### COURSE OBJECTIVES:

- To deepen student's programming skills by analyzing the real – world problem in a programmer's point of view and implement the concepts in real time projects.
- To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society.

### COURSE OUTCOMES:

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand the design patterns with decorator pattern and command patterns	K1
CO-2	Know about applet programs	K2
CO-3	Understand the JDBC architecture	K3
CO-4	Acquire the knowledge of servlet programming	K4
CO-5	Develop application for various problems	K5

### UNIT-I

Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Single ton Pattern - Adapter Pattern - Proxy Pattern - Decorator Pattern – Command Pattern - Template Pattern - Mediator Pattern - Collection Framework – ArrayList class – Linked List class – ArrayList vs. Linked List – List Iterator interface – HashSet class – Linked HashSet class - TreeSet class Priority Queue class – Map interface – HashMap class - LinkedHashMap class – TreeMap class - Comparable interface – Comparator interface – Comparable vs Comparator.

### UNIT-II

Applet Fundamentals – Applet Class – Applet life cycle – Steps for Developing Applet Programs – Passing Values through Parameters – Graphics in Applets – GUI Application – Dialog Boxes – Creating Windows – Layout Managers – AWT Component classes – Swing component classes - Borders – Event handling with AWT components – AWT Graphics classes – File Choosers – Color Choosers – Tree – Table Tabbed panels – Progressive bar - Sliders.

### UNIT-III

JDBC – Introduction – JDBC Architecture – JDBC Classes and Interfaces – Database Access with MySQL - Steps in Developing JDBC application – Creating a New Database and Table with JDBC – Working with Database Metadata; Java Networking Basics of Networking – Networking in Java – Socket Program using TCP/IP – Socket Program using UDP – URL and IP address classes.

## **UNIT-IV**

Servlet: Advantages over Applets – Servlet Alternatives – Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters – Server - Side Include – Cookies – JSP Engines – Working with JSP – JSP and Servlet - Anatomy of a JSP Page – Database Connectivity using Servlets and JSP.

## **UNIT-V**

Lambda Expressions – Method Reference – Functional Interface – Streams API, Filters – Optional Class – Nashorn - Base64 Encode Decode – Jshell (RPEL) - Collection Factory Methods - Private Interface Methods – Inner Class Diamond Operator – Multi resolution Image API.

### **BOOKS FOR STUDY:**

1. Bert Bates, Kathy Sierra, Eric Freeman, Elisabeth Robson, “Head First Design Patterns”, O'REILLY Media Publishers. (1<sup>st</sup>-Unit).
2. Herbert Schildt, “Java: A Beginner Guide”, Oracle Press – Seventh Edition. (2<sup>nd</sup> and 3<sup>rd</sup> Unit).
3. Murach's, “Java Servlets and JSP”, 2<sup>nd</sup> Edition, Mike Murach & Associates Publishers; 3<sup>rd</sup> Edition. (4<sup>th</sup> Unit).
4. Warburton Richard, “Java8 Lambdas”, Shroff Publishers & Distributors Pvt Ltd. (5<sup>th</sup> Unit).

### **BOOKS FOR REFERENCE:**

1. Paul Deitel and Harvey Deitel, “Java: How to Program”, Prentice Hall Publishers; 9<sup>th</sup> Edition.
2. Jan Graba, “An Introduction to Network Programming with Java -Java7 Compatible”, 3<sup>rd</sup> Edition, Springer.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	3	2	2	1	3	2.75
CO2	2	2	2	1	2	2	3	2	2	3	2.63
CO3	2	3	1	3	2	3	3	1	2	2	2.75
CO4	1	4	1	1	2	1	2	2	3	2	2.38
CO5	2	3	2	3	3	2	3	1	3	3	3.13
Mean Overall Score (High Level Relationship between COs and POs)											2.73

**Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

<b>Section A</b> -Answer All Questions (Two questions from each unit)	$10 \times 2 = 20$
<b>Section B</b> - Answer All questions (Either or Type – Two questions from each unit)	$5 \times 5 = 25$
<b>Section C</b> - Answer any THREE questions (One question from each unit)	$3 \times 10 = 30$

Signature of the HOD

துறையித்துறையலை  
கணினி அறிவியல் துறை  
**மன்னர் சுபோசி அரசுக் கல்லூரி**  
(தன்னாட்சி)  
தஞ்சாவூர் - 613 005.

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 4

Code: A4PCSEC2

Hours/Week :

Medium of instruction: English

**M.Sc(Computer Science) - Semester: 4**  
(For students admitted from 2022-2023 onwards)

**ADVANCED DATABASE MANAGEMENT SYSTEMS**

**COURSE OBJECTIVES:**

- Acquire Knowledge of Database Models,
- Understand the applications of Database Models
- To know about and Emerging Trends in database management systems

**COURSE OUTCOMES:**

CO's	CO–Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO–1	Identify advance database concepts and database models.	K1
CO–2	Apply and analyze various terms related to transaction management in centralized and distributed database.	K2
CO–3	Produce data modeling and database development process for object –oriented DBMS.	K3
CO–4	Analyze and implement the concept of object- relational database in development of various real time software	K4
CO–5	Examine the issues related to multimedia and mobile database performance	K5

**UNIT -I**

Relational and parallel Database Design: Basics, Entity Types, Relationship Types, ER Model, ER-to-Relational Mapping algorithm. Normalization: Functional Dependency, 1NF, 2NF, 3NF, BCNF, 4NF and 5NF. Architecture, I/O Parallelism, Inter query Parallelism, Intra query Parallelism, Intra operation Parallelism, Interoperation Parallelism.

**UNIT -II**

Distributed and Object based Databases: Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multi set, Object Identity and Reference Types, Object Oriented versus Object Relational.

**UNIT -III**

Spatial Database: Spatial Database Characteristics, Spatial Data Model, Spatial Database Queries, Techniques of Spatial Database Query, Logic based Databases: Introduction, Overview, Propositional Calculus, Predicate Calculus, Deductive Database Systems, Recursive Query Processing.

**UNIT -IV**

XML Databases: XML Hierarchical data model, XML Documents, DTD, XML Schema, XML Querying, XHTML, and Illustrative Experiments.

## UNIT -V

Temporal Databases: Introduction, Intervals, Packing and Unpacking Relations, Generalizing the relational Operators, Database Design, Integrity Constraints, Multimedia Databases: Multimedia Sources, Multimedia Database Queries, Multimedia Database Applications.

### BOOKS FOR STUDY:

1. Abraham Silberschatz, Henry F Korth , S Sudarshan, "Database System Concepts", 6th edition , McGraw-Hill International Edition , 2011
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education Reprint 2016.

### BOOKS FOR REFERENCE:

1. RamezElmasri, Shamkant B Navathe, "Fundamental of Database Systems", Pearson, 7th edition 2016.
2. Thomas Connolly, Carolyn Begg., "Database Systems a practical approach to Design ,Implementation and Management ", Pearson Education, 2014.

### Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	3	2	2	1	3	2.75
CO2	2	2	2	1	2	2	3	2	2	3	2.63
CO3	2	3	3	3	2	3	3	1	2	2	3.00
CO4	1	4	1	1	2	3	2	2	3	2	2.63
CO5	2	3	2	3	3	2	3	3	3	3	3.38
Mean Overall Score (High Level Relationship between COs and POs)											2.88

### Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

ஆற்காடு பூர்வை  
கலைஞர் அறிவியல் துறை  
மன்றார் சபோசி அரசுக் கல்லூரி  
(தங்களாட்சி)

PG -71 இண்ணாலூர் - 613 005.

  
COE

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THAVALAI, TIRUCHIRAPPALAYAM - 613 005.

Credits : 1

Code:

Hours/Week :

Medium of instruction: English

**For PG NME - Semester: 1**  
(For students admitted from 2022-2023 onwards)

## BASIC CONCEPTS OF COMPUTER SCIENCE

### **COURSE OBJECTIVES:**

- To learn basic concepts of information technology.
- To analyze the function of network and database management system.
- To learn about web site development and cyber security.

### **COURSE OUTCOMES**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understand fundamental concepts of computer	K1
CO-2	Know the use of network and DBMS	K2
CO-3	Recognize the programming skills	K3
CO-4	Aware the use of internet and web pages	K4
CO-5	Acquaint the cyber security issues and its prevention.	K5

### **UNIT I**

Computer Fundamentals: Definition-Components of Computer-Input devices -Output devices-Memory- Primary and secondary memory-Software -System Software-Application Software-Open vs closed source-Operating system- Types of operating system - Operating system functions -List of operating systems - Artificial intelligence (AI)- Applications of AI

### **UNIT II**

Network: Definition of network-Components of network- Network architecture -Types of network-Networks Topologies-Transmission Medias-Layers in network Model and functions

Database Management system: Database vs Database System-Advantages of DBMS-Database languages- Types of databases-Relational database system-Architecture of DBMS-List of Database management system

### **UNIT III**

Computer Programming: Program-Complier-Interpreter- List of programming languages-Syntax of C programming language-Data Types-Variables-operators-Decisions-loops-Arrays-Functions-Strings-Files

## UNIT IV

Internet: Internet basics overview-Domain Name system-Internet services-Internet connection types-World wide web-Web Pages-Browsers-Search engines - Dark web- Web site overview-Web site types-Web site Development-Web Site publishing-URL registration

## UNIT V

Cyber Security: Definition-Goals of cyber security-Types of attacks-Types of attackers-Cyber Security Tools-Challenges in security- Cyber Crime: Introduction-Classifications of cybercrime-Effects of cybercrimes-Prevention of cybercrime-Cybercrime law in India

## WEB REFERENCES

1. WWW.tutorialspoint.com
2. WWW.w3schools.com
3. WWW.javapoint.com

## Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	2	2	2	1	2	1	1	2	2.25
CO2	2	2	2	1	2	2	2	2	2	2	2.38
CO3	2	3	3	3	2	3	2	1	2	2	2.88
CO4	1	4	1	1	2	3	2	2	3	2	2.63
CO5	2	3	2	2	2	2	2	2	3	2	2.75
Mean Overall Score (High Level Relationship between COs and POs)											2.58

## Semester Question paper Pattern:

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

துயரத்து வா  
கணினி அறியல் கலை  
மன்ற சபோதி அரசுக் கல்லூரி  
(தங்கட்டி)  
PG -7 தாலைநீர் - 613 005.

COE  
CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.

Credits : 1

Code:

Hours/Week :

Medium of instruction: English

**For PG NME - Semester: 2**

(For students admitted from 2022-2023 onwards)

**PROGRAMMING IN CPP**

**COURSE OBJECTIVES:**

- To impart basic knowledge of programming skills in C++.
- To Understand the OOPs Concept
- To Visualize the OOPs Concepts using C++

**COURSE OUTCOMES:**

CO's	CO-Statements	Cognitive Levels
	<i>On successful completion of this course, students will be able to</i>	
CO-1	Understood the programming techniques	K1
CO-2	Acquired the basics of the C++ programming	K2
CO-3	Acquired knowledge about Applications of C++	K3
CO-4	Would have learnt the various OOPs Concept using C++	K4
CO-5	Apply OOPs techniques in programming	K5

**Unit I: Introduction to C++:** Applications of C++ - Structure of C++ Program - Tokens: Keywords – Identifiers – Constants. Data types -Variables - Operators and expressions.

**Unit II: Control Structures:** Decision making, looping and branching - Jumps in Loops – Managing input and output Operations. Array: One dimensional array – Two dimensional array.

**Unit III: Functions:** The Main Function – Function Prototyping - Call by value - call by reference - String handling functions - Inline Function

**Unit IV: Basic concepts of object oriented programming** - Benefits of oops - Applications of oops – Classes and object - Access Specifier - Member function – Function Overloading.

**Unit V: Constructor:** parameterized constructor – Constructor Overloading - **Inheritance:** Types of Inheritance – Single Inheritance – Multiple Inheritance – Multilevel Inheritance – Hierarchical and Hybrid Inheritance.

**BOOK FOR STUDY:**

Object Oriented Programming With C++ By E. Balagurusamy, Tata McGraw Hill.

**BOOKS FOR REFERENCE:**

Herbert Schildt, "Teach Yourself C++", Third edition, Tata McGraw Hill, 2000.

**Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes**

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	Mean Score of COs
CO1	2	3	1	2	2	1	2	1	1	2	2.13
CO2	2	2	2	1	2	2	2	2	2	2	2.38
CO3	2	3	3	3	2	3	2	1	2	2	2.88
CO4	1	4	1	1	2	3	2	2	3	2	2.63
CO5	2	3	2	2	2	2	2	2	3	1	2.63
Mean Overall Score (High Level Relationship between COs and POs)											2.53

**Semester Question paper Pattern:**

Maximum Marks: 75

Exam Duration: Three Hours

Section A-Answer All Questions (Two questions from each unit)	10x2=20
Section B- Answer All questions (Either or Type – Two questions from each unit)	5x5=25
Section C- Answer any THREE questions (One question from each unit)	3x10=30

Signature of the HOD

தமிழ்நாட்டு மாநில பொது வகுப்பு மன்ற கல்லூரி  
மன்றாங்கிர் தமிழ்நாட்டு மாநில பொது வகுப்பு மன்ற கல்லூரி  
(தமிழ்நாட்டு)  
தஞ்சாவூர் - 613 005.

CONTROLLER OF EXAMINATIONS  
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)  
THANJAVUR - 613 005.  
COE