RAJAH SERFOJI GOVERNMENT COLLEGE(AUTONOMOUS),
THANJAVUR 613 005
M.Sc. Computer Science COURSE STRUCTURE (From the Academic Year 2023-2024 onwards)

SL. No.	Part	COURSE	Sub-Code	Course Title	Hrs.	Credits	CIA	Sem. Exam	Total
				I SEMESTER					
1	III	CC1	T1PCSC1	Analysis& Design of Algorithms	6	5	25	75	100
2	III	CC2	T1PCSC2	Python Programming	6	5	25	75	100
3	III	CC3 - Practical-I	T1PCSC3	Python Programming – Lab	6	4	40	60	100
4	III	EC1		Elective course I	6	3	25	75	100
5	III	EC2		Elective course II	6	3	25	75	100
				Total	**30**	**20**			**500**
				II SEMESTER					
6	III	CC4	T2PCSC4	Data Mining and Warehousing	6	5	25	75	100
7	III	CC5	T2PCSC5	Advanced Java Programming	6	5	25	75	100
8	III	CC6	T2PCSC6	Data science & Analytics	6	4	40	60	100
9	III	EC3 Practical-II		Elective course III- Practical	4	3	25	75	100
10	III	EC4		Elective course IV	4	3	25	75	100
11	IV	SEC1	T2PCSS1	Artificial Intelligence & Machine Learning	4	2	25	75	100
				Total	**30**	**22**			**600**
				III SEMESTER					
12	III	CC7	T3PCSC7	Network Security and Cryptography	6	5	25	75	100
13	III	CC8	T3PCSC8	Advanced operating systems	6	5	25	75	100
14	III	CC9- Industry Module	T3PCSC9	Web application Development	6	5	25	75	100
15	III	CC10-Practical-III	T3PCSC10	Web application Development - Lab	6	4	40	60	100
16	III	EC5		Elective course V	3	3	25	75	100
17	IV	SEC2	T3PCSS2	Principles of Compiler design	3	2	25	75	100
	IV	Internship/ Industrial activity				2			
				Total	**30**	**26**			**600**
				IV SEMESTER					
18	III	CC11	T4PCSC11	Cloud Computing	6	5	25	75	100
19	III	CC12	T4PCSC12	Advanced Computer Networks	6	5	40	60	100
20	III	CC13	T4PCSC13	Project viva voce	10	7	25	75	100
21	III	EC6 Practical IV		Elective course VI-Practical	4	3	25	75	100
22	IV	PCS	T4PCSS3	Internet of things	4	2	25	75	100
	V	Ext. Activity				1			
				Total	**30**	**23**			**500**
				Grand Total	**120**	**91**			**2200**

****Intenship will be carried out during the summer vacation of the first year and marks will included in the Third Semester Mark Statement**

Passing Minimum is prescribed for Internal and External

a) The Passing minimum for CIA shall be 12 out of 25 Marks

b)The Passing minimum for Autonomous Examinations shall be 38 out of 75 marks

List of discipline specific elective papers

S. No	COURSE CODE	TITLE
1	TPCSECA	Advanced Java Lab
2	TPCSECB	Internet of things Lab
3	TPCSECC	Algorithm and OOP's Lab
4	TPCSECD	Digital Image Processing using MAT lab
5	TPCSECE	Cloud computing Lab
6	TPCSECF	Object oriented analysis and design
7	TPCSECG	Advanced Database Management Systems
8	TPCSECH	Mobile Computing
9	TPCSECI	Advanced Software Engineering
10	TPCSECJ	Multimedia and its Applications
11	TPCSECK	Embedded Systems
12	TPCSECL	Robotic and its applications
13	TPCSECM	Cyber security
14	TPCSECN	Software Testing
15	TPCSECO	Process Modelling and Simulation
16	TPCSECP	Block chain Technology

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

Code: T1PCSC1

M.Sc (Computer Science) - Semester: I
(For students admitted from 2023-2024 onwards)

ANALYSIS AND DESIGN OF ALGORITHMS

Course Objectives:
The main objectives of this course are to: 1. Enable the students to learn the Elementary Data Structures and algorithms. 2. Presents an introduction to the algorithms, their analysis and design 3. Discuss various methods like Basic Traversal and Search Techniques, divide and conquer method, Dynamic programming, backtracking 4. Understood the various design and analysis of the algorithms.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Get knowledge about algorithms and determines their time complexity. Demonstrate specific search and sort algorithms using divide and conquer technique.	K1,K2
2	Gain good understanding of Greedy method and its algorithm.	K2,K3
3	Able to describe about graphs using dynamic programming technique.	K3,K4
4	Demonstrate the concept of backtracking & branch and bound technique.	K5,K6
5	Explore the traversal and searching technique and apply it for trees and graphs.	K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction: – Algorithm Definition and Specification – Space complexity – Time Complexity – Asymptotic Notations – Elementary Data Structure: Stacks and Queues – Binary Tree – Binary Search Tree – Heap – Heap sort – Graph.

Unit: II **No. of hours: 15**

Basic Traversal And Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Divide and Conquer: – General Method – Binary Search – Merge Sort – Quick Sort.

Unit: III **No. of hours: 15**

The Greedy Method: General Method – Knapsack Problem – Minimum Cost Spanning Tree – Single Source Shortest Path.

Unit: IV

No. of hours: 15

Dynamic Programming – General Method – Multistage Graphs – All Pair Shortest Path –Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.

Unit: V

No. of hours: 15

Backtracking: General Method –8-Queens Problem–Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Branch and Bound: The Method – Traveling Sales person.

Total Hours: 75

Text Books

1. Ellis Horowitz, "Computer Algorithms", Galgotia Publications.
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".

Reference Books

1. Goodrich, "Data Structures & Algorithms in Java", Wiley 3rd edition.
2. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008
3. Anany Levith, "Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
4. Robert Sedgewick, Phillipe Flajolet, "An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company, 1996.

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	M	S	L	M	L	S	M
CO2	S	S	S	S	S	M	S	M	S	M
CO3	S	S	S	S	S	M	S	M	S	M
CO4	S	S	S	S	S	M	S	M	S	M
CO5	S	S	S	S	S	M	S	M	S	M

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

துறைததலைவா
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RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

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

Code: T1PCSC2

M.Sc (Computer Science) - Semester: I
(For students admitted from 2023-2024 onwards)

PYTHON PROGRAMMING

Course Objectives:
The main objectives of this course are to: 1. Presents an introduction to Python, creation of web applications, network applications and working in the clouds 2. Use functions for structuring Python programs 3. Understand different Data Structures of Python 4. Represent compound data using Python lists, tuples and dictionaries

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the basic concepts of Python Programming	K1,K2
2	Understand File operations, Classes and Objects	K2,K3
3	Acquire Object Oriented Skills in Python	K3,K4
4	Develop web applications using Python	K5
5	Develop Client Server Networking applications	K5,K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction – Numbers – Strings – Variables – Lists – Tuples – Dictionaries – Sets – Comparison.

Unit: II **No. of hours: 15**

If, else if, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.

Unit: III **No. of hours: 15**

Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. Objects and Classes: Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–Inself Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy – Method Types – Duck Typing – Special Methods – Composition.

Unit: IV **No. of hours: 15**

Text Strings–Binary Data. Storing and Retrieving Data: File Input/ Output– Structured Text Files – Structured Binary Files – Relational Databases – No SQL Data Stores. Web: Web Clients –Web Servers–Web Services and Automation

Unit: V **No. of hours: 15**

Files – Directories – Programs and Processes – Calendars and Clocks. **Concurrency**: Queues–Processes–Threads–Green Threads and gevent – twisted – Redis. **Networks**: Patterns – The Publish – Subscribe Model – TCP/IP – Sockets – Zero MQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Working in the Clouds.

Total Hours: 75

Text Books

1. Bill Lubanovic, "Introducing Python", O' Reilly, First Edition–Second Release, 2014.
2. Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.

Reference Books

1. David M. Beazley, "Python Essential Reference", Developer's Library, Fourth Edition, 2009.
2. Sheetal Taneja, Naveen Kumar, "Python Programming– A Modular Approach", Pearson Publications.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	M	S	M

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

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THANJAVUR-613 005.

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

Code: T1PCSC3

M.Sc (Computer Science) - Semester: I
(For students admitted from 2023-2024 onwards)

PYTHON PROGRAMMING LAB

Course Objectives:		
The main objectives of this course are to: 1. This course presents an overview of elementary data items, lists, dictionaries, sets and tuples 2. To understand and write simple Python programs 3. To Understand the OOPS concepts of Python 4. To develop web applications using Python		
Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Able to write programs in Python using OOPS concepts	K1,K2
2	To understand the concepts of File operations and Modules in Python	K2,K3
3	Implementation of lists, dictionaries, sets and tuples as programs	K3,K4
4	To develop web applications using Python	K5,K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; **K6**-Create		

LIST OF PROGRAMS **Total Hours: 75 Hours**

Implement the following in Python:

1. Programs using elementary data items, lists, dictionaries and tuples
2. Programs using conditional branches,
3. Programs using loops.
4. Programs using functions
5. Programs using exception handling
6. Programs using inheritance
7. Programs using polymorphism
8. Programs to implement file operations.
9. Programs using modules.
10. Programs for creating dynamic and interactive web pages using forms.

Text Books

1. Bill Lubanovic, "Introducing Python", O'Reilly, First Edition-Second Release, 2014.
2. Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.

Reference Books

1. David M. Beazley, "Python Essential Reference", Developer's Library, Fourth Edition, 2009.
2. Sheetal Taneja, Naveen Kumar, "Python Programming - A Modular Approach", Pearson Publications.

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

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

Credits : 5 **Code: T2PCSC4**
Hours/Week : 6
Medium of instruction: English

M.Sc (Computer Science) - Semester: II
(For students admitted from 2023-2024 onwards)

DATA MINING AND WAREHOUSING

Course Objectives:
The main objectives of this course are to: 1. Enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing. 2. Develop skills of using recent data mining software for solving practical problems. 3. Develop and apply critical thinking, problem-solving, and decision-making skills.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the basic data mining techniques and algorithms	K1,K2
2	Understand the Association rules, Clustering techniques and Data warehousing contents	K2,K3
3	Compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	K4,K5
4	Design data ware house with dimensional modeling and apply OLAP operations	K5,K6
5	Identify appropriate data mining algorithms to solve real world problems	K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.

Unit: II **No. of hours: 15**

Classification: Introduction –Statistical –based algorithms – distance–based algorithms– decision tree– based algorithms– neural network–based algorithms–rule–based algorithms–combining techniques.

Unit: III **No. of hours: 15**

Clustering: Introduction– Similarity and Distance Measures – Outliers – Hierarchical Algorithms – Partitional Algorithms. Association rules: Introduction – large item sets – basic algorithms – parallel &distributed algorithms – comparing approaches– incremental rules – advanced association rules techniques – measuring the quality of rules.

Unit: IV **No. of hours: 15**

Data warehousing: introduction–characteristics of a data warehouse – data marts– other aspects of data mart. Online analytical processing: introduction –OLTP & OLAP systems. Data modeling – star schema for multidimensional view – data modeling – multifact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.

Unit: V **No. of hours: 15**

Developing a data warehouse: why and how to build a data warehouse –data warehouse architectural strategies and organization issues – design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction – national data warehouses – other areas for data warehousing and data mining.

Total Hours: 75

Text Books

1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson education, 2003.
2. C.S.R. Prabhu, "Data Warehousing Concepts, Techniques, Products and Applications", PHI, Second Edition.

Reference Books

1. Arun K. Pujari, "Data Mining Techniques", Universities Press (India) Pvt. Ltd., 2003.
2. Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining and OLAP", TMCH, 2001.
3. Jiawei Han & Micheline Kamber, "Data Mining Concepts & Techniques", 2001, Academic press.

Mapping with Programming Outcomes										
Cos	**PO 1**	**PO 2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO1 0**
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S.	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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

Code: T2PCSC5

M.Sc (Computer Science) - Semester: II
(For students admitted from 2023-2024 onwards)

ADVANCED JAVA PROGRAMMING

Course Objectives:
The main objectives of this course are to: 1. Enable the students to learn the basic functions, principles and concepts of advanced java programming. 2. Provide knowledge on concepts needed for distributed Application Architecture. 3. Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the advanced concepts of Java Programming	K1,K2
2	Understand JDBC and RMI concepts	K2,K3
3	Apply and analyze Java in Database	K3,K4
4	Handle different event in java using the delegation event model, event listener and class	K5
5	Design interactive applications using Java Servlet, JSP and JDBC	K5,K6
K1-Remember; K**2**-Understand; K**3**-Apply; **K4**-Analyze; K**5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Java Basics Review: Components and event handling – Threading concepts–Networking features – Media techniques

Unit: II **No. of hours: 15**

Remote Method Invocation–Distributed Application Architecture– Creating stubs and skeletons– Defining Remote objects– Remote Object Activation–Object Serialization–Java Spaces

Unit: III **No. of hours: 15**

Java in Databases– JDBC principles– database access– Interacting–database search–Creating multimedia databases – Database support in web applications.

Unit: IV **No. of hours: 15**

Java Servlets: Java Servlet and CGI programming– A simple java Servlet– Anatomy of a java Servlet – Reading data from a client–Reading http request header–sending data to a client and writing the http response header–working with cookies Java Server Pages: JSP Overview–Installation–JSP tags–Components of a JSP page–Expressions– Scriptlets – Directives–Declarations– A complete example.

Unit: V **No. of hours: 15**

JAR file format creation – Internationalization – Swing Programming – Advanced Java techniques

Total hours: 75

Text Books

1. Jamie Jaworski, "Java Unleashed", SAMS Tech media Publications, 1999.
2. Campione, Walrath and Huml , "The Java Tutorial", Addison Wesley, 1999.

Reference Books

1. Jim Keogh, "The Complete Reference J2EE",Tata Mc Graw Hill Publishing Company Ltd, 2010.
2. David Sawyer Mc Far land, "Java Script and JQuery-The Missing Manual", Oreilly Publications, 3rd Edition, 2011.
3. Deitel and Deitel, "Java How to Program", Third Edition, PHI/ Pearson Education Asia.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	M	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

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Credits : 4 **Code: T2PCSC6**
Hours/Week : 6
Medium of instruction: English

M.Sc (Computer Science) - Semester: II
(For students admitted from 2023-2024 onwards)

DATA SCIENCE & ANALYTICS

Course Objectives:
The main objectives of this course are to: 1. Introduce the students to data science, big data & its ecosystem. 2. Learn data analytics &its life cycle. 3. To explore the programming language R, with respect to the data mining algorithms. 4. Relate the relationship between artificial intelligence, machine learning and data science.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the concept of data science and its techniques	K1,K2
2	Review data analytics	K2,K3
3	Apply and determine appropriate Data Mining techniques using R to real time applications	K3,K4
4	Analyze on clustering algorithms	K4,K5
5	Analyze on regression methods in AI	K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5** -Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction of Data Science: data science and big data – facets of data–data science process– Ecosystem – The Data Science process – six steps– Machine Learning.

Unit: II **No. of hours: 15**

Data Analytics life cycle – review of data analytics – Advanced data Analytics–technology and tools.

Unit: III **No. of hours: 15**

Basic Data Analytics using R : R Graphical User Interfaces – Data Import and Export – Attribute and Data Types – Descriptive Statistics – Exploratory Data Analysis –Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables – Data Exploration Versus Presentation.

Unit: IV **No. of hours: 15**

Overview of Clustering : K-means – Use Cases – Overview of the Method – Perform a K–means Analysis using R –Classification – Decision Trees – Overview of a Decision Tree – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Tree in R – Bayes' Theorem – Naïve Bayes Classifier – Smoothing – Naïve Bayes in R.

Unit: V **No. of hours: 15**

Artificial intelligence: Machine Learning and deep learning in data science–Clustering, association rules. Linear regression – logistic regression – Additional regression methods.

Total hours: 75

Text Books

1. Introducing–Data-Science-Big-Data-Machine-Learning-and-more-using-Python-tools-2016 pdf
2. Data science in big data analytics-Wiley 2015 John Wiley & Sons

Reference Books

1. A simple introduction to Data Science – Lars Nielson 2015.
2. Introducing Data Science Davy Cielen, Arno D. B. Meysman, Mohamed Ali 2016 Manning Publication.
3. R Programming for Data Science-Roger D. Peng 2015 Lean Publication.
4. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

துறைததலைவா
கணினி அறிவியல் துறை
மன்னர் சரபோசி அரசுக் கல்லூரி
(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 2
Hours/Week : 4
Medium of instruction: English

Code: T2PCSS1

M.Sc (Computer Science) - Semester: II
(For students admitted from 2024-2025 onwards)

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Course Objectives:
The main objectives of this course are to: 1. Enable the students to learn the basic functions of AI, Heuristic Search Techniques. 2. Provide knowledge on concepts of Representations and Mappings and Predicate Logic. 3. Introduce Machine Learning with respect Data Mining, Big Data and Cloud. 4. Study about Applications & Impact of ML.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Demonstrate AI problems and techniques	K1,K2
2	Understand machine learning concepts	K2,K3
3	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	K3,K4
4	Analyze the impact of machine learning on applications	K4,K5
5	Analyze and design a real world problem for implementation and understand the dynamic behavior of a system	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.

Unit: II **No. of hours: 15**

Heuristic Search techniques: Generate and Test – Hill Climbing – Best – First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations Issues in Knowledge representations – Frame Problem.

Unit: III **No. of hours: 15**

Using Predicate logic: Representing simple facts in logic – Representing Instance and Isa relationships – Computable functions and predicates. Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning.

Unit: IV **No. of hours: 15**

Understanding Machine Learning: What Is Machine Learning? – Defining Big Data –Big Data in Context with Machine Learning – The Importance of the Hybrid Cloud –Leveraging the Power of Machine Learning – The Roles of Statistics and Data Mining with Machine Learning – Putting Machine Learning in Context – Approaches to Machine Learning.

Unit: V **No. of hours: 15**

Looking Inside Machine Learning: The Impact of Machine Learning on Applications – Data Preparation – The Machine Learning Cycle.

Total hours: 75

Text Books

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata Mc Graw Hill Publishers company Pvt Ltd, Second Edition, 1991.
2. George Luger, "Artificial Intelligence", 4th Edition, Pearson Education Publ, 2002.

Reference Books

1. Machine Learning for Dummies, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch.

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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COE

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

Credits : 5 **Code: T3PCSC7**
Hours/Week : 6
Medium of instruction: English

M.Sc (Computer Science) - Semester: III
(For students admitted from 2024-2025 onwards)

NETWORK SECURITY AND CRYPTOGRAPHY

Course Objectives:
The main objectives of this course are to: 1. Enable students to learn the Introduction to Cryptography, Web Security and Case studies in Cryptography. 2. Togainknowledgeonclassicalencryptiontechniquesandconceptsofmodulararithmeticand number theory. 3. To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms. 4. To explore the design issues and working principles of various authentication Applications and various secure communication standards including Kerberos, IP sec, and SSL/TLS and email.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the process of the cryptographic algorithms	K1,K2
2	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication	K2,K3
3	Apply and analyze appropriate security techniques to solve network security problem	K3,K4
4	Explore suitable cryptographic algorithms	K4,K5
5	Analyze different digital signature algorithms to achieve authentication and design secure applications	K5,K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction to Cryptography: The OSI Security Architecture- Security Attacks – Security Services – Security Mechanisms – Stream cipher and Block cipher – Symmetric and Asymmetric cipher.

Unit: II **No. of hours: 15**

Symmetric Cipher: Symmetric Cipher Model – Substitution Techniques – Transposition techniques – Steganography – Block Cipher: Data Encryption Standard – Advanced Encryption Standard.

Unit: III **No. of hours: 15**

Public–key Cryptosystem: RSA Algorithm – Diffie-Hellman Key exchange – Elliptic Curve Cryptography.

Unit: IV **No. of hours: 15**

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.

Unit: V **No. of hours: 15**

Web Security: Secure Socket Layer – Secure Electronic Transaction – System Security – Intruders and Viruses – Firewalls – Password Security.

Total hours: 75

Text Books

1. William Stallings, "Cryptography and Network Security", PHI/Pearson Education.
2. Bruce Schneir, "Applied Cryptography", CRC Press.

Reference Books

1. A.Menezes, P Van Oorschot and S.Vanstone, "Hand Book of Applied Cryptography", CRC Press, 1997
2. Ankit Fadia, "Network Security", Mac Millan.

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	M	L	S	M	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

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COE

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

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

Code: T3PCSC8

M.Sc (Computer Science) - Semester: 2
(For students admitted from 2023-2024 onwards)

ADVANCED OPERATING SYSTEMS

Course Objectives:
The main objectives of this course are to: 1. Enable the students to learn the different types of operating systems and their functioning. 2. Gain knowledge on Distributed Operating Systems 3. Gain insight into the components and management aspects of real time and mobile operating systems. 4. Learn case studies in Linux Operating Systems

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the design issues associated with operating systems	K1,K2
2	Master various process management concepts including scheduling, deadlocks and distributed file systems	K3,K4
3	Prepare Real Time Task Scheduling	K4,K5
4	Analyze Operating Systems for Handheld Systems	K5
5	Analyze Operating Systems like LINUX and iOS	K5,K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems – Feature Migration – Computing Environments –Process Scheduling – Cooperating Processes – Inter Process Communication – Deadlocks –Prevention – Avoidance – Detection – Recovery.

Unit: II **No. of hours: 15**

Distributed Operating Systems: Issues – Communication Primitives – Lamport's Logical Clocks – Deadlock handling strategies – Issues in deadlock detection and resolution – distributed file systems – design issues – Case studies – The Sun Network File System – Coda.

Unit: III **No. of hours: 15**

Real time Operating Systems: Introduction – Applications of Real Time Systems – Basic Model of Real Time System – Characteristics – Safety and Reliability – Real Time Task Scheduling

Unit: IV **No. of hours: 15**

Operating Systems for Hand held Systems: Requirements – Technology Overview –Hand held Operating Systems – Palm OS – Symbian Operating System – Android –Architecture of android – Securing hand held systems.

Unit: V **No. of hours: 15**

Linux System: Introduction – Memory Management – Process Scheduling – Scheduling Policy – Managing I/O devices – Accessing Files – iOS : Architecture and SDK Framework – Media Layer – Services Layer – Core OS Layer – File System.

Total hours: 75

Text Books

1. Abraham Silber schatz; Peter Baer Galvin; Greg Gagne, "Operating System Concepts", Seventh Edition, John Wiley & Sons, 2004.
2. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems", Tata Mc Graw-Hill, 2001.

Reference Books

1. Rajib Mall, "Real-Time Systems: Theory and Practice",Pearson Education India,2006.
2. Pramod Chandra P.Bhatt, An introduction to operating systems, concept and practice, PHI, Third edition, 2010.
3. Daniel.P.Bovet & Marco Cesati, "Understanding the Linux kernel",3rdedition, O" Reilly, 2005
4. Neil Smyth, "iPhone iOS 4Development Essentials–X code", Fourth Edition, Payload media, 2011.

Mapping with Programming Outcomes										
Cos	**PO 1**	**PO 2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO1 0**
CO1	S	M	S	S	S	S	M	M	M	M
CO2	S	M	S	S	S	S	S	M	S	M
CO3	S	M	S	S	S	S	S	M	S	M
CO4	S	M	S	S	S	S	S	M	S	M
CO5	S	M	S	S	S	S	S	M	S	M

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

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(தன்னாட்சி)
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COE

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

Credits : 5 **Code: T3PCSC9**
Hours/Week : 6
Medium of instruction: English

M.Sc (Computer Science) - Semester: III
(For students admitted from 2023-2024 onwards)
WEB APPLICATION DEVELOPMENT

Course Objectives:
The main objectives of this course are to: 1. Explore the backbone of web page creation by developing .NET skill. 2. Enrich knowledge about HTML control and web control classes 3. Provide depth knowledge about ADO.NET 4. Understand the need of usability, evaluation methods for web services

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Design a web page with Web form fundamentals and web control classes.	K1,K2
2	Recognize the importance of validation control, cookies and session.	K2,K3
3	Apply the knowledge of ADO.NET data access and SQL to develop a client server model.	K4,K5
4	Apply the knowledge of ADO.NET data access and SQL to develop a client server model.	K5,K6
5.	Know about the advanced concepts of ASP.NET.	
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

UNIT – I **No. of hours: 15**

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 **No. of hours: 15**

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

No. of hours: 15

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 Data Reader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data.

UNIT - IV

No. of hours: 15

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. Web Services - Web services Architecture: Internet programming then and now- WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI.

UNIT – V

No. of hours: 15

Web Services: 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.

Total hours: 75

BOOK FOR STUDY:

- 1 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.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75

Exam Duration: Three Hours

Section A - Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B - Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C - Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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COE

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

Credits : 4 **Code: T3PCSC10**
Hours/Week : 6
Medium of instruction: English

M.Sc (Computer Science) - Semester: III
(For students admitted from 2023-2024 onwards)

WEB APPLICATION DEVELOPMENT LAB

Course Objectives:
The main objectives of this course are to: 1. Explore the backbone of ASP.net programming. 2. Enrich knowledge about the controls in ASP.Net 3. Provide depth knowledge in the implementation of ASP.Net programming

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Develop simple programs using simple logics	K1,K2
2	Recognize how to develop programs for real time applications.	K2,K3
3	Apply the knowledge using various data controls	K3,,K4
4	Apply the knowledge to get the values remotely.	K4,K5
5.	Know about the database connectivity in ASP.NET.	K5,K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

LIST OF PROGRAMS: **Total Hours: 75 Hours**

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.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.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

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COE

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

Credits : 2 **Code: T3PCSS2**
Hours/Week : 3
Medium of instruction: English

M.Sc (Computer Science) – Semester: III
(For students admitted from 2024-2025 onwards)

PRINCIPLES OF COMPILER DESIGN

Course Objectives:
1. Discover principles, algorithms and techniques that can be used to construct various phases of compiler. 2. Acquire knowledge about finite automata and regular expressions 3. Learn context free grammars, compiler parsing techniques. 4. Explore knowledge about Syntax Directed definitions and translation scheme 5. Understand intermediate machine representations and actual code generation

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Design various phases of compiler, a lexical analyzer	K1,K2
2	Write a scanner, parser, and semantic analyzer without the aid of automatic generator	K3,K4
3	Discuss intermediate code generation	K4,K5
4	Discuss the various storage allocation strategies and implement a code generator	K5,K6
5	Apply the various optimization techniques	K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; **K6**-Create		

UNIT – I **No. of hours: 15**

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.

UNIT – II **No. of hours: 15**

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

UNIT – III **No. of hours: 15**

Semantic Analysis – Inherited and synthesized attributes – Applications of Syntax Directed translation – Syntax Directed translations schemes – Storage organization.

UNIT – IV **No. of hours: 15**

Intermediate Code Generation – Variants of Syntax trees – Three Address code – Types and Declarations – Translation of Expressions – Type checking – Control flow – Back patching.

UNIT – V **No. of hours: 15**

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

Total hours: 75

Text Books:

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

Reference Books:

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.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

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

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

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

Code: T4PCSC11

M.Sc (Computer Science) – Semester: IV
(For students admitted from 2023-2024 onwards)

CLOUD COMPUTING

Course Objectives:
The main objectives of this course are to: 1. Gain knowledge on cloud computing, cloud services, architectures and applications. 2. Enable the students to learn the basics of cloud computing with real time usage 3. How to store and share, in and from cloud?

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the concepts of Cloud and its services	K1,K2
2	Collaborate Cloud for Event & Project Management	K3,K4
3	Analyze on cloud in–Word Processing, Spread Sheets, Mail, Calendar, Database	K4,K5
4	Analyze cloud in social networks	K5,K6
5	Explore cloud storage and sharing	K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction Cloud Computing Introduction, From, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.

Unit: II **No. of hours: 15**

Cloud computing for everyone Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping, schedules, managing projects, presenting on road.

Unit: III **No. of hours: 15**

Using cloud services Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.

Unit: IV **No. of hours : 15**

Outside the cloud Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating online group ware, collaborating via blogs and wikis.

Unit: V **No. of hours: 15**

STORING AND SHARING Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.

Total hours: 75

Text Books

1. Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009.

Reference Books

1. Anthony T. Velte, "Cloud Computing: A Practical Approach", 1st Edition, Tata Mc Graw Hill Education Private Limited, 2009.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	S	M	S	M	S	M	M	M	S
CO2	M	S	M	S	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	M	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

துறைததலைவர்
கணினி அறிவியல் துறை
மன்னர் சரபோசி அரசுக் கல்லூரி
(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 5 **Code: T4PCSC12**
Hours/Week : 6
Medium of instruction: English

M.Sc(Computer Science) – Semester: 4
(For students admitted from 2023-2024 onwards)

ADVANCED COMPUTER NETWORKS

Course Objectives:
The main objectives of this course are to: 1. To study communication network protocols 2. To understand different communication layer structure 3. To learn security mechanism for data communication.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Master in the terminology and concepts of the OSI reference model and the TCP-IP reference model	K1,K2
2	Know how reliable data communication is achieved through data link layer	K3,K4
3	Suggest appropriate network model for data communication	K4,K5
4	Propose appropriate routing algorithm for data routing	K5,K6
5	Connect internet to the system and knowledge of trouble shooting	K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

UNIT – I **No. of hours: 15**

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 **No. of hours: 15**

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 **No. of hours: 15**

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 **No. of hours: 15**

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 **No. of hours: 15**

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.

Text Books

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

Reference Books

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.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	S	M	S	M	S	M	M	M	S
CO2	M	S	M	S	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	M	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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

Credits : 7
Hours/Week : 10
Medium of instruction: English

Code: T4PCSC13

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

PROJECT WORK

Course Objectives:
The main objectives of this course are to: ➢ To should know about what is project ➢ To learn about how to solve a problem ➢ To understand any one application software with database concepts ➢ To know the various stages of project development

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand how to analyze a problem	K1,K2
2	Describe the findings into descriptive form using various diagrams	K3,K4
3	Develop the software using the diagrams in design phase	K4,K5
4	Do testing with various techniques	K5,K6
5	Develop knowledge how to implement and maintain the software	K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; **K6**-Create		

Evaluation of project Marks

Dissertation: 75 Marks

Viva voce: 25 Marks

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	L	S	M	S	M	S	M	M	M	S
CO2	M	S	M	S	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	M	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Signature of the HOD

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

Credits : 2
Hours/Week : 4
Medium of instruction: English

Code: T4PCSS3

M.Sc (Computer Science) – Semester: IV
(For students admitted from 2023-2024 onwards)

INTERNET OF THINGS

Course Objectives:
The main objectives of this course are to: 1. About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain. 2. Enable students to learn the Architecture of IoT and IoT Technologies 3. Developing IoT applications and Security in IoT, Basic Electronics for IoT, Arduino IDE, Sensors and Actuators Programming NODEMCU using Arduino IDE.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand about IoT, its Architecture and its Applications	K1,K2
2	Understand basic electronics used in IoT & its role	K2,K3
3	Develop applications with C using Arduino IDE	K4
4	Analyze about sensors and actuators	K5,K6
5	Design IoT in real time applications using today's internet &wireless technologies	K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

Unit: I **No. of hours: 15**

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 **No. of hours: 15**

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 6 Low PAN Security, Privacy and challenges in IoT: Design Challenges – Development Challenges – Security Challenges – Privacy Challenges – Other challenges – Trust management

Unit: III **No. of hours: 15**

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 cloud IoT

Unit: IV **No. of hours: 15**

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 **No. of hours: 15**

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, Vibration sensor, Ultrasonic sensor, gas sensor, water level sensor, PIR sensor, IR sensor, Sound sensor, humidity sensor – Motor Control

Total hours: 75

Text Books

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, 2nd Edition, O'Reilly

Reference Books

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

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	M	S	M	S	M	M	S	M
CO2	M	S	M	S	M	S	M	S	S	S
CO3	S	S	S	S	M	S	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
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Signature of the HOD

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

ELECTIVE COURSES

Credits : 3
Hours/Week : 4 /6
Medium of instruction: English

Code: TPCSECA

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

ADVANCED JAVA LAB

Course Objectives:
The main objectives of this course are to:
1.To enable the students to implement the simple programs using JSP, JAR 2.To provide knowledge on using Servlets, Applets 3.To introduce JDBC and navigation of records 4.To understand RMI & its implementation 5.To introduce to Socket programming

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand to the implement concepts of Java using HTML forms, JSP & JAR	K1,K2
2	Must be capable of implementing JDBC and RMI concepts	K3,K4
3	Able to write Applets with Event handling mechanism	K4,K5
4	To Create interactive web based applications using servlets and jsp	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

LIST OF PROGRAMS **Total hours: 75**

1. Display a welcome message using Servlet.
2. Design a Purchase Order form using Html form and Servlet.
3. Develop a program for calculating the percentage of marks of a student using JSP.
4. Design a Purchase Order form using Html form and JSP.
5. Prepare a Employee pay slip using JSP.
6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.
7. Write a program using Java Servlet to handle form data.
8. Write a simple Servlet program to create a table of all the headers it receives along with their associated values.
9. Write a program in JSP by using session object.
10. Write a program to build a simple Client Server application using RMI.
11. Create an applet for a calculator application.

ELECTIVE COURSES

Credits : 3
Hours/Week : 4 /6
Medium of instruction: English

Code: TPCSECA

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

ADVANCED JAVA LAB

Course Objectives:
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On the successful completion of the course, student will be able to:		
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2	Must be capable of implementing JDBC and RMI concepts	K3,K4
3	Able to write Applets with Event handling mechanism	K4,K5
4	To Create interactive web based applications using servlets and jsp	K5,K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

LIST OF PROGRAMS **Total hours: 75**

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2. Design a Purchase Order form using Html form and Servlet.
3. Develop a program for calculating the percentage of marks of a student using JSP.
4. Design a Purchase Order form using Html form and JSP.
5. Prepare a Employee pay slip using JSP.
6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.
7. Write a program using Java Servlet to handle form data.
8. Write a simple Servlet program to create a table of all the headers it receives along with their associated values.
9. Write a program in JSP by using session object.
10. Write a program to build a simple Client Server application using RMI.
11. Create an applet for a calculator application.

12. Program to send a text message to another system and receive the text message from the system (use socket programming).

Text Books

1. Jamie Jaworski, "Java Unleashed", SAMS Tech media Publications, 1999.
2. Campione, Walrath and Huml, " The Java Tutorial", Addison Wesley, 1999.

Reference Books

1. Jim Keogh, "The Complete Reference J2EE", Tata McGraw Hill Publishing Company Ltd, 2010.
2. David Sawyer McFarland, "Java Script and JQuery – The Missing Manual", Oreilly Publications, 3rd Edition, 2011.

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

One question from the list of exercises.	45
Another question not in the list but relevant to the list of exercises.	30

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

Signature of the HOD

துறைததலைவா
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தஞ்சாவூர்-613 005

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

Credits : 3
Hours/Week : 4/6
Medium of instruction: English

Code: TPCSECB

M.Sc (Computer Science)
(For students admitted from 2022-2023 onwards)
INTERNET OF THINGS (IoT) Lab

Course Objectives:
1. To know about the use of IoT 2. To learn about the areas of IoT 3. To understand the implementation of IoT and its benefits

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the importance of internet of things in present scenario	K1,K2
2	Describe the functions of various sensors and its connections	K3,K4
3	Design the circuits for Arduino programming	K4,K5
4	Analyze the circuit diagram of various sensors using Arduino sketch	K5,K6
5	Develop Arduino sketch for home and industrial applications	K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

LIST OF PROGRAMS: **Total hours: 75**

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

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

One question from the list of exercises.	45
Another question not in the list but relevant to the list of exercises.	30

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

Signature of the HOD

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

Credits : 3 **Code: TPCSECC**
Hours/Week : 4/ 6
Medium of instruction: English

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

ALGORITHMAND OOPS LAB

Course Objectives:
1. The main objectives of this course are to: 2. This course covers the basic data structures like Stack, Queue, Tree, and List. 3. Thiscourseenablesthestudentstolearntheapplicationsofthedatastructuresusing various techniques 4. It also enable the students to understand C++ language with respect to OOAD concepts 5. Application of OOPS concepts.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the concepts of object oriented with respect to C++	K1,K2
2	Able to understand and implement OOPS concepts	K3,K4
3	Implementation of data structures like Stack, Queue, Tree, List using C++	K4,K5
4	Application of the data structures for Sorting, Searching using different techniques.	K5,K6
K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate; **K6**-Create		

List of Programs

1) Write a program to solve the tower of Hanoi using recursion.
2) Write a program to traverse through binary search tree using traversals.
3) Write a program to perform various operations on stack using linked list.
4) Write a program to perform various operation in circular queue.
5) Write a program to sort an array of an elements using quick sort.
6) Write a program to solve number of elements in ascending order using heap sort.
7) Write a program to solve the knapsackproblem using greedy method
8) Write a program to search for an element in a tree using divide& conquer strategy.
9) Write a program toplacethe8 queens on an8X8matrixso that no two queens Attack.
10) Write a C++program to perform Virtual Function
11) Write a C++ program to perform Parameterized constructor
12) Write a C++ program to perform Friend Function

13) Write a C++ program to perform Function Overloading

14) Write a C++program to perform Single Inheritance

15) Write a C++program to perform Employee Details using files.

Text Books	
1	Goodrich,"DataStructures&AlgorithmsinJava",Wiley3rd edition.
2	Skiena,"TheAlgorithmDesignManual",SecondEdition,Springer,2008
ReferenceBooks	
1	Anany Levith,"Introduction to the Design and Analysis of algorithm", Pearson Education Asia, 2003.
2	Robert Sedge wick,Phillipe Flajolet,"An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company,1996.

Mappingwith Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong;M-Medium;L-Low

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

One question from the list of exercises.	45
Another question not in the list but relevant to the list of exercises.	30

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

Signature of the HOD

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

Credits : 3 **Code: TPCSECD**
Hours/Week : 4/6
Medium of instruction: English

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

DIGITALIMAGE PROCESSING Using MATLAB

Course Objectives:
The main objectives of this course are to: 1. To understand the basics of Digital Image Processing fundamentals, image enhancement and image restoration techniques 2. Toenablethestudentstolearnthefundamentalsofimagecompressionandsegmentation 3. To understand Image Restoration &Filtering Techniques 4. Implementation of the above using MATLAB

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	To write programs in MATLAB for image processing using the techniques	K1,K2
2	To able to implement Image Enhancements & Restoration techniques	K2,K3
3	Capable of using Compression techniques in an Image	K3,K4
4	Must be able to manipulate the image and Segment it	K5,K6
K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate; **K6**-Create		

List of Programs

1. Implement Image enhancement Technique.
2. Histogram Equalization
3. Image Restoration.
4. Implement Image Filtering.
5. Edge detection using Operators(Roberts, Prewitts and Sobels operators)
6. Implement image compression.
7. Image Subtraction
8. Boundary Extraction using morphology.
9. Image Segmentation

Total hours: 60

Text Books	
1	Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Second Edition,

	PHI/Pearson Education.
2	B. Chanda, D.Dutta Majumder,"Digital Image Processing and Analysis", PHI, 2003.
Reference Books	
1	Nick Efford, "DigitalImageProcessingapracticalintroducingusingJava", Pearson Education, 2004.
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]	
1	https://nptel.ac.in/courses/117/105/117105135/
2	https://www.tutorialspoint.com/dip/index.htm
3	https://www.javatpoint.com/digital-image-processing-tutorial

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

One question from the list of exercises.	35
Another question not in the list but relevant to the list of exercises.	40

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

Signature of the HOD

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

Total hours: 60

Text Books	
1	Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Second Edition,

	PHI/Pearson Education.
2	B. Chanda, D.Dutta Majumder,"Digital Image Processing and Analysis", PHI, 2003.
Reference Books	
1	Nick Efford, "DigitalImageProcessingapracticalintroducingusingJava", Pearson Education, 2004.
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]	
1	https://nptel.ac.in/courses/117/105/117105135/
2	https://www.tutorialspoint.com/dip/index.htm
3	https://www.javatpoint.com/digital-image-processing-tutorial

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

One question from the list of exercises.	35
Another question not in the list but relevant to the list of exercises.	40

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

Signature of the HOD

துறைததலைவா
கணினி அறிவியல் துறை
மன்னர் சரபோசி அரசுக் கல்லூரி
(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 3
Hours/Week : 4/ 6
Medium of instruction: English

Code :TPCSECE

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

CLOUD COMPUTING LAB

Course Objectives:
The main objectives of this course are to: 1. This course covers the basic data structures like Stack, Queue, Tree, and List. 2. This course enables the students to learn the applications of the data structures using various techniques 3. It also enable the students to understand C++ language with respect to OOAD concepts 4. Application of OOPS concepts

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the concepts of object oriented with respect to C++	K1,K2
2	Able to understand and implement OOPS concepts	K3,K4
3	Implementation of data structures like Stack, Queue, Tree, List using C++	K4,K5
4	Application of the data structures for Sorting, Searching using different techniques.	K5,K6
K1-Remember;**K2**-Understand;**K3**-Apply;**K4**-Analyze;**K5**-Evaluate; **K6**-Create		

1. Working with Google Drive to make spread sheet and notes.
2. Launch a Linux Virtual Machine.
3. To host a static website
4. Exploring Google cloud for the following
    a. Storage
    b. Sharing of data
    c. Manage your calendar, to-do lists,
    d. a document editing tool
5. Working and installation of GoogleApp Engine
6. Working and installation of MicrosoftAzure
7. To Connect Amazon RedshiftwithS3bucket
8. To Create and Query a NoSQLTable

Total hours: 60

Text book	
1	Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009.
Reference books	
RelatedOnlineContents[MOOC,SWAYAM,NPTEL,Websitesetc.]	
1	https://nptel.ac.in/courses/106/105/106105167/
2	https://www.tutorialspoint.com/cloud_computing/index.htm
3	https://www.javatpoint.com/cloud-computing-tutorial

MappingwithProgrammingOutcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	S	S	S	M	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

One question from the list of exercises.	35
Another question not in the list but relevant to the list of exercises.	40

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

Signature of the HOD

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மன்னர் சரபோசி அரசுக் கல்லூரி
(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 3 **Code: TPCSECF**
Hours/Week : 4/6
Medium of instruction: English

M.Sc (Computer Science) – Semester: I
(For students admitted from 2023-2024 onwards)

OBJECT ORIENTED ANALYSIS AND DESIGN

Course Objectives:
The main objectives of this course are to: 1. Gain knowledge on cloud computing, cloudservices. 2. Enable the students to learn the basics of cloud computing with real time usage 3. How to store and share in and from cloud?

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the concept of Object-Oriented development and modeling techniques	K1,K2
2	Gain knowledge about the various steps performed during object design	K2,K3
3	Abstract object-based views for generic software systems	K3
4	Analyze the problem using object oriented concepts.	K4,K5
5	Create the applications using OOPs concepts	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

UNIT – I **No. of hours: 15**

Fundamentals of OOSD – Overview of Object Oriented Systems Development: Two orthogonal view of the software – OOSD methodology – Why an object Object orientation. Object basics: Object Oriented Philosophy – Objects – Attributes – Object 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 **No. of hours: 15**

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 **No. of hours: 15**

Object Oriented Analysis – Object Oriented Analysis process: Business Object Analysis – Use case driven object oriented analysis – Business process modelling – 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 – Subclass relationship – Aggregation – Class responsibility – Object responsibility.

UNIT – IV **No. of hours: 15**

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 **No. of hours: 15**

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.

Text Books

1. Ali Bahrami, "Object Oriented Systems Development using UML", McGraw-Hill, 2008

Reference Books

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. Balagurusamy "Object Oriented Programming with C++", TMH, Second Edition, 2003.

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	S	M	S	M	S	S
CO2	S	S	S	M	S	M	S	M	S	S
CO3	S	S	S	M	S	M	S	M	S	S
CO4	S	S	S	M	S	M	S	M	S	S
CO5	S	S	S	M	S	M	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 3 **Code: TPCSECG**
Hours/Week : 4/6
Medium of instruction: English

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

ADVANCED DATABASE SYSTEMS

Course Objectives:
The main objectives of this course are to: 1. To understand the basic concepts of relational database management systems 2. To understand the architecture of distributed database management systems 3. To understand the special database and its techniques 4. To understand XML databases and its model 5. To understand temporal and multimedia databases

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the concepts of ER model and the need of normalization	K1,K2
2	Understand the mechanisms used in distributed databases	K2,K3
3	Understand the Spatial Database Characteristics and Recursive Query Processing	K4
4	Understand the routing metrics and protocols of Network layer	K4,K5
5	Understand the basics of temporal and multimedia databases	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

UNIT -I **No. of hours: 15**

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 **No. of hours: 15**

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 **No. of hours: 15**

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 **No. of hours: 15**

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

UNIT –V **No. of hours: 15**

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.

Total hours: 75

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 ,Inmplementation and Management ", Pearson Education, 2014.

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 3
Hours/Week : 4/6
Medium of instruction: English

Code: TPCSECH

M.Sc (Computer Science) – Semester: II
(For students admitted from 2023-2024 onwards)

MOBILE COMPUTING

Course Objectives:
The main objectives of this course are to: 1. Present the overview of Mobile computing, Applications and Architectures. 2. Describe the futuristic computing challenges. 3. Enable the students to learn the concept of ad

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the need and requirements of mobile communication	K1,K2
2	Focus on mobile computing applications and techniques	K2,K3
3	Demonstrate satellite communication in mobile computing	K4
4	Analyze about wireless local loop architecture	K5,K6
5	Analyze various mobile communication technologies	K6
K1-Remember; K**2**-Understand; K**3**-Apply; **K4**-Analyze; K**5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction: Advantages of Digital Information – Introduction to Telephone Systems –Mobile communication: Need for Mobile Communication – Requirements of Mobile Communication – History of Mobile Communication.

Unit: II **No. of hours: 15**

Introduction to Cellular Mobile Communication – Mobile Communication Standards –Mobility Management – Frequency Management – Cordless Mobile Communication Systems.

Unit: III **No. of hours: 15**

Mobile Computing: History of data networks – Classification of Mobile data networks – CDPD System – Satellites in Mobile Communication: Satellite classification – Global Satellite Communication – Changeover from one satellite to other – Global Mobile Communication – Interferences in Cellular Mobile Communication.

Unit: IV **No.of.hours:15**

Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems

in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol.

Unit: V **No. of hours: 15**

CDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system – Fourth Generation Mobile Communication systems.

Total hours: 75

Text Books

1. T.G. Palanivelu, R. Nakkeeran, "Wireless and Mobile Communication", PHI Limited, 2009. Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley, 1999.
2. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2007.

Reference Books

1. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal, "Mobile Computing", TMH, 2010.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	M	L	L	M	S	M	M	M	M
CO2	S	S	S	M	M	S	M	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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மன்னர் சரபோசி அரசுக் கல்லூரி
(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol.

Unit: V **No. of hours: 15**

CDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system – Fourth Generation Mobile Communication systems.

Total hours: 75

Text Books

1. T.G. Palanivelu, R. Nakkeeran, "Wireless and Mobile Communication", PHI Limited, 2009. Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley, 1999.
2. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2007.

Reference Books

1. Asoke K Talukder, Hasan Ahmed, Roopa Yavagal, "Mobile Computing", TMH, 2010.

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	L	M	L	L	M	S	M	M	M	M
CO2	S	S	S	M	M	S	M	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 3 **Code:TPCSECI**
Hours/Week : 4 /6
Medium of instruction: English

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

ADVANCED SOFTWARE ENGINEERING

Course Objectives:
The main objectives of this course are to: 1. Introduce to Software Engineering, Design, Testing and Maintenance. 2. Enable the students to learn the concepts of Software Engineering. 3. Learn about Software Project Management, Software Design &Testing.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand about Software Engineering process	K1,K2
2	Understand about Software project management skills, design and quality management	K2,K3
3	Analyze on Software Requirements and Specification	K3,K4
4	Analyze on Software Testing, Maintenance and Software Re-Engineering	K4,K5
5	Design and conduct various types and levels of software quality for a software project	K5,K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction: The Problem Domain – Software Engineering Challenges – Software Engineering Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes.

Unit: II **No. of hours: 15**

Software Requirements Analysis and Specification : Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS – Formal System Specification – Axiomatic Specification – Algebraic Specification – Case study: Student Result management system. Software Quality Management – Software Quality, Software Quality Management System, ISO 9000, SEI CMM.

Unit: III **No. of hours: 15**

Software Project Management: Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead "s software science – Staffing level estimation – Scheduling – Organization and Team Structures – Staffing – Risk management – Software Configuration Management – Miscellaneous Plan.

Unit: IV **No. of hours: 15**

Software Design: Outcome of a Design process – Characteristics of a good software design – Cohesion and coupling – Strategy of Design – Function Oriented Design – Object Oriented Design – Detailed Design – IEEE Recommended Practice for Software Design Descriptions.

Unit: V **No. of hours: 15**

Software Testing: A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of testing – Validation testing – Regression testing – Art of Debugging– Testing tools–Metrics–Reliability Estimation. Software Maintenance –Maintenance Process – Reverse Engineering – Software Re-engineering – Configuration Management Activities.

Total hours: 75

Text Books

1. An Integrated Approach to Software Engineering – Pankaj Jalote, Narosa Publishing House, Delhi, 3rd Edition.
2. Fundamentals of Software Engineering – Rajib Mall, PHI Publication, 3rd Edition.

Reference Books

1. Software Engineering–K. K. Aggarwal and Yogesh Singh, New Age International Publishers, 3 rd edition.
2. A Practitioners Approach–Software Engineering, – R.S.Pressman, Mc Graw Hill.
3. Fundamentals o f Software Engineering–Carlo Ghezzi, M.Jarayeri, D. Manodrioli, PHI Publication.

Mapping with Programming Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	S	S	M	M	M	M
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit) .	3 x 10 = 30

Signature of the HOD
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(தன்னாட்சி)
தஞ்சாவூர்-613 005

COE

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

Credits : 3 **Code: TPCSECJ**
Hours/Week : 4/6
Medium of instruction: English

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

MULTIMEDIA AND ITS APPLICATIONS

Course Objectives:
The main objectives of this course are to: 1. To introduce the students the concepts of Multimedia, Images & Animation. 2. To introduce Multimedia authoring tools 3. To understand the role of Multimedia in Internet 4. To know about High Definition Television and Desktop Computing – Knowledge based Multimedia systems

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the basic concepts of Multimedia	K1,K2
2	Demonstrate Multimedia authoring tools	K2,K3
3	Analyze the concepts of Sound, Images, Video & Animation	K4
4	Apply and Analyze the role of Multimedia in Internet and real time applications	K4,K5
5	Analyze multimedia applications using HD TV	K5,K6
K1-Remember; K**2**-Understand; K**3**-Apply; K**4**-Analyze; K**5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

What is Multimedia? – Introduction to making Multimedia – Macintosh and Windows Production platforms – Basic Software tools.

Unit: II **No. of hours: 15**

Making Instant Multimedia – Multimedia authoring tools – Multimedia building blocks –Text – Sound.

Unit: III **No. of hours: 15**

Images – Animation – Video.

Unit: IV **No. of hours: 15**

Multimedia and the Internet – The Internet and how it works – Tools for World Wide Web – Designing for the World Wide Web.

Unit: V **No. of hours: 15**

High Definition Television and Desktop Computing – Knowledge based Multimedia systems.

Total hours: 75

Text Books

1. Tay Vaughan, "Multimedia making it work", Fifth Edition, Tata McGraw Hill.
2. John F. Koegel Bufford, "Multimedia Systems", Pearson Education.

Reference Books

1. Judith Jeffloate, "Multimedia in Practice (Technology and Applications)", PHI, 2003.

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	S	M	M	M	S
CO2	S	S	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
Section B – Answer All Questions (Either or Type – Two questions from each unit)	5 x 5 = 25
Section C – Answer any THREE Questions (One question from each unit)	3 x 10 = 30

Signature of the HOD

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

COE

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

Credits : 3
Hours/Week : 4/6
Medium of instruction: English

Code: TPCSECK

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

EMBEDDED SYSTEMS

Course Objectives:
The main objectives of this course are to: 1. Present the introduction to 8051 Microcontroller Instruction Set, concepts on RTOS & Software tools. 2. Gain the knowledge about the embedded software development. 3. Learn about Microcontroller and software tools in the embedded systems.

Expected Course Outcomes :		
On the successful completion of the course, student will be able to:		
1	Understand the concept of 8051 microcontroller	K1,K2
2	Understand the Instruction Set and Programming	K2,K3
3	Analyze the concepts of RTOS	K3,K4
4	Analyze and design various real time embedded systems using RTOS	K5
5	Debug the malfunctioning system using various debugging techniques	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**– Create		

Unit: I **No. of hours: 15**

8051 Microcontroller: Introduction – 8051 Architecture – Input / Output Pins, Ports and Circuits – External Memory – Counters / Timers – Serial Data Input / Output – Interrupts.

Unit: II **No. of hours: 15**

Instruction Set and Programming Moving Data – Addressing Modes – Logical operations – Arithmetic Operation – Jump and Call Instructions – Simple Program. Applications: Keyboard Interface – Display Interface – Pulse Measurements – DIA and AID Conversions – Multiple Interrupts.

Unit: III **No. of hours: 15**

Introduction to RTOS – Selecting an RTOS – Task and Task states – Tasks and data – Semaphores and shared data. MORE operating systems services: Interrupt Process communication – Message Queues, Mailboxes and pipes – Timer Functions – Events – Memory Management – Interrupt Routines in an RTOS Environment.

Unit: IV **No. of hours: 15**

Basic Design using a RTOS: Principles – Encapsulating semaphores and Queues – Hard real time scheduling considerations-Saving memory space and power – introductions to RTL &QNX.

Unit: V **No. of hours: 15**

Embedded software Development Tools: Hosts and Target Machines – Linker / Locators for Embedded software – getting embedded software into the Target systems. Debugging Techniques: Testing on your Host machine – Instruction set simulators – The assert macro – using laboratory tools.

Total hours: 75

Text Books

1. David E. Simon, "An Embedded Software primer" Pearson Education Asia, 2003.
2. Kenneth J Ayala, "The 8051 Microcontroller and Architecture programming and application", Second Edition, Penram International.

Reference Books

1. RajKamal, "Embedded Systems – Architecture, programming and design", Tata McGraw – Hill, 2003.

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	L	L	L	S	M	S	S	M	M	S
CO2	M	M	S	S	M	S	M	S	S	S
CO3	M	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
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COE

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

Credits : 3
Hours/Week : 4/6
Medium of instruction: English

Code: TPCSECL

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

ROBOTIC PROCESS AUTOMATION FOR BUSINESS

Course Objectives:
The main objectives of this course are to: 1. Learn the concepts of RPA, its benefits, types and models. 2. Gain the knowledge in application of RPA in Business Scenarios. 3. Identify measures and skills required or RPA

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Demonstrate the benefits and ethics of RPA	K1,K2
2	Understand the Automation cycle and its techniques	K2
3	Draw inferences and information processing of RPA	K3,K4
4	Implement & Apply RPA in Business Scenarios	K5
5	Analyze on Robots & leveraging automation	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction to RPA – Overview of RPA – Benefits of RPA in a business environment – Industries & domains fit for RPA – Identification of process for automation – Types of Robots – Ethics of RPA & Best Practices – Automation and RPA Concepts – Different business models for implementing RPA – Centre of Excellence –Types and their applications – Building an RPA team – Approach for implementing RPA initiatives.

Unit: II **No. of hours: 15**

Role of a Business Manager in Automation initiatives – Skills required by a Business Manager for successful automation – The importance of a Business Manager in automation – Analyzing different business processes – Process Mapping frameworks – Role of a Business Manager in successful implementation – Understanding the Automation cycle – First 3 automation stages and activities performed by different people.

Unit: III **No. of hours: 15**

Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people – Role of a Business Manager in successful completion – Activities to be performed post – implementation – Guidelines for tracking the implementation success – Metrics/Parameters to be considered for gauging success – Choosing the right licensing option – Sending emails – Publishing and Running Workflows.

Unit: IV **No. of hours: 15**

Ability to process information through scopes/systems – Understand the skill of information processing and its use in business – Leveraging automation – Creating a Robot – New Processes. Establish causality by variable behavior – Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable – Leveraging automation for this skill – Robot & new process creation.

Unit: V **No. of hours: 15**

Inference from snapshots of curated terms – Omni – source data curation – Multisource trend tracking – Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) – Leveraging automation for this skill – Robot creation and new process creation for this skill.

Total hours: 75

Text Books

1. Alok Mani Tripathi" Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool" Packet Publishing Limited March 2018.
2. Tom Taulli " The Robotic Process Automation Handbook" Apress, February 2020.

Reference Books

1. Steve Kaelble" Robotic Process Automation" John Wiley & Sons, Ltd., 2018

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
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RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

Credits : 3
Hours/Week : 4/6
Medium of instruction: English

Code: TPCSECM

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

CYBER SECURITY

Course Objectives:

The main objectives of this course are to:

1. To learn cybercrime and cyberlaw.
2. To understand the cyber attacks and tools for mitigating them.
3. To understand information gathering.
4. To learn how to detect a cyber attack.
5. To learn how to prevent a cyber attack.

Expected Course Outcomes:

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

1	Explain the basics of cyber security, cyber crime and cyber law	K1,K2
2	Apply various tools to perform information gathering	K2
3	Apply intrusion prevention techniques to prevent intrusion	K3,K4
4	Apply intrusion techniques to detect intrusion	K5
5	Apply intrusion prevention techniques to prevent intrusion	K5,K6

K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create

Unit: I **No. of hours: 15**

Cyber Security – History of Internet – Impact of Internet – CIA Triad; Reason for Cyber Crime – Need for Cyber Security – History of Cyber Crime; Cybercriminals – Classification of Cybercrimes – A Global Perspective on Cyber Crimes; Cyber Laws – The Indian IT Act – Cybercrime and Punishment.

Unit: II **No. of hours: 15**

OSWAP; Malicious Attack Threats and Vulnerabilities: Scope of Cyber – Attacks – Security Breach – Types of Malicious Attacks – Malicious Software – Common Attack Vectors – Social engineering Attack – Wireless Network Attack – Web Application Attack – Attack Tools – Countermeasures.

Unit: III **No. of hours: 15**

Harvester – Who is – Netcraft – Host – Extracting Information from DNS – Extracting Information from E-mail Servers – Social Engineering Reconnaissance; Scanning – Port Scanning – Network Scanning and Vulnerability Scanning – Scanning Methodology – Ping Sweer Techniques – Nmap Command Switches – SYN – Stealth – XMAS – NULL – IDLE – FIN Scans – Banner Grabbing and OS Finger printing Techniques.

Unit: IV **No. of hours: 15**

Host – Based Intrusion Detection – Network – Based Intrusion Detection – Distributed or Hybrid Intrusion Detection – Intrusion Detection Exchange Format – Honeypots – Example System Snort.

Unit: V **No. of hours: 15**

Firewalls and Intrusion Prevention Systems: Need for Firewalls – Firewall Characteristics and Access Policy – Types of Firewalls – Firewall Basing – Firewall Location and Configurations – Intrusion Prevention Systems – Example Unified Threat Management Products.

Total hours: 75

Text Books

1. Anand Shinde, "Introduction to Cyber Security Guide to the World of Cyber Security", Notion Press, 2021.
2. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publishers, 2011.

Reference Books

1. David Kim, Michael G. Solomon, "Fundamentals of Information Systems Security", Jones & Bartlett Learning Publishers, 2013

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
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CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

COE

Credits : 3 **Code: TPCSECN**
Hours/Week : 4/ 6
Medium of instruction: English

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

SOFTWARE TESTING

Course Objectives:
The main objectives of this course are to: 1. To learn the criteria for test cases. 2. To learn the design of test cases. 3. To understand test management and test automation techniques. 4. To apply test metrics and measurements.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Design test cases suitable for a software development for different domains.	K1,K2
2	Identify suitable tests to be carried out.	K2,K3
3	Prepare test planning based on the document.	K4
4	Document test plans and test cases designed.	K4,K5
5	Develop and validate a test plan.	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

UNIT: I **No. of hours: 15**

Testing as an Engineering Activity – Testing as a Process – Testing Maturity Model – Testing axioms – Basic definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design –Defect Examples – Developer/Tester Support of Developing a Defect Repository.

UNIT II **No. of hours: 15**

Test case Design Strategies – Using Black Box Approach to Test Case Design – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause – effect graphing – Compatibility testing – user documentation testing – domain testing – Random Testing – Requirements based testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Additional White box testing approaches – Evaluating Test Adequacy Criteria.

UNIT III **No. of hours: 15**

The need for Levels of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing –Compatibility testing – Testing the documentation – Website testing.

UNIT IV **No. of hours: 15**

People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group – The Structure of Testing Group – .The Technical Training Program.

UNIT V **No. of hours: 15**

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

Total hours: 75

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing Principles and Practices, Pearson Education, 2006.
2. Ron Patton, Software Testing, Second Edition, Sams Publishing, Pearson Education, 2007.

REFERENCES:

1. Ilene Burnstein, Practical Software Testing‖, Springer International Edition, 2003.
2. Edward Kit, Software Testing in the Real World Improving the Process‖, Pearson Education, 1995.

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
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COE

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

Credits : 3
Hours/Week : 4/6
Medium of instruction: English

Code: TPCSECO

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

PROCESS MODELING AND SIMULATION

Course Objectives:
The main objectives of this course are to: 1. To give an overview of various methods of process modeling, different computational techniques for simulation

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	The student should have understood the development of process models. based on conservation principles	K1,K2
2	Process data and computational techniques	K2,K3
3	To solve the process models.	K4
4	Document test plans and test cases designed	K4,K5
5	Develop and validate a test plan.	K5,K6
K1-Remember; **K2**-Understand; **K3**-Apply; **K4**-Analyze; **K5**-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction to modeling and simulation, classification of mathematical models, conservation equations and auxiliary relations.

Unit: II **No. of hours: 15**

Degree of freedom analysis, single and network of process units, systems yielding linear and non – linear algebraic equations, flow sheeting – sequential modular and equation oriented approach, tearing, partitioning and precedence ordering, solution of linear and non – linear algebraic equations.

Unit: III **No. of hours: 15**

Analysis of liquid level tank, gravity flow tank, jacketed stirred tank heater, reactors, flash and distillation column, solution of ODE initial value problems, matrix differential equations, simulation of closed loop systems.

Unit: IV **No. of hours: 15**

Analysis of compressible flow, heat exchanger, packed columns, plug flow reactor, solution of ODE boundary value problems.

Unit: V **No. of hours: 15**

Analysis laminar flow in pipe, sedimentation, boundary layer flow, conduction, heat exchanger, heat transfer in packed bed, diffusion, packed bed adsorption, plug flow reactor. Empirical modeling, parameter estimation, population balance and stochastic modeling.

Total hours: 75

TEXT BOOKS:

1. Ramirez, W.; "Computational Methods in Process Simulation ", 2nd Edn., Butter worths Publishers, New York, 2000.
2. Luyben, W.L., " Process Modelling Simulation and Control ",2nd Edn, McGraw-Hill Book Co., 1990

REFERENCES:

1. Felder, R. M. and Rousseau, R. W., "Elementary Principles of Chemical Processes ", John Wiley, 2000.
2. Franks, R. G. E., "Mathematical Modelling in Chemical Engineering ", John Wiley, 1967.

Mapping with Programming Outcomes										
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
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CONTROLLER OF EXAMINATIONS
RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS)
THANJAVUR-613 005.

Credits : 3 **Code: TPCSECP**
Hours/Week : 4/6
Medium of instruction: English

M.Sc (Computer Science)
(For students admitted from 2023-2024 onwards)

BLOCK CHAIN TECHNOLOGY

Course Objectives:
The main objectives of this course are to: 1. Understand the fundamentals of block chain and crypto currency. 2. Understand the influence and role of block chain in various other fields. 3. Learn security features and its significance. 4. Identify problems & challenges posed by Block Chain.

Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Demonstrate block chain technology and crypto currency	K1,K2
2	Understand the mining mechanism in block chain	K2
3	Apply and identify security measures, and various types of services that allow people to trade and transact with bit coins	K3,K4
4	Apply and analyze Block chain in health care industry	K4,K5
5	Analyze security, privacy, and efficiency of a given Block chain system	K5,K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; **K6**-Create		

Unit: I **No. of hours: 15**

Introduction to Block chain – The big picture of the industry – size, growth, structure, players. Bit coin versus Crypto currencies versus Block chain – Distributed Ledger Technology (DLT). Strategic analysis of the space – Block chain platforms, regulators, application providers. The major application: currency, identity, chain of custody.

Unit: II **No. of hours: 15**

Advantage over conventional distributed database, Block chain Network, Mining Mechanism, Distributed Consensus, Block chain 1.0, 2.0 and 3.0 – transition, advancements and features. Privacy, Security issues in Block chain.

Unit: III **No. of hours: 15**

Crypto currency – History, Distributed Ledger, Bit coin protocols –Symmetric–key cryptography – Public-key cryptography – Digital Signatures –High and Low trust societies – Types of Trust model: Peer–to–Peer, Leviathan, and Intermediary. Application of Cryptography to Block chain

Unit: IV **No. of hours: 15**

Crypto currency Regulation– Stakeholders, Roots of Bit coin, Legal views– exchange of crypto currency–Black Market– Global Economy. Cyrpto economics – assets, supply and demand, inflation and deflation – Regulation.

Unit: V **No. of hours: 15**

Opportunities and challenges in Block Chain – Application of block chain: Industry 4.0 – machine to machine communication –Data management in industry 4.0–future prospects. Block chain in Health 4.0 – Block chain properties – Healthcare Costs – Healthcare Quality – Healthcare Value – Challenges for using block chain for healthcare data

Total Hours: 75

Text Books

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bit coin and Crypto currency Technologies: A Comprehensive Introduction", Princeton University Press (July 19, 2016).
2. Antonopoulos, "Mastering Bit coin: Unlocking Digital Crypto currencies"

Reference Books

1. Satoshi Nakamoto, "Bit coin: A Peer-to-Peer Electronic Cash System"
2. Rodri goda Rosa Righi, Antonio Marcos Alberti, Madhusudan Singh, "Block chain Technology for Industry 4.0" Springer 2020.

Mapping with Programming Outcomes										
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Semester Question Paper Pattern

Maximum Marks: 75 Exam Duration: Three Hours

Section A – Answer All Questions (Two questions from each unit)	10 x 2 = 20
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