SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SILVER JUBILEE INSTITUTION

(Affiliated to Bharathidasan University)

(Accredited by NAAC | An ISO 9001:2015 Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI – 614016, TAMILNADU, INDIA.

M.Sc., COMPUTER SCIENCE

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK(CBCS-LOCF)

(For the candidates admitted in the academic year 2024–2025)

PROGRAMME → **2PSCSC**

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TAMILNADU, INDIA.

M.Sc., COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM - LEARNINIG OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(For the candidates admitted in the academic year 2024-2025)

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

OUTCOME-BASED EDUCATION (OBE)
LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses with in a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education

Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs): PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Some important terminologies repeatedly used in LOCF.

Core Courses (CC): A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE): Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

Generic Elective Courses: An elective course chosen generally from an **unrelated discipline/subject,** with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of other disciplines. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Non Major Elective (NME): A student shall choose at least two Non-major Elective Courses (NME) from outside his/her department.

Skill Enhancement Courses (SECs): These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge**.**

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Postgraduate Programme:

Programme Pattern: The Post Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part –A	:	Core Course (Theory, Practicals) Core Industry Module, Core Project
Part-B (i)	:	Elective courses
Part-B (ii)	:	Non Major Elective, Skill Enhancement course, Professional Competency course
Part-B (iii)	:	Internship
Part –C	:	Extension activity

EXAMINATION

Continuous Internal Assessment (CIA):

PG - Distribution of CIA Marks

Passing Minimum: 50 %

Assignments – 3 = 30%
Tests – 2 = 50%
Seminar =10 %
Attendance = 10 %

Question Paper Pattern

Part A: includes two subsections

Part A 1 (10X1=10 marks)
One word question/ Fill in/ /True or False/ Multiple Choice Questions Two Questions from Each unit

Part A 2(5X2=10 marks)
Match the following
Short Answers
One question from Each unit

Total Marks - 20

Part B: (5X5=25 marks)
Paragraph Answers
Either/ or type, One Question from each unit

Part C: (10X3=30)
Essay Type Answers
Answer 3 out of 5 Questions
One Question from each unit

Part A: K1 Level
Part B: K2, K3 and K4 Level
Part C: K5 and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S.No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previouslylearned
2	K2	Comprehension /Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analyzing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis/Creating	The learner creates a new product or pointof view

WEIGHTAGE of K –LEVELS IN QUESTION PAPER

(Cognitive Level) K-LEVELS →	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
END SEMESTER EXAMINATIONS (ESE)	20	25			30		75
Continuous Internal Assessment (CIA)	20	25			30		75

QUESTION PATTERN FOR END SEMESTER EXAMINATION/ Continuous Internal Assessment		
PART		**MARKS**
PART –A I. (No choice ,One Mark) **TWO** questions from each unit **II.** (No choice, Two Mark) **ONE** question from each unit	(10x1=10) (5x2=10)	**20**
PART –B (Either/ or type,5-Marks) **ONE** question from each unit	(5x5=25)	**25**
PART –C (3 out of 5) (10Marks) **ONE** question from each unit	(3x10=30)	**30**
	Total	**75**

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION							
DURATION: 3.00 Hours.							**Max Mark :75**
K-LEVELS / **PART**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
PART –A (One Mark, No choice) (10x1=10)	10						**10**
(2-Marks,No choice) (5x2=10)	10						**10**
PART –B (5-Marks)(Either/or type) (5x5=25)		5	10	10			**25**
PART –C (10 Marks)(3 out of 5) (3x10=30) Courses having only **K5,K6** levels, K5 level- 3 Questions, K6 level- 2 Questions **(One K6 level question is compulsory)**					20	10	**30**
Total	**20**	**05**	**10**	**10**	20	10	**75**

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated bysemester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{I=1}^{n} C_i}$	$WAM(\text{Weighted Average Marks}) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{I=1}^{n} C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses **Passed** in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

i. The classification of final results shall be based on the CGPA, as indicated in Table-2.

ii. For the purpose of Classification of Final Results, the candidates who earn the CGPA 9.00 and above shall be declared to have qualified for the Degree as 'Outstanding'. Similarly the candidates who earn the CGPA between 8.00 and 8.99, 7.00 and 7.99, 6.00 and 6.99 and 5.00 and 5.99 shall be declared to have qualified for their Degree in the respective programmes as 'Excellent', 'Very Good', 'Good', and 'Above Average' respectively.

iii. Absence from an examination shall not be taken an attempt.

Table- 1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	**10**	**O**
80 and above and below 90	**9**	A+
70 and above and below 80	**8**	**A**
60 and above and below 70	**7**	**B+**
50 and above and below 60	**6**	**B**
Below50	**NA**	**RA**

NA- Not Applicable, RA- Reappearance

The candidates performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including previous semester/s is indicated by **Cumulative Grade Point Average (CGPA)**

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	**O**	**Outstanding**
8.00 to 8.99	A+	**Excellent**
7.00 to 7.99	**A**	**Very Good**
6.00 to 6.99	**B+**	**Good**
5.00 to 5.99	**B**	**Above Average**

***** The candidates who have passed in the first appearance and within the prescribed duration of the PG Programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good"

Vision

Attaining Global Recognition in Computer Science Education and to Develop the Software Professionals

Mission

Imparting Quality Education through a Well – Designed Curriculum in tune with the Challenging Software Needs of the Industry

PROGRAMME OUTCOMES FOR M.Sc.,DEGREE PROGRAMMES

PO.No	Programme Outcomes (*Upon completion of the M.Sc.,Degree Programme, the Post graduate will be able to)*
PO-1	**Disciplinary Knowledge**: demonstrate in-depth knowledge and understanding of theories, policies, and practices in one or more disciplines that form a part of a Post Graduate program of study in Master of Science.
PO-2	**Critical Thinking and Problem Solving**: apply analytic thought to a body of knowledge, analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence, identify relevant assumptions or implications, formulate coherent arguments, critically evaluate practices, policies and theories by following scientific approach to knowledge development: solve problems and extrapolate the same to real life situation
PO-3	**Information/digital literacy and Communication Skills:** use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources, and use appropriate software for analysis of data: communicate thoughts and ideas analytically and effectively in writing and orally using appropriate media, and present complex information in a clear and concise manner to different groups.
PO-4	**Research-related skills:** conduct independent inquiry in a chosen scientific discipline, demonstrate sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; plan, execute and report the results of an experiment or investigation.
PO-5	**Scientific reasoning and Reflective Thinking:** analyse, interpret and draw conclusions from quantitative/qualitative data and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective; critically and sensibly evaluate life experiences, with self awareness and reflexivity of both self and society.
PO-6	**Multidisciplinary Approach, Innovation and Entrepreneurship:** propose novel ideas of interdisciplinary approach in providing better solutions and new ideas for the sustainable developments; identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.
PO-7	**Moral and ethical awareness/reasoning:** embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work, demonstrate the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, appreciate environmental andsustainability issues, and adopt objective, unbiased and truthful actions in all aspects of work.
PO-8	**Self directed Learning:** work independently, identify appropriate resources required fora project, and manage a project till completion.
PO-9	**Lifelong Learning:** engage in continuous learning for professional growth and development, acquire knowledge and skills, adapt to changing environment and to changing trades and demands of work place through knowledge/skill development/reskilling.
PO-10	**Multicultural Competence, Social Interaction and Effective Citizenship:** understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings, and demonstrate empathetic social concern and equity centred national development

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO No.	Program Specific Outcomes (M.Sc., Computer Science)
PSO1:	Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems of varying complexity.
PSO2:	Explore the concepts and theories behind computer science to develop innovative software applications.
PSO3:	Apply the latest trends in technology to design, develop and test software applications for specific needs.
PSO4:	Plan and take part in continuous learning and deliver efficient solutions for emerging challenges in the computation domain.
PSO5:	Implement new development tools, software framework, middleware, programming language or methodology to aid in the development of software projects.
PSO6:	Apply and Implement the working of compilers which also tends towards system programming and using various components to implement a efficient scalable software solution in the form of web application.
PSO7:	Understand the interdisciplinary nature of data, information and communications and Adapt new languages quickly.

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TAMILNADU, INDIA.

M.Sc., COMPUTER SCIENCE

COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM - LEARNINIGOUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted form the academic year 2024-2025)

ELIGIBILITY: Candidates who have passed B.Sc. Computer Science / B.Sc. Information Technology/ B.C.A / B.Sc. Software Development of this University or from a recognized University or an examination accepted by the Syndicate equivalent there to

Sem	Part	Course	Course Code	Title of the Paper	Ins. Hours / Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
I	Part A	Core Course-I	P24CS101	Discrete Mathematics	6	4	1	-	1	5	3	25	75	100
		Core Course -II	P24CS102	Python Programming	6	4	1	-	1	5	3	25	75	100
		Core Practical-I	P24CS103P	Python Programming Lab-Practical I	6	-	-	6	-	3	3	25	75	100
	Part B(i)	Elective Course- I	P24CSE11A/ P24CSE11B/ P24CSE11C	Mobile Computing/Soft Computing/Web Technologies	5	5	-	-	-	3	3	25	75	100
		Elective Course-II	P24CSE12A/ P24CSE12B/ P24CSE12C	Internet of Things/Theory of Computation/Digital Image Processing	5	4	1	-	-	3	3	25	75	100
	Part B (ii)	Non Major Elective-I	P24NMECS11	Data Mining	2	2	-	-	-	2	3	25	75	100
				TOTAL	**30**	**19**	**3**	**6**	**2**	**21**	-	-	-	**600**
II	Part A	Core Course -III	P24CS204	Design and Analysis of Algorithms	6	4	1	-	1	5	3	25	75	100
		Core Course -IV	P24CS205	Compiler Design	6	4	1	-	1	5	3	25	75	100
		Core Practical-II	P24CS206P	Design and Analysis of Algorithms Lab - Practical II	6	-	-	6	-	3	3	25	75	100

	Part B(i)	Elective Course-III	P24CSE23A/ P24CSE23B/ P24CSE23C	Cryptography and Network Security /Network Protocols/Computer Vision	5	5	-	-	-	3	3	25	75	100
		Elective Course - IV	P24CSE24A/ P24CSE24B/ P24CSE24C	Biometrics Techniques / Social Networking /Open Source Technologies	5	4	1	-	-	3	3	25	75	100
	Part B (ii)	NME –II	P24NMECS22	Cloud Computing	2	2	-	-	-	2	3	25	75	100
	Part B (iii)	Internship/Industrial Activity			-	-	-	-	-	-	-	-	-	-
				TOTAL	**30**	**19**	**3**	**6**	**2**	**21**	-	-	-	**600**
III	Part A	Core Course – V		Data Mining and Warehousing	6	4	1	-	1	5	3	25	75	100
		Core Course – VI		Advanced Software Engineering	6	4	1	-	1	5	3	25	75	100
		Core Practical-III		Data Mining Lab Practical-III	6	-	-	6	-	3	3	25	75	100
		Core Industry Module		Data Analytics	5	4	1	-	-	3	3	25	75	100
	Part B(i)	Elective Course-V		Advanced Operating Systems / Research Methodology/ Web Services	5	4	1	-	-	3	3	25	75	100
	Part B (ii)	Skill Enhancement Course		Desktop Publishing	2	2	-	-	-	2	3	25	75	100
	Part B (iii)	Internship/Industrial Activity			-	-	-	-	-	2	-	-	-	-
				TOTAL	**30**	**18**	**4**	**6**	**2**	**23**	**-**	**-**	-	**600**
IV	Part A	Core Course - VII		J2EE Technologies	5	4	1	-	-	5	3	25	75	100
		Core Course-VIII		Artificial Intelligence and Machine Learning	5	4	1	-	-	5	3	25	75	100
		Core Practical-IV		J2EE Technologies Lab Practical-IV	6	-	-	6	-	3	3	25	75	100
		Core Project		Project with Viva Voce	8	-	2	6	-	7	3	25	75	100
	Part B(i)	Elective Course-VI(Industry /Entrepreneurship)		Cloud Computing Technologies / Block Chain Technologies / Advanced Database Systems	4	3	1	-	-	3	3	25	75	100
	Part B (ii)	Professional Competency Course		Computer Science for NET/SET	2	2	-	-	-	2	3	25	75	100
	Part C	Extension Activity			-	-	-	-	-	1	-	-	-	-

			TOTAL	**30**	**13**	**5**	**12**	**-**	**26**	-	-	-	**600**
			GRAND TOTAL	**120**	**69**	**15**	**30**	**06**	**91**	-	-	-	**2400**
	Extra Credit		**MOOC/SWAYAM/ NPTEL**	**-**	**-**	**-**	**-**	**-**	**2**	-	-	-	**-**
			Value Added Courses (Atleast one per year)	**-**	**-**	**-**	**-**	**-**	**2**	-	-	-	**-**

CREDIT DISTRIBUTION FOR M.SC., COMPUTER SCIENCE

S.No	Part	Subject	Total Credits
1	Part A	Core Course [8 Courses X 5 Credits]	40
2		Core Practical [4 Courses X 3 Credits]	12
3		Core Project Work VIVA VOCE	7
4		Core Industry Module	3
5	Part B (i)	Elective Course [6 Courses X 3 Credits]	18
6	Part B (ii)	Non Major Elective [2 Course X 2 Credits]	4
7		Skill Enhancement Course [1 Courses X 2 Credits]	2
8		Professional Competency Course [1 Course X 2 Credits]	2
9	Part B (iii)	Internship	2
10	Part C	Extension Activity	1
Total Credit			**91**

Part A component and Part B (i) will be taken into account for CGPA calculation for the postgraduate programme and the other components of Part B and Part C have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the PG degree.

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Course Code	Title of the Paper
I	Part B (ii)	NME-I	P24NMECS11	Data Mining
II		NME-II	P24NMECS22	Cloud Computing

SEMESTER I

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I–CC-I Discrete Mathematics

Ins. Hrs. /Week: 6 **Course Credit**: **5** **Course Code: P24CS101**

UNIT-I RELATIONS **(18 Hours)**

Binary relations-Operations on relations- properties of binary relations in a set – Equivalence relations—Representation of a relation by a matrix -Representation of a relation by a digraph – **Functions**: Definition and examples-Classification of functions-Composition of functions-Inverse function.

UNIT-II MATHEMATICAL LOGIC **(19 Hours)**

Logical connectives-well formed formulas – Truth table of well formed formula –Algebra of proposition – Quine's method- Normal forms of well formed formulas- Disjunctive normal form-Principal Disjunctive normal form-Conjunctive normal form-Principal conjunctive normal form-Rules of Inference for propositional calculus.

UNIT-III RECURRENCE RELATIONS **(19 Hours)**

Formulation -solving recurrence Relation by Iteration- solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two- Solving Linear Non homogeneous Recurrence Relations. **Permutations**-Cyclic permutation- Permutations with repetitions- **Combinations**- Combinations with repetition

UNIT-IV MATRICES **(19 Hours)**

Special types of matrices-Determinants-Inverse of a square matrix-Cramer's rule for solving linear equations-Elementary operations-Rank of a matrix-solving a system of linear equations-characteristic roots and characteristic vectors-Cayley - Hamilton Theorem-problems

UNIT-V GRAPHS **(15 Hours)**

Connected Graphs -Euler Graphs- Euler line- Complete graph-Bipartite graph-Matrix representation of graphs.

Total Lecturer Hours-90

COURSE OUTCOMES

On the successful completion of the course, students will be able

1. To understand the concepts of relations and functions distinguish among normal forms.
2. To understand the concepts of relations and functions distinguish among normal forms.
3. To distinguish among various normal forms and predicate calculus.
4. To solve and know various types of matrices.
5. To evaluate and solve various types of graphs.

TEXT BOOK

1. N.Chandrasekaran and M.Umaparvathi, Discrete mathematics, PHI Learning Private Limited, New Delhi, 2015.

REFERENCE BOOK(S)

1. Kenneth H. Rosen Discrete Mathematics and applications, Mc Graw Hill, 2012
2. Kimmo Eriksson & Hillevi Gavel, Discrete Mathematics & Discrete Models, Student litteratur AB, 2015.

E-RESOURCES

1. https://www.e-booksdirectory.com/details.php?ebook=11612
2. https://www.e-booksdirectory.com/details.php?ebook=10940
3. https://home.iitk.ac.in/~arlal/book/mth202.pdf

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	2	3	3	3	3	3	3	2	3	3	3	3	1
CO2	3	1	3	3	3	2	3	3	3	3	3	3	3	2	1	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	2	3	3	3	3	3	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	1	3	3	3	3	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

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(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I–CC-II Python Programming

Ins. Hrs. /Week: 6 **Course Credit: 5** **Course Code: P24CS102**

UNIT I INTRODUCTION (18 Hours)

Fundamental ideas of Computer Science **-** Strings, Assignment, and Comments - Numeric Data types and Character sets – Expressions – Loops and Selection Statements: Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop .

UNIT II STRINGS AND TEXT FILES (19 Hours)

Accessing Characters and substrings in strings - Data encryption-Strings and Number systems- String methods – Text - Lists and Dictionaries: Lists – Dictionaries – Design with Functions: A Quick review - Problem solving with top-Down Design - Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions

UNIT III DESIGN WITH CLASSES (20 Hours)

Getting inside Objects and Classes – Data-Modeling Examples – Building a New Data Structure – The Two – Dimensional Grid - Structuring Classes with Inheritance and Polymorphism - Graphical User Interfaces - The Behavior of terminal-Based programs and GUI-Based programs - Coding Simple GUI-Based programs - Windows and Window Components - Command Buttons and responding to events.

UNIT IV WORKING WITH PYTHON PACKAGES (17 Hours)

NumPy Library-Ndarray – Basic Operations – Indexing, Slicing and Iteration – Array manipulation - Pandas –The Series – The DataFrame - The Index Objects – Data Vizualization with Matplotlib – The Matplotlib Architecture – pyplot – The Plotting Window – Adding Elements to the Chart – Line Charts – Bar Charts – Pie charts

UNIT V DJANGO (16 Hours)

Installing Django – Building an Application – Project Creation – Designing the Data Schema - Creating an administration site for models - Working with QuerySets and Managers – Retrieving Objects – Building List and Detail Views.

Total Lecturer Hours-90

COURSE OUTCOMES

The students will be able to,

1. Comprehend the programming skills in python and develop applications using conditional branches and looping.
2. Create python applications with strings and functions
3. Understand and implement the Object Oriented Programming paradigm with the concept of objects and classes, Inheritance and polymorphism
4. Evaluate the use of Python packages to perform numerical computations and data visualization
5. Design interactive web applications using Django

TEXT BOOK(S)

1. Antonio Mele, "Django 3 By Example", Third Edition, 2020.
2. Fabio Nelli, "Python Data Analytics: With Pandas, NumPy, and Matplotlib", Second Edition, Kindle Edition, 2018.
3. K.A. Lambert, "Fundamentals of Python: first programs", Second Edition, Cengage Learning, 2018 .

REFERENCE BOOK(S)

1. Jeff McNeil ,"Python 2.6 Text Processing: Beginners Guide", Packet Publications, 2010.
2. Mark Pilgrim ,"Dive Into Python " , 2nd edition, Apress, 2009.

E_RESOURCES

1. https://www.computer-pdf.com/
2. https://rb.gy/mnhgz5
3. http://www.oreilly.com/programming/free/functional-programming-python.csp

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	*3*	*3*	2	*3*	2	*3*	1	*3*	2	2	*3*	*3*	2	*3*	2	*3*	2
CO2	2	*3*	*3*	*3*	2	1	*3*	2	*3*	2	2	*3*	2	*3*	*3*		*3*
CO3	2	*3*	1	2	*3*	*3*	2	*3*	2	*3*	*3*	2	*3*	2	*3*	*3*	*3*
CO4	*3*	2	*3*	2	*3*	2	*3*	2	*3*	*3*	*3*	*3*	*3*	1	2	2	*3*
CO5	*3*	2	*3*	*3*	2	*3*	2	*3*	2	*3*	2	1	2	*3*	2	*3*	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-CP-I Python Programming Lab-Practical I

Ins. Hrs. /Week: 6 **Course Credit:3** **Course Code: P24CS103P**

EXERCISE:

1. Program using elementary data items, lists, dictionaries and tuples
2. Program using conditional branches, loops
3. Program using functions
4. Program using classes and objects
5. Program using inheritance
6. Program using polymorphism
7. Program using Numpy
8. Program using Pandas
9. Program using Matplotlib
10. Program for creating dynamic and interactive web pages using forms

COURSE OUTCOMES

On the successful completion of the course, students will be able to

1. Comprehend the programming skills in python and write scripts
2. Create python applications with elementary data items, lists, dictionaries and tuples
3. Implement the Object Oriented Programming concepts such as objects and classes, Inheritance and polymorphism
4. Assess the use of Python packages to perform numerical computations and perform data visualization
5. Create interactive web applications using Django

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	3	2	3	3	2	3	3	3	3	3	3	2	3	3	3
CO2	3	3	3	3	3	3	2	3	3	2	3	2	3	3	3	3	3
CO3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	2
CO5	3	3	2	3	3	3	3	3	1	3	3	3	3	3	2	3	2

S-Strong (3) M-Medium (2) L-Low (1)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-EC-I(a) Mobile Computing

Ins. Hrs. /Week: 5 **Course Credit: 3** **Course Code: P24CSE11A**

UNIT I INTRODUCTION (15 Hours)

Mobile Computing-Mobility of Bits and Bytes – Networks – Middleware and Gateways – Developing Mobile Computing Applications–**Mobile Computing Architecture:** Architecture for Mobile Computing–Three-Tier Architecture-Mobile Computing through Internet–**Emerging Technologies:** Bluetooth – Radio Frequency Identification (RFID) -Wireless Broadband (WIMAX)- Mobile IP – Internet Protocol Version6 (IPV6)- Java Card.

UNIT II GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS (GSM) (15 Hours)

Global System for Mobile Communications - GSM Architecture–GSM Entities-Call Routing in GSM– GSM Addresses and Identifiers – Network Aspects in GSM –Mobility Management - GSM Frequency Allocation – Authentication and Security-**Short Message Service (SMS):** Mobile Computing Over SMS– Value Added Services through SMS- MMS.

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UNIT III GENERAL PACKET RADIO SERVICE (GPRS) (15 Hours)

Introduction - GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS - Applications for GPRS–Limitations of GPRS.– Wireless Data – Third Generation Networks – Applicationson3G.

UNIT IV GETTING STARTED WITH ANDROID (15 Hours)

Android Definition-Android Versions-Features of Android-Architecture of Android – **Activities, Fragments and Intents**: Understanding Activities – Applying Styles and Themes to an Activity- Hiding the Activity Title- Displaying a Dialogue window-Intent-Fragments – **Android User Interface**: Understanding the Components of a screen- Adapting to Display Orientation– Designing User Interface with views – Displaying Pictures and Menus with Views – Data Persistence. **Content Providers**: Sharing Data in Android- Using a Content Provider- Predefined Query String Constants- Projections- Filtering- Sorting- Using the Content Provider.

UNIT V MESSAGING (15 Hours)

SMS Messaging- Sending SMS Messages- Receiving SMS Messages – **Location Based Services:** Displaying Maps- Creating the Project- Changing Views- Navigation-Getting Location- Monitoring

Location – **Networking**: Consuming Web Services using HTTP-Downloading Binary Data– Downloading Text Content - **Developing Android Services:** Creating Your Own Services-Performing Long-Running Tasks in a Service -Performing Repeated Tasks in a Service -Executing Asynchronous Tasks on Separate Threads Using Intent Service -Establishing Communication between a Service and an Activity - Binding Activities to Services -Understanding Threading.

Total Lecturer Hours-75

COURSE OUTCOMES

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

1. Understanding the basic concepts of Mobile and Wireless Communication
2. Understanding the basic concepts of Spread Spectrum, Analyzing the concepts of Medium Access Control.
3. Analyzing the concepts of Global System for Mobile Communication and Satellite Communications.
4. Understanding the basic concepts of Wireless LAN.
5. Understanding the basic concepts of Wireless Application Protocol and create a Mobile App with real time application.

TEXT BOOK(S)

1. Ashok K Talukder, Hasan Ahmed, Roopa R Yavagal, , "Mobile Computing", 2nd Edition, TataMcGraw Hill Publishing Company Limited, India,2010.
2. Wei Meng Lee, "Beginning Android 4 Application Development", Wiley India Pvt.Ltd,New Delhi , 2012.

REFERENCE BOOK(S)

1 .Jochen Schiller, "Mobile Communications", Pearson Education, India , 2008.

2. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHILearning, 2014.

3.RetoMeir, "Professional Android 4 Application Development", Wiley India Pvt. Ltd.,NewDelhi, 2012.

E-RESOURCES

1. https://books.google.co.in/books/about/Mobile_Computing.html?id=psAgAQAAIAAJ
2. https://www.slideshare.net/mobile/ankurkumar983/mobile-computing-part1
3. https://www.google.com/amp/s/www.ncertbooks.guru/mobile-computing-pdf/amp/
4. https://www.javatpoint.com/mobile-computing

.COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	3	2	3	3	3	2	3	3	3	3	2	3	2	3	3
CO2	3	3	2	3	2	2	3	3	3	2	3	3	3	3	1	3	3
CO3	3	3	3	3	3	2	1	3	2	3	3	2	2	3	3	3	3
CO4	2	3	1	3	3	3	3	3	3	2	2	3	3	2	3	1	3
CO5	3	2	3	3	3	3	3	2	3	3	2	3	3	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-EC-I(b) Soft Computing

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE11B**

UNIT-I INTRODUCTION TO SOFT COMPUTING: (15 Hours)

Artificial Neural Networks- Biological Neurons- Basic Models of Artificial Neural Networks-Connections-Learning-Activation Functions- Important Terminologies of ANNs- Muculloch and Pitts Neuron-Linear separability- Hebb Network-Flowchart of Training Process-Training Algorithm.

UNIT – II SUPERVISED LEARNING NETWORK (15 Hours)

Perceptron Networks–Perceptron Learning Rule-Architecture-Flowchart for Training Process-Perceptron Training Algorithms for Single Output Classes-Perceptron Training Algorithm for Multiple Output Classes-Perceptron Network Testing Algorithm - Adaptive Linear Neuron-Delta Rule for Single Output Unit-Flowchart for training algorithm-Training Algorithm – Testing Algorithm - Multiple Adaptive Linear Neurons-Architecture-Flowchart of Training Process-Training Algorithm-Back Propagation Network-Architecture-Flowchart for Training Process-Training Algorithm-Learning Factors of Back-Propagation Network-Radial Basis Function Network- Architecture-Flowchart for Training Process-Training Algorithm.

UNIT-III UNSUPERVISED LEARNING NETWORK (15 Hours)

Associative Memory Networks - Auto Associative Memory Network**-**Architecture-Flowchart for Training Process-Training Algorithm-Testing Algorithm- Bidirectional Associative Memory- Architecture-Discrete Bidirectional Associative Memory-Iterative Auto Associative Memory Networks - Linear Auto Associative Memory-Kohonen Self-Organizing Feature Map- Architecture-Flowchart for Training Process-Training Algorithm.

UNIT-IV INTRODUCTION TO FUZZY LOGIC (15 Hours)

Classical Sets –Operations on Classical Sets-Fuzzy sets - Fuzzy Sets- Properties of Fuzzy Sets- Fuzzy Relations –Membership Functions: Fuzzification- Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods–Max-Membership Principle-Centroid Method-Weighted Average Method-Mean Max Membership-Center of Sums-Center of Largest Area-First of Maxima - Fuzzy Set Theory - Fuzzy Arithmetic And Fuzzy Measures: Fuzzy Measures – Belief and Plausibility Measures-Probability Measures-Possibility and Necessity Measures- Formation of Rules –Fuzzy Inference Systems (FIS) – Fuzzy Decision Making – Fuzzy Logic Control Systems.

UNIT-V GENETIC ALGORITHM **(15 Hours)**

Introduction - Biological Background - Traditional Optimization and Search Techniques -Gradient Based Local Optimization Method-Random Search-Stochastic Hill Climbing-Simulated Annealing-Symbolic Artificial Intelligence-Operators in Genetic Algorithm -Encoding-Selection-Crossover-Mutation - Stopping Conditions for Genetic Algorithm Flow-Genetic Programming-Working of Genetic Programming-Characteristics of Genetic Programming-Data Representation.

Total Lecturer Hours-75

COURSE OUTCOMES

On the successful completion of the course, students will be able to

1. To provide an introduction to the basic principles, techniques, and applications of soft computing
2. To get familiar with Neural network architectures and supervised learning algorithms
3. To understand the architectures and algorithms of Unsupervised Learning techniques
4. Develop the skills to gain a basic understanding of fuzzy logic theory and fuzzy inference systems
5. Ability to learn traditional optimization and search techniques and genetic programming

TEXT BOOK(S)

1. Das, A. , Artificial Intelligence and Soft Computing for Beginners, 2018.

2. S.N. Sivanandam, S.N.Deepa ,Principles of Soft Computing, , Wiley, Third Edition, 2019.

REFERENCE BOOK(S)

1. Amit, K., Artificial intelligence and soft computing: behavioral and cognitive modeling of the human brain. CRC press, 2018.
2. Jang, J. S. R., Sun, C. T., & Mizutani, E., Neuro-fuzzy and soft computing-a computational approach to learning and machine intelligence [Book Review]. IEEE Transactions on automatic control, 42(10), 1482-1484, 2004.
3. Rajasekaran, S., & Pai, G. V. Neural networks, fuzzy logic and genetic algorithm: synthesis and applications (with cd). PHI Learning Pvt. Ltd, 2011.

E-RESOURCES

1. https://www.slideshare.net/ganeshpaul6/soft-computing-14879490
2. https://www.worldscientific.com/worldscibooks/10.1142/p773

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	*3*	2	*3*	2	1	*3*	*3*	*3*	2	*3*	1	*3*	2	2	1	*3*	*3*
CO2	*3*	*3*	1	*3*	*3*	2	*3*	2	*3*	*3*	*3*	2	*3*	*3*	*3*	*3*	2
CO3	*3*	2	*3*	*3*	*3*	2	*3*	2	*3*	*3*	*3*	2	*3*	*3*	*3*	*3*	2
CO4	2	*3*	2	*3*	*3*	*3*	1	*3*	2	2	*3*	*3*	*3*	2	*3*	*3*	*3*
CO5	*3*	*3*	*3*	*3*	2	*3*	*3*	*3*	*3*	*3*	*3*	*3*	2	*3*	*3*	1	*3*

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

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(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-EC-I (c) Web Technologies

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE11C**

UNIT –I INTRODUCTION TO XHTML AND CSS: (15 Hours)

Basic syntax, Standard structure, Basic text-markup, Images, Hypertext Links. Lists, Tables, Forms, Frames, syntactic differences between HTML and XHTML-Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.

UNIT – II THE BASICS OF JAVASCRIPT: (15 Hours)

Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts. **Javascript And XHTML Documents**: The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model

UNIT- III DYNAMIC DOCUMENTS WITH JAVASCRIPT AND XML: (15 Hours)

Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Color and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements. Introduction to XML, Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, XSLT Style Sheets, Web services.

UNIT IV PHP (15 Hours)

Introduction to PHP: Overview of PHP - General Syntactic Characteristics - Primitives, Operations, and Expressions - Output - Control Statements - Arrays - Functions - Pattern Matching - Form Handling - Cookies - Session Tracking.

UNIT V ANGULAR JS AND JQUERY (15 Hours)

Introduction to JQuery, Syntax, selectors, events, JQuery HTML, JQuery Effects, JQuery CSS. Introduction to Angular JS, Directives, Expressions, Controllers, Filters, Services, Events, Forms, Validations, Examples.

Total Lecturer Hours-75

COURSE OUTCOMES

1. Design dynamic web pages using Java script, Jquery and Angular Java script
2. Develop Web pages using HTML, CSS and XML
3. Create web application using PHP and MySQL
4. To design dynamic web pages using Angular java script
5. Develop interactive web pages using Jquery

TEXT BOOK(S)

1. Dayley Brad, Dayley Brendan ,"AngularJS, JavaScript, and jQuery All in One", Sams Teach Yourself 1st Edition, Kindle Edition, 2015.
2. Sebesta: Programming the World Wide Web, Eighth Edition, Pearson education, 2015.

REFERENCE BOOK(S)

1. Chris Bates: Web Technology Theory and Practice, Pearson Education, 2012.
2. Jeffrey C. Jackson: Web Technologies-A Computer Science Perspective, Pearson Education,7th Impression,2012.
3. M. Srinivasan: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
4. Raj Kamal: Internet and Web Technologies, McGraw Hill Education , 2017.

E_RESOURCES

1. .https://bit.ly/3nNnEip
2. .https://bit.ly/3fokIpA
3. .https://bit.ly/3kTW9C1
4. .https://g.co/kgs/dboiqp

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	2	3	2	3	3	3	2	3	3	2	3	2	3	2	3	3	2
CO2	3	2	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3
CO3	2	3	2	3	3	2	3	1	3	3	2	3	2	3	3	3	3
CO4	3	3	3	2	1	3	2	3	3	2	3	3	1	2	3	3	3
CO5	3	1	3	3	3	3	3	3	2	3	3	2	3	3	2	1	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-EC-II (a) Internet of Things

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE12A**

UNIT-I INTRODUCTION TO IOT (15 Hours)

Introduction to IOT - Definition and Characteristics, Physical Design Things- Protocols, Logical Design-Functional Blocks, Communication Models- Communication APIs-Introduction to measure the physical quantities, IOT Enabling Technologies - Wireless Sensor Networks, Cloud Computing Big Data Analytics, Communication Protocols- Embedded System- IOT Levels and Deployment Templates.

UNIT-II IOT APPLICATIONS (15 Hours)

Home Automation- Smart Lighting- Smart Appliances- Intrusion Detection- Smoke/Gas Detectors – **Smart Cities:** Smart Parking-Smart Lighting-Smart Roads- Structural Health Monitoring-Surveillance- **Environment:** Weather Monitoring- Air Pollution Monitoring- Noise Pollution Monitoring-Forest Fire Detection- **River Floods Detection, Energy:** Smart Grids- Renewable Energy Systems- Retail: Inventory Management, Smart Payments- Smart Vending Machines- **Logistics:** Route Generation-Fleet Tracking- Shipment Monitoring- **Agriculture:** Smart Irrigation- Green House Control, **Industry:** Machine Diagnosis-Indoor Air Quality Monitoring- **Health and Lifestyle:** Health and Fitness Monitoring.

UNIT-III NETWORK OF WIRELESS SENSOR NODES (15 Hours)

Introduction- Background of Sensor Network Technology- Applications of Sensor Networks- **Basic Overview of the Technology:** Basic Sensor Network Architectural Elements- **Applications of Wireless Sensor Networks**: Examples of Category 2 WSN Applications- Home Control- Building Automation - Industrial Automation - Medical Applications- Examples of Category 1 WSN Applications: Sensor and Robots - Reconfigurable Sensor Networks-Highway Monitoring Military Applications-Civil and Environmental Engineering Applications-Wildfire Instrumentation- Habitat Monitoring – Nanoscopic Sensor Applications- **Basic Wireless Sensor Technology:** Sensor Node Technology- WN Operating Environment.

UNIT-IV MAC, ROUTING PROTOCOLS FOR WSN (15 Hours)

Introduction – **Fundamentals of MAC Protocols:** Performance Requirements- Common Protocols– MAC protocols for WSN: Schedule-Based Protocols- Random Access-Based Protocols – **Sensor-MAC Case Study:** Protocol Overview- Periodic Listen and Sleep Operations- Schedule Selection and Coordination-Schedule Synchronization- Adaptive Listening- Access Control and Data Exchange- Message Passing.

UNIT-V TRANSPORT CONTROL IN WSN (15 Hours)

Traditional Transport Control Protocols - TCP (RFC 793)-UDP (RFC 768) - Mobile IP- Feasibility of Using TCP or UDP for WSNs - **Transport Protocol Design Issues:** Examples of Existing Transport Control Protocols- CODA (Congestion Detection and Avoidance)- ESRT (Event-to-Sink Reliable Transport)- RMST (Reliable Multi segment Transport)- PSFQ (Pump Slowly, Fetch Quickly)- GARUDA- ATP (Ad Hoc Transport Protocol).

Total Lecturer Hours-75

COURSE OUTCOMES

On the successful completion of the course, students will be able to

1. Understand the fundamentals of IOT
2. Analyze the Design of IOT systems
3. Develop programs for IOT systems
4. Identify wireless sensor networks
5. Understand protocols and routing methods for wireless sensor networks

TEXT BOOK(S)

1. Arshdeep Bahga and Vijay Madisetti, , "Internet of Things: Hands-on Approach",University Press, Hyderabad, 2015
2. Kazem Sohraby, Daniel Minoli and TaiebZnati, "Wireless Sensor Networks: Technology,Protocols and Application", Wiley Publications, New Delhi, 2010.

REFERENCE BOOK(S)

1. Carlos De Morais Cordeiro and Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks:Theory and Applications", World Scientific Publishing, 2011.
2. Edgar Callaway, "Wireless Sensor Networks: Architecture and Protocols", AuerbachPublications, 2003.
3. Erdal cayırcı and Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks",John Wiley and Sons, 2009.
4. Michael Miller, "The Internet of Things", Pearson Education, India, 2015.
5. Waltenegus Dargie and Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", John Wiley and Sons Ltd, 2010.

E-RESOURCES

1. https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/
2. https://data-flair.training/blogs/iot-applications/
3. https://www.sciencedirect.com/topics/computer-science/wireless-sensor-networks

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	3	2	2	3	3	1	3	3	3	2	2	2	3	2	3
CO2	3	3	2	3	3	3	3	3	2	3	2	3	3	3	3	3	2
CO3	2	3	2	3	3	3	2	3	3	3	3	3	3	2	3	3	3
CO4	3	1	3	2	3	2	3	3	3	2	2	3	3	3	3	3	3
CO5	3	3	3	3	2	3	3	2	3	3	3	3	2	3	2	3	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

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(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-EC-II (b) Theory of Computation

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE12B**

UNIT I INTRODUCTION (15 Hours)

History of automata- grammar-Chomsky hierarchy-use of automata characteristics of automata-finite automata-graphical and tabular representation transactional system-DFA and NFA –conversion of NFA to DFA-Equivalence of DFA and NFA-Dead state-Finite automata with output-conversion of one machine to minimization of finite automata-Two way finite automata.

UNIT II FINITE AUTOMATION (15 Hours)

Finite state machine-state equivalence and minimization of machine - incompletely specified machine-merger graph- merger table-finite memory and definite memory information lossless machine-inverse machine-minimal inverse machine-ardens theorem-construction of finite automata from regular expression

UNIT III REGULAR GRAMMAR (15 Hours)

Equivalence of two finite automata- Equivalence of two regular expression- construction of regular grammar from an RE-constructing FA from regular grammar-Pumping lemma for regular expression-- derivation and parse tree-Ambiguity in context free grammar-left recursion and left factoring-linear grammar-normal form – pumping lemma for CFL-Ogdens lemma for CFL

UNIT IV PUSH DOWN AUTOMATA (15 Hours)

Push down automata-acceptance PDA-DPDA and NPDA-Construction of PDA from CFG-construction of CFG equivalent to PDA-Graphical notation for PDA-Turing Machine-transactional representation of Turing machine –non deterministic Turing – conversion of regular expression to Turing machine.

UNIT V TURING MACHINE (15 Hours)

Variations of Turing machine-Turing machine as an integer function-Universal Turing machine-linear bounded automata- undecidability- reducibility.

Total Lecturer Hours-75

COURSE OUTCOMES

On the successful completion of the course, students will be able to

1. To understand the concepts and methodology of automata
2. To analyze and construct automata, regular expressions and grammars
3. To analyses and evaluate the push down automata .

4. Understand the concepts of Turing Machine
5. Know the Linear Bounded Automata

TEXT BOOK:

1. Shyamlendu Kandar, "Introduction to automata theory, formal languages and Computation" First Edition, Pearson Education, 2013.

REFERENCE BOOK:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, "Introduction to Automata Theory, Languages and Computation", 3rd Edition, Pearson Education, 2011.

E-RESOURCES

1. https://cglab.ca/~michiel/TheoryOfComputation/TheoryOfComputation.pdf
2. https://fuuu.be/polytech/INFOF408/Introduction-To-The-Theory-Of-Computation-Michael-Sipser.pdf

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	2	3	3	2	3	3	2	3	3	3	2	3	3	3	3	3	2
CO3	3	1	3	3	3	3	3	2	3	2	2	3	3	3	3	2	3
CO4	3	3	3	2	2	3	3	3	2	3	3	3	2	1	3	3	3
CO5	3	3	2	3	3	2	3	3	3	3	3	2	3	3	2	3	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-EC-II (c) Digital Image Processing

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE12C**

UNIT- I CONTINUOUS AND DISCRETE IMAGES AND SYSTEMS (15 Hours)

Introduction - Digital Image Processing System-Problems and Applications-Image Representation and Modeling – **Two-Dimensional Systems and Mathematical Preliminaries:** Linear Systems and Shift Invariance-Fourier Transform- Z Transform-Matrix Theory Results-Block Matrices and Kronecker Products - **Image Perception:** Light-Luminance- Brightness and Contrast-Eye-The Monochrome Vision Model-Vision Camera – **Image Sampling and Quantization:** 2-D Sampling Theory-Aliasing- Image Quantization-Lloyd-Max Quantizer-Dither-Color Images.

UNIT- II IMAGE TRANSFORMS (15 Hours)

Introduction – Two Dimensional Orthogonal and Unitary Transforms-One Dimensional Discrete Fourier Transforms (DFT)-Properties of DFT/ Unitary DFT - 2- Dimensional DFT- Properties of 2-DDFT- Cosine Transform-Sine Transform-Walsh Transform-Hadamard Transform-Haar Transform- Slant Transform-**Karhunen-Loeve (KL) Transform:** KL Transform of Images and Properties- Singular value Decomposition transforms.

UNIT- III IMAGE ENHANCEMENT (15 Hours)

Point Operations- Contrast Stretching-Clipping and Thresholding- Intensity Level Slicing - **Histogram Modeling:** Histogram Equalization-Histogram Modification and Histogram Specification - **Spatial Operations:** Spatial Averaging and Spatial Low-pass Filtering-Direction Smoothing- Medium Filtering-Spatial Low-pass-High-pass-Band-pass Filtering-**Transform Operations:** Generalized Cepstrum and Homomorphic Filtering-Edge enhancement using 2-D IIR and FIR filters-Color Image Enhancement.

UNIT- IV IMAGE FILTERING AND RESTORATION (15 Hours)

Introduction - Image Observation Models- Image Formation Models-Detector and Recorder Models- Noise Models-Sampled Image Observation Models - Sources of Degradation - Inverse and Wiener Filtering - Geometric Mean Filter - Nonlinear Filters - Smoothing Splines and Interpolation - **Least Squares Filters:** Constrained Least Squares Restoration.

UNIT –V IMAGE DATA COMPRESSION AND IMAGE RECONSTRUCTION FROM PROJECTIONS (15 Hours)

Introduction - Image Raw Data Rates-Data Compression versus Bandwidth Compression- Information Rates- Pixel Coding - Predictive Techniques - Transform Coding Theory – Hybrid Coding and Vector

DPCM - Block Truncation Coding-Wavelet Transform Coding of images-Color Image Coding – Lossy and Lossless in prediction coding.

Total Lecturer Hours-75

COURSE OUTCOMES

The students will be able to,

1. Explain the concepts, methods and algorithms of digital image processing
2. Understand the concepts of image transformation
3. Analyze about image enhancement
4. Gain the knowledge of KL transform of image.
5. Describe about image restoration

TEXT BOOK(S)

1. Anil K. Jain, "Fundamentals of Digital Image Processing", 1st Edition, Pearson Education, NewDelhi,2015.
2. Gonzalaz R and Wintz P, "Digital Image Processing", 2nd Edition, Addison Wesley, Baston,USA, 1987.

REFERENCE BOOK(S):

1. Jayaraman.S, Easkkirajan. S, Veerakumar.T, "Digital Image Processing", Tata McGraw Hill Education Pvt. Ltd, India, 2017.
2. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Fourth Edition, Pearson Education, India, 2018.
3. Sid Ahmed M.A., "Image Processing", McGraw Hill Inc, New York, USA, 1995.

E_RESOURCES

1. https://rb.gy/yrt9vv
2. https://rb.gy/daglt2
3. https://rb.gy/jzzafz

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	3	2	3	2	3	2	3	3	3	3	3	2
CO2	3	2	3	3	2	1	3	3	2	3	3	2	1	2	3	2	3
CO3	1	3	3	3	2	3	3	3	3	3	3	3	3	3	2	15	15
CO4	3	2	3	3	3	3	3	3	3	2	3	3	3	3	3	3	2
CO5	3	3	2	3	3	3	3	2	3	3	3	1	3	2	2	3	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SEMESTER II

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II CC-III Design and Analysis of Algorithms

Ins. Hrs. /Week: 6 **Course Credit:5** **Course Code: P24CS204**

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UNIT-I INTRODUCTION (19 Hours)

Introduction – Notion of Algorithm - Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm efficiency – analysis frame work – Asymptotic Notations and Basic Efficiency Classes-Mathematical analysis of non-recursive Algorithms – Non-recursive solution to the Matrix Multiplication - Mathematical analysis of recursive algorithms – Recursive solution to the Tower of Hanoi Puzzle.

UNIT-II DIVIDE AND CONQUER TECHNIQUE (18 Hours)

Multiplication of large integers – Strassen's matrix multiplication – Closest pair and Convex Hull Problems - Greedy method – Prim's algorithm – Kruskal's algorithm – Dijkstra's algorithm.

UNIT-III DYNAMIC PROGRAMMING (18 Hours)

Computing a binomial coefficient – Warshall's and Floyd' Algorithm – Application of Warshall's Algorithm to the digraph – Flyod's Algorithm for the All Pair Shortest Paths Problem - The Knapsack problem and Memory function.

UNIT-IV BACKTRACKING (18 Hours)

N-Queens problem – Hamiltonian circuit problem – Subset sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.

UNIT-V GREEDY METHOD (17 Hours)

P, NP and NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem – Knapsack problem.

Total Lecturer Hours-90

COURSE OUTCOMES

1. To understand and apply knowledge of computing and mathematics to find the algorithm efficiency.
2. To analyze a problem and identify the computing requirements appropriate for its solution.
3. To create, implement, and evaluate a Dynamic Programming algorithm to meet desired needs.
4. To create, implement, and evaluate a Backtracking and Knapsack to meet desired needs
5. To evaluate the algorithmic principles and efficiency of NP and NP-Complete

TEXT BOOK:

1. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2011.

REFERENCE BOOKS:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, "Introduction to algorithms", Prentice Hall 1990.
2. S.K. Basu, "Design methods and Analysis of Algorithms", Prentice Hall, 2005.

E_RESOURCES

1. https://www.geeksforgeeks.org/divide-and-conquer-algorithm-introduction/
2.https://www.tutorialspoint.com/data_structures_algorithms/merge_sort_algorithm.html
3. http://surl.li/hbwrb

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	3	2	2	3	3	3	3	2	3	2	3	3	2	3	2
CO2	3	3	2	3	3	2	3	2	2	3	2	3	3	2	3	1	3
CO3	2	3	2	3	3	2	3	3	3	2	3	2	3	3	3	3	2
CO4	3	3	3	3	3	3	1	3	2	3	3	3	2	3	3	3	3
CO5	3	3	2	3	3	2	2	2	3	2	2	3	2	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II CC-IV Compiler Design

Ins. Hrs. /Week: 6 **Course Credit:5** **Course Code: P24CS205**

UNIT -I COMPILER INTRODUCTION (18 Hours)

Introduction-Language processors-The structure of a Compiler: Lexical analysis – syntax analysis – semantic analysis-intermediate code generation –code optimization –code generation. Symbol table management – The grouping of phases into passes- Compiler construction tools. **A simple syntax directed translator**: Introduction –syntax definition– derivations –parse trees -ambiguity-Associativity of operators-precedence of operators-Syntax directed translation: postfix notation –synthesized attributes-tree traversals-translation schemes.

UNIT- II PARSING (18 Hours)

Parsing: Top-Down parsing-predictive parsing –when to use £ productions-designing a predictive parser-left recursion. Lexical analysis: removal of white space and comments- Reading Ahead –Recognizing keywords and identifiers-A Lexical Analyzer. Symbol Tables- Symbol table per scope-the use of symbol tables. Intermediate code generation: Two kinds of intermediate representations –Construction of syntax tree-static checking-Three Address code.

UNIT- III LEXICAL ANALYSIS (17 Hours)

Lexical analysis: The Role of the Lexical Analyser-Lexical analysis versus parsing –Tokens, patterns lexemes –Attributes for tokens-lexical Errors. Input Buffering –Buffer pairs- sentinels**. Specification of Tokens**: String and Languages operations on languages – Regular Expressions- Regular Definitions-Extension of regular Expressions. Recognition of Tokens: Transition diagrams-Recognition of served words and identifiers –Completion of the Running Example

UNIT- IV FINITE AUTOMATA (19 Hours)

Finite Automata: Nondeterministic Finite Automata – Transition Tables- Deterministic Finite Automata-From Regular Expressions to Automata –Conversion of an NFA to a DFA Simulation of an NFA-Efficiency of NFA Simulation-Construction of an NFA from a Regular Expression – Efficiency of string processing algorithms-Construction of an NFA from a regular Expression. **Syntax Analysis**: Introduction-The role of the parser- Representative grammars-syntax error handling-Error Recovery strategies. Context free grammar:-The formal definition of a context free grammar-National conventions-Derivations- parse trees and derivations- Ambiguity-Verifying the Language generated by a grammar- context free grammars versus regular expression. Writing a grammar: - Lexical versus syntactic analysis-Eliminating ambiguity-Elimination of left recursion –Left factoring-Non- Context free language constructs

UNIT- V TOP-DOWN PARSING **(18 Hours)**

Recursive Descent Parsing –FIRST and FOLLOW-LL(1) Grammars-Non recursive parsing-Error recovery in predictive Parsing –Bottom Up parsing: Reductions- Handle pruning-Shift reduced parsing. **Syntax directed translation** :- Syntax directed definition-Evaluation order for SDD's-Ordering the evaluation attributes –S-attribute definitions-L-attributes definitions-Intermediate **code generation**: Variants of syntax trees – Three address code-Types and declarations –Type checking. Run time Environments:-Storage organization-Stack allocation of space.

Total Lecturer Hours-90

COURSE OUTCOMES

The students will be able to,

1. Understand about the different phases of compiler
2. Explain about parsing and symbol table entry
3. Analyze the storage and organization of storage allocation strategies
4. Apply the concept of finite automata
5. Illustrate the use of top down parsing and code generation

TEXTBOOK(S)

1. Aho, Ullman, "Compilers, Principles and Techniques and Tools", – 6th edition, Pearson Education, India, 2001.
2. Tremblay.J.PandSorrenson.P.G,, "The Theory and Practice of Compiler Writing", McGraw Hill, 1985.

REFERENCE BOOK(S)

1. Andrew Appel.N, "Modern Complier Implementation in C", Cambridge University Press, United Kingdom, 2004.
2. Kakde Charles.O.G,"Algorithms for Compiler Design" River Media , 2011.

E-RESOURCES

1. https://www.youtube.com/watch?v=Qkwj65l_96I
2. https://www.slideshare.net/naparnanayak/code-generation-15188739

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	3	2	1	3	3	3	2	3	3	2	3	3	2	3	3
CO2	3	3	1	3	3	3	2	3	3	2	2	3	3	2	3	3	2
CO3	3	2	3	3	3	2	3		3	3	3	3	3	2	3	3	2
CO4	3	3	3	2	2	3	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	2	3	3	2	3	3	1	3	3	1	2	3	2	2	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II CP-II Design and Analysis of Algorithms Lab-Practical II

Ins. Hrs. /Week: 6 **Course Credit:3** **Course Code: P24CS206P**

EXERCISE

1. Compute the transitive closure of any directed graph using Warshall's Algorithm.
2. Knapsack problem using backtracking
3. 0/1 knapsack problem using Dynamic programming
4. Apply the divide and conquer technique implement Strassen's matrix Multiplication Algorithm
5. Find minimum cost spanning Tree of a given undirected graph using Kruskal's Algorithm.
6. Find minimum cost spanning Tree of a given undirected graph using Prim's Algorithm.
7. All-pairs Shortest Paths algorithms
8. 8 Queen's problem using backtracking
9. Dljkstra's Algorithm using greedy technique
10. Sum of subset problem using backtracking

COURSE OUTCOMES

The students will be able to,

1. Understand the Knapsack problem using backtracking
2. Implement the Divide and Conquer Algorithm.
3. Understand to compute Shortest PathsAlgorithm
4. Implement the data in greedy Algorithm.
5. Evaluate the Fundamentals of Greedy Technique.

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	3	3	2	3	3	3	3	3	2	3	3
CO2	3	3	2	3	3	3	3	3	3	2	1	3	3	2	3	2	3
CO3	2	2	3	3	3	2	3	2	3	3	3	3	3	2	3	3	3
CO4	3	2	3	1	2	3	2	3	3	3	3	2	3	2	3	3	2
CO5	3	3	2	3	3	2	3	3	1	3	3	3	2	3	2	2	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II EC-III(a) Cryptography and Network Security

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE23A**

UNIT-I COMPUTER AND NETWORK SECURITY CONCEPTS (15 Hours)

Introduction: The OSI Security Architecture-Security attacks-Security Services-Security mechanisms - A model for network Security - **Classical Encryption Techniques:** Symmetric Cipher model: Cryptography – Cryptanalysis and Brute-Force Attack. **Substitution Techniques**: Caesar Cipher – Monoalphabetic Ciphers – Playfair Cipher – Hill Cipher – Polyalphabetic Ciphers – One Time Pad. Transposition Techniques–Rotor Machines– Steganography.

UNIT- II BLOCK CIPHERS AND THE DATA ENCRYPTION STANDARDS (15 Hours)

Traditional Block Cipher Structure-Stream Ciphers and block Ciphers –Motivation for the Feistel Cipher Structure – The Fiestel Cipher- **The Data Encryption Standard:** DES Encryption – DES Decryption. **The Strength of DES:** The use of 56-Bit Keys – The Nature of the DES Algorithm Timing Attacks. **Block Cipher Design Principles:** Number of Rounds – Design of function F Key Schedule Algorithm. **Public-Key Cryptography and RSA:** Public Key Cryptosystems-Applications for Public-Key Cryptosystems Requirements for public-Key Cryptography–Public Key Cryptanalysis-The RSA Algorithm. **Cryptographic Hash Functions:** Applications of Cryptographic Hash Functions –SHA-3.

UNIT- III TRANSPORT LEVEL SECURITY (15 Hours)

Web Security Considerations- Web Security Threats- Web Traffic Security Approaches. **Secure Socket Layer :** SSL Architecture – SSL Record Protocol – Change Cipher Spec Protocol – Alert Protocol – Handshake Protocol- Cryptographic Computations. **Transport Layer Security**: Version Number- Message Authentication Code – Pseudorandom Function –Alert Codes – Cipher Suites – Client Certificate types – Certificate-Verify and Finished Messages – Cryptographic Computations-Padding. HTTPS – Secure Shell(SSH) - secure electronic transaction (SET)

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UNIT-IV WIRELESS NETWORK SECURITY AND IP SECURITY (15 Hours)

Wireless Security - Wireless Network Threats – Wireless Security Measures. **Mobile Device Security:** Security Threats – **Mobile Device Security Strategy. IEEE 802.11. Wireless LAN Overview:** The Wi-Fi Alliance – IEEE 802 Protocol Architecture – IEEE 802.11 Network Components and Architectural Model – IEEE 802.11 Services. **IEEE 802.11i Wireless LAN Security:** IEEE 802.11i Services – IEEE 802.11i Phases of Operations – Discovery Phase – Authentication Phase – Key Management Phase – Protected data Transfer Phase – The IEEE Pseudo random Function. **IP Security:** Overview-IP Security policy – Encapsulating Security Payload – Combining Security Associations – Internet Key Exchange

UNIT- V SYSTEM SECURITY (15 Hours)

System Security: Intruders-Intrusion Detection-Password Management- Malicious Software: Types of Malicious Software(Malware)-Advanced Persistent Threat-Viruses- Worms-Spam E-mail,

Trojans- System Corruption-Zombie, Bots - Information Theft - Keyloggers, Phishing, Spyware-Countermeasures-Distributed Denial of Service attacks- Firewalls: The Need for Firewalls-Firewall characteristics and Access Policy- Types of Firewalls-Firewall basing-Firewall Location and Configurations.

Total Lecturer Hours-75

COURSE OUTCOMES

The Students will be able to,

1. Understand the concepts, methods of Network Security using cryptography basics.
2. Analyze and design classical encryption techniques and block ciphers.
3. Acquire knowledge about Public Key cryptography.
4. Evaluate Hash Functions in network security.
5. Analyze about IP security, Wireless Network security.

TEXT BOOK(S)

1. Behrouz A. Ferouzan, 2015, "Cryptography & Network Security", Tata Mc Graw Hill, India.
2. Neal Krawetz, "Intoduction to Network Security", Charles River media Publications, 2007.

REFERENCE BOOK(S)

1. Johannes A. Buchaman, "Introduction to cryptography" (2nd edition), 2004. ISBN 0387207562, Springer Publications, United States, 2004.
2. Robert Collins, "Network Security Monitoring: Basics for Beginners", 2017.
3. William Stalings,"Network Security Essentials-Applications and Standards", Sixth Edition, Pearson Publications, India, 2016.
4. William Stallings, "Cryptography and Network Security"-Principles and Practices,Prentice-Hall, Seventh edition, **ISBN:**10:1-292-15858-1, India, 2017.

E_RESOURCES

1. http://surl.li/hbwqu
2. http://uru.ac.in/uruonlinelibrary/Cyber_Security/Cryptography_and_Network_Secury. pdf
3. https://youtu.be/2Z3toEiY5ll

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	1	3	3	3	3	3	2	3	3	2	3	2	3	3	3	3	3
CO3	2	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	2
CO5	3	3	3	3	3	3	2	3	3	1	3	3	3	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II EC-III(b) Network Protocols

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE23B**

UNIT -I TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL (15 Hours)

Fundamental Architecture - Internet Protocol Basics - Routing - **Transport-Layer Protocols** : Transmission Control Protocol - User Datagram Protocol - Stream Control Transmission Protocol - Real-Time Transport Protocol.

UNIT- II INTERNET ARCHITECTURE (15 Hours)

Internet Exchange Point - History of Internet Exchange Points - Internet Service Provider Interconnection Relationships - Peering and Transit - IP Routing Protocols: Overview of Routing Protocols - Routing Information Protocol - Open Shortest Path First - Border Gateway Protocol - Multiprotocol Label Switching.

UNIT- III IP QUALITY OF SERVICE (15 Hours)

Introduction - Quality of Service in IP Version 4 - Integrated Services - Differentiated Services - Quality of Service with Nested Differentiated Services Levels - IP Multicast and Any cast: Addressing- Multicast Routing - Routing Protocols –Any casting- IPv6 Any cast Routing Protocol: Protocol Independent Any cast—Sparse Mode - Transport over Packet: Draft-Martini Signaling and Encapsulation - Layer-2 Tunneling Protocol.

UNIT- IV VIRTUAL PRIVATE WIRED SERVICE (12 Hours)

Types of Private Wire Services - Generic Routing Encapsulation - Layer-2 Tunneling Protocol - Layer-3 Virtual Private Network 2547bis, Virtual Router - IP and Optical Networking: IP/Optical Network Evolution - Challenges in Legacy Traditional IP/Optical Networks - Automated Provisioning in IP/Optical Networks - Control Plane Models for IP/Optical Networking - Next-Generation Multi Layer Network Design Requirements - Benefits and Challenges in IP/Optical Networking - IP Version 6: Addresses in IP Version 6 - IP Packet Headers - IP Address Resolution -IP Version 6 Deployment: Drivers and Impediments.

UNIT V IP TRAFFIC ENGINEERING (15 Hours)

Models of Traffic Demands - Optimal Routing with Multiprotocol Label Switching - Link-Weight Optimization with Open Shortest Path First - Extended Shortest-Path-Based Routing Schemes - IP Network Security: Introduction - Detection of Denial-of-Service Attack - IP Trace back- Edge Sampling Scheme - Advanced Marking Scheme - Mobility Support for IP: Mobility Management Approaches - Security Threats Related to IP Mobility - Mobility Support in IPv6 - Reactive Versus Proactive Mobility Support - Relation to Multi homing - Protocols Supplementing.

Total Lecturer Hours-75

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

1. Understand, analyze and examine the concepts of Communication Protocols with its architecture and functions
2. Illustrate and apply the appropriate internet architecture along with efficient protocol models for the user defined communication environment
3. Comprehend, categorize and formulate the appropriate IP routing protocol to establish a efficient data transfer
4. Comprehend, analyze and evaluate the concepts of Virtual wired service and IP/optical networking with its functions and deployment
5. Elucidate, analyze and inspect the IP traffic engineering and its models along with the security mechanisms

TEXT BOOK :

1. John Wiley & Sons, Inc."Advanced Internet Protocols, Services and Applications", Eiji Oki, Roberto Rojas-Cessa, Mallikarjun Tatipamula, Christian Vogt, Copyright © 2012.

REFERENCE BOOK(S):

1. BehrouzA. Forouzan ,"TCP/IP Protocol Suite", Fourth Edition, Tata Mcgraw-Hill Edition 2010.
2. Michael A. Gallo & William M. Hancock- BROOKS&COLE ,"Computer Communications and Networking Technologies" ,2001.

E-RESOURCES

1. https://www.kobo.com/in/en/ebook/attacking-network-protocols
2. https://www.kobo.com/in/en/ebook/packet-guide-to-core-network-protocols

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	2	3	2	3	3	3	3	3	3	3	3	3	2	3	1	3	3
CO3	2	3	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3
CO4	3	2	3	1	3	3	2	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	2	3	3	1	3	3	3	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II EC-III(c) Computer Vision

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE23C**

UNIT-I BASIC IMAGE HANDLING AND PROCESSING **(15 Hours)**

PIL – the Python Imaging Library-Matplotlib-NumPy-SciPy-Advanced example: Image de-noising. **Local Image Descriptors:** Harris corner detector-SIFT - Scale-Invariant Feature Transform-Matching Geotagged Images.

UNIT-II IMAGE TO IMAGE MAPPINGS **(15 Hours)**

Homographies-Warping images-Creating Panoramas. **Camera Models and Augmented Reality:** The Pin-hole Camera Model-Camera Calibration-Pose Estimation from Planes and Markers-Augmented Reality.

UNIT-III MULTIPLE VIEW GEOMETRY **(15 Hours)**

Epipolar Geometry-Computing with Cameras and 3D Structure-Multiple View Reconstruction-Stereo Images. **Clustering Images:** K-means Clustering-Hierarchical Clustering-Spectral Clustering.

UNIT-IV SEARCHING IMAGES **(15 Hours)**

Content based Image Retrieval-Visual Words-Indexing Images- Searching the Database for Images-Ranking Results using Geometry-Building Demos and Web Applications. **Classifying Image Content:** K-Nearest Neighbors-Bayes Classifier-Support Vector Machines-Optical Character Recognition.

UNIT-V IMAGE SEGMENTATION **(15 Hours)**

Graph Cuts-Segmentation using Clustering-Variational Methods. **OpenCV:** Python Interface-OpenCV Basics-Processing Video-Tracking.

Total Lecturer Hours-75

COURSE OUTCOMES

On the successful completion of the course, students will be able

1. To understand and recall computer vision and its application areas
2. To develop build a computer vision system
3. To apply and analyze a design range of algorithms for image processing and computer vision
4. To develop incorporate machine learning techniques with computer vision system
5. To apply and analyze image segmentation and image registration.

TEXT BOOK(S)

1. Richard Szeliski, "Computer Vision"- Algorithms and Applications Springer, 2010.
2. Simon Prince, " Computer Vision" Models, Learning and inference2012.

REFERENCE BOOK(S)

1 .David Forsyth and Jean ponce, "Computer Vision" A Modern Approach", Second Edition, 2011.

2. Richard Hartley and Andrew Zisserman " Multiple View Geometry in Computer Vision, Second Edition ,2004.

E-RESOURCES

1. http://surl.li/hbwqj
2. http://vision.stanford.edu/teaching/cs131_fall1718/files/cs131-class-notes.pdf

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II EC-IV(a) Biometrics Techniques

Ins. Hrs. /Week:5 **Course Credit:3** **Course Code: P24CSE24A**

UNIT- I INTRODUCTION (15 Hours)

Person Recognition – Biometric systems –Biometric functionalities: verification, identification – Biometric systems errors - The design cycle of biometric systems – Applications of Biometric systems– Security and privacy issues.

UNIT-II FINGER PRINT AND FACIAL RECOGNITION (15 Hours)

FINGERPRINT : Introduction – Friction ridge pattern- finger print acquisition :sensing techniques ,image quality –Feature Extraction –matching –indexing. FACE RECOGNITION: Introduction –Imageacquisition: 2D sensors ,3D sensors- Face detection- Feature extraction -matching.

UNIT-III IRIS AND OTHER TRAITS (15 Hours)

Design of an IRIS recognition system-IRIS segmentation- normalization – encoding and matching IRISquality –performance evaluation –other traits- ear detection –ear recognition – gait feature extraction andmatching –challenges- hand geometry –soft biometrics.

UNIT-IV BEHAVIORAL BIOMETRICS (15 Hours)

Introduction –Features- classification of behavioral biometrics –properties of behavioral biometrics –signature –keystroke dynamics –voice- merits –demerits –applications- error sources-types –open issues –future trends.

UNIT-V APPLICATIONS AND TRENDS (15 Hours)

Application areas: surveillance applications- personal applications –design and deployment -usersystem interaction-operational processes – architecture –application development –design validation disaster recovery plan-maintenance-privacy concerns.

Total Lecturer Hours :75

COURSE OUTCOMES:

At the end of the course, the student should be able to

1. Identify the various Biometric Technologies.
2. Design of biometric recognition for the organization.
3. Develop simple applications for privacy.
4. Understand the need of biometric in the society
5. Analyze the real time applications

TEXT BOOK(S)

1. James wayman,Anil k.Jain ,Arun A.Ross ,Karthik Nandakumar, ―Introduction to Biometrics‖,Springer, 2011
2. John Vacca "Biometrics Technologies and Verification Systems" Elsevier 2007

REFERENCE BOOK(S)

1.James Wayman,Anil Jain,David MAltoni,DasioMaio(Eds) "Biometrics Systems Technology",Design and Performance Evalution.Springer 2005
2. Khalid saeed with Marcin Adamski, Tapalina Bhattasali, Mohammed K. Nammous, Piotr panasiuk, mariusz Rybnik and soharab H.Sgaikh, ―New Directions in Behavioral Biometrics‖,CRC Press, 2017.
3. Paul Reid "Biometrics For Network Security "Person Education, 2004.
4. Shimon K.Modi , ―Biometrics in Identity Management :concepts to applications‖, Artech House,2011.

E-RESOURCES

1. https://www.tutorialspoint.com/biometrics/biometrics_quick_guide.htm
2. https://www.pvpsiddhartha.ac.in/dep_it/lecture%20notes/Biometrics/BiometricUnit-1.pdf

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	1	3	3	3	3	3	2	3	3	2	3	2	3	3	3	3	3
CO3	2	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	2
CO5	3	3	3	3	3	3	2	3	3	1	3	3	3	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II EC-IV(b) Social Networking

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE24B**

UNIT I INTRODUCTION (15 Hours)

Social Media Strategy-Important First Decisions -Websites, Blogs - RSS Feeds Mapping - Preparation - Multimedia Items Gathering Content for Blog Posts RSS Feeds & Blogs-RSS Feeds-The Feed Reader- The Feed-Options for Creating an RSS Feed-Planning Feed-Blogs-Options for Starting. Blog and RSS Feed-Feed or Blog Content-Search Engine Optimization (SEO)-Feed Burner-RSS Feed and Blog Directories-An Optimization Plan for Blog or RSS Feed

UNIT II BUILDING A WORD PRESS POWERED WEBSITE (15 Hours)

Word Press as A CMS - Diversity of Word Press Sites-The Anatomy of a Word Press Site -a Brief Look at the Word Press Dashboard Planning - Site Themes Plug-ins setting up Sidebars Building Pages- Posting Blog Entries. Podcasting, Vidcasting, & Webcasting- Publishing Options for Podcast-Creating and Uploading Podcast Episodes-Publishing Podcast Optimizing Podcast- Webcasting

UNIT III SOCIAL NETWORKING & MICRO-BLOGGING (15 Hours)

Facebook-The Facebook Profile -Myspace LinkedIn-Twitter-Niche Social Networking Sites-Creating Own Social Network-Promoting Social Networking Presence- Social Bookmarking & Crowd-Sourcing- Social Bookmarking-A Social Bookmarking Strategy- Crowd-Sourced News Sites- Preparation And Tracking Progress Media Communities-Image Sharing Sites-Image Sharing Strategy-Video Sharing Sites-Video Sharing Strategy-Searching And Search Engine Placement-Connecting With Others.

UNIT IV WIDGETS & BADGES (15 Hours)

Highlighting Social Web Presence-Sharing And Syndicating Content Making Site More Interactive-Promoting Products And Making Money-Using Widgets In Word Press-Widget Communities And Directories- Working Widgets Into Strategy Social Media Newsrooms-Building Social Media Newsroom - Populating The Newsroom-Social Media News Releases-Social Media Newsroom Examples. More Social Tools-Social Calendars-Social Pages Wikis-Social Search Portals-Virtual Worlds.

UNIT V WEBSITE OPTIMIZATION (15 Hours)

A Website Optimization Plan-Streamlining Web Presence-An Integration Plan- Looking to the Future-

Life streaming: The Future of Blogging-Distributed Social Networking-Social Ranking, Relevancy, and ―Defriending-Web 3.0 or The Semantic Web-Mobile Technology- Measuring Your Success-A Qualitative Framework-A Quantitative Framework-Tools to Help You Measure-Come To Your Own Conclusions

Total Lecturer Hours-75

COURSE OUTCOMES

On the successful completion of the course, students will be able to

1. To understand, impart and summarize the concepts of Social media, Social networking and Webcasts
2. To comprehend, design and develop a Word Press Powered Website
3. To understand, implement and perform evaluation of Social Networking and Micro-Blogging
4. To collaborate, implement and analyze the Widgets and Badges in social networking environment
5. To understand, illustrate and perform evaluation of web optimization for social networks

TEXT BOOK:

1. Deltina hay ―A Survival Guide To social Media and Web 2.0 Optimization‖, Dalton Publishing, 2009

REFERENCE BOOKS:

1. Miriam Salpeter ―Social Networking for Career Success‖ Learning Express, 2011.
2. Miles, Peggy, ―Internet world guide to webcasting‖ Wiley, 2008
Professionals", Wiley Publication,2015.

E-RESOURCES

1. https://www.kobo.com/in/en/ebook/social-networking-13
2. https://ils.unc.edu/cws/Handouts/Social%20Networking/Social-Networking.pdf

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	2	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3	3	2	3	2	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II EC-IV(c) Open-Source Technologies

Ins. Hrs. /Week: 5 **Course Credit:3** **Course Code: P24CSE24C**

UNIT-I INTRODUCTION (15 Hours)

Introduction to Open-Source: Open Source, Need and Principles of OSS, Open- Source Standards, Requirements for Software, OSS success, Free Software, Examples, Licensing, Free Vs. Proprietary Software, Free Software Vs. Open- Source Software, Public Domain. History of free software, Proprietary Vs Open- Source Licensing Model, use of Open-Source Software, FOSS does not mean no cost. History: BSD, the Free Software Foundation and the GNU Project.

UNIT- II OPEN-SOURCE PRINCIPLES AND METHODOLOGY (15 Hours)

Open-Source History, Open Source Initiatives, Open Standards Principles, Methodologies, Philosophy, Software freedom, Open-Source Software Development, Licenses, Copyright vs. Copy left, Patents, Zero marginal cost, Income-generation Opportunities, Internationalization.Licensing: What Is A License, How to create your own Licenses, Important FOSS Licenses (Apache,BSD, PL, LGPL), copyrights and copy lefts, Patent.

UNIT-III OPEN-SOURCE PROJECTS (15 Hours)

Starting and maintaining own Open-Source Project, Open-Source Hardware, Open-Source Design, Open-source Teaching, Open source media. **Collaboration**: Community and Communication, Contributing to Open source projects Introduction to GitHub, interacting withthe community on GitHub, Communication and etiquette, testing open-source code, reportingissues, contributing code. Introduction to Wikipedia, contributing to Wikipedia or contributingto any prominent open-source project of student's choice

UNIT- IV OPEN-SOURCE ETHICS AND SOCIAL IMPACT (15 Hours)

Open source vs. closed source, Open-source Government, Ethics of Open-source, Social and Financial impacts of open-source technology, Shared software, Shared source, Open Source asa Business Strategy

UNIT-V UNDERSTANDING OPEN-SOURCE ECOSYSTEM (15 Hours)

Open-Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris.

Open- Source Hardware, Virtualization Technologies, Containerization Technologies: Docker,Development tools, IDEs, Debuggers, Programming languages, LAMP, Open-Source Database technologies

Total Lecturer Hours:75

COURSE OUTCOMES

At the end of the course, the students will be able to:

1. Can identify the licensing of open source systems and make decisions on their use, based on an understanding of the legal, economical and technical issues.
2. Can find open source projects related to a given development problem
3. Differentiate between Open Source and Proprietary software and Licensing.
4. Recognize the applications, benefits and features of Open-Source Technologies
5. Gain knowledge to start, manage open-source project.

TEXT BOOK(S)

1. Fadi P. Deek and James A. M.McHugh "Open-Source Technology and Policy", ,Cambridge University Press, 2008.
2. Kailash Vadera & Bhavyesh Gandhi "Open-Source Technology", , University Science Press,Laxmi Publications, 2009.

REFEENCE BOOK(S)

1. Andrew M. St.Laurent "Understanding Open Source and Free Software Licensing", O'Reilly Media,2004.
2. Clay Shirky and Michael Cusumano ,"Perspectives on Free and Open-Source Software", ,MIT press,2007.

E-RESOURCES

1. http://kernel.org
2. https://opensource.org/
3. http://www.linuxfoundation.org/

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COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	1	3	3	3	3	3	2	3	3	2	3	2	3	3	3	3	3
CO3	2	3	3	3	3	3	2	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	2
CO5	3	3	3	3	3	3	2	3	3	1	3	3	3	3	3	3	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2024 – 2025)
PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE
M.Sc., COMPUTER SCIENCE

Semester: II VAC -I Fundamentals of Digital Marketing

Course Credit:2 **Course Code:P24CSVA21**

UNIT-I INTRODUCTION TO DIGITAL MARKETING (6 hours)

Evolution of Digital Marketing - From Traditional to Modern Marketing – Growth of 'E' Concepts: from E- Business to Advanced E-Commerce – Digital, The next wave of marketing – DigitalMarketing: Emergence of Digital Marketing as a Tool – Digital Marketing Channels – Types and Business Models – Digital Marketing Applications and Benefits. Internet Marketing: Underlying Technology and Frameworks – Digital Marketing Framework.

UNIT-II DIGITAL MARKETING MODELS CREATION (6 hours)

Factors Impacting Digital Marketplace – Value Chain Digitization- Digital Marketing BusinessModels, Understanding Digital Value Elements – Digital Value – Led Marketing Approach – Digital Marketing Models Creation – Application of Digital Marketing Models. Consumer for Digital Marketing: Consumer Behaviour on the Internet – Evolution of Consumer Behaviour Models – Brand Building on the Web – Web Tracking Audits and Forecasting – Integrated Marketing Communications
– Basics of Integrated Marketing Communications – Four Pillars of IMC Construct – Impact of Digital Channels on IMC.

UNIT-III DIGITAL MARKETING ASSESSMENT PHASE (6 hours)

Elements of the Assessment Phase – Marketing Strategy and its Digital Shifts – The assessment Phase Elements – Macro-Micro Environment Analysis – Marketing Situation Analysis – Digital Marketing Internal Assessment – Analyzing Present Offerings Mix – Marketing Mix Analysis – Internal Resource Mapping.

UNIT-IV DIGITAL MARKETING STRATEGY (6 hours)

Groundwork – Understanding Digit al Business Strategy – Emerging Digital Business Structures – Digital Core Competency Alignment – Customer Development Strategy – Defining the Digital Marketing Mix -Offering Mix for Digital – Digital Pricing Models – Channels of purchasing, Reaching the E-consumer- Managing Promotional Channels – Digital Marketing Strategy Roadmap – The 6S Digital Marketing Implementation Strategy – PLC Concept.

UNIT –V DIGITAL MARKETING OPERATIONS SET-UP (6 hours)

Understanding Digital Marketing Conversion – Basics of Lead Generation and Conversion Marketing – Setting up for conversion – Lead Management across Channels – Basics of Web Development and Management – Pre Planning for Web Development – Website Development Stages – Developing Site Diagrams and Wireframes – Website Content Development and Management

Total Lecturer Hours-30

COURSE OUTCOMES

The students will be able to,

1. Understand the basic elements and factors of digital marketing
2 .Classify the technology and frameworks in which digital marketing operates.
3. Choose the key internal analysis elements for the relevant applications of

underlying frameworks of digital marketing
4 .Analyze different digital marketing strategies for the real time business applications
5 .Determine technical specifications and to develop site/portal to promote digital marketing

TEXT BOOK

1. Puneet Bhatia, “Fundamentals of Digital Marketing, 2/e”, Pearson India Publications, New York,2019.

REFERENCE BOOK(S)

1. Jeremy Kagan, Siddharth Shekhar Singh, “Digital Marketing: Strategy & Tactics”, Wiley Publications, 2020

2. Marjolein Visser, Berend Sikkenga, Mike Berry, “Digital Marketing Fundamentals: From Strategyto ROI”, Noordhoff Groningen / Utrecht, Netherlands, 2018.

3. Vandana Ahuja “Digital Marketing”, Oxford University Press, 2015.

E-RESOURCES

1. https://www.digitalmarketer.com/digital-marketing/assets/pdf/ultimate-guide-to-digital- marketing.pdf
2. https://www.eway-crm.com/eWay-Book/eWay-Book%20%20Online%20Marketing%20EN.pdf

NME OFFERED BY THE DEPARTMENT

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: I-NME-I DATA MINING

Ins. Hrs. /Week: 2 **Course Credit: 2** **Course Code: P24NMECS11**

UNIT-I INTRODUCTION TO DATA MINING (6 hours)

Database–Relational Databases -Transactional Databases-Knowledge Discovery Database –Data Mining–Architecture of Data Mining- Data Warehouses.

UNIT II BASIC DATA MINING TASKS (6 hours)

Classification–Regression-Time Series-Prediction-Association rule -Sequence Discovery-Clustering-Summarization- Data Mining Issues- Social Implications of Data Mining.

UNIT III APPLICATIONS IN DATA MINING (6 hours)

Data Mining Applications – Data Mining System Products and Research Prototypes –Trends in Data mining.

UNIT IV DATA WAREHOUSE AND OLAP TECHNOLOGY (6 hours)

An Overview - Definition of Data Warehouse - A Multidimensional Data Model - Schemas for Multidimensional databases – OLAP Operations in the Multidimensional Data Model-Data Warehouse Architecture.

UNIT V WEB MINING AND TEXT MINING: (6 hours)

Web Mining: Mining the Web Page Layout Services – Mining the Web's Linking Structures to identify Authoritative Web pages –Mining Multimedia Data on the Web **Text Mining:** Text Data Analysis and Information Retrieval – Dimensionality Reduction for Text – Text Mining Approaches.

Total Lecturer Hours:30

COURSE OUTCOMES

The Students will be able to,

1. Understand the various techniques of Data Mining
2. Apply the usage of data preprocessing techniques
3. Interpret the concept of data warehouse Architecture and its Environment
4. Identify the different types of OLAP servers

5. Apply the concepts of Web Mining and Text Mining in the real world scenario

TEXT BOOK

1.Jiawei Hanand Miceline Kamber, ,"DataMining Concepts and Techniques", Morgan Kaulmann Publishers, Massachusetts, USA.,2006.

REFERENCE BOOK(S)

1. Arun Pujari.K, "Data mining Techniques", Universities Press(India) Pvt, Hyderabad,2016.
2. Max Bramer, "Principles of data mining", Springer 4th Edition,NewYork,USA, 2020.
3. Pieter Adriaans, Dolf Zantinge, ,"Data Mining" Pearson Education, India, 1998.

E-RESOURCES

1.https://hanj.cs.illinois.edu/bk3/bk3_slidesindex.html
2.https://www.slideshare.net/2cdude/data-warehousing-3292359

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	2	3	3	3	3	3	3	3	3	2	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	2	3	3	3	3	3	3	3	2	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

S-Strong (3) **M-Medium (2)** **L-Low**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: II -NME -II CLOUD COMPUTING

Ins. Hrs. /Week:2 **Course Credit:2** **Course Code:P24NMECS22**

UNIT-I Introduction to Cloud Computing : **(6 Hours)**
Cloud Computing Basics –History of cloud computing-Importance of Cloud Computing in the Current Era-Characteristics of Cloud Computing Pros and Cons of Cloud Computing .

UNIT II Types of Cloud: **(6 Hours)**
Public and Private Cloud -Cloud Infrastructure. Working of Cloud Computing: Trends in Computing- Cloud services models – Cloud Deployment Models.

UNIT III Cloud Computing Technology: **(6 Hours)**
Cloud Life Cycle Model- Reference Model for Cloud Computing. Foundations : Introduction to Virtualization-Types of Virtualization-Virtual Clustering.

UNIT IV Cloud Computing Tools : **(6 Hours)**
Moving Applications to the Cloud – Cloud Opportunities - Cloud Mashaps – Apache Hadoop – Cloud Tools.

UNIT V Cloud Applications: **(6 Hours)**
Microsoft Cloud Services. **Google Cloud Applications:** Google Applications Utilizing Cloud-Google App Engine. **Amazon Cloud Services:** Understanding Amazon Web Components and Services-Elastic Compute Cloud.

Total Lecturer Hours-30

COURSE OUTCOMES

Upon successful completion of this course, students will be able to

1. Understand Cloud Computing and different Cloud service and deployment models
2. Describe importance of virtualization along with their technologies
3. Use and Examine different cloud computing services
4. Understand the cloud computing security
5. Understand the cloud applications and concepts of Amazon cloud services

TEXT BOOK

1. Srinivasan.A and Suresh.J, Cloud Computing – A Practical Approach for Learning and Implementation, Pearson Publicaion,India , 2014 .

REFERENCE BOOKS

1.Kannammal.A , " Fundamentals of Cloud Computing", 1st Edition Cengage Learning Private Limited,India, 2015.

2. Mehul Mahrishi Kamal Kant Hiran,Ruchi Doshi, Dr.Fagbola Temitayo , "Cloud Computing", 1stEdition ,BPB Publications, New Delhi, 2019.

3.Rajkumar Buyya, James Broberg, Andrzej Goscinsky, "Cloud Computing Principles and Paradigms", Wiley Pvt. Ltd, India, 2011.

E- RESOURCES

1. https://www.javatpoint.com/cloud-computing-architecture

2.https://www.tutorialspoint.com/cloud_computing/index.html

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3
CO4	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

S-Strong (3) **M-Medium (2)** **L-Low (1)**