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 2023–2024)

PROGRAMME CODE **2PSCSC**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)

Accredited by NAAC-An ISO 9001:2015 Certified Institution SUNDARAKKOTTAI, MANNARGUDI–614016.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 2023-2024)

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): Course outcomes 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 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 A1 (10X1=10 marks)
One word question/ Fill in/ /True or False/ Multiple Choice Questions
Two Questions from Each unit

Part A2 (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 previously learned
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/Analysing	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 point of 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) **PART – A II.** (No choice, Two Mark)	**TWO** questions from each unit **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 by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{N} C_i G_i}{\sum_{I=1} C_i}$	$WAM(\text{Weighted Average Marks}) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{I=1} C_i}$
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
Below 50	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 and sustainability issues, and adopt objective, unbiased and truthful actions in all aspects of work.
PO-8	**Self directed Learning:** work independently, identify appropriate resources required for a 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 centered 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, and 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 an 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.

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)

Accredited by NAAC-An ISO 9001:2015 Certified Institution

SUNDARAKKOTTAI, MANNARGUDI–614016.

TAMILNADU, INDIA.

M.Sc., COMPUTER SCIENCE

COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM – LEARNINIG OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted form the academic year **2023-2024**)

ELIGIBILITY: Candidates who have passed B.Sc. Computer Science / B.Sc. InformationTechnology/ 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	P23CS101	Discrete Mathematics	6	4	1	-	1	5	3	25	75	100
		Core Course –II	P23CS102	Python Programming	6	4	1	-	1	5	3	25	75	100
		Core Practical- I	P23CS103P	Python Programming Lab - Practical I	6	-	-	6	-	3	3	25	75	100
	Part B(i)	Elective Course- I	P23CSE11A/ P23CSE11B/ P23CSE11C	Mobile Computing/ Soft Computing/ Web Technologies	5	5	-	-	-	3	3	25	75	100
		Elective Course- II	P23CSE12A/ P23CSE12B/ P23CSE12C	Internet of Things/ Theory of Computation/ Digital Image Processing	5	4	1	-	-	3	3	25	75	100
	Part B(ii)	Non Major Elective-I	P23NMECS11	Data Mining	2	2	-	-	-	2	3	25	75	100
				TOTAL	**30**	**19**	**3**	**6**	**2**	**21**	**-**	**-**	**-**	**600**
II	Part A	Core Course –III	P23CS204	Design and Analysis of Algorithms	6	4	1	-	1	5	3	25	75	100
		Core Course –IV	P23CS205	Compiler Design	6	4	1	-	1	5	3	25	75	100
		Core Practical- II	P23CS206P	Design and Analysis of Algorithms Lab -Practical II	6	-	-	6	-	3	3	25	75	100
	Part B(i)	Elective Course -III	P23CSE23A/ P23CSE23B/ P23CSE23C	Cryptography and Network Security/ Network Protocols/ Computer Vision	5	5	-	-	-	3	3	25	75	100
		Elective Course -IV	P23CSE24A/ P23CSE24B/ P23CSE24C	Embedded Systems / Social Networking /Software Development Technologies	5	4	1	-	-	3	3	25	75	100
	Part B (ii)	Non Major Elective-II	P23NMECS22	Cloud Computing	2	2	-	-	-	2	3	25	75	100
	Part B(iii)	Internship/Industrial Activity			-	-	-	-	-	-	-	-	-	-
				TOTAL	**30**	**19**	**3**	**6**	**2**	**21**	-	-	-	**600**

Sem	Part	Course	Course Code	Title of the Paper	Ins. Hours/ Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
III	Part A	Core Course–V	P23CS307	J2EE Technologies	6	4	1	-	1	5	3	25	75	100
		Core Course-VI	P23CS308	Data Mining and Warehousing	6	4	1	-	1	5	3	25	75	100
		Core Practical- III	P23CS309P	J2EE Technologies Lab-Practical III	6	-	-	6	-	3	3	25	75	100
		Core Industry Module	P23CSI31	Data Analytics	5	4	1	-	-	3	3	25	75	100
	Part B(i)	Elective Course- V	P23CSE35A / P23CSE35B / P23CSE35C	Research Methodology / Data Engineering and Management/ Architecture and Framework	5	4	1	-	-	3	3	25	75	100
	Part B (ii)	Skill Enhancement Course	P23SECS31	Animation in Flash	2	2	-	-	-	2	3	25	75	100
	Part B (iii)	Internship/Industrial Visit			-	-	-	-	-	2	-	-	-	-
				TOTAL	**30**	**18**	**4**	**6**	**2**	**23**	**-**	**-**	-	**600**
IV	Part A	Core Course –VII	P23CS410	Advanced Machine Learning Technologies	5	4	1	-	-	5	3	25	75	100
		Core Course –VIII	P23CS411	Software Engineering	5	4	1	-	-	5	3	25	75	100
		Core Practical – IV	P23CS412P	Data Mining Lab-Practical IV	6	-	-	6	-	3	3	25	75	100
		Core Project	P23CSPW	Project with Viva Voce	8	-	2	6	-	7	3	25	75	100
	Part B(i)	Elective Course–VI (Industry/ Entrepreneurship)	P23CSE46A / P23CSE46B / P23CSE46C	Cloud Computing Technologies / Dot Net Technologies / Block ChainTechnologies	4	3	1	-	-	3	3	25	75	100
	Part B (ii)	Professional Competency Course	P23PCCS41	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 Course 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 / Industrial Visit	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	P23NMECS11	Data Mining
II		NME-II	P23NMECS22	Cloud Computing

SEMESTER III

Semester: III–CC-V - J2EE TECHNOLOGIES

Ins. Hrs. /Week: 6 **Course Credit: 5** **Course Code: P23CS307**

UNIT I CLIENT – SERVER ARCHITECTURE (18 Hours)

Introduction – Distributive Systems – Real Time Transmission – Software objects – Web Services –The Tier – Client, Resources and Components – Accessing Services - J2EE Multi-Tier Architecture– J2EE Best Practices – Clients – Client Presentation – Client Input Validation- Client Control- Duplicate Client Request- Session Management- Client-side Session State – Server-side Session State.

UNIT II PRESENTATION SERVICES (18 Hours)

Java and XML – Generating an XML Document – Parsing XML- Document Object model (DOM)- Simple API for XML (SAX)- Java Servlets – Java Servlets and Common Gateway Interface Programming-Benefits of Using a Java Servlet – A Simple Java Servlet- Anatomy of a Java servlet - Java Server Pages-JSP Installation – JSP Tags – Tomcat – Request String-User Sessions – Cookies – Session Objects.

UNIT III INTERACTION SERVICES (18 Hours)

Enterprise Java Beans – EJB Container – EJB Classes – EJB Interfaces - Deployment Descriptors – Session Java Bean – Stateless Vs Stateful – Creating a Session Java Bean - Entity Java Bean – Message Driven Bean – The JAR File -Java Mail – Java Remote Method Invocation – Remote method Invocation Concept- Server Side – Client Side.

UNIT IV SECURITY SERVICES (18 Hours)

Java Message Service – JMS Fundamentals – Components of a JMS Program – Messages – Message Selector – Sending Message to a Queue – Receiving Message from a Queue – Compiling and Running Queue Programs – Creating a Publisher – Creating a Subscriber – Security – J2EE Security Concepts– JVM Security – Security Management – Java API Security – Browser Security – Web Services Security-Web Services Security Classifications – Security Within a WebServices Tier- Programmatic Security.

UNIT V J2EE DATABASES (18 Hours)

J2EE Database Concepts – Data – Database – JDBC Objects – Database Connection – The Connection– Timeout - JDBC and Embedded SQL – Tables – Inserting Data into Tables – Selecting Data from a Table – Updating Tables – Deleting Data from Table.

Total Lecture Hours-90

COURSE OUTCOMES

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

1. Develop own Web applications with various available resources
2. Understand different open-source frameworks
3. Evaluate Java Runtime Environment and Java Virtual Machine
4. Familiarize the concept of J2EE Architecture and Specifications
5. Effectively use J2EE Databases

TEXT BOOK(S)

1. James Holmes, "The Complete References Struts Second Edition", Tata McGraw Hill Edition, India, 2007.
2. Jim Keogh, "The Complete Reference J2EE", Tata McGraw – Hill Edition, India, 2002.

REFERENCE BOOK(S)

1. Jusin Couch, Daniel H. Steinberg, "J2EE Bible", Wiley India (P) Ltd, New Delhi, 2002.
2. Paul Tremblett, "Instant Enterprise Java Y-Beans", Tata McGraw Hill Publishing Company, NewDelhi, 2001.
3. Rick Cattell, "J2ee Technology in Practice: Building Business Applications with the Java 2Platform", Enterprise Edition (Enterprise), Addison-Wesley Professional, Bostan, USA, 2001.

E_RESOURCES

1. http://ptgmedia.pearsoncmg.com/imprint_downloads/informit/sun/032124575X.pdf
2. https://www.lnjpitchapra.in/wp-content/uploads/2020/03/file_5e817ee54956f.pdf
3. https://people.engr.ncsu.edu/efg/517/f02/common/syllabus/lectures/lec21.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	2	3	3	3	3	3	2	2	3	3	3	3	3	3	3	2	2
CO2	3	2	3	2	2	3	3	3	2	2	2	3	2	3	3	2	3
CO3	3	3	2	3	3	3	3	2	3	2	2	2	2	3	3	3	2
CO4	3	2	3	2	3	2	3	3	2	2	2	3	3	3	2	3	3
CO5	3	3	2	3	3	3	2	2	3	3	3	2	3	2	2	2	2

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

Semester: III–CC-VI - DATA MINING AND WAREHOUSING

Ins. Hrs. /Week: 6 **Course Credit**: **5** **Course Code: P23CS308**

UNIT-I INTRODUCTION TO DATA MINING (20 Hours)

Overview of Data mining–Relational Databases-Data Warehouses–Transactional Databases-KDD vs Data Mining – Data Mining Functionalities–Classification of Data mining System-Basic Data mining tasks–Data Mining Issues. **Applications and Trends in Data Mining:** Data Mining Applications – Data Mining System Products and Research Prototypes –Additional Themes on Data mining–Social Implications of Data Mining.

UNIT-II DATA PREPROCESSING (19 Hours)

Need to preprocess the Data–Descriptive Data Summarization – Data Cleaning- Data Integration and Transformation – Data Reduction – Data cube Aggregation – Attribute Subset Selection-Data Discretization and Concept Hierarchy Generation. **Classification**: Introduction–statistical based algorithms –Bayesian Classification – Distance Based Algorithms – Decision Tree Based algorithms – ID3.

UNIT-III CLUSTERING (18 Hours)

Introduction – A Categorization of Major Clustering Methods – Hierarchical algorithms – Partitional algorithms – Minimum spanning Tree – K Means Clustering - Nearest Neighbour algorithm. **Association Rules:** Definition of Association rule – Methods to discover an association rule–Mining Various kinds of Association Rules – APRIORI algorithm– Partitioning algorithm.

UNIT-IV DATA WAREHOUSE AND OLAP TECHNOLOGY (17 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 – Metadata Repository – Types of OLAP Servers - Data Warehouse Implementation–Efficient Computation of Data Cubes-Indexing OLAP Data- Efficient Processing of OLAP Queries – From Data Warehousing to Data Mining – Data Warehouse Usage.

UNIT-V WEB MINING AND TEXT MINING (16 Hours)

Web Mining: Mining the Web Page Layout Services – Mining the Web's Linking Structures toidentifyAuthoritativeWebpages–MiningMultimediaDataontheWeb–AutomaticClassification of Web Documents- Web usage mining. **Text Mining:** Text Data Analysis and Information Retrieval – Dimensionality Reduction for Text– Text Mining Approaches.

Total Lecture Hours - 90

COURSE OUTCOMES

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

1. Understand the various techniques of Data Mining
2. Apply the usage of data preprocessing techniques
3. Implement the Concept of Clustering Algorithm in the real world problems
4. Apply the Association rule and APRIORI algorithm for mining frequent item sets
5. Interpret the concept of data warehouse Architecture, different types of OLAP servers and Web Mining and Text Mining

TEXTBOOK(S)

1. Jiawei Han and Miceline Kamber, "DataMining Concepts and Techniques", Morgan Kaulmann Publishers, Massachusetts, USA.x, 2006
2. Margaret Dunham.H, ,"Datamining Introductory & Advanced Topics", Pearson Education,India, 2003.

REFERENCEBOOK(S)

1. ArunPujari.K ,"Datamining Techniques", Universities Press(India) Pvt, Hyderabad, 2003
2. MaxBramer, "Principlesofdatamining",Springer4thEdition,NewYork,USA,2020
3. PieterAdriaans,DolfZantinge,"DataMining"PearsonEducation,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 OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	2	3	2	2	2	3	3	3	2	3	3	2	2	3	2	3
CO2	2	3	2	3	3	3	2	2	3	3	2	3	3	3	3	3	2
CO3	3	3	2	3	3	3	2	2	2	3	3	3	3	3	3	3	2
CO4	2	3	2	3	3	3	2	2	2	3	2	3	3	3	3	3	2
CO5	3	2	3	2	2	3	3	3	3	2	3	3	2	2	2	2	3

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

Semester: III–CP-III - J2EE TECHNOLOGIES LAB -PRACTICAL III

Ins. Hrs. /Week: 6 **Course Credit: 3** **Course Code: P23CS309P**

EXERCISES

1. To find the marks of the students using Remote Method Invocations.
2. To write a Servlet program to calculate the bonus of an employee
3. To write a Servlet program to implement Session Tracking.
4. To write a Servlet program to check authentication for user using Cookies.
5. To write a Servlet program and use JDBC in it.
6. To write a simple program for JSP.
7. To write a JSP program that works with JDBC.
8. To write a JSP Program with Bean Class.
9. To write a EJB Stateless Program to create bonus of an employee.

COURSE OUTCOMES

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

1. To master the whole process of designing, implementing, and deploying J2EE Applications.
2. To implement and access web service components using EJB in java EE Applications.
3. To understand the concept of Servlet.
4. To know about the concept of Core Java.
5. Understanding different open source formats

TEXT BOOK(S)

1. James Holmes, "The Complete References Struts Second Edition", Tata McGraw Hill Edition, India, 2007.
2. Jim Keogh, "The Complete Reference J2EE", Tata McGraw – Hill Edition, India, 2002.

REFERENCE BOOK(S)

1. Jusin Couch, Daniel H. Steinberg, "J2EE Bible", Wiley India (P) Ltd, New Delhi, 2002.
2. Paul Tremblett, "Instant Enterprise Java Y-Beans", Tata McGraw Hill Publishing Company, NewDelhi, 2001.
3. Rick Cattell, "J2ee Technology in Practice: Building Business Applications with the Java 2Platform", Enterprise Edition (Enterprise), Addison-Wesley Professional, Bostan, USA, 2001.

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	2	3	3	3	2	2	2	3	3	3	2	2
CO2	2	3	2	3	3	3	2	2	3	3	3	2	3	3	3	3	2
CO3	3	3	2	3	3	3	2	2	2	3	3	3	3	3	3	3	3
CO4	2	3	2	3	3	3	2	2	2	3	3	3	2	2	2	3	3
CO5	3	2	3	2	2	3	3	3	3	2	2	3	2	2	2	2	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 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: III– Core IndustryModule - DATA ANALYTICS

Ins. Hrs. /Week: 5 **Course Credit: 3** **Course Code: P23CSI31**

UNIT I TYPES OF DIGITAL DATA (15 Hours)

Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment.

UNIT II DATA ANALYTICS (15 Hours)

Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment.

UNIT III BIG DATA TECHNOLOGIES AND DATABASES (15 Hours)

Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache Cassandra and its needs, Characteristics of Cassandra.

UNIT IV HADOOP FOUNDATION FOR ANALYTICS (15 Hours)

History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop Architectures.

UNIT V HADOOP MAPREDUCE AND YARN FRAMEWORK (15 Hours)

Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats.

Total Lecture Hours-75

COURSE OUTCOMES

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

1. Outline the basics in Big Data Analytics
2. Interpret and demonstrate the knowledge of data analysis techniques
3. Understand, illustrate and evaluate the concepts and techniques of Data Science, Big DataAnalytics and its tools
4. Collaborate, apply and review the computing for big data in Hadoop, and NoSQL environment
5. Comprehend, implement and review the concepts of data science and big data analytics projects using MapReduce, MongoDB, HIVE and PIG

TEXT BOOK(S)

1. Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016

REFERENCE BOOK(S)

1. Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, “Mining of Massive Datasets”, Springer, July 2013.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, “Big Data”, Wiley Publications, 2014.
3. Soumendra Mohanty, MadhuJagadeesh and Harsha Srivatsa, “Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics”, Apress Media, Springer Science + Business Media New York, 2013
4. Tom White,“Hadoop: The definitive Guide”, O'Reilly Media, 2010.

E- RESOURCES

1. http://www.thearling.com/text/dmwhite/dmwhite.htm
2. http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=AD0770256
3. https://www.datamentor.io/r - programming#tutorial
4. http://www.csis.pace.edu/~ctappert/cs816- 15fall/books/2015DataScience&BigDataAnalytics.pdf
5. http://www.rdatamining.com/
6. https://www.analyticsvidhya.com/blog/2016/02/complete - tutorial - learn - data - science -scratch/
7. https://www.tutorialspoint.com/data_mining/dm_classification_prediction.htm (Classification)

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	3	2	2	3	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	2
CO3	3	2	3	3	2	2	3	3	3	3	2	3	2	2	2	2	3
CO4	3	3	3	3	3	3	2	2	3	2	3	2	3	3	3	3	2
CO5	3	3	3	3	3	3	3	2	3	3	3	2	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 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: III–EC-V(a) – RESEARCH METHODOLOGY

Ins. Hrs. /Week: 5 **Course Credit : 3** **Course Code: P23CSE35A**

UNIT-I RESEARCH FUNDAMENTALS (14 Hours)

Motivation and Objectives – Research Methods and Methodology - Research types – Descriptive Vs Analytical, Applied Vs Fundamental, Quantitative Vs Qualitative, Conceptual Vs Empirical, concept of applied and Basic research process – Criteria of good Research.

UNIT-II RESEARCH FORMULATION AND PROBLEMS (16 Hours)

Defining and formulating the Research problem – Selecting the problem – Necessity of defining the problem – Importance of Literature review in defining a problem – Literature collection - Literature review – Primary and secondary sources – Reviews – Monograph – Patents – Research Databases – Web as a source – Searching the web – Critical literature review – Identifying gap areas from literature and research database, Development of working hypothesis.

UNIT-III THESIS WRITING (14 Hours)

Writing review and journal articles – manuscript publication - **Thesis Writing**: Planning a thesis – general format – page and chapter format – footnotes – tables and figures–references and appendices. Research Tools in Computer Science: LaTex, R, WEKA, MATLAB, NS2.

UNIT-IV RESEARCH ETHICS (16 Hours)

Philosophy - Definition, nature, scope and concept - Ethics – definition, moral philosophy, nature of moral judgments and reactions - Ethics with respect to science and research- Scientific misconducts– falsification, fabrication and plagiarism software – Turnitin, Urkund and other open source software tools - Redundant publications-duplicate and overlapping publications - Publication ethics- definition and importance. Publication miscount-definition, concept, problems that lead to unethical behavior, types, Violation of publication ethics, authorship and contributor ship - Software tool to identify predatory publications developed by SPPU - Subject specific ethical issues-authorship, Conflicts of interest.

UNIT-V ETHICS IN INFORMATION TECHNOLOGY (15 Hours)

Overview of Ethics: Definition of Ethics - The Importance of Integrity - The Difference Between Morals, Ethics, and Laws - Ethics in the Business World - Corporate Social - Improving Corporate Ethics Creating an Ethical Work Environment - Ethics in Information Technology – **Ethics for IT Workers and IT users**: IT Professionals - Professional Relationships - Professional Codes of Ethics - Professional Organizations.

Total Lecture Hours - 75

COURSE OUTCOMES

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

1. Understand the basic concepts of research and its types
2. Analyze the research problems in the real world scenario
3. Understand scholarly writing and development of the skills to write the same
4. Use tools related to research in Computer Science and art of thesis writing
5. Apply the research ethics and publication ethics in Information technology to justify the morals of professional ethics

TEXT BOOK(S)

1. Garg B.L.Karadia, R.Agarwal, F and Agarwal, "An Introduction to Research Methodology" RBSA Publishers, U.K., 2002
2. George Reynolds, "Ehics in Information Technology" Thompson Course Technology, 2007 ISBN 13:978-1-4188-3631-3(Chapter:1,2,10)
3. Kothari C.R. Research Methodology – methods and techniques, 2 nd Edition,Wishwa Prakashjan NewDelhi, 1999.
4. Sinha.S.C, and Dhiman A.K, , " Research Methodology", Ess Ess Publications- Second Volume, 2002.
5. Trochim W.M.K, "Research Methods: the concise knowledgebase", Atomic Dog Publishing,2005.

REFERENCE BOOK(S)

1. Anderson, Durston and Poole, 'Thesis and Assignment writing', Wiley Eastern Ltd.ND, 1970.
2. Misra R.P. Research Methodology–A Hand Book, Concept publishing Company, NewDelhi, 1988.

E_RESOURCES

1. https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf
2. https://repository.dinus.ac.id/docs/ajar/ethics_in_information_technology2c_5th_ed._0 3. _.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	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	3
CO2	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO3	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	3
CO4	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	3
CO5	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2

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

Semester: III–EC-V(b) - DATA ENGINEERING AND MANAGEMENT

Ins. Hrs. /Week: 5 **Course Credit: 3** **Course Code: P23CSE35B**

UNIT-I DATABASE DEVELOPMENT (15 Hours)

Database architecture of an information system - Overview of the database development process - Conceptual data modeling - Relational data analysis-Roles of a data model - Physical database design. DATA MANAGEMENT: Problems encountered without data management-Data management responsibilities-Data management activities-Roles within data management-Benefits of data management-Relationship between data management and enterprise

UNIT-II CORPORATE DATA MODELLING (15 Hours)

Need for a corporate data model-Nature of a corporate data model- Develop a corporate data model - Corporate data model principles. DATA DEFINITION AND NAMING: Elements of a data definition-Data naming conventions. DATA QUALITY: Issues associated with poor data quality - Causes of poor data quality-Dimensions of data quality-Data model quality-Improving data quality. DATA ACCESSIBILITY: Data security - Data integrity-Data recovery

UNIT-III USE OF PACKAGED APPLICATION SOFTWARE, DATABASES (15 Hours)

Application software packages - Impact on data management. DISTRIBUTED DATA AND DATABASES: Rationale for distributing data - Perfect distributed database system - Top down fragmentation and partitioning. Bottom up integration -The management of replication. BUSINESS INTELLIGENCE: Data warehousing - Multidimensional model of data - Standard reporting tools-Online analytical processing OLAP-Relational schema for a data warehouse.

UNIT-IV CRM and ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (15 Hours)

Three main pillars of CRM - GETTING TO KNOW YOUR CUSTOMER: 360-degree client view. UTILIZING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN YOUR CRM STRATEGY: Evolution of AI - Current state of AI-Teaming up AI with people-Applying AI to your CRM solution-ethical aspects of AI-An example of AI in CRM processes.

UNIT-V CLOUD VERSUS ON PREMISE VERSUS HYBRID (15 Hours)

Factors influencing vendor selection - Hybrid deployment - Options. CRM DIFFERENTIATORS: It's not about the feature list; it's about the ecosystem-Fourth industrial revolution and CRM-AI and smart cloud-To cloud or not to cloud-Leveraging smart cloud into CRM-Big data-Social selling and advertising-Implementation tools-Sustainable CRM platform.

Total Lecture Hours-75

COURSE OUTCOMES

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

1. Comprehend the Data Management concepts and analyse the relationship with the enterprise
2. Analyze Data Modelling concepts and assess its quality
3. Understand and implement business modelling techniques
4. Evaluate the use of Artificial Intelligence and Machine Learning in CRM
5. Develop CRM applications in cloud

TEXT BOOK(S)

1. Keith Gordon, "Principles of Data Management Facilitating Information Sharing", BCS Learning, 2013. (Chapters:1-5, 7,8,12,13,14)
2. Max Fatouretchi, "The Art of CRM", Packt Publishing, 2019.(Chapters: 1,2,5,8,9)

REFERENCE BOOK(S)

1. Francis Buttle, Stan Maklan, Customer Relationship Management Concepts and Technologies, Routledge, 2019.
2. Peter Ghavami, "Big Data Management_ Data Governance Principles for Big Data Analytics", De Gruyter, 2020.

E-RESOURCES

1. https://www.oreilly.com/library/view/implementing-a-smart/9781491983492/ch04.html
2. https://github.com/letthedataconfess/Data-Engineering-Books/blob/main/Book-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
CO1	3	3	3	3	3	3	3	2	3	3	2	3	3	3	2	3	3
CO2	2	3	2	3	2	3	2	3	2	2	3	2	3	2	3	3	2
CO3	3	2	3	2	3	2	3	3	3	3	3	3	3	3	3	2	3
CO4	2	3	2	3	2	3	2	3	3	2	3	2	2	2	3	3	2
CO5	3	2	3	2	3	3	3	2	2	3	2	3	3	3	2	2	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 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: III–EC-V(c) - ARCHITECTURE AND FRAMEWORK

Ins. Hrs. /Week: 5 **Course Credit: 3** **Course Code: P23CSE35C**

UNIT – I INTRODUCTION (15 Hours)

Software architecture introduction – Importance of Software architecture –Software architecture consumers – Architect role - software architecture in an organization – Types of software architects – Software development methodologies – Project management – Office politics – Software risk management – Configuration management – Software product lines

UNIT – II DOMAIN KNOWLEDGE AND SOFTWARE QUALITY ATTRIBUTE (15 Hours)

Domain Knowledge – Developing business acumen – Domain-driven design – requirement engineering – requirement elicitation –Software Quality attributes: Maintainability – Usability – Availability – Portability – Interoperability - Testability

UNIT – III SOFTWARE ARCHITECTURES DESIGN (15 Hours)

Software Architectures design – Importance - Top-down Versus bottom-up design approaches – Architectural drivers – Documenting the Software architecture design – Systematic approach - Attribute-driven design – Microsoft's technique for architecture and design –Architecture-centric design method – Architecture development method – Tracking the progress of the software architecture's design.

UNIT – IV ORTHOGONAL SOFTWARE SYSTEMS (15 Hours)

Designing orthogonal software systems – Minimizing complexity – SOLID design principles – Software architecture patterns – layered – Event-driven architecture – Model-View patterns – Service-oriented architecture

UNIT – V MODERN APPLICATIONS (15 Hours)

Architecting Modern Applications.- Importance of Performance – Performance improvement - Server side caching – Web application performance – Database performance -Securing software systems – Threat modelling – Secure by design

Total Lecture Hours-75

COURSE OUTCOMES

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

1. Understand the purpose of Software architecture and development methodologies with consideration of risk management
2. Comprehend the domain knowledge for software development process and determine the impact of quality attributes.
3. Examine the systematic approach for various software design models with effective document process

4. Illustrate and summarize the functions of orthogonal systems with complexity, design principles and design pattern for software architecture
5. Evaluate the performance and security measures for Server, Web and Database applications in order to create the secure software systems for various domain applications

TEXT BOOK(S)

1. Joseph Ingeno, "Software Architect's Handbook" Packt Publishing 2018.

REFERENCE BOOK(S)

1. Ian Gorton, "Essential Software architecture", Second Edition, Springer, 2011.
2. Len Bass, Paul Clements and Rick Kazman, "Software architecture in practice", Third edition, Addison-Wesley, 2013.
3. Oliver Vogel, Indo Arnold, ArifChughtai and TImoKehrer, "Software Architecture" Springer- Verlag, 2011.

E-RESOURCES

1. https://cloud.ibm.com/docs/architecture-framework?topic=architecture-framework-intro
2. https://www.infoq.com/articles/frameworks-require-decisions/

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	3	3	3	3	3	2	3	2	2	3
CO2	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO3	3	3	3	3	3	2	3	2	2	3	3	3	2	3	2	2	3
CO4	3	2	3	2	3	3	3	3	3	3	2	3	3	3	2	3	3
CO5	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2

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

Semester: III – SEC - ANIMATION IN FLASH

Ins. Hrs. /Week: 2 **Course Credit: 2** **Course Code: P23SECS31**

UNIT I INTRODUCTION (6 Hours)

Introduction: Computer Animation - Macromedia flash - History of Macromedia flash - Bitmap Graphics - Vector Graphics.

UNIT II CREATING, MODIFYING, SAVING AND OPENING FLASH DOCUMENT (6 Hours)

Function of the start page - Parts of the macromedia flash screen - Different elements of the macro media flash - Creating flash document - Modifying document properties - Saving the flash document - Opening an Existing flash document.

UNIT III DRAWING AND PAINTING OBJECTS (6 Hours)

Drawing and Painting Objects: Drawing lines - using the Line , Pencil and Pen Tool - Creating shapes - Using Rectangle , oval , polystar , brush - color modes , color tool , Color mixer panel and working with gradient.

UNIT IV USING TOOLS (6 Hours)

Ink bottle tool, Eye dropper tool, drawing modes - Using the selection tools, Transforming objects - Eraser tools - Align panel - Changing the stacking order.

UNIT V USING TEXT AND OBJECTS (6 Hours)

Using Text - Types of text - Adding text - Formatting text - Converting text into shapes - Moving objects, copying objects and Grouping objects.

Total Lecture Hours-30

COURSE OUTCOMES

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

1. Apply animation and drawing through different tools
2. Enhance the features of frame and object properties
3. Implement the properties such as position, size and rotation for an instance
4. Enhance the creativity and designing Techniques
5. Create animation using scripting

TEXT BOOK(S)

1. Russell Chun, "Adobe Flash Professional CC" , Adobe press , Pearson Education 2014

REFERENCE BOOK(S)

1. Aaron pedersen , James polanco, Doug Winnie, "Adobe Flash platform from start to finish", Adobe press, 2010

E-RESOURCES

1. https://ptgmedia.pearsoncmg.com/images/9780133927108/samplepages/9780133927108.pdf
2. https://ptgmedia.pearsoncmg.com/images/9780321680716/samplepages/0321680715.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	2	3	2	3	3	3	2	3	3	2	3	2	3	2	3	3	2
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	2	3	2	3	3	3	2	3	3	2	3	2	3	2	3	3	2
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	2	3	2	3	3	3	2	3	3	2	3	2	3	2	3	3	2

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

Semester: III– VAC –II - CYBER CRIME AND SECURITY

Course Credit: 2 **Course Code: P23CSVA32**

UNIT I INTRODUCTION

Cyber Crime- Overview, Internal and External Attacks, Attack Vectors. Cybercrimes against Individuals – E-mail spoofing and online frauds, Phishing and its forms, Spamming, Cyber-Defamation, Cyberstalking, Cyber Bullying and harassment, Computer Sabotage, Pornographic offenses, Password Sniffing. Keyloggers and Screenloggers

UNIT II CYBER CRIME IN ORGANIZATION

Cybercrime against organization – Unauthorized access of computer, Password Sniffing, Denial-of-service (DOS) attack, Backdoors and Malwares and its types, E-mail Bombing, Salami Attack, Software Piracy, Industrial Espionage, Intruder attacks.

UNIT III SECURITY POLICIES

Security policies violations, Crimes related to Social Media, ATM, Online and Banking Frauds - Intellectual Property Frauds - Cyber Crimes against Women and Children.

UNIT IV CYBER ATTACKS

A global perspective on cybercrimes, Phases of cyber attack – Reconnaissance, Passive Attacks, Active Attacks, Scanning, Gaining Access, Maintaining Access, Lateral movement and Covering Tracks. Detection Avoidance, Types of Attack vectors, Zero-day attack, Overview of Network based attacks.

UNIT V TOOLS IN CYBERCRIME

Cybercrime and cloud computing, Different types of tools used in cybercrime, Password Cracking – Online attacks, Offline attacks, Remote attacks, Random Passwords, Strong and weak passwords - Viruses and its types - Ransomware and Cryptocurrencies.

COURSE OUTCOMES

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

1. Understand the foundations and importance of Cybercrime.
2. Analyze the cybercrime against organization.
3. Describe the security policies.
4. Assess the various attacks on Cybercrime.
5. Understand the tools used in Cybercrime.

TEXT BOOK(S)

1. Nina Godbole and Sunit Belapore; “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley Publications, 2011.
2. Shon Harris, “All in One CISSP, Exam Guide”, Sixth Edition, McGraw Hill, 2013.

REFERENCE BOOK(S)

1. Atul Jain; “Cyber Crime: Issues, Threats and Management”, 2004.
2. Bill Nelson, Amelia Phillips and Christopher Steuart; “Guide to Computer Forensics and Investigations”3 rd Edition, Cengage, 2010 BBS.
3. Majid Yar; “Cybercrime and Society”, Sage Publications, 2006.
4. Michael E Whiteman and Herbert J Mattord; “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003. 8. Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2002.
5. William Stallings; “Cryptography and Network Security: Principles and Practices”, Fifth Edition, Prentice Hall Publication Inc., 2007.

E-RESOURCES

1. https://vikaspedia.in/education/digital-litercy/information-security/cyber-laws
2. https://www.educba.com/cyber-law/
3. https://www.geeksforgeeks.org/cyber-law-it-law-in-india/

SEMESTER IV

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: IV – CC -VII - ADVANCED MACHINE LEARNING TECHNOLOGIES

Ins. Hrs. /Week: 5 **Course Credit: 5** **Course Code: P23CS410**

UNIT-I INTRODUCTION TO MACHINE LEARNING (20 Hours)

Introduction to Machine Learning-Origins of Machine Learning-Uses of Machine Learning-Machine Learning Ethics-How Machine Learn-Data Storage- Abstraction-Generalization-Evaluation-Types of Input Data-**Managing and Understanding Data:** R Data Structures-Vectors-Factors-Lists-Data Frames-Matrices and arrays-**Exploring and Understanding Data:** Exploring the structure of data-Exploring Numeric Variables-Exploring Categorial Variables-Exploring relationship between variables.

UNIT-II SUPERVISED AND UNSUPERVISED LEARNING (20 Hours)

Supervised machine learning-Working and steps of supervised learning-Regression analysis-Simple and Multiple linear regression-Classification algorithms in machine learning**- Linear Models:** Logistic Regression-Support Vector Machines-Naïve Bayes Classifier-**Non-Linear Models:** K-Nearest Neighbours- Naïve Bayes- Random Forest Classification-Working of Unsupervised Learning-K-means Clustering-Apriori algorithm-Hierarchical Clustering.

UNIT-III ARTIFICIAL NEURAL NETWORKS (20 Hours)

Introduction to Artificial Neural Networks-Understanding neural networks from Biological to Artificial Neurons-Architecture of Artificial Neural Network-Working of artificial neural networks-**Convolutional Neural Networks(CNN):** Structure of Convolutional Neural Network-Components of CNN Architecture-Convolutional Layer-Pooling Layer-**Recurrent Neural Network:** Fully Recurrent Network-Elman Neural Networks-Training RNNs with Back-Propagation Through Time (BPPT)- Deep Belief Networks.

UNIT-IV INTRODUCTION TO DEEP LEARNING (15 Hours)

Introduction to Deep Learning-Deep Learning Models-Single Layer Perceptron Model(SLP)-Multilayer Perceptron Model(MLP)- Restricted Boltzmann Machines (RBMs)-Genetic Algorithm in machine learning-Working of Genetic Algorithm-Difference between Traditional algorithm and genetic algorithm-**Other Local Search Methods:** Hill Climbing search methods-Stimulated Annealing(SA)-Steepest Ascent Hill Climbing.

UNIT-V EXAMPLE PROBLEMS OF MACHINE LEARNING (15 Hours)

Apply KNN Algorithm for Diagnosing Breast Cancer- Apply Naïve Bayes Algorithm for filtering Mobile Phone Spam-Apply Classification Rules for Identifying Poisonous

Mushrooms with Rule Learners-Finding Groups of Data and Clustering with K-Means Algorithm for clustering Finding teen market segments using k-means Clustering.

Total Lecture Hours-90

COURSE OUTCOMES

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

1. Understand about basic concepts of machine learning techniques.
2. Analyse the supervised and unsupervised learning algorithms.
3. Apply the basic concepts of Artificial Neural Networks.
4. Implement the basic concepts of Deep Learning and local search methods.
5. Apply the machine learning algorithm and apply the algorithm to a problem and make a prediction.

TEXT BOOK(S)

1. Brett Lantz, "Machine Learning with R: Expert techniques for predictive modeling", 3rd Edition, April 2019.
2. Taweh Beysolow, "Introduction to Deep Learning Using R: A Step-by-Step Guide to Learning and Implementing Deep Learning Models Using R", San Francisco, California, USA, 2017.

REFERENCE BOOK(S)

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.
2. Daniel T. Larose, Chantal D. Larose, "Data mining and Predictive analytics", Second Ed., Wiley Publication, 2015.
3. Jason Bell, "Machine Learning: Hands-On for Developers and Technical Professionals", Wiley Publication, 2015.

E_RESOURCES

1. https://rb.gy/2x75x
2. https://rb.gy/xpd7p
3. https://rb.gy/m7rcf

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	2	3	2	2	3	2	3	2	3	2	2	3
CO2	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	3
CO3	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO4	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
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)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: IV – CC -VIII – SOFTWARE ENGINEERING

Ins. Hrs. /Week: 5 **Course Credit: 5** **Course Code: P23CS411**

UNIT I NEED FOR S/W ENGINEERING (19 Hours)

About software and S/w engineering – A systems approach – Engineering approach – Members of the development team – Change in S/w engineering. - Modeling the process and Life cycle: The meaning of process – S/w process models– Tools and techniques for projects modeling – Practical process modeling.

UNIT II PLANNING AND MANAGING THE PROCESS (20 Hours)

Tracking progress -Milestones-Difference between milestone and activity- Work breakdown and Activity Graphs- Activity Graph- Estimating completion- Tools to track progress-Project personnel : Staff roles and characteristics- Work styles- Rational extroverts- Project Organization: Chief programmer team- Egoless Approach-Effort estimation: Facilities Expert Judgement- Delphi Technique- Algorithmic Methods- COCOMO Model- Machine learning methods - Risk management: Risk Management Activities -The project plan-process models and project management.

UNIT III CAPTURING THE REQUIREMENTS (17 Hours)

The requirement process – Types of Requirements – Characteristics of requirements – Modeling Notations-Prototyping requirements – Requirements Documentation –validation and verification – Measuring requirements – Choosing a requirements specification Techniques.

UNIT IV DESIGNING THE SYSTEM (17 Hours)

Design Introduction - Modeling the Architectures-Decomposition and views – Architectural styles and strategies – Achieving Quality Attributes-Collaborative Design - Architectural Evaluation and Refinement - Documenting software Architectures – Programming standards and procedures – Programming guidelines – Documentation.

UNIT V SOFTWARE TESTING AND MAINTENANCE (17 Hours)

Testing strategic issues – Test strategies for conventional S/w – Test strategies for object-oriented S/w – Validation testing – System testing – S/w testing. Fundamentals – Black-box and White-box testing – White box testing – Black box testing – Mccall's Quality factors – ISO 9126 - QF– S/w engineering – S/w Maintenance.

Total Lecture Hours-90

COURSE OUTCOMES

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

1. Describe software engineering layered technology and Process frame work
2. Analyze the role of project management including planning, scheduling, risk management, etc.
3. Analyze implementation issues such as modularity and coding standards.
4. Understand of approaches to verification and validation including static analysis, and reviews.
5. Understand of software testing approaches such as unit testing and integration testing.

TEXT BOOK(S)

1. Roger S. Pressman, "Software Engineering A Practitioner's Approach", 6th Edition, Tata Mc Graw Hill Publication, New Delhi, India. [(for Unit 5) Chapters : 13, 14, 15, 31]
2. Shari Lawrence P. Fleeger, 2001, "Software Engineering Theory and Practice", 2nd Edition, Pearson Education, Delhi. [(for Units 1–4) Chapters 1, 2, 3, 4, 5, 7]

REFERENCE BOOK(S)

1. Douglas Bell , "Software Engineering for Students-A Programming Approach", 4th Edition, Pearson Education, Delhi, 2007.
2. Ian Sommerville, "Software Engineering", 6th Edition, Pearson Education, Delhi, 2005.
3. Rajib Mall, "Fundamentals of Software Engineering",5 th Edition, PHIlearning, Delhi.

E_RESOURCES

1. https://books.google.com/books/about/Software_Engineering.html?id=fadQAAAAMAAJ
2. https://shorturl.at/guBF9
3. https://www.tutorialspoint.com/sdlc/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
CO1	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	3
CO2	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO3	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO4	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	3
CO5	3	3	3	2	3	3	3	2	3	3	3	3	3	3	2	2	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 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: IV – CP -IV – DATA MINING LAB - PRACTICAL IV

Ins. Hrs. /Week: 6 **Course Credit: 3** **Course Code: P23CS412P**

EXERCISE

1. Write a R program using Simple Commands.
2. Write a R program using Control Structures.
3. Write a calculator program using R.
4. Write a R Program to perform Data Preprocessing:
   a. Data type Conversion
   b. Data Transformation
5. Write a R Program to apply Filters:
   a. Replace Missing Values
   b. Add Expression
6. Regression: Perform Simple Regression using R Package
7. Classification: Apply Naïve Bayes Rule by using R Package.
8. Clustering: Apply Partitioned Algorithm by using R Package.
9. Clustering: Apply Hierarchical Algorithm by using R Package.
10. Association Rule Mining: A- Priori Algorithm by using R Package.

COURSE OUTCOMES

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

1. Understand to import external data into R for data processing and statistical analysis
2. Implement the R data structures – vector and data frame
3. Understand to compute basic summary statistics
4. Implement the data visualizations in the ggplot package
5. Evaluate the fundamental error problems in R Studio.

TEXT BOOK(S)

1. MargaretH.Dunham,"DataMining:IntroductoryandAdvancedTopics",Pearson education,2003
2. C.S.R. Prabhu, "Data Warehousing Concepts,Techniques, Productsand Applications", PHI, Second Edition

REFERENCE BOOK(S)

1. Arun K.Pujari,"Data Mining Techniques",Universities Press(India)Pvt. Ltd.,2003.
2. Alex Berson,Stephen J.Smith,"Data Warehousing, Data Mining and OLAP",TMCH, 2001.

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	2	3	2	3	2	3	2	2	3
CO2	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO3	3	2	3	3	3	2	3	2	2	3	2	3	2	3	2	2	3
CO4	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO5	3	2	3	2	3	2	3	2	2	3	2	3	2	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 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: IV–EC-VI(a) - CLOUD COMPUTING TECHNOLOGIES

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: P23CSE46A**

UNIT-I COMPUTING BASICS (15 Hours)

Introduction to Cloud computing definition- Characteristics of Cloud Computing- Cloud Models- Cloud Service Examples- Cloud based Services and Applications-Cloud concepts and Technologies.

UNIT-II CLOUD SERVICES AND PLATFORMS (15 Hours)

Compute Services - Storage Services - Cloud Database Services - Application Services – Content Delivery Services - Analytics Services - Deployment And Management Service - Identity and Access Management Services - Open Source Private Cloud Software.

UNIT-III CLOUD APPLICATION DESIGN AND DEVELOPMENT (15 Hours)

Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches – Application: Image Processing - Document Storage - Map Reduce - Social Media Analytics.

UNIT-IV PYTHON FOR CLOUD (15 Hours)

Introduction- Installing Python- Data types & Data Structures- Control Flow- Functions Modules- Packages- File Handling- Date/Time Operations – Classes- Python for Cloud: Amazon Web Services –Google Cloud Platform - Windows Azure –Map Reduced – Packages of Interest – Designing a RESTful Web API.

UNIT-V MULTIMEDIA CLOUD & CLOUD SECURITY (15 Hours)

Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols – Case Study: Video Transcoding App-Cloud Security: CSA Cloud Security Architecture – Authentication - Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Industry, Healthcare &Education.

Total Lecture Hours- 75

COURSE OUTCOMES

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

1. Understand the characteristics, Challenges, Computing Platforms, Models, Concepts and Technologies
2. Describe about Virtualization, Cloud Services and Platforms
3. Analyze the Cloud Application Design and Development
4. Analyze about Python for Cloud Mobile Cloud Computing
5. Describe the Big data analytics, Multimedia Cloud & Cloud Security

TEXT BOOK(S)

1. Arshdeep Bahga, Vijay Madisetti, "Cloud Computing: A Hands – On Approach" Universitiespress (India) Pvt. limited 2016.

REFERENCE BOOK(S)

1. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile,Security and More, Jones & Bartlett Learning, 2012.
2. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.
3. Michael Miller "Cloud Computing Web based application that change the way you work and collaborate online". Pearson edition, 2008.

E_RESOURCES

1. https://www.ripublication.com/aeee_spl/aeeev4n1spl_15.pdf (Cloud Computing Services and its Applications)
2. https://cloud.google.com/products/databases (Google Cloud based Databases)
3. https://www.ibm.com/blogs/cloud-computing/2013/10/15/social-media-analytics-as-saas-whats-in-it-for-asocial-dataanalyst/(Social Media Analytics as SaaS)
4. https://www.ibm.com/blogs/cloud-computing/2013/10/15/social-media-analytics-as-saas-whats-in-it-for-asocial dataanalyst/ (Social Media Analytics - II)

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	3	2	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	2	3	3	3	2	3	3	2	3	2	3	2	2	3
CO3	2	3	2	3	3	3	2	3	2	2	3	2	3	2	3	3	2
CO4	2	3	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2
CO5	3	2	3	3	2	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 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: IV–EC-VI(b) - DOT NET TECHNOLOGIES

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: P23CSE46B**

UNIT-I INTRODUCING C# (14 Hours)

Dot NET Framework - C# language - Visual Studio 2017 - Writing a C# Program: Visual Studio 2017 Development Environment - Console Applications - Desktop Applications - Variables and Expressions: Basic C# Syntax - Basic C# Console Application Structure - Variables - Expressions - Flow Control: Boolean Logic – Branching - Looping.

UNIT-II VARIABLES, FUNCTIONS AND OBJECT ORIENTED PROGRAMMING (15 Hours)

More About Variables: Type Conversion - Complex Variable Types - String Manipulation – Functions: Defining and Using Functions - Variable Scope - The Main Function - Struct Functions - Overloading Functions - Using Delegates - Debugging and Error Handling: Debugging in Visual Studio - Error Handling - Introduction to Object Oriented Programming: Object-Oriented Programming - OOP Techniques - OOP in Desktop Applications.

UNIT-III CLASSES AND CLOUD PROGRAMMING (16 Hours)

Defining Classes: Class Definitions in C# - System Object - Constructors and Destructors - OOP Tools in Visual Studio - Class Library Projects - Interfaces Versus Abstract Classes - Struct Types - Shallow Copying Versus Deep Copying - Defining Class Members: Member Definitions - Additional Class Member Topics - Interface Implementation - Partial Class Definitions - Partial Method Definitions - The Call Hierarchy Window - Basic Cloud Programming: Cloud, Cloud Computing, and the Cloud Optimized Stack - Cloud Patterns and Best Practices - Using Microsoft Azure C# Libraries to Create a Storage Container - Creating an ASP.NET 4.7 Web Site That Uses the Storage Container - Advanced Cloud Programming and Deployment: Creating an ASP.NET Web API - Deploying and Consuming an ASP.NET Web API on Microsoft Azure - Scaling an ASP.NET Web API on Microsoft Azure.

UNIT-IV DOT NET STANDARD AND .NET CORE (15 Hours)

Cross-Platform Basics and Must Know Terms – Need of .NET - Referencing and Targeting Frameworks - .NET Core - Building and Packaging a.NET Standard Library - Building a .NET Core Application with Visual Studio - Porting from .NET Framework to .NET Core - ASP.NET and ASP.NET Core: Overview of Web Applications – Use of ASP.NET - ASP.NET Web Forms - Creating ASP.NET Core Web Applications – Files: File Classes for Input and Output – Streams - Monitoring the File System - XML and JSON:

XML Basics - JSON Basics - XML Schemas - XML Document Object Model - Converting XML to JSON - Searching XML with XPath.

UNIT-V LINQ AND DATABASE (15 HOURS)

LINQ: LINQ TO XML - LINQ Providers - LINQ Query Syntax - LINQ Method Syntax - Ordering Query Results - Understanding the orderby Clause - Querying a Large Data Set -Using Aggregate Operators - Using the Select Distinct Query - Ordering by Multiple Levels -Using Group Queries - Using Joins – Databases: Using Databases - Installing SQL Server - Express - Entity Framework - Code First Database - Finding the Database - Navigating Database Relationships - Handling Migrations - Creating and Querying XML from an Existing Database - Universal Apps: Windows Universal Apps - App Concepts and Design - App Development - Common Elements of Windows Store Apps - Windows Store.

Total Lecture Hours-75

COURSE OUTCOMES

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

1. Understand and learn .NET Framework and C# .NET
2. Apply the concepts to develop the applications for real-time problem in C# .NET and ASP .NET
3. Analyze the feasibility of using .NET for real time problems
4. Develop real-time standalone, web applications using .NET Technologies.
5. Understand and get experience in Microsoft Azure.

TEXT BOOK(S)

1. Benjamin Perkins, Jacob Vibe Hammer, Jon D. Reid, "Beginning C#7 Programming with Visual Studio 2017", Wiley Publishing, 2018. Chapters: 1 to 10, 16 to 23, and 25.

REFERENCE BOOK(S)

1. Mehboob Ahmed Khan, Ovais, "C# 7 and .NET Core 2.0 High Performance", Packt Publishing, 2018
2. Nagel, Christian, "Professional C 7 and .NET Core 2.0", Wrox Publishing, 2018.

E- RESOURCES

1. https://shorturl.at/ehNOU
2. https://shorturl.at/bkqt5

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	2	3	3	3	3	2	3	2	3	2	2	3
CO2	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO3	3	2	3	2	3	3	3	2	2	3	2	3	2	3	2	2	3
CO4	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO5	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	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 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: IV–EC-VI(c) - BLOCK CHAIN TECHNOLOGIES

Ins. Hrs. /Week: 4 **Course Credit: 3** **Course Code: P23CSE46C**

UNIT I INTRODUCTION TO BLOCK CHAIN (14 Hours)

Introduction to Blockchain - The big picture of the industry – size, growth, structure, players. Bitcoin versus Cryptocurrencies versus Blockchain - Distributed Ledger Technology (DLT). Strategic analysis of the space – Blockchain platforms, regulators, application providers. The major application: currency, identity, chain of custody

UNIT – II NETWORKAND SECURITY (16 Hours)

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

UNIT – III CRYPTOCURRENCY (14 Hours)

Cryptocurrency - History, Distributed Ledger, Bitcoin protocols -Symmetric-key cryptography - Public-key cryptography - Digital Signatures - High and Low trust societies - Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary. Application of Cryptography to Blockchain

UNIT – IV CRYPTOCURRENCY REGULATION (16 Hours)

Cryptocurrency Regulation - Stakeholders, Roots of Bitcoin, Legal views – exchange of cryptocurrency – Black Market – Global Economy. Cyrpto economics – assets, supply and demand, inflation and deflation – Regulation.

UNIT – V CHALLENGES IN BLOCK CHAIN (15 Hours)

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

Total Lecture Hours -75

COURSE OUTCOMES

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

1. Demonstrate blockchain technology and crypto currency
2. Understand the mining mechanism in blockchain
3. Apply and identify security measures, and various types of services that allow people to trade and transact with bitcoins
4. Apply and analyze Blockchain in healthcare industry
5. Analyze security, privacy, and efficiency of a given Blockchain system

TEXT BOOK(S)

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

REFERENCE BOOK(S)

1. Rodrigoda Rosa Righi,Antonio Marcos Alberti, Madhusudan Singh,"Blockchain Technology for Industry 4.0" Springer 2020.
2. Satoshi Nakamoto,"Bitcoin:APeer-to-PeerElectronic Cash System", 2008.

E-RESOURCES

1. https://www.javatpoint.com/blockchain-tutorial
2. https://www.tutorialspoint.com/blockchain/index.htm
3. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/

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	2	3	2	2	3	2	3	2	3	2	2	3
CO2	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	3
CO3	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO4	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
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)**

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2023 – 2024)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

Semester: IV– Professional Competency Course - COMPUTER SCIENCE FOR NET / SET

Ins. Hrs. /Week: 2 **Course Credit:2** **Course Code: P23PCCS41**

UNIT - I Discrete Structures and Optimization and Computer System Architecture (6 Hours)
Discrete Structures and Optimization: Mathematical Logic -Sets and Relations - Counting, Mathematical Induction and Discrete Probability - Group Theory - Graph Theory - Boolean Algebra – Optimization - **Computer System Architecture :** Digital Logic Circuits and Components - Data Representation - Register Transfer and Microoperations - Basic Computer Organization and Design - Programming the Basic Computer - Microprogrammed Control - Central Processing Unit - Pipeline and Vector Processing - Input-Output Organization - Memory Hierarchy – Multiprocessors.

UNIT - II Programming Languages,Computer Graphic, Database Management Systems (6 Hours)
Programming Languages: Language Design and Translation Issues - Elementary Data Types - Programming in C - Object Oriented Programming - Programming in C++ - Web Programming - **Computer Graphics:** 2-D Geometrical Transforms and Viewing - 3-D Object Representation, Geometric Transformations and Viewing - **Database Management Systems:** Database System Concepts and Architecture - Data Modeling – SQL - Normalization for Relational Databases - Enhanced Data Models - Data Warehousing and Data Mining - Big Data Systems.

UNIT III System Software and Operating System and Software Engineering (6 Hours)
System Software and Operating Systems: System Software - Basics of Operating System - Process Management – Threads - CPU Scheduling – Deadlocks - Memory Management - Storage Management - File and Input/Output Systems – Security - Virtual Machines – Linux operating Systems - Windows Operating Systems - Distributed Systems. **Software Engineering:** Software Process Models - Software Requirements **-** Software Design - Software Quality - Estimation and Scheduling of Software Projects - Software Testing - Software Configuration Management.

Unit IV Data Structures and Algorithms and Theory of Computation and Compilers (6 Hours)
Data Structures and Algorithms: Data Structures - Performance Analysis of Algorithms and Recurrences - Design Techniques - Lower Bound theory - Graph Algorithms - Complexity Theory - Advanced Algorithms. **Theory of Computation – Compilers:** Regular Language Models - Context Free Language - Turing Machines(TM) **-** Unsolvable Problems and Computational Complexity - Syntax Analysis - Semantic Analysis - Run Time System - Intermediate Code Generation - Code Generation and Code Optimization.

Unit V Data Communication and Computer Networks and Artificial Intelligence (6 Hours)

Data Communication and Computer Networks: Network Models - Functions of OSI and TCP/IP Layers - World Wide Web (WWW) - Network Security - Mobile Technology - Cloud Computing and IoT - **Artificial Intelligence (AI):** Approaches to AI - Knowledge Representation – Planning - Natural Language Processing - Multi Agent Systems - Fuzzy Sets - Genetic Algorithms (GA) - Artificial Neural Networks (ANN).

Total Lecture Hours -30

COURSE OUTCOMES

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

1. Demonstrate the concepts of Discrete Structures and Optimization and Computer System Architecture
2. Analyze the applications of Programming Languages, Computer Graphics and Database Management Systems
3. Analyze the concepts of System Software, Operating System and Software Engineering
4. Understand the features of Data Structures and Algorithm, Theory of Computation and Compilers
5. Understand the Data Communication and Computer Networks and Artificial Intelligence (AI)

TEXT BOOK(S)

1. R.Gupta, "NTA-UGC-NET/JRF: Computer Sciences & Applications (Paper I & Paper II) Previous Years Papers (Solved)", 2024, RPH Editorial Board

REFERENCE BOOK(S)

1. Behrouz A.Forouzan, "Data Communications and Networking", 5th Edition, McGraw Hill Education.
2. Dhananjay Dhamdhere, "System Programming", 1st Edition, McGraw Hill Education.
3. Donald D.Hearn, M.Pauline Baker, "Computer Graphics C Version", 2nd Edition, Pearson Education India.
4. Douglas B.West, "Introduction to Graph Theory", 2nd Edition, Pearson Education India.
5. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, "Fundamentals of Data Structures in C", 2nd Edition, Universities Press.
6. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", 3rd Edition, Pearson Education.
7. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, McGraw Hill Education (India) Private Limited.
8. Morris Mano,"Computer System Architecture", Third edition,2019
9. Pressman, "Software Engineering: A Practitioner's Approach", 8th Edition, McGraw Hill Education.
10. Stuart E.Madnick, John J.Donovan, "Operating Systems", McGraw-Hill,1978
11. Peter Norvig, Stuart J.russell, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education India.
12. M. Ganesh, "Introduction to Fuzzy Sets and Fuzzy Logic", Prentice Hall India Learning Private Limited.

E-RESOURCES

1. https://www.mbit.edu.in/wp-content/uploads/2020/05/computer-systems-Architecture.pdf
2. https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf
3. https://www.ddegjust.ac.in/2021/bca/Operating%20System.pdf
4. https://cglab.ca/~michiel/TheoryOfComputation/TheoryOfComputation.pdf
5. https://www.geeksforgeeks.org/ugc-net-cs-notes-according-to-syllabus-of-paper-ii/

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	2	3	2	2	3	2	3	2	3	2	2	3
CO2	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO3	2	3	2	3	2	3	2	3	3	2	3	2	3	2	3	3	2
CO4	3	2	3	2	3	2	3	2	2	3	2	3	2	3	2	2	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)**