LOCF SYLLABUS – 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 have 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 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.

Post graduate Programme:

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

follows:

Part –A : Core Course (Theory) Project

Part-B (i) : Elective courses

Part-B (ii) : Non Major Elective, Soft Skills, 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:

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

BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION							
DURATION: 3. 00 Hours.							**Max Mark : 100**
K- LEVELS	**K1**	**K2**	**K3**	**K4**	**K5**	**K 6**	**Total Marks**
PART							
PART –A (One Mark, No choice) (10x1 =10)	10						**10**
(2-Marks, No choice) (10x2=20)	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 fromthe 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 twoare calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{I=1}^{n} C_i}$	$WAM\ (Weighted\ Average\ Marks) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{I=1}^{n} C_i}$
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) For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.

ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.

iii) Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
iv) A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
v) Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses - UG

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**
40 and above and below 50	**5**	**C**
Below 40	**0**	**RA**

Table- 2: Grading of the Courses - PG

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	**0**	**RA**

Table-3: 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**
4.00 to 4.99	**C**	**Average**
Below 4.00	**RA**	**Re-appearance**

Vision

To Empower the women students by providing excellent software engineering skills to meet the global needs of IT industry

.

Mission

- Providing quality education in computer science and its applications by updated knowledge through technology transfer
- Enhancing professional skills to satisfy the needs of the Software industries and Technical skills of the individual towards competitive world.

PROGRAMME OUTCOMES FOR M.C.A.,DEGREE PROGRAMMES

PO.No	Programme Outcomes (*Upon completion of the M.C.A.,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 Computer Applications.
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 age 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.C.A.,DEGREE)
PSO1	Design, Develop, Analyse, and implement systems and to deliver the application software.
PSO2	Pursue the research in computer science and computer applications.
PSO3	Develop techniques for independent and lifelong learning in computer application.
PSO4	Analyze and Plan systematic planning, development, testing and executing of complex computing applications in Social Media and Analytics, Web Application Development and Data Interpretations.
PSO5	Utilize current technologies, skills and models for computing practice
PSO6	Formulate diverse software engineering practices and project management, and work as a team leader/team member and communicate efficiently with team in developing software of multidisciplinary nature.
PSO7	Appraise emerging technologies and provide innovative solutions to real time problems within the constraints such as financial, environmental, social and ethical.

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

(Affiliated to Bharathidasan University)

(Accredited by NAAC|AnISO9001:2015Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI–614016,TAMILNADU,INDIA.

MASTER OF COMPUTER APPLICATIONS COURSE STRUCTURE UNDER CBCS

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

LEARNINIG OUTCOMES BASED CURRICULUM FRAME WORK (CBCS-LOCF)

ELIGIBILITY: Those who have completed any degree with Mathematics as one of the core subjects in degree or in +2 levels.

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Ins. Hrs/ Week	L	T	P	O	Credit	Exam Hrs	Marks		Total
												Int.	Ext.	
I	Part A	Core Course(CC)–I	P24CA101	Discrete Mathematics	5	4	1	-	-	4	3	25	75	100
		Core Course(CC)–II	P24CA102	Linux and Shell Programming	5	4	1	-	-	4	3	25	75	100
		Core Practical(CP)–I	P24CA103P	Linux and Shell Programming Lab	5	2	-	3	-	3	3	25	75	100
		Core Practical(CP)–II	P24CA104P	Python Programming Lab	5	2	-	3		3	3	25	75	100
	Part B(i)	Elective Course(EC)–I	P24CAE11A P24CAE11BP P24CAE11C P24CAE11DP	Data Engineering and Management/ Data Engineering and Management Lab/ Architecture and Frameworks/ Architecture and Frameworks Lab	4	3	1	-	-	3	3	25	75	100
		Elective Course(EC)–II	P24CAE12A P24CAE12BP P24CAE12C P24CAE12DP	Software Development Technologies/ Software Development Technologies Lab/ Soft Computing/ Soft Computing Lab	4	3	1	-	-	3	3	25	75	100
	Part B(ii)	Non Major Elective (NME)-I			2	2	-	-	-	2	3	25	75	100
				Total	**30**	**20**	**4**	6	-	**22**	**-**		**-**	**700**
II	Part A	Core Course(CC)–III	P24CA205	Data Structures and Algorithms	5	4	1	-		4	3	25	75	100
		Core Course(CC)–IV	P24CA206	Accounting and Financial Management	5	4	1	-		4	3	25	75	100
		Core Practical(CP)–III	P24CA207P	Data Structures and Algorithms Lab	5	2	-	3	-	3	3	25	75	100
		Core Practical(CP)–IV	P24CA208P	Big Data Analytics Lab	5	2	-	3		3	3	25	75	100
	Part B(i)	Elective Course(EC)–III	P24CAE23A P24CAE23BP P24CAE23C P24CAE23DP	Internet of Things/ Internet of Things Lab/ Computer Vision/ Computer Vision Lab	4	3	1	-	-	3	2	25	75	100
		Elective Course(EC)–IV	P24CAE24A P24CAE24BP P24CAE24C 24CAE24DP	Cyber Security/ Cyber Security Lab/ Block Chain Technologies/ Block Chain Technologies Lab	4	1	3	-	-	3	3	25	75	100
	Part B(ii)	Non Major Elective(NME)-II			2	2	-	-	-	2	3	25	75	100

	Part B(iii)	Internship /Industry activity			-	-	-	-	-	-	-	-	-	-
		Total			**30**	**18**	**6**	**6**		**22**	**-**		**-**	**700**
III	Part A	Core Course(CC)–V		Java Programming	6	5	1	-	-	5	3	25	75	100
		Core Industry Module		Machine Learning	6	5	1	-	-	3	3	25	75	100
		Core Practical(CP)–V		Java Programming Lab	6	3	-	3	-	3	3	25	75	100
		Core Practical(CP)–VI		Web Technologies Lab	6	3	-	3	-	3	3	25	75	100
	Part B(i)	Elective Course(EC)–V		Web Technologies/ Compiler Design / Mobile Computing / Mobile Computing Applications Development Lab	4	3	1	-	-	3	3	25	75	100
	Part B (ii)	Skill Enhancement course		Managerial Skills	2	2	-	-	-	2	3	25	75	100
	Part B (iii)	Internship/ Industry activity			-	-	-	-	-	2	-	-	-	-
				Total	**30**	**21**	**3**	**06**	**-**	**21**	**-**	**-**	**-**	**700**
IV	Part A	Core Course(CC)-VI		Research Methodology	6	5	1	-	-	5	3	25	75	100
		Core Course(CC)-VII		Cloud Computing Technologies	5	4	1	-	-	5	3	25	75	100
		Core Practical(CP)-VII		Cloud Computing Technologies Lab	5	2	-	3	-	3	3	25	75	100
		Core Project		Project	8	2	-	6	-	7	3	25	75	100
	Part B(i)	Elective Course(EC)–VI (Industry Entrepreneurship)		Social Networking/ Social Networking Lab/ High Performance Computing/ High Performance Computing lab	4	3	1	-	-	3	3	25	75	100
	Part B(ii)	Professional Competency Course		Enterprise Resource Planning	2	2	-	-		2	3	25	75	100
	Part C			Extension Activity	-	-	-	-		1	-	-	-	
				TOTAL	**30**	**18**	**3**	**9**	**-**	**26**	**-**	**-**	**-**	**600**
				GRANDTOTAL	**120**	**80**	**14**	**26**	**-**	**91**	**-**	**-**	**-**	**2600**
	***Extra credit**			**MOOC /SWAYAM/NPTEL**	-	-	-	-	-	**2**	-	-	-	
				Value Added Course (At least one per year)	-	-	-	-	-	3*2	-	-	-	

- Student submit report of Industrial Internship Program after completion during summer.

S.No	Course Component	No. of Courses	Total Credits
1	Core Courses	7	31
2	Core Practical	7	21
3	Core Project	1	7
4.	Core Industry Module	1	3
4	Elective Courses	6	18
5	Skill Enhancement Course	1	2
6	Professional Competency Course	1	2
7	Non major Elective	2	4
8	Internship	1	2
9	Extension Activity	1	1
	Total	**28**	**91**

S.no	**Particulars**	**CIA**	**ESE**
1.	Theory	25	75
2.	Practical	25	75

Separate Passing Minimum is prescribed for Internal and External marks

FORTHEORY

1. The passing minimum for CIA shall be 40% out of 25 marks[i.e.10marks]
2. The passing minimum for ESE shall be 40% out of 75 marks[i.e.30marks]
3. The passing minimum not less than 50% in the aggregate

FORPRACTICAL

1. The passing minimum for CIA shall be 40% out of 25 marks[i.e.10marks]
2. The passing minimum for ESE shall be 40% out of 75marks[i.e.30marks]
3. The passing minimum not less than 50%intheaggregate.

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

S.NO	**SEMESTER**	**COURSECODE**	**ELECTIVECOURSE(EC) (Any one from the list)**
1	**I**	**P24NMECA11**	Fundamentals of Human Rights
2.	**II**	**P24NMECA22**	Cloud Computing

ELECTIVE COURSES (EC)

S.NO	SEM	COURSECODE	ELECTIVECOURSE(EC) (Any one from the list)
1	I	**P24CAE11A** **P24CAE11BP** **P24CAE11C** **P24CAE11DP**	**Elective I** Data Engineering and Management Data Engineering and Management Lab Architecture and Frameworks Architecture and Frameworks lab
		P24CAE12A **P24CAE12BP** **P24CAE12C** **P24CAE12DP**	**Elective II** Software Development Technologies Software Development Technologies Lab Soft Computing Soft Computing Lab
	II	**P24CAE23A** **P24CAE23BP** **P24CAE23C** **P24CAE23DP**	**Elective III** Internet of Things Internet of Things Lab Computer Vision Computer Vision Lab
		P24CAE24A **P24CAE24BP** **P24CAE24C** **P24CAE24DP**	**Elective IV** Cyber Security Cyber Security Lab Block chain Technologies Block chain Technologies Lab
3	III		**Elective V** Web Technologies Compiler Design Mobile Computing Mobile Computing Application Development Lab
4	IV		**Elective VI** Social Networks Social Networks lab High Performance Computing High Performance Computing Lab

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I CC-I: Discrete Mathematics

Ins. Hrs./Week: 5 **Course Credit:** 4 **Course Code: P24CA101**

UNIT- I: Relations **(15 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 **(15 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 **(15 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 with repetition

UNIT-IV: Matrices **(15 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 Lecture Hours-75

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 analyze and evaluate the recurrence relations
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 graph

TEXT BOOK

1. N.Chandrasekaran and M.Umaparvathi, Discrete mathematics, PHI Learning Private Limited, New Delhi, 2010.

REFERENCE BOOK(S)

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

E-RESOURCES

1. http://www.quantum.edu.in/qlib/pages/books/ebooks_maths.html
2. https://gju-koha.informindia.co.in/cgi-bin/koha/opac-detail.pl?biblionumber=6653&shelfbrowse_itemnumber=6869
3. https://www.amazon.in/Discrete-Mathematics-Its-Applications-SIE/dp/0070681880
4. https://www.amazon.in/Discrete-Mathematics-Its-Applications-SIE/dp/0070681880

MAPPING WITH PROGRAMME 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			
CO2		3	3												3	3	
CO3				2	3	2						3			3		
CO4						3		3	3							2	
CO5			3					2					2				3

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

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I CC-II: Linux and Shell Programming

Ins. Hrs./Week: 5 **Course Credit:** 4 **Course Code: P24CA102**

Unit-I: Basic bash Shell Commands (15 Hours)

Interacting with the shell-Traversing the file system-Listing files and directories-Managing files and directories-Viewing file contents. Basic Script Building:Using multiple commands-Creating a script file-Displaying messages-Using variables-Redirecting input and output-Pipes-Performing math-Exiting the script. Using Structured Commands:Working with the if-then statement-Nesting ifs-Understanding the test command-Testing compound conditions-Using double brackets and parentheses-Looking at case.

Unit-II: More Structured Commands (15 Hours)

Looping with for statement-Iterating with the until statement- Using the while statement-Combining loops-Redirecting loop output. Handling User Input: Passing parameters-Tracking parameters-Being shifty-Working with options-Standardizing options-Getting user input. Script Control: Handling signals-Running scripts in the background-Forbidding hang-ups -Controlling a Job-Modifying script priority-Automating script execution.

Unit-III: Creating Functions (15 Hours)

Basic script functions-Returning a value-Using variables in functions- Array and variable functions-Function recursion-Creating a library-Using functions on the command line. Writing Scripts for Graphical Desktops: Creating text menus-Building text window widgets-Adding X Window graphics. Introducing sed and gawk: Learning about the sed Editor-Getting introduced to the gawk Editor-Exploring sed Editor basics.

Unit-IV: Regular Expressions (15 Hours)

Defining regular expressions-Looking at the basics-Extending our patterns-Creating expressions. Advanced sed: Using multiline commands-Understanding the hold space-Negating a command-Changing the flow-Replacing via a pattern-Using sed in scripts-Creating sed utilities. Advanced gawk: Reexamining gawk-Using variables in gawk- Using structured commands-Formatting the printing-Working with functions.

Unit-V: Working with Alternative Shells (15 Hours)

Understanding the dash shell-Programming in the dash shell-Introducing the zsh shell-Writing scripts for zsh.Writing Simple Script Utilities: Automating backups-Managing user accounts-Watching disk space. Producing Scripts for Database, Web, and E-Mail: Writing database shell scripts-Using the Internet from your scripts-Emailing reports from scripts. Using Python as a Bash Scripting Alternative: Technical requirements-Python Language-Hello World the Python way-Pythonic arguments- Supplying arguments-Counting arguments-Significant whitespace-Reading user input-Using Python to write to files-String manipulation.

Total Lecture Hours-75

COURSE OUTCOME

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

1. To understand, apply and analyze the concepts and methodology of Linux shell programming
2. To comprehend, impart and apply fundamentals of control structure and script controls
3. To understand, analyses and evaluate the functions, graphical desktop interface and editors
4. To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk
5. To comprehend, use and illustrate the advance concepts such as alternate shell script, data connectivity and bash scripting using python

TEXT BOOK(S)

1. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley Publishing, 3rd Edition, 2015.Chapters: 3, 11 to 14, 16 to 25.
2. Mokhtar Ebrahim, Andrew Mallett, "Mastering Linux Shell Scripting", Packt Publishing, 2nd Edition, 2018. Chapter: 14.

REFERENCEBOOK(S)

1. ClifFlynt,SarathLakshman,ShantanuTushar, "Linux Shell Scripting Cookbook ", Packt Publishing, 3rd Edition, 2017.
2. Stephen G.Kochan, Patrick Wood, "Shell Programming in Unix, Linux, and OS X", Addison Wesley Professional, 4th Edition, 2016.
3. Robert Love, "Linux System Programming", O'Reilly Media, Inc, 2013
4. W.R. Stevens, "Advanced Programming in the UNIX environment", 2nd Edition, Pearson Education, 2013
5. Graham Glass, King Ables, " UNIX for Programmers and Users", 3rd Edition, Pearson Education, 2003

E-RESOURCES

1. https://www.wiley.com/en-us/Linux+Command+Line+and+Shell+Scripting+Bible,+3rd+Edition-p- 9781118983843
2. https://www.oreilly.com/library/view/linux-command-line/9781118983843/
3. https://dev.my.dmd.uconn.edu/Publication?id=8P242L0&hl=en&source=Linux-Command-Line-And-Shell-Scripting-Bible-3rd.pdf

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3										3			3			
CO2	3	3		3	2						3	3			3		
CO3	3			3	3						3		3	3			
CO4	3				3	3			3	2	3				3	3	3
CO5	3	3	3								3		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 2024 – 2025)
DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-CP-I: Linux and Shell Programming Lab

Ins. Hrs./Week: 5 **Course Credit:** 3 **Course Code: P24CA103P**

LIST OF PROGRAMS

1. Write a Shell Script program to calculate the number of days between two dates.
2. Write a Shell Script program to check systems on local network using control structures with user input.
3. Write a Shell Script program to check systems on local network using control structures with file input.
4. Write a Shell Script program to demonstrate the script control commands.
5. Write a Shell Script program to demonstrate the Shell script function.
6. Write a Shell Script program to demonstrate the Regular Expressions.
7. Write a Shell Script program to demonstrate the sed and awk Commands.
8. Write a Shell Script program to demonstrate the File Backup process through creating a daily archive location.
9. Write a Shell Script program to create a following GUI tools.

    a.Creating text menus
    b.Building text window widgets
10. Write a Shell Script program to demonstrate to connect a PostgreSQL database and performing CRUD operations.

Total Lab Hours-75

COURSE OUTCOMES

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

1. To understand, apply and analyze the concepts and methodology of Linux shell programming
2. To comprehend, impart and apply fundamentals of control structure and script controls
3. To understand, analyses and evaluate the functions, graphical desktop interface and editors
4. To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk
5. To comprehend, use and analyze the advance concepts such as alternate shell script, dy and bash scripting using PostgreSQL

TEXT BOOK(S)

1. Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley Publishing, 3rd Edition, 2015.Chapters: 3, 11 to 14, 16 to 25.
2. Mokhtar Ebrahim, Andrew Mallett, "Mastering Linux Shell Scripting", Packt Publishing, 2nd Edition, 2018. Chapter: 14.

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1. ClifFlynt,SarathLakshman,ShantanuTushar, "Linux Shell Scripting Cookbook ", Packt Publishing, 3rd Edition, 2017.
2. Stephen G.Kochan, Patrick Wood, "Shell Programming in Unix, Linux, and OS X", Addison Wesley Professional, 4th Edition, 2016.
3. Robert Love, "Linux System Programming", O'Reilly Media, Inc, 2013
4. W.R. Stevens, "Advanced Programming in the UNIX environment", 2nd Edition, Pearson Education, 2013
5. Graham Glass, King Ables, " UNIX for Programmers and Users", 3rd Edition, Pearson Education, 2003

E-RESOURCES

1. https://www.wiley.com/en-us/Linux+Command+Line+and+Shell+Scripting+Bible,+3rd+Edition-p- 9781118983843
2. https://www.oreilly.com/library/view/linux-command-line/9781118983843/
3. https://dev.my.dmd.uconn.edu/Publication?id=8P242L0&hl=en&source=Linux-Command-Line-And-Shell-Scripting-Bible-3rd.pdf

MAPPING WITH PROGRAMME OUTCOMES

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

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

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-CP-II: Python Programming Lab

Ins. Hrs./Week: 5 **Course Credit:** 3 **Course Code: P24CA104P**

Implement the following in Python:

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

Total Lab Hours- 75

COURSE OUTCOME

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 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

TEXT BOOK(S):

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

REFERENCE BOOK(S)

1. Charles Dierbach. 2013. Introduction to Computer Science using Python: A Computational Problem- Solving Focus. Wiley India Edition.
2. Timothy A. Budd. 2015. Exploring Python. Mc-Graw Hill Education (India) Private Ltd.
3. Gowrishankar S, Veena A. 2018. Introduction to Python Programming. First Edition, CRC Press, Florida, USA.
4. Jake Vander Plas. 2016. Python Data Science Handbook: Essential Tools for Working with Data. First Edition, O'Reilly Media, Newton, USA.
5. Miguel Grinberg. 2018. Flask Web Development: Developing Web Applications with Python, Second Edition, O'Reilly Media, Newton, USA

E-RESOURCES

1. https://downloads.mysql.com/docs/connector-python-en.pdf
2. http://index-of.es/Python/Core.Python.Programming.2nd.Edition.Wesley.Chun.2006.pdf
3. http://index-of.es/Python/Exploring%20Python.pdf
4. https://files.meetup.com/18552511/Learn%20Python%20The%20Hard%20Way%203rd%20Edit ion%20V413HAV.pdf
5. www.ideone.com

MAPPING WITH PROGRAMME 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					
CO2					3			3			3		3			3	
CO3	3	3				2					3	2		3	3		
CO4		3						3	3						3	3	
CO5	3		3					3				3					3

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

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-EC-I: Data Engineering and Management

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE11A**

Unit-I: Database Development (12 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 (12 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 (12 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 (12 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 (12 Hours)

Factors influencing vendor selection-Hybrid deployment-what are your 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-60

COURSE OUTCOME

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

E-RESOURCES

1. https://www.flipkart.com/data-engineering-management/p/itmfc66cemsqgscr
2. https://www.thriftbooks.com/w/data-engineering-and-management-second-international-conference-icdem-2010-tiruchirappalli-india-july-29-31-2010-revised-selected-papers/11342250/
3. https://towardsdatascience.com/10-fantastic-classic-books-for-data-engineering-84de7fb7e061

MAPPING WITH PROGRAMME OUTCOMES

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

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

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-EC-I: Data Engineering and Management Lab

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE11BP**

LIST OF PROGRAMS

1. Write a script to create a MongoDB database and perform insert operation
2. Write a MongoDB script to perform query operations
3. Write a MongoDB Script to perform update operations
4. Write a MongoDB Script to update documents with aggregation pipeline
5. Write a MongoDB script to delete single and multiple documents
6. Write a MongoDB script to perform string aggregation operations
7. Design a Data Model for MongoDB using DbVisualizer
8. Perform CRUD operations using DbVisualizer
9. Create a CRM account and organize your Tasks, Meetings and Deals
10. Create and maintain a project using CRM features

Total Lab Hours-60

COURSE OUTCOME

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

E-RESOURCES

1. https://www.flipkart.com/data-engineering-management/p/itmfc66cemsqgscr
2. https://www.thriftbooks.com/w/data-engineering-and-management-second-international-conference-icdem-2010-tiruchirappalli-india-july-29-31-2010-revised-selected-papers/11342250/
3. https://towardsdatascience.com/10-fantastic-classic-books-for-data-engineering-84de7fb7e061

MAPPING WITH PROGRAMME OUTCOMES

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

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

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-EC-I: Architecture and Frameworks

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code :P24CAE11C**

Unit – I: Software architecture (12 Hours)

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 (12 Hours)

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

Unit – III: Software Architectures design (12 Hours)

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: Designing orthogonal software systems (12 Hours)

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

Unit – V: Architecting Modern Applications (12 Hours)

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

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand, analyze and evaluate the purpose of Software architecture and development methodologies with consideration of risk management
2. Comprehend, apply and evaluate the domain knowledge for software development process and determine the impact of quality attributes
3. Understand, track and 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. Comprehend, analyze and 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

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

REFERENCE BOOK(S)

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

E-RESOURCES

1. https://www.google.com/url?esrc=s&q=&rct=j&sa=U&url
2. https://www.infoq.com/articles/frameworks-
3. https://www.google.com/url?esrc=s&q=&rct=j&sa=U&url
4. https://www.google.com/url?esrc=s&q=&rct=j&sa=U&url
5. https://www.leanix.net/en/wiki/ea/enterprise

MAPPING WITH PROGRAMME OUTCOMES

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

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

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Semester: I-EC-I: Architecture and Frameworks Lab

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code :P24CAE11DP**

Implement the following using Linux / Windows environments

1. Find the WebID profile document and display the necessary attributes
2. Set and access the primary authentications with account recovery mechanisms
3. Set and access the secondary authentications with account recovery mechanisms
4. Design authorization and web access control
5. Find the content representation
6. Reading resources from HTTP REST API and WebSockets API
7. Writing resources from HTTP REST API and WebSockets API
8. Data notification using Social Web App protocol
9. Managing subscriptions and friends list using Social Web App protocol
10. Managing list of followers and following list using Social Web App protocol

Total Lab Hours-60

COURSE OUTCOME

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

1. Understand, analyze and evaluate the purpose of Software architecture and development methodologies with consideration of risk management
2. Comprehend, apply and evaluate the domain knowledge for software development process and determine the impact of quality attributes
3. Understand, track and 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. Comprehend, analyze and 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

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

REFERENCE BOOK(S)

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

E-RESOURCES

1. https://www.google.com/url?esrc=s&q=&rct=j&sa=U&url
2. https://www.infoq.com/articles/frameworks-
3. https://www.google.com/url?esrc=s&q=&rct=j&sa=U&url
4. https://www.google.com/url?esrc=s&q=&rct=j&sa=U&url
5. https://www.leanix.net/en/wiki/ea/enterprise

MAPPING WITH PROGRAMME OUTCOMES

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

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

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DEPARTMENT OF COMPUTER APPLICATIONS
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Semester: I-EC-II: Software Development Technologies

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE12A**

Unit –I: Implementing Microservices (12 Hours)

Client to micro services communication,Interservice communication, data considerations, security, monitoring, micro services hosting platform options. Azure Service Fabric: Introduction, core concepts, supported programming models, service fabric clusters, develop and deploy applications of service fabric. Monitoring Azure Service Fabric Clusters: Azure application, resource manager template, Adding Application Monitoring to a Stateless Service Using Application Insights, Cluster monitoring, Infrastructure monitoring.

Unit-II: Azure Kubernetes Service (AKS) (12 Hours)

Introduction to kubernetes and AKS, AKS development tools, Deploy applications on AKS. Monitoring AKS: Monitoring, Azure monitor and analytics, monitoring AKS clusters, native kubernetes dashboard, Prometheus and Grafana. Securing Microservices: Authentication in microservices, Implenting security using API gateway pattern, Creating application using Ocrlot and securing APIs with Azure AD. Database Design for Microservices: Data stores, monolithic approach, Micro services approach, harnessing cloud computing, database options on MS Azure, overcoming application development challenges. Building Microservices on Azure Stack: Azure stack, Offering IaaS, PaaS on-premises simplified, SaaS on Azure stack.

Unit-III: .NET DevOps for Azure: (12 Hours)

DevOps introduction, Problem and solution. Professional Grade DevOps Environment: The state of DevOps, professional grade DevOps vision, DevOps architecture, tools for professional DevOps environment, DevOps centered application. Tracking work: Process template, Types of work items, Customizing the process, Working with the process. Tracking code: Number of repositories, Git repository, structure, branching pattern, Azure repos configuration, Git and Azure.

Unit-IV: Building the code (12 Hours)

Structure of build, using builds with .NET core and Azure pipelines, Validating the code: Strategy for defect detection, Implementing defect detection. Release candidate creation: Designing release candidate architecture, Azure artifacts workflow for release candidates, Deploying the release: Designing deployment pipeline, Implementing deployment in Azure pipelines. Operating and monitoring release: Principles, Architectures for observability, Jumpstarting observability.

Unit-V: Introduction to APIs: (12 Hours)

Introduction, API economy, APIs in public sector. API Strategy and Architecture: API Strategy, API value chain, API architecture, API management. API Development: Considerations, Standards, kick-start API development, team orientation. API Gateways: API Gateways in public cloud, Azure API management, AWS API gateway. API Security: Request-based security, Authentication and authorization.

Total Lecture Hours-60

COURSE OUTCOME

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

1. To understand, apply and summarize the basic concepts of Micro services communication Microsoft Azure and Dev Ops for software development life cycle
2. To illustrate, and implement Azure Kubernetes Service tools for software development life cycle
3. To recognize, analyse and summarize the functionalities of .NET Dev Ops for Azure applications
4. To understand, design and evaluate the principles and architecture service tools for software development life cycle.
5. To comprehend, implement and review the functionalities of API and API gateways for cloud and Azure applications

TEXT BOOK(S)

1. Harsh Chawla and Hemant Kathuria, Building Microservices Applications on Microsoft Azure- Designing, Developing, Deploying, and Monitoring, Apress, 2019.
2. Jeffrey Palermo , NET DevOps for Azure A Developer's Guide to DevOps Architecture the Right Way, Apress, 2019.
3. Thurupathan and Vijayakumar, Practical API Architecture and Development with Azure and AWS - Design and Implementation of APIs for the Cloud, Apress, 2018.

REFERENCE BOOK(S)

1. Karl Matthias and Sean P. Kane, Docker: Up and Running, O'Reilly Publication, Second Edition 2018.
2. Len Bass,IngoWeber,LimingZhu,"DevOps, A Software Architects Perspective", AddisonWesley-Pearson Publication, First Ediiton 2015.
3. John Ferguson Smart,"Jenkins, The Definitive Guide", O'Reilly Publication, First Ediiton 2011.

E-RESOURCES

1. https://scand.com/technologies/
2. https://novateus.com/blog/trending-software-development-technologies/
3. https://www.ibm.com/topics/software-development
4. https://www.ibm.com/topics/software-development
5. https://programmersforce.co.uk/blogs/top-8-most-popular-software-developmenttechnologies-in-2023/

MAPPING WITH PROGRAMME 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	
CO2		3		3	3				3				3		3	3	2
CO3	3	3		3	3	3		3	3		3	3	3	3	2		
CO4	3	3	3			3		2		2	3	3	3			3	3
CO5			3	3				3	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 2024 – 2025)
DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-EC-II: Software Development Technologies Lab

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code P24CAE12BP**

List of Programs

1. Deploy Version Control System / Source Code Management, install git and create a GitHub account.
2. Perform various GIT operations on local and Remote repositories using GIT Cheat-Sheet
3. Continuous Integration: install and configure Jenkins with Maven/Ant/Gradle to setup a build Job.
4. Build the pipeline of jobs using Maven / Gradle / Ant in Jenkins, create a pipeline script to Test and deploy an application over the tomcat server.
5. Implement Jenkins Master-Slave Architecture and scale your Jenkins standalone implementation by implementing slave nodes.
6. Setup and Run Selenium Tests in Jenkins Using Maven.
7. Implement Docker Architecture and Container Life Cycle, install Docker and execute docker commands to manage images and interact with containers.
8. Implement Dockerfile instructions, build an image for a sample web application using Dockerfile.
9. Install and Configure Pull based Software Configuration Management and provisioning tools using Puppet.
10. Implement LAMP/MEAN Stack using Puppet Manifest.

Total Lab Hours-60

COURSE OUTCOME

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

1. To understand, apply and summarize the basic concepts of Micro services communication Microsoft Azure and Dev Ops for software development life cycle
2. To illustrate, and implement Azure Kubernetes Service tools for software developmentlife cycle
3. To recognize, analyse and summarize the functionalities of .NET Dev Ops for Azureapplications
4. To understand, design and evaluate the principles and architecture service tools forsoftware development life cycle.
5. To comprehend, implement and review the functionalities of API and API gateways forcloud and Azure applications

TEXT BOOK(S)

1. Harsh Chawla and Hemant Kathuria, Building Microservices Applications on MicrosoftAzure- Designing, Developing, Deploying, and Monitoring, Apress, 2019.
2. Jeffrey Palermo , NET DevOps for Azure A Developer's Guide to DevOps Architecturethe Right Way, Apress, 2019.
3. Thurupathan and Vijayakumar, Practical API Architecture and Development with Azureand AWS - Design and Implementation of APIs for the Cloud, Apress, 2018.

REFERENCE BOOK(S)

1. Karl Matthias and Sean P. Kane, Docker: Up and Running, O'Reilly Publication, SecondEdition 2018.
2. Len Bass,IngoWeber,LimingZhu,"DevOps, A Software Architects Perspective", AddisonWesley-Pearson Publication, First Ediiton 2015.
3. John Ferguson Smart,"Jenkins, The Definitive Guide", O'Reilly Publication, First Ediiton2011.

E-RESOURCES

1. https://scand.com/technologies/
2. https://novateus.com/blog/trending-software-development-technologies/
3. https://www.ibm.com/topics/software-development
4. https://www.ibm.com/topics/software-development
5. https://programmersforce.co.uk/blogs/top-8-most-popular-software-developmenttechnologies-in-2023/

MAPPING WITH PROGRAMME 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	
CO2		3		3	3				3				3		3	3	2
CO3	3	3		3	3	3		3	3		3	3	3	3	2		
CO4	3	3	3			3		2		2	3	3	3			3	3
CO5			3	3				3	3	2		3		3		3	3

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

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-EC-II: Soft Computing

Ins. Hrs./Week: 4 **Course Credit:3** **Course Code: P24CAE12C**

UNIT-I: Introduction to Soft Computing (12 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 (12 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 (12 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 AutoAssociative Memory-Kohonen Self-Organizing Feature Map- Architecture-Flowchart for Training Process- Training Algorithm.

UNIT-IV: Introduction To Fuzzy Logic (12 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 (12 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 Lecture Hours-60

COURSE OUTCOME

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

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

UNIT I: Chapter 1: 2.1,2.3,2.4,2.5,2.6,2.7
UNIT II: Chapter 2: 3.2,3.3,3.4,3.5,3.6
UNIT III: Chapter 3: 4.3,4.4,4.7,5.3
UNIT IV: Chapter 4: 7.2,7.3,8.4,9.3,9.4,10,10.2,10.3,10.4,11.4,12.8,14
UNIT V: Chapter 5: 15,15.2,15.3,15.4,15.9,15.10

REFERENCE BOOK(S)

1. Das, A. (2018). Artificial Intelligence and Soft Computing for Beginners.
2. Amit, K. (2018). Artificial intelligence and soft computing: behavioral and cognitive modeling of the human brain. CRC press.
3. Rajasekaran, S., &Pai, G. V. (2011). Neural networks, fuzzy logic and genetic algorithm: synthesis and applications (with cd). PHI Learning Pvt. Ltd.
4. Gupta, M. M. (2004). Soft computing and intelligent systems: theory and applications. Elsevier.
5. Jang, J. S. R., Sun, C. T., &Mizutani, E. (1997). Neuro-fuzzy and soft computing-a computational approach to learning and machine intelligence [Book Review]. IEEE Transactions on automatic control, 42(10), 1482-1484.

E-RESOURCES

1. www.springer.com/journal/500
2. www.vssut.ac.in/lecture_notes/lecture1423723637.pdf
3. www.sciencedirect.com/topics/computer-science/soft-computing
4. www.cet.edu.in/noticefiles/274_soft%20computing%20LECTURE%20NOTES.pdf
5. www.techtarget.com/whatis/definition/soft-computing

MAPPING WITH PROGRAMME 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	
CO2	3	3			3	3		3		2	3	3	3			3	2
CO3	3	3			3	3		3		2	3	3	3	3	3		
CO4	3	3		3	3	3	3	3	2	2			3	3		3	
CO5	3	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
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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-EC-II: Soft Computing Lab

Ins. Hrs./Week: 4 **Course Credit:3** **Course Code: P24CAE12DP**

Program List

1. Implementation of Logic gates using Artificial Neural Network.
2. Implementation of Perception Algorithm.
3. Implementation of Back Propagation Algorithm.
4. Implementation of Self Organizing Maps.
5. Implementation of Radial Basis Function Network.
6. Implementation of De-Morgan's Law.
7. Implementation of McCulloch Pits Artificial Neuron model
8. Implementation of Simple genetic algorithm
9. Implementation of fuzzy based Logical operations
10. Implementation of fuzzy based arithmetic operations

Total Lab Hours-60

COURSE OUTCOME

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
5. Ability to learn traditional optimization and search techniques and genetic programming

TEXT BOOK

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

UNIT I: Chapter 1: 2.1,2.3,2.4,2.5,2.6,2.7
UNIT II: Chapter 2: 3.2,3.3,3.4,3.5,3.6
UNIT III: Chapter 3: 4.3,4.4,4.7,5.3
UNIT IV: Chapter 4: 7.2,7.3,8.4,9.3,9.4,10,10.2,10.3,10.4,11.4,12.8,14
UNIT V: Chapter 5: 15,15.2,15.3,15.4,15.9,15.10

REFERENCE BOOK(S)

1. Das, A. (2018). Artificial Intelligence and Soft Computing for Beginners.
2. Amit, K. (2018). Artificial intelligence and soft computing: behavioral and cognitive modeling of the human brain. CRC press.
3. Rajasekaran, S., &Pai, G. V. (2011). Neural networks, fuzzy logic and genetic algorithm: synthesis and applications (with cd). PHI Learning Pvt. Ltd.
4. Jang, J. S. R., Sun, C. T., &Mizutani, E. (2004). Neuro-fuzzy and soft computing-a computational approach to learning and machine intelligence [Book Review]. IEEE Transactions on automatic control, 42(10), 1482-1484.
5. Gupta, M. M. (2004). Soft computing and intelligent systems: theory and applications. Elsevier.
6. Jang, J. S. R., Sun, C. T., &Mizutani, E. (1997). Neuro-fuzzy and soft computing-a computational approach to learning and machine intelligence [Book Review]. IEEE Transactions on automatic control, 42(10), 1482-1484.

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1. www.springer.com/journal/500
2. www.vssut.ac.in/lecture_notes/lecture1423723637.pdf
3. www.sciencedirect.com/topics/computer-science/soft-computing
4. www.cet.edu.in/noticefiles/274_soft%20computing%20LECTURE%20NOTES.pdf
5. www.techtarget.com/whatis/definition/soft-computing

MAPPING WITH PROGRAMME 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	
CO2	3	3			3	3		3		2	3	3	3			3	2
CO3	3	3			3	3		3		2	3	3	3	3	3		
CO4	3	3		3	3	3	3	3	2	2			3	3		3	
CO5	3	3	3					3	3		3		3	3		3	2

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

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: I-NME -I Fundamentals of Human Rights

Ins. Hrs./Week: 2 **Course Credit:** 2 **Course Code: P24NMECA11**

Unit I: Introduction (6 Hours)

Meaning and Definitions of Human Rights – Characteristics and Importance of Human Rights – Evolution of Human Rights – Formation, Structure and Functions of the UNO - Universal Declaration of Human Rights – International Covenants – Violations of Human Rights in the Contemporary Era.

Unit II: Human Rights in India (6 Hours)

Development of Human Rights in India – Constituent Assembly and Indian Constitution – Fundamental Rights and its Classification – Directive Principles of State Policy – Fundamental Duties.

Unit III: Rights of Marginalized and other Disadvantaged People (6 Hours)

Rights of Women – Rights of Children – Rights of Differently Abled – Rights of Elderly - Rights of Scheduled Castes – Rights of Scheduled Tribes – Rights of Minorities – – Rights of Prisoners – Rights of Persons Living with HIVAIDS – Rights of LGBT.

Unit IV: Human Rights Movements (6 Hours)

Peasant Movements (Tebhaga and Telangana) – Scheduled Caste Movements (Mahar and Ad-Dharmi) – Scheduled Tribes Movements (Santhal and Munda) – Environmental Movements (Chipko and Narmada BachaoAndolan) – Social Reform Movements (Vaikom and Self Respect).

Unit V: Redressal Mechanisms (6 Hours)

Protection of Human Rights Act, 1993 (Amendment 2019) – Structure and Functions of National and State Human Rights Commissions – National Commission for SCs – National Commission for STs – National Commission for Women – National Commission for Minorities – Characteristics and Objectives of Human Rights Education.

Total Lecture Hours-30

COURSE OUTCOME

The Students will be able to

1. Knowledge- learning for human rights
2. To consider human rights practice in relation to the logical standards.
3. To explain the development of human rights principles historically.
4. To evidence how human rights relate to yourself and the people you work with.
5. To identify strategies for the promotion of people's human rights.

TEXT BOOK(S)

1.Human Rights Law and Practice book online at best... Principles of Statutory Interpretation (also including General Clauses Act ...

2.Human Rights Study Books You Can Download For Free· 1. Lifting the Spirit: Human Rights and Freedom of Religion or Belief (Published by Human Rights

REFERENCE(S)

1. SudarshanamGankidi, Human Rights in India: Prospective and Retrospective,Rawat Publications, Jaipur, 2019.
2. SatvinderJuss, Human Rights in India, Routledge, New Delhi, 2020.
3. Namita Gupta, Social Justice and Human Rights in India, Rawat Publications,Jaipur, 2021.
4. Mark Frezo, The Sociology of Human Rights, John Willy & Sons, U.K. 2014.
5. Dr. S. Mehartaj Begum, Human Rights in India: Issues and perspectives, APH Publishing Corporation, New Delhi, 2010.
6. Asha Kiran, The History of Human Rights, Mangalam Publications, Delhi, 2011.
7. Bani Borgohain, Human Rights, Kanishka Publishers & Distributors, New Delhi-2,2007.
8. Jayant Chudhary, A Textbook of Human Rights, Wisdom Press, New Delhi, 2011.

E-RESOURCES

1. https://nhrc.nic.in/sites/default/files/HREdu.pdf
2. https://www.amazon.in/Textbook-Human-Rights-law-Practice/dp/9351437388
3. https://www.humanrightscareers.com/magazine/human-rights-study-books-
4. you-can- download-for-free/
5. https://www.corteidh.or.cr/tablas/23861.pdf
6. https://legalaffairs.gov.in/sites/default/files/chapter%203.pdf

MAPPING WITH PROGRAMME 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	3	3	3		3		3
CO2	3	3	3	2	3		3	3			3	3	3		3	3	
CO3	3	3			3	3			3	3	3		3	3	3		3
CO4	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)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-CC-III: Data Structures and Algorithms
Ins. Hrs./Week: 5 **Course Credit:** 4 **Course Code: P24CA205**

Unit-I: Abstract Data Types (15 Hours)
Introduction-Date Abstract Data Type-Bags-Iterators. Arrays: Array Structure-Python List-Two Dimensional Arrays-Matrix Abstract Data Type. Sets, Maps: Sets- Maps- Multi-Dimensional Arrays.

Unit-II: Algorithm Analysis (15 Hours)
Experimental Studies-Seven Functions-Asymptotic Analysis. Recursion: Illustrative Examples-Analyzing Recursive Algorithms-Linear Recursion- Binary Recursion- Multiple Recursion.

Unit-III: Stacks, Queues, and Deques (15 Hours)
Stacks- Queues- Double-Ended Queues Linked. Lists: Singly Linked Lists-Circularly Linked Lists-Doubly Linked Lists. Trees: General Trees-Binary Trees- Implementing Trees-Tree Traversal Algorithms.

Unit-IV: Priority Queues (15 Hours)
Priority Queue Abstract Data Type- Implementing a Priority Queue- Heaps- Sorting with a Priority Queue. Maps, Hash Tables, and Skip Lists: Maps and Dictionaries-Hash Tables- Sorted Maps-Skip Lists-Sets, Multisets, and Multimaps.

Unit-V: Search Trees (15 Hours)
Binary Search Trees-Balanced Search Trees-AVL Trees-Splay Trees. Sorting and Selection: Merge sort-Quick sort-Sorting through an Algorithmic Lens- Comparing Sorting Algorithms-Selection. Graph Algorithms: Graphs-Data Structures for Graphs-Graph Traversals- Shortest Paths-Minimum Spanning Trees.

Total Lecture Hours-75

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

1. Understand various ADT concepts
2. Familiar with implementation of ADT models with Python language and understand how to develop ADT for the various real-time problems
3. Apply with proper ADT models with problem understanding
4. Apply and Analyze right models based on the problem domain
5. Evaluate modern data structures with Python language

TEXT BOOK(S):

1. Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011. (Unit – 1)Chapters: 1, 2, 3.
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", John Wiley & Sons, 2013. (Unit – 2, 3, 4, and 5)Chapters: 3 to 12, and 14.

REFERENCE BOOK(S):

1. Dr. Basant Agarwal; Benjamin Baka, "Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7", Packt Publishing, 2018.
2. Magnus Lie Hetland, "Python Algorithms: Mastering Basic Algorithms in the Python Language", Apress, 2014.

E-RESOURCES

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3. https://www.freecodecamp.org/news/learn-data-structures-and-algorithms/
4. https://www.javatpoint.com/data-structure-tutorial
5. https://www.javatpoint.com/data-structure-algorithm

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3		3	3			2	2		3			3	3		2
CO2	3		3	3		3	3	3			3		3	3	3		
CO3	3	3	3	3		3					3	3	3			3	3
CO4		3		3		3	3	3	3	2	3	3	3			3	3
CO5	3	3	3		3						3	3	3	3	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)
DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-CC-VIII : Accounting and Financial Management

Ins. Hrs./Week: 5 **Course Credit:** 4 **Course Code: P24CA206**

Unit- I: Basics Of Accounting **(15 Hours)**
Accounting Principles and Concepts – Double entry book keeping - Journal – Ledger - Trial Balance- Depreciation, Depletion and Amortization - Accounting for depreciation.

Unit- II: Profit And Loss **(15 Hours)**
Trading, Manufacturing and profit and Loss account – Income and expenditure- Accounting record and system- assets and liabilities.

Unit- III: Financial Statement **(15 Hours)**
Analysis and interpretation of financial statements with ratios

Unit- IV: Cost Accounting **(15 Hours)**
Cost Accounting- Methods and Techniques of Cost Accounting- classifications of cost - Material Cost-
Labour Cost – Overhead- fixed and variable cost- Cost-volume – profit analysis - marginal costing and decision making.

Unit- V: Budget **(15 Hours)**
Budgeting and budgetary control – types of budgets- Preparation of various functional budgets- Preparations of cash budgets- flexible budgets- Advantages of Budgeting and Budgetary control.

Total Lecture Hours- 75

COURSE OUTCOME
The students will be able to
1. Understand the meaning, objectives and advantages of accounting
2. Identify and understand the Objectives, advantages and need of Book Keeping
3. State the need and objective of preparing trial balance and Final Accounts
4. Analyze and interpret the financial statements with ratios and they can know the financial position of the company with the help of the ratio
5. Understand Cost Accounting, its Methods and Techniques, classifications of cost, Cost volume, profit analysis, marginal costing and decision making

TEXT BOOK(S)
1. T.S. Grewal. 2019. Double Entry Book Keeping. Sultan Chand, New Delhi.
2. S.N. Maheswari. 2018. Principles of Management Accounting.Sultan Chand, New Delhi.
3. Shukla, Grewal& Gupta. 2018. Advanced Accounts. Sultan ChandPublications, New Delhi.

REFERENCE BOOK(S)

1. S.K. Gupta & R.K. Sharma. 2010. Practical Problems in Management Accounting, Kalyani publishers, Chennai.
2. Khan and Jain. 2007. Financial Management, Tata McGraw Hill Education, New Delhi.
3. R.L. Gupta and Radhaswamy. 2016. Financial Accounting. S. Chand Publishers, New Delhi.
4. T.S Reddy and A.Murthy. 2012. Financial Accounting. Margham Publications, Chennai.
5. P.C. Tulasian. 2016. Introduction to Accounting. Seventh Edition, Pearson, UK.

E-RESOURCES

1. https://www.pdfdrive.com/financial-and-management-accounting-d5126265.html
2. https://en.wikipedia.org/wiki/Financial_management
3. https://libguides.furman.edu/oer/subject/accounting-and-finance
4. https://www.youtube.com/watch?v=c_D8sgO8azA
5. https://www.tutorialspoint.com/accounting_basics/index.htm

MAPPING WITH PROGRAMME 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			
CO2	3	3			3			3	3		3	3			3		
CO3	3	3			3			3	3		3	3	3	3	3		3
CO4	3	3		2		3				2	3			3		3	3
CO5	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'SCOLLEGE (AUTONOMOUS)

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

DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-CP-III: Data Structures and Algorithms Lab

Ins. Hrs./Week: 5 **Course Credit:** 3 **Course Code: P24CA207P**

Implement the following problems using Python

1. Recursion concepts.

a) Linear recursion

b) Binary recursion.

2. Stack ADT.

3. Queue ADT.

4. Doubly Linked List ADT.

5. Heaps using Priority Queues.

6. Merge sort.

7. Quick sort.

8. Binary Search Tree.

9. Minimum Spanning Tree.

10. Depth First Search Tree traversal.

Total Lab Hours-75

COURSE OUTCOME:

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

1. Strong understanding in various ADT concepts
2. To become a familiar with implementation of ADT models
3. Apply sort and tree search algorithms
4. Evaluate the different data structure models
5. Learn how to develop ADT for the various real-time problems

TEXT BOOK(S):

1. Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011. (Unit – 1)Chapters: 1, 2, 3.
2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", John Wiley & Sons, 2013. (Unit – 2, 3, 4, and 5)Chapters: 3 to 12, and 14.

REFERENCE BOOK(S):

1. Dr. Basant Agarwal; Benjamin Baka, "Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7", Packt Publishing, 2018.
2. Magnus Lie Hetland, "Python Algorithms: Mastering Basic Algorithms in the Python Language", Apress, 2014.

E-RESOURCES

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3. https://www.freecodecamp.org/news/learn-data-structures-and-algorithms/
4. https://www.javatpoint.com/data-structure-tutorial
5. https://www.javatpoint.com/data-structure-algorithm

MAPPING WITH PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3		3	3			2	2		3			3	3		2
CO2	3		3	3		3	3	3			3		3	3	3		
CO3	3	3	3	3		3					3	3	3			3	3
CO4		3		3		3	3	3	3	2	3	3	3			3	3
CO5	3	3	3		3						3	3	3	3	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 2024 – 2024)

DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-CP-IV: Big Data Analytics Lab

Ins. Hrs./Week: 5 **Course Credit: 3** **Course Code: P24CA208P**

List of Programs

1. Implement File System Shell Commands for HDFS in Hadoop Environment
2. Write a Mapreduce program using single reduce function for finding Maximum and Minimum Number
3. Write a Mapreduce program using multiple reduce function for Word Count in an given Text document
4. Implement the following using Pig Latin Input and Output Operations Relational Operations
5. Implement the following using Pig Latin User Defined Functions Advanced Relational Operations
6. Write a Word Count program using Pig Latin Script
7. Write a program to find a maximum temperature using Pig Latin Script
8. Implement the following using Hive commands Handling the Database Creating and Manipulating table
9. Implement Simple Queries for database using Mongo
10. Implement Simple Queries for collections using Mongo

Total Lab Hours-75

COURSE OUTCOME

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

1. Understand and develop conceptually how Big Data is stored and implement it using different tools
2. Comprehend and implement programs for data storage in HDFS and table manipulation using Big Data tools in Hadoop environment
3. Understand and Critically analyse existing Big Data datasets and implementations the solutions for it using MongoDB
4. Understand and examine existing Big Data datasets and implementations the solutions using HIVE database
5. Comprehend and review existing datasets and implementations the solutions to handle it using PIG

TEXT BOOK(S):

1.Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, First Edition, 2015

REFERENCE BOOK(S):

1. Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman,"Big data for dummies",John Wiley & Sons, Inc. (2013)

2. Tom White, "Hadoop The Definitive Guide", O'Reilly Publications, Fourth Edition,2015

3. Dirk Deroos, Paul C.Zikopoulos, Roman B.Melnky, Bruce Brown, Rafael Coss,"Hadoop For Dummies", Wiley Publications, 2014

4. Robert D.Schneider, "Hadoop For Dummies", John Wiley & Sons, Inc. (2012)

5. Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012 Chuck Lam, "Hadoop In Action", Dreamtech Publications, 2010

E-RESOURCES

1. https://www.ibm.com/analytics/big-data-analytics
2. https://www.coursera.org/articles/big-data-analytics
3. https://www.simplilearn.com/what-is-big-data-analytics-article
4. https://intellipaat.com/blog/big-data-analytics/
5. https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-big-data-analytics

MAPPING WITH PROGRAMME 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		3			2
CO2	3	3					3			3	3		3	3	3		
CO3	3	3			3	3		3		2	3	3	3	3		2	
CO4	3	3			3	3		3		2	3	3	3	3		2	
CO5	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
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DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-EC-III: Internet of Things

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE23A**

UNIT- I: Fundamentals of IOT **(12 Hours)**

Evolution of Internet of Things – Enabling Technologies – IOT Architectures: oneM2M, IOT World Forum (IOTWF) and Alternative IOT models – Simplified IOT Architecture and Core IOT Functional Stack -– Fog, Edge and Cloud in IOT – Functional blocks of an IOT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT- II: IOT Protocols **(12 Hours)**

IOT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IPversions, Constrained Nodes and Constrained Networks – Optimizing IP for IOT: From 6LoWPANto 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT.

UNIT- III: Design and Development **(12 Hours)**

Prototyping Embedded Devices: Electronics - Embedded Computing Basics – Arduino - Raspberry Pi - Beagle Bone Black - Electric Imp. Prototyping the Physical Design: Non digital Methods - Laser Cutting - 3D printing - CNC Milling - Repurposing/Recycling.

UNIT – IV: Prototyping Online Components **(12 Hours)**

Getting started with an API - Writing a New API - Real-Time Reactions - Other Protocols. Techniques for Writing Embedded Code: Memory Management - Performance and Battery Life – Libraries - Debugging.

UNIT – V: Business Models **(12 Hours)**

History of Business Models – Model – Internet of Starting up – Lean Startups. Moving to Manufacture: Designing Kits - Designing Printed circuit boards – Certification – Costs - Scaling Up Software. Ethics: Privacy – Control – Environment – Solutions.

Total Lecture Hours - 60

COURSE OUTCOME

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

1. Comprehend the IoT evolution with its architecture and sensors
2. Understand the networking concepts for communication and underlying IoT protocols
3. Assess the embedded technologies and develop prototypes for the IoT products
4. Evaluate the use of Application Programming Interface and design an API for IoT in real time
5. Recognize the ethics of business models and perform security analysis

TEXT BOOK(S):

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017 (UNIT I and II)
2. Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014. (UNIT III, IV and V)

REFERENCE BOOK(S):

1. Ovidiu Vermesan and Peter Friess, "Internet of Things – From Research and Innovation to Market Deployement" , River Publishers, 2014.
2. Peter Waher, "Learning Internet of Things" ,Packt Publishing, 2015.
3. Donald Norris, "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBoneBlack",McGraw Hill, 2015.

E-RESOURCES

1. https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT
2. https://en.wikipedia.org/wiki/Internet_of_things
3. https://www.ibm.com/topics/internet-of-things
4. https://www.wired.co.uk/article/internet-of-things-what-is-explained-iot

MAPPING WITH PROGRAMME OUTCOMES

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

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-EC-III: Internet of Things Lab

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE23BP**

1. To develop an IoT program to turn ON/OFF LED light (3.3V)
2. To develop an IoT program using IR sensor (Smart Garbage Monitoring, Detecting Parking Availability, etc.)
3. To develop an IoT program using Humidity and Temperature Monitoring (Forest fire Detection, Weather Monitoring)
4. To develop an IoT web server program for local hosting
5. To develop an IoT program using Soil Moisture Sensor
6. To develop an IoT program using Ultrasonic Sensor (Distance Measurement, etc.)
7. To develop an real-time IoT program using Relay Module (Smart Home Automation with 230V)
8. To develop an IoT program for Fire Detection (Home, Industry,etc.)
9. To develop an IoT program for Gas Leakage detection (Home, Industry, etc.)
10. To develop an IoMT program using Heartbeat Sensor

Total Lab Hours- 60

COURSE OUTCOME

On the successful completion of the course, students will be able to
1. Comprehend the IoT evolution with its architecture and sensors
2. Understand the networking concepts for communication and underlying IoT protocols
3. Assess the embedded technologies and develop prototypes for the IoT products
4. Evaluate the use of Application Programming Interface and design an API for IoT in realitime
5. Recognize the ethics of business models and perform security analysis

TEXT BOOK(S):

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017 (UNIT I and II)
2. Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014. (UNIT III, IV and V)

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1. Ovidiu Vermesan and Peter Friess, "Internet of Things – From Research and Innovation to Market Deployement" , River Publishers, 2014.
2. Peter Waher, "Learning Internet of Things" ,Packt Publishing, 2015.
3. Donald Norris, "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBoneBlack",McGraw Hill, 2015.

E-RESOURCES

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2. https://en.wikipedia.org/wiki/Internet_of_things
3. https://www.ibm.com/topics/internet-of-things
4. https://www.wired.co.uk/article/internet-of-things-what-is-explained-iot

MAPPING WITH PROGRAMME 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			3	2	
CO2	3	3		3		3	3			3	3	3	3	3			3
CO3	3	3	3	3					3	3	3		3		3		2
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3		3		3	3	3			2	3			3	3		

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

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-EC-III: Computer Vision

Ins. Hrs./Week: 4 **Course Credit: 3** **Course Code:P24CAE23C**

Unit-I: Basic Image Handling and Processing

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

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

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:

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

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

Total Lecture Hours - 60

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

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 andcomputer 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. This book is largely based on the computer vision courses that I have co-taught at the University of Washington (2020, 2008, 2005, 2001) with ...81420 · 2010 Richard Szeliski... · Richard Szeliski
2. Computer Vision Textbooks. Textbooks are those books written by experts, often academics, and are designed to be used as a reference for ...

REFERENCE BOOK(S):

1. Computer Vision: Algorithms and Applications , Richard Szeliski, illustrated, Springer London, 2010,
2. Computer Vision: Models, Learning, and Inference Simon J. D. Prince, Cambridge University Press, 18- Jun-2012 –

E-RESOURCES

1. https://en.wikipedia.org/wiki/Computer_vision
2. https://towardsdatascience.com/everything-you-ever-wanted-to-know-about-computer-visi
3. https://azure.microsoft.com/en-in/resources/cloud-computing-dictionary/what-is-computer
4. https://builtin.com/machine-learning/computer-vision

MAPPING WITH PROGRAMME OUTCOMES

	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		3		3	3			3	3	3		2		
CO3	3	3	3		3	3			3	2	3		3				
CO4	3	3	3	3	3	3					3	3	3		3	3	
CO5	3	3	3	3		3		3	3	2	3	3	3	3	3	3	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)
DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-EC-III: Computer Vision Lab

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE23DP**

Implement the following problems using Python with OpenCV

1. Image Loading, Exploring, and displaying an Image.
2. Access and Manipulate of Image Pixels.
3. Image Transformations.
   i) Resizing
   ii) Rotation
4. Addition operation of Two Images.
5. Image filtering operations
   i) Mean Filtering
   ii) Gaussian Filtering
6. Image Binarization Using Simple Thresholding method.
7. Edge Detection operation using Sobel and Scharr Gradients.
8. Find Grayscale and RGB Histograms of an Image.
9. Segment an Image using K-means Clustering algorithm.
10. Write a program to classify an Image using KNN Classification algorithm.

Total Lab Hours- 60

COURSE OUTCOME

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

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 andcomputer vision
4. To develop incorporate machine learning techniques with computer vision system
5. To apply and analyze image segmentation and image registration

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1. This book is largely based on the computer vision courses that I have co-taught at the University of Washington (2020, 2008, 2005, 2001) with ...81420 · 2010 Richard Szeliski... · Richard Szeliski
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2. Computer Vision: Models, Learning, and Inference Simon J. D. Prince, Cambridge University Press, 18- Jun-2012 –

E-RESOURCES

1. https://en.wikipedia.org/wiki/Computer_vision
2. https://towardsdatascience.com/everything-you-ever-wanted-to-know-about-computer-visi
3. https://azure.microsoft.com/en-in/resources/cloud-computing-dictionary/what-is-computer
4. https://builtin.com/machine-learning/computer-vision

MAPPING WITH PROGRAM OUTCOMES

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

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

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-EC-IV: Cyber Security

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE24A**

Unit – I: Cybercrime **(12 Hours)**

Introduction to cybercrime: Classification of cybercrimes – reasons for commission of cybercrime – malware and its type – kinds of cybercrime – authentication – encryption – digital signatures – antivirus – firewall – steganography – computer forensics – why should we report cybercrime – introduction counter cyber security initiatives in India – generating secure password – using password manager-enabling two-step verification – security computer using free antivirus.

Unit – II: Tips for buying online **(12 Hours)**

Clearing cache for browsers – wireless LAN-major issues with WLAN-safe browsing guidelines for social networking sites – email security tips – introduction-smartphone security guidelines – purses, wallets, smart phones – platforms, setup and installation-communicating securely with a smartphone.

Unit – III: Cyber investigation roles **(12 Hours)**

Introduction – role as a cybercrime investigator – the role of law enforcement officers – the role of the prosecuting attorney – incident response: introduction- post mortem versus live forensics – computer analysis for the hacker defender program- network analysis – legal issues of intercepting Wi-Fi transmission – Wi-Fi technology – Wi-Fi RF-scanning RF – eavesdropping on Wi-Fi – fourth amendment expectation of privacy in WLAN.

Unit – IV: Seizure of digital information **(12 Hours)**

Introduction – defining digital evidence – digital evidence seizure methodology – factors limiting the wholesale seizure of hardware – other options for seizing digital evidence – common threads within digital evidence seizure – determining the most appropriate seizure method– conducting cyber investigations–demystifying computer/cyber crime – IP addresses – the explosion of networking – interpersonal communication.

Unit – V: Digital forensics and analyzing data **(12 Hours)**

Introduction – the evolution of computer forensics– phases of digital forensics-collection – examination-analysis – reporting – Cyber crime prevention: Introduction – crime targeted at a government agency.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand, describe, analyze and examine the basics of Cyber security concepts and its implementation in India.
2. Comprehend and demonstrate the security tips in browsers, WLAN, social networks,Email security and Smart phone. Apply the investigations in post mortem and Forensics.
3. Understand, apply and evaluate the various investigation roles and Wi Fi protecting mechanisms.
4. Understand, illustrate and evaluate the method of seize the digital information and evidences forensics data and evaluate the forensics reports.
5. Comprehend, apply and appraise the methods digital forensics with cybercrimeprevention techniques.

TEXT BOOK(S)

1. Dr.JeetendraPande, **"**Introduction to Cyber Security" Published by Uttarakhand Open University, 2017.(Chapter: 1.2-6.4,9.3-12.2)
2. Anthony reyes, Kevin o'shea, Jim steele, Jon R. Hansen, Captain Benjamin R. Jean Thomas Ralph, "Cyber-crime investigations" - bridging the gaps between security professionals, law enforcement, and prosecutors, 2007.(Chapter: 4, 5, 6, 7, 8, 9,10)

REFERENCE BOOK(S)

1. Sebastian Klipper, "Cyber Security" EinEinblickfur Wirtschafts wissenschaftler Fachmedien Wiesbaden,2015
2. John G.Voller Black and Veatch, "Cyber Security" Published by John Wiley & Sons, Inc., Hoboken, New Jersey Published simultaneously in Canada ©2014.

E-RESOURCES

1. https://www.kaspersky.com/resource-center/definitions/what-is-cyber
2. https://www.kaspersky.co.in/resource-center/definitions/what-is-cyber-security
3. https://www.itgovernance.co.uk/what-is-cybersecurity
4. https://www.digitalguardian.com/blog/what-cyber-security

MAPPING WITH PROGRAM OUTCOMES

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

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

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Semester: II-EC-IV: Cyber Security Lab

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE24BP**

Implement the following using any cyber security tools

1. Install virtual box (kali Linux)
2. Generate a secure password using keepass
3. Change the wireless device mode as monitor mode
4. Find the known and open vulnerabilities of system using metaspolit
5. Identify the multiple vulnerabilities webserver using nikto tool
6. Identify the open ports in the network using nmap tools
7. List all the network around us and display the information about the networks
8. Sniff and capture the packet sent over HTTP requests
9. Find the owners of internet resources using Whois Lookup tool
10. Find the subdomains of webpage using knock tool

Total Lab Hours- 60

COURSE OUTCOMES

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

1. Understand, describe, analyze and examine the basics of Cyber security concepts and its implementation in India
2. Comprehend and demonstrate the security tips in browsers, WLAN, social networks, Email security and Smart phone. Apply the investigations in post mortem and Forensics
3. Understand, apply and evaluate the various investigation roles and Wi Fi protecting mechanisms.
4. Understand, illustrate and evaluate the method of seize the digital information and evidences forensics data and evaluate the forensics reports
5. Comprehend, apply and appraise the methods digital forensics with cybercrime prevention techniques

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1. Dr.JeetendraPande, **"**Introduction to Cyber Security" Published by Uttarakhand Open University, 2017.(Chapter: 1.2-6.4,9.3-12.2)
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E-RESOURCES

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3. https://www.itgovernance.co.uk/what-is-cybersecurity
4. https://www.digitalguardian.com/blog/what-cyber-security

MAPPING WITH PROGRAM OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3			3		2		3	3	3		3		2
CO2	3	3	3	2	3		3	3			3	3	3			2	
CO3	3	3	3		3	3			3	2	3		3	3			2
CO4	3	3	3	3	3	3		3	3	2	3	3	3		3	3	
CO5	3	3	3	3		3		3	3	2	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)
DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-EC-IV: Block chain Technologies

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE24C**

Unit I: Blockchain, Decentralization (12 Hours)

Blockchain :The growth of blockchain technology - Distributed systems - The history of blockchain and Bitcoin - Blockchain - Consensus - CAP theorem and blockchain. Decentralization: Decentralization using blockchain - Methods of decentralization -Routes to decentralization - Blockchain and full ecosystem decentralization - Pertinent terminology - Platforms for decentralization - Innovative trends.

Unit II: Public Key Cryptography, Consensus Algorithms and Smart Contracts (12 Hours)

Public Key Cryptography: Asymmetric cryptography - Cryptographic constructs and blockchain technology. Consensus Algorithms: Introducing the consensus problem -Analysis and design - Classification - Algorithms - Choosing an algorithm. Smart Contracts: History - Definition - Ricardian contracts - Smart contract templates – Oracles - Deploying smart contracts - DAO

Unit III: Bitcoin (12 Hours)

Bitcoin: Bitcoin—an overview - Cryptographic keys - Transactions - Blockchain – Mining. Bitcoin Network and Payments: The Bitcoin network - Wallets - Bitcoin payments -Innovation in Bitcoin - Advanced protocols - Bitcoin investment and buying and sellingBitcoin. Bitcoin Clients and APIs: Bitcoin client installation - Experimenting further with bitcoin-cli - Bitcoin programming.

Unit IV: Alternative Coins (12 Hours)

Alternative Coins: Theoretical foundations - Difficulty adjustment and retargeting algorithms - Bitcoin limitations - Extended protocols on top of Bitcoin -Development of altcoins.Ethereum: Ethereum – an overview - Ethereum network - Components of the Ethereum ecosystem - EthereumVirtual Machine (EVM) - Smart contracts. - Blocks and blockchain - Wallets and client - Nodes and miners - APIs, tools, and DApps - Supporting protocols - Programming languages.

Unit V: Development Tools and Frameworks, Use Cases & Security (12 Hours)

Development Tools and Frameworks :Languages - Compilers - Tools and libraries - Frameworks - Contract development and deployment - Layout of a Solidity source code file - Solidity language. Use Cases: IoT – Government - Health -Finance – Media. Scalability and Other Challenges: Scalability - Privacy - Security - Other challenges.

Total Lecture Hours - 60

COURSE OUTCOME

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

1. Understand,apply and examine the characteristics of blockchain, bitcoin and consensus algorithm in centralized and decentralized methods.
2. Comprehend and demonstrate the application of hashing and public key cryptography in protecting the blockchain.
3. Understand and analyse the elements of trust in a Blockchain: validation, verification, and consensus.
4. Comprehend and evaluate the alternate coin, Ethereum and smart contract.
5. Grasp and apply the knowledge of Tools and languages for applications

TEXT BOOK:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder. Bitcoin and Cryptocurrency Technologies. Princeton University Press, 2016. ISBN 978-0691171692

REFERENCE BOOK:

1. Andreas Antonopoulos. Mastering Bitcoin: Programming the open block chain. Oreilly Publishers, 2017. ISBN 978-9352135745

E-RESOURCES

1. https://www.ibm.com/topics/blockchain
2. https://www.euromoney.com/learning/blockchain-explained/what-is-blockchain
3. https://en.wikipedia.org/wiki/Blockchain
4. https://aws.amazon.com/what-is/blockchain/

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

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DEPARTMENT OF COMPUTER APPLICATIONS
MASTER OF COMPUTER APPLICATIONS (MCA)

Semester: II-EC-IV: Block chain Technologies Lab

Ins. Hrs./Week: 4 **Course Credit:** 3 **Course Code: P24CAE24DP**

Implement the following

1. Create a Public Ledger and Private Ledger with the various attributes like Access, Network Actors, Native token, Security, Speed and examples.
2. Building and Deploying MultiChain private Blockchain
3. Write Hello World smart contract in a higher programming language (Solidity)
4. Construct the Naïve block chain
5. Construct and deploy your contract (Use deploy method)
6. Set up a Regtest environment
7. Build a payment request URI
8. Hashcash implementation
9. Develop a toy application using Blockchain
10. Create simple wallet transaction from one account to another account using Metamask.

Total Lab Hours- 60

COURSE OUTCOME

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

1. Enable to setup your own private Blockchain and deploy smart contracts on Ethereum.
2. Gains familiarity and implement with cryptography and Consensus algorithms.
3. Create and deploy projects using Web3j.
4. Recall and deploy the structure and mechanism of Bitcoin, Ethereum, Hyperledger
5. Implement Blockchain for various use cases

TEXT BOOK:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder. Bitcoin and Cryptocurrency Technologies. Princeton University Press, 2016. ISBN 978-0691171692

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

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

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DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS (MCA)

Semester:II-NME-II:Cloud Computing

Ins. Hrs./Week: 2 **Course Credit:** 2 **Course Code: P24NMECA22**

Unit-I :Cloud Computing Basic (6 Hours)

Cloud computing definition- Characteristics- Benefit-Challenges-Distributed SystemsVirtualization-Service-oriented computing- Utility-oriented computing- Building Cloud Computing environments- computing platforms & technologies - Cloud Models – Cloud Service Examples - Cloud Based Services & Applications - Cloud concepts and Technologies.

Unit–II: Virtualization, Cloud Services and Platforms (6 Hours)

Virtualization: Virtualization- Characteristics- taxonomy-types- Pros and ConsExamples Architecture: Reference model- types of clouds- Compute Service - 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 (6 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 (6 Hours)

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

Unit–V: Big Data Analytics, Multimedia Cloud & Cloud Security (6 Hours)

Big Data Analytics: Clustering Big data - Classification of Big Data – Recommendation systems. 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-30

COURSE OUTCOME

The Students will be able to

1. Building Cloud Computing environments
2. Write Reference model and types of clouds
3. Understand Cloud Application Design Methodologies
4. Installing Python and Designing a Restful Web API
5. Learn the Big Data Concepts.

TEXT BOOK(S)

1. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013.

2. ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands –On Approach" Universities press (India) Pvt. limited 2016.

REFERENCE BOOK(S):

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

E-RESOURCES

1. https://www.tutorialspoint.com/cloud_computing/index.htm
2. https://www.tutorialspoint.com/cloud_computing/cloud_computing_architecture.htm
3. https://www.tutorialspoint.com/cloud_computing/cloud_computing_public_cloud_model.htm
4. https://www.javatpoint.com/virtualization-in-cloud-computing
5. https://www.javatpoint.com/virtualization-in-cloud-computing

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CO3	3	3			3	3			3	3	3		3	3	3		3
CO4	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)