E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.
(*An Autonomous Institution – Affiliated to Madurai Kamaraj University*)
Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF COMPUTER APPLICATIONS

TANSCHE-CBCS with OBE

MASTER OF COMPUTER APPLICATIONS

PROGRAMME CODE - MC

COURSE STRUCTURE

(w.e.f. 2023 – 2024 Batch onwards)

Annexure - 3

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI-14.

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DEPARTMENT OF COMPUTER APPLICATIONS - PG

TANSCHE – CBCS with OBE

(w.e.f. 2023-2024 Batch Onwards)

VISION

To achieve excellence in Information Technology Enabled Services through Teaching, research, Extension and Consultancy.

MISSION

- To offer accredited post graduate and research programmes with the state-of-art technology throughout the Nation.
- To maintain high academic standards and teaching quality
- To be a centre of excellence for research and innovation in frontier areas of Computer Applications and technology relevant to the country.

Programme Educational Objectives (PEOs) : M.C.A

PEO	On Completion of the Programme , the student will be able to
PEO1	Utilizing strong technical aptitude and domain knowledge to develop smart softwaresolutions for the upliftment of society.
PEO2	To equip the students to meet the requirement of Corporate world and Industry standard.
PEO3	Showing continuous improvement in their professional career through life-long learning,appreciating human values and ethics.
PEO4	To engage in professional development and to pursue post graduate education in the fieldsof Information Technology and Computer Applications.
PEO5	To provide the students about computing principles and business practices in softwaresolutions, outsourcing services, public and private sectors

Annexure - 3

Programme Outcomes (POs) with Graduate Attributes

PO	Graduate Attributes	On Completion of the Programme , the students will be able to
PO1	Problem Solving Skill	Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.
PO2	Decision Making Skill	Foster analytical and critical thinking abilities for data-based decision-making.
PO3	Ethical Value	Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities
PO4	Communication Skill	Ability to develop communication, managerial and interpersonal skills
PO5	Employability Skill	Inculcate contemporary business practices to enhance employability skills in the competitive environment
PO6	Individual and Team Leadership Skill	Capability to lead themselves and the team to achieve organizational goals.

Programme Specific Outcomes (PSOs) with Graduate Attributes

PSO	Graduate Attributes	On Completion of the Programme, the student will be able to
PSO 1	Placement	To prepare the students who will demonstrate respectful engagement with others‟ ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions
PSO 2	Entrepreneur	To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
PSO 3	Research and Development	Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development..
PSO 4	Contribution to Business World	To produce employable, ethical and innovative professionals to sustain in the dynamic business world.
PSO 5	Contribution to the Society	To contribute to the development of the society by collaborating with stakeholders for mutual benefit

Annexure - 3

Eligibility for Admission

Qualifying Exam	**:**	Candidates should have Bachelor's Degree of three-year duration from any recognized college.
Eligibility	**:**	Candidates must have Mathematics at 10+2 or graduation level.

Duration of the Course

The students shall undergo prescribed course of study for the period of two academic years under **CBCS** semester pattern with **O**utcome **B**ased **E**ducation.

Medium of Instruction **:** English

System **: TANSCHE - C**hoice **B**ased **C**redit **S**ystem with **O**utcome **B**ased **E**ducation.

Nature of the Course

Courses are classified according to the following nature

1. Knowledge & Skill
2. Employability Oriented
3. Entrepreneurship Oriented

Outcome Based Education (OBE) & Assessment

Students understanding must be built on and assessed for wide range of learning activities, which includes different approaches and are classified along several bases, such as

1. **Based on purpose:**
   - Continuous Internal Assessment - **CIA** (Internal tests, Assignment, Seminar, Quiz, Documentation, ICT based Assignment, Mini Projects administered during the learning process)
   - Summative (Evaluation of students learning at the end of instructional unit)
2. **Based on Domain knowledge: (Post Graduate Up to K5 Levels)**
   - Assessment through K1, K2, K3 , K4 & K5

Evaluation (Theory)

Continuous Internal Assessment Test (CIA)	: 25 Marks
Summative Examination	: 75 Marks
Total	: 100 Marks

Annexure - 3

CIA - Continuous Internal Assessment: 25 Marks

Components	Marks
Test (Average of two tests) (I and II Assessments 60 Marks each and 120 Marks is converted into 12 Marks)	**12**
Application-Oriented / Innovation / Creativity Assignment	**3**
Assignment	**5**
Seminar	**5**
Total	**25**

- ✓ 2 Centralized system of Internal Assessment Tests
- ✓ There will be two Internal Assessment tests
- ✓ Duration of I and II Assessment Tests will be 2 hours 30 Minutes
- ✓ Students shall write retest on the genuine grounds if they are absent in either Test I or Test II with the approval of Head of the Department

Question Paper Pattern for Continuous Internal Assessment Test I and Test II

Section	Marks
A – Multiple Choice Questions (8 x 1 Mark)	8
B – Short Answer (6 x 2 Marks)	12
C – Either Or type (4/8 x 5 Marks)	20
D – Open Choice type (2/4 x 10 Marks)	20
Total	**60**

Conducted for 120 Marks and converted into 12 Marks

Question Paper Pattern for Summative Examination:

Section	Marks
A- Multiple Choice Questions type (10 x 1 Mark)	10
B- Short Answer Questions without choice(5 x 2 Marks)	10
C- Either Or type (5/10 x 5 Marks)	25
D- Open Choice type (3 out of 5 x 10 Marks)	30
Total	**75**

Annexure - 3

Evaluation (Practical)

Internal	:	40 Marks
External (Summative)	:	60 Marks
Total	:	100 Marks

Question Paper Pattern for Internal Practical Examination : 40 Marks and
External Practical Examination : 60 Marks

Internal	
Components	**Marks**
Major Question	20
Minor Question	10
Record Work	5
Program Explanation / VIVA	5
Total	**40**

External	
Components	**Marks**
Major Question	30
Minor Question	20
Record Work	5
Program Explanation / VIVA	5
Total	**60**

- In respect of Summative Examinations passing minimum is **45%** for Post Graduate. and in total, aggregate of **50%.**
- Latest amendments and revisions as per **UGC** and **TANSCHE** norms are taken into Consideration in Curriculum Preparation.

Distribution of Marks in % with K levels CIA I, II & External Assessment

Blooms Taxonomy	**Internal Assessment**		**External Assessment**
	I	**II**	
Knowledge(K1)	8 %	8 %	5%
Understanding(K2)	8 %	8 %	14%
Apply(K3)	24 %	24 %	27%
Analyze(K4)	30 %	30 %	27%
Evaluate(K5)	30%	30%	27%

Annexure - 3

BLUE PRINT FOR INTERNAL ASSESSMENT – I

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Up to K5	1 2	K1 K2	1 1	K1 K3	2(K3) 2(K5)	1(K4)	
2	CLO 2	Up to K5	2 1	K1 K2	1 1	K1 K2	2(K3)	1(K4) 1(K5)	
3.	CLO3	Up to K5	1 1	K1 K2	1 1	K2 K3	2(K4) (Each set of questions must be in the same level)	1(K5)	
No. of Questions to be asked			8		6		8	4	26
No. of Questions to be answered			8		6		4	2	20
Marks for each question			1		2		5	10	
Total Marks for each section			8		12		40	40	100

Annexure - 3

BLUE PRINT FOR INTERNAL ASSESSMENT – II

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1.	CLO3	Up to K5	1 2	K1 K2	1 1	K1 K3	2(K3) 2(K5)	1(K4)	
2.	CLO4	Up to K5	2 1	K1 K2	1 1	K1 K2	2(K3)	1(K4) 1(K5)	
3	CLO5	Up to K5	1 1	K1 K2	1 1	K2 K3	2(K4) (Each set of questions must be in the same level)	1(K5)	
No. of Questions to be asked			8		6		8	4	26
No. of Questions to be answered			8		6		4	2	20
Marks for each question			1		2		5	10	
Total Marks for each section			8		12		40	40	100

Annexure - 3

Distribution of Marks with choice K Levels CIA I and CIA II

CIA	K Levels	Section- A MCQ (No choice)	Section -B Short Answer (No choice)	Section- C (Either or Type)	Section-D (Open Choice)	Total Marks	% of Marks
I	K1	4	4	-	-	8	**8**
	K2	4	4	-	-	8	**8**
	K3	-	4	20	-	24	**24**
	K4	-	-	10	20	30	**30**
	K5	-	-	10	20	30	**30**
	Marks	**8**	**12**	**40**	**40**	**100**	**100**
II	K1	4	4	-	-	8	**8**
	K2	4	4	-	-	8	**8**
	K3	-	4	20	-	24	**24**
	K4	-	-	10	20	30	**30**
	K5	-	-	10	20	30	**30**
	Marks	**8**	**12**	**40**	**40**	**100**	**100**

Annexure - 3

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for Internal Assessment (SEC)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No choice)		Short Answers (No choice)		(Either/or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K4	2	K1			2(K3&K3) 2(K3&K3) 2(K4&K4) 2(K5&K5)	1(K3)	
2	CLO 2	Up to K4	2	K1				1(K4)	
3	CLO 3	Up to K4			2	K2		1(K4)	
4	CLO 4	Up to K5			2	K2		1(K5)	
5	CLO 5	Up to K5			2	K2		1(K5)	
No. of Questions to be asked			4		3		8	5	20
No. of Questions to be answered			4		3		4	2	13
Marks for each question			1		2		5	10	
Total Marks for each section			4		6		20	20	50 (Marks)

Distribution of Section-wise Marks with K Levels for Internal Assessment (SEC)

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	4				**4**	**4**
K2		6			**6**	**6**
K3			20	10	**30**	**30**
K4			10	20	**30**	**30**
K5			10	20	**30**	**30**
Total Marks	**4**	**6**	**40**	**50**	**100**	

K1- Remembering and recalling facts with specific answers.
K2- Basic understanding of facts and stating main ideas with general answers.
K3- Application oriented- Solving Problems, Justifying the statement and derivingInferences.
K4- Examining, analyzing, presentation and make inferences with evidences.
K5- Evaluating, making Judgments based on criteria.

Annexure - 3

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for ExternalAssessment

Sl. No	CLOs	K-Level	Section A		Section B		Section C	Section D	Total
			MCQs (No choice)		Short Answers (No choice)		(Either/or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K4	2	K1&K2	1	K1	2 (K2& K2)	1(K3)	
2	CLO 2	Up to K4	2	K1&K2	1	K2	2(K3& K3)	1(K4)	
3	CLO 3	Up to K4	2	K1&K2	1	K3	2 (K3 &K3)	1(K4)	
4	CLO 4	Up to K5	2	K1&K2	1	K4	2 (K4 & K4)	1(K5)	
5	CLO 5	Up to K5	2	K1&K2	1	K5	2 (K5 & K5)	1(K5)	
No. of Questions to beasked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75 (Marks)

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	5	2	-	-	**7**	**5**
K2	5	2	10	-	**17**	**14**
K3	-	2	20	10	**32**	**27**
K4	-	2	10	20	**32**	**27**
K5	-	2	10	20	**32**	**27**
Total Marks	**10**	**10**	**50**	**50**	**120**	**100**

K1- Remembering and recalling facts with specific answers.
K2- Basic understanding of facts and stating main ideas with general answers.
K3- Application oriented- Solving Problems, Justifying the statement and deriving Inferences.
K4- Examining, analyzing, presentation and make inferences with evidences.
K5- Evaluate , making Judgments based on criteria.

Annexure - 3

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DEPARTMENT OF COMPUTER APPLICATIONS - PG

TANSCHE – CBCS with OBE
(w.e.f. 2023-2024 Batch Onwards)
COURSE STRUCTURE - SEMESTER WISE

Sem.	Category	Course Code	Course Title	Teaching Hours / Week	Duration of Exam (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	Core – I	23OPCA11	Discrete Mathematics	6	3	25	75	100	6
	Core – II	23OPCA12	Linux and Shell Programming	6	3	25	75	100	6
	Core - III	23OPCA13	Python Programming	6	3	25	75	100	4
	Elective –I		DSEC - 1	6	3	40	60	100	3
	Elective – II		DSEC - 2	6	3	40	60	100	3
II	Core – IV	23OPCA21	Data Structures and Algorithms	6	3	25	75	100	5
	Core – V	23OPCA22	Big Data Analytics	6	3	25	75	100	5
	Core - VI	23OPCA21P	Data Structures and Algorithms Lab	6	3	40	60	100	4
	Elective –III		DSEC - 3	5	3	40	60	100	3
	Elective – IV		DSEC - 4	5	3	40	60	100	3
	SEC 1	23OPCASEC21	Block Chain Technologies	2	3	25	75	100	2

Annexure - 3

DSEC: Discipline Specific Elective Courses:

Semester I

DSEC – 1 (Choose any One)

1.Data Engineering and Management Lab	-	23OPCADSE1AP
2. Architecture and Frameworks Lab	-	23OPCADSE1BP

DSEC –2 (Choose any One)

1.Software Development Technologies Lab	-	23OPCADSE1CP
2.Soft Computing Lab	-	23OPCADSE1DP

Semester II

DSEC – 3 (Choose any One)

1.Internet of Things Lab	-	23OPCADSE2AP
2.Computer Vision Lab	-	23OPCADSE2BP

DSEC – 4 (Choose any One)

1. Cryptography and Network Security Lab	-	23OPCADSE2CP
2. Block Chain Technologies Lab	-	23OPCADSE2DP

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
I	Core - 1	23OPCA11	Discrete Mathematics	6	6	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives:

1. To know the concepts of relations and functions
2. To distinguish among different normal forms and quantifiers
3. To solve recurrence relations and permutations & combinations
4. To know and solve matrices, rank of matrix & characteristic equations
5. To study the graphs and its types

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Relations**- 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	18	Up to K5	CLO1
II	**Mathematical Logic**-Logical connectives-Predicates and **Quantifiers**- Universal Quantifiers- Existential Quantifiers- **Well formed formulas** – Truth table of well-formed formula –Tautology – Contradiction and Contingency- Equivalence of formulas - Algebra of propositions –Quine's method- Functionally complete sets – Normal Forms of well-formed formulas-Disjunctive normal form-Principal Disjunctive normal form-Conjunctive normal form-Principal conjunctive normal form	18	Up to K5	CLO2

III	**Recurrence Relations**- Formulation -solving recurrence Relation by Iteration- solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two- Solving Linear Non homogeneous Recurrence Relations. **Permutations**- Permutations with repetitions- permutations of sets with indistinguishable objects- **Combinations**- Combinations with repetition.	18	Up to K5	CLO3
IV	**Matrices**- special types of matrices -Inverse of a square matrix- Determinants-Elementary operations -Rank of a matrix-Simultaneous linear equations –Inverse by partitioning- Eigen Values and Eigen Vectors	18	Up to K5	CLO4
V	**Graphs -** Connected Graphs –Examples of special Graphs- Euler Graphs-Hamiltonian circuits and paths – planar graphs – Petersen Graph – Colouring of Graphs and Chromatic Number -Matrix representation of graphs	18	Up to K5	CLO5

Books for Study:

1. N.Chandrasekaran and M.Umaparvathi, Discrete mathematics, PHI Learning Private Limited, New Delhi, 2010.
2. Discrete Mathematics- M.K. Venkataraman, N.Sridharan, N.Chandrasekaran

Chapters :

Unit-I: Chapter V: 5.1 to 5.5 & Chapter I: 1.5.1 & 1.5.2

Unit-II: Chapter I: 1.1 & Chapter II: 2.1 to 2.7

Unit-III: Chapter VI: 6.1 to 6.5 & Chapter III: 3.1 to 3.5

Unit-IV: Chapter VI: 6.1 to 6.7 (Text Book 2)

Unit-V: Chapter X: 10.1 to 10.8

Books for Reference:

1. Kimmo Eriksson &Hillevi Gavel, Discrete Mathematics & Discrete Models, Student literature AB, 2015.
2. Kenneth H. Rosen Discrete Mathematics and applications, Mc Graw Hill, 2012
3. Dr. B.S.Vatsa, Introduction to Discrete Mathematics, Fourth Edition, 2004
4. S.C.Malik, Principles of Discrete Mathematics, New Age International (P) Ltd Publishers, Second Edition, 2008.

5.Mc Graw Hill, Applications of Discrete Mathematics, Eighth Edition, Special Indian Edition.

Web Resources :

1. https://youtu.be/Lbhqe8lca3Q?si=hOlh5Z4aLv5NVtWa
2. https://youtu.be/p2b2Vb-cYCs?si=3Fflgfz2_SnonAyE
3. https://youtu.be/F1emx9_hruA?si=iqfqedeq2CumEyWo

e-books :

1. https://discrete.openmathbooks.org/&ved
2. https://www.javatpoint.com/matrix-in-discrete-mathematics
3. https://www.freebookcentre.net/Mathematics/Graph-Theory-Books.html&ved

Pedagogy :

Chalk and Talk, Group Discussion, Student Seminar, Spot Test, Assignments, Quiz.

Rationale for Nature of the Course :

1. To prove a knowledge of binary relations and matrices
2. Apply logic in real life problem

Activities to be Given :

- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLOs):

On successful Completion of the course Students will be able to

CLO	Course Learning Outcomes	Knowledge Level(According toBloom's Taxonomy)
CLO1	Understand the basic concepts of relations and functions	Up to K5
CLO2	To distinguish among different normal forms and quantifiers	Up to K5
CLO3	To understand recurrence relations and permutations & combinations	Up to K5
CLO4	Demonstrate the ability to solve matrices, rank of matrix & characteristic equations	Up to K5
CLO5	Use graphs as tools to visualize and simplify situations	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate, making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level 2 – Intermediate Level 3- Advanced Level

Annexure - 3

LESSON PLAN :

Unit	Description	Hours		Mode of Teaching
I	**Relations**- Binary relations-Operations on relations-properties of binary relations in a set – Equivalence relations	6	18	Chalk & Talk
	Representation of a relation by a matrix -Representation of a relation by a digraph	6		Chalk & Talk Spot Test
	Functions-Definition and examples-Classification of functions	6		Chalk & Talk
II	**Mathematical Logic**-Logical connectives-Predicates and **Quantifiers**- Universal Quantifiers- Existential Quantifiers- **Well formed formulas** – Truth table of well-formed formula –Tautology – Contradiction and Contingency	6	18	Chalk & Talk
	Equivalence of formulas- Algebra of propositions – Quine's method- Functionally complete sets	6		Chalk & Talk, Spot Test
	Normal Forms of well-formed formulas-Disjunctive normal form-Principal Disjunctive normal form-Conjunctive normal form-Principal conjunctive normal form	6		Chalk & Talk
III	**Recurrence Relations**- Formulation -solving recurrence Relation by Iteration	6	18	Chalk & Talk
	Solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two-Solving Linear Non homogeneous Recurrence Relations.	6		Chalk & Talk
	Permutations- Permutations with repetitions-permutations of sets with indistinguishable objects-			PowerPoint Presentation
	Combinations- Combinations with repetition.	6		
IV	**Matrices**- special types of matrices -Inverse of a square matrix	6	18	PowerPoint Presentation
	Determinants-Elementary operations -Rank of a matrix-Simultaneous linear equations	6		Power Point Presentation
	Inverse by partitioning- Eigen Values and Eigen Vectors	6		Chalk & Talk, Assignment
V	**Graphs -** Connected Graphs –Examples of special Graphs- Euler Graphs	6	18	Chalk & Talk
	Hamiltonian circuits and paths –planar graphs – Petersen Graph	6		PowerPoint Presentation
	Colouring of Graphs and Chromatic Number -Matrix representation of graphs	6		Chalk & Talk, Students Seminar

Course Designer
Miss.A.Manickavalli

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Core-II	23OPCA12	Linux and Shell Programming	6	6	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. To teach principles of operating system including File handling utilities, Basic Linux commands, Scripts and filters.
2. To familiarize fundamentals of shell (bash), shell programming, pipes, Control structures,arithmetic in shell interrupt processing, functions, debugging shell scripts.
3. To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API‟s).
4. To facilitate students in understanding Inter process communication, semaphore and shared memory.
5. To explore real-time problem solution skills in Shell programming.

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Basic bash Shell Commands:** Interacting with the shell-Traversing the file system-Listing files and directories-Viewing file contents. **Basic Script Building:** Using multiple commands-Creating a script file-Displaying messages-Using variables-Pipes-Performing math-Exiting the script. **Using Structured Commands:** Working with the if- then statement-Nesting ifs-Testing compound conditions-Using double brackets and parentheses-Looking at case.	18	Up to K5	CLO1
II	**More Structured Commands:** 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.	18	Up to K5	CLO2

III	**Creating Functions:** Basic script functions-Returning a value-Using variables in functions-Array and variable functions-Function recursion.**Writing Scripts for Graphical Desktops:** Creating text menus--Adding X Window graphics. **Introducing sed and gawk:** Learning about the sed Editor-Getting introduced to the gawk Editor-Exploring sed Editor basics.	18	Up to K5	CLO3
IV	**Regular Expressions:** 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 :** Using variables in gawk-Using structured commands- Formatting the printing	18	Up to K5	CLO4
V	**Working with Alternative Shells:** Understanding the dash shell-Programming in the dash shell- Introducing the zsh shell-Writing scripts for zsh.**Writing Simple Script Utilities:** Automating backups-Watching disk space. **Producing Scripts for Database, Web, and E-Mail:** Writing database shell scripts-Using the Internet from your scripts. **Using Python as a Bash Scripting Alternative:** Technical requirements-Python Language- Hello World the Python way-Pythonic arguments-Supplying arguments-Reading user input.	18	Up to K5	CLO5

Books for Study :

1.Richard Blum, Christine Bresnahan, "Linux Command Line and Shell Scripting BIBLE", Wiley Publishing, 3rd Edition, 2015.

2.Mokhtar Ebrahim, Andrew Mallett, "Mastering Linux Shell Scripting", Packt Publishing, 2nd Edition, 2018.

Chapters :

Unit - I : **Book 1 -** 3, 11, and 12
Unit – II : **Book 1** - 13, 14, and 16
Unit – III : **Book 1** - 17, 18, and 19
Unit – IV : **Book 1** - 20, 21, and 22
Unit – V : **Book 1** - 23, 24, 25 and **Book 2** – 14

Books for Reference:

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

Web Resources :

1. https://linuxmint.com/
2. https://www.udemy.com/course/linux-mastery
3. https://www.webminal.org/

e-books :

1.https://linuxnewbieguide.org/wp-content/uploads/2016/07/The-Ultimate-Linux-Newbie-Guide-eBook-Edition-January-2017.pdf
2.https://tldp.org/LDP/GNU-Linux-Tools-Summary/GNU-Linux-Tools-Summary.pdf
3. https://linux-training.be/linuxfun.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs ,Assignments , Quiz.

Rationale for Nature of the Course :

The purpose of Linux is it is an open-source OS. With no restrictions on how to use the software, anyone can run and modify the source code for their own purposes. Being open-source allows Linux to meet the developer's needs completely.

Activities on Knowledge and Skill

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	To understand, apply and analyze the concepts and methodology of Linux shell programming	Up to K5
CLO2	To comprehend, impart and apply fundamentals of control structure and script controls	Up to K5
CLO3	To understand, analyses and evaluate the functions, graphical desktop interface and editors	Up to K5
CLO4	To collaborate, apply and review the concepts and methodology of regular expression and advanced gawk	Up to K5
CLO5	To comprehend, use and illustrate the advance concepts such as alternate shell script, data connectivity and bash scripting using python	Up to K5

K1- Remembering and recalling facts with specific answers.

K2- Basic understanding of facts and stating main ideas with general answers.

K3 – Application oriented – Solving Problems.

K4 –Examining, analyzing, presentation and make inferences with evidences.

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	3	-	3	1
CLO2	3	3	2	-	3	1
CLO3	3	3	2	-	3	1
CLO4	3	3	2	-	3	1
CLO5	3	3	2	-	3	1

1 – Basic Level 2 – Intermediate Level 3- Advanced Level

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	**Basic bash Shell Commands:** Interacting with the shell-Traversing the file system-Listing files and directories-Managing files and directories-Viewing file contents.	6	18	Chalk & Talk
	Basic Script Building: Using multiple commands-Creating a script file-Displaying messages-Using variables-Redirecting input and output - -Pipes-Performing math-Exiting the script	6		Chalk & Talk , Spot test
	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.	6		Chalk and Talk
II	**More Structured Commands:** Looping with for statement-Iterating with the until statement-Using the while statement-Combining loops-Redirecting loop output.	6	18	Chalk & Talk
	Handling User Input: Passing parameters-Tracking parameters-Being shifty-Working with options- Standardizing options-Getting user input.	6		Chalk & Talk, Spot Test ,
	Script Control: Handling signals-Running scripts in the background-Forbidding hang-ups -Controlling a Job-Modifying script priority-Automating script execution.	6		Chalk & Talk
III	**Creating Functions:** 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.	6	18	Chalk & Talk, Spot Test ,
	Writing Scripts for Graphical Desktops: Creating text menus-Building text window widgets-Adding X Window graphics.	6		Chalk & Talk
	Introducing sed and gawk: Learning about the sed Editor-Getting introduced to the gawk Editor-Exploring sed Editor basics.	6		Chalk & Talk , Group Discussion
IV	**Regular Expressions:** Defining regular expressions-Looking at the basics-Extending our patterns- Creating expressions.	6	18	Chalk & Talk
	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.	6		Chalk & Talk,
	Advanced gawk: Reexamining gawk-Using variables in gawk-Using structured commands- Formatting the printing-Working with functions.	6		Chalk & Talk, Assignment

Annexure - 3

V	**Working with Alternative Shells:** 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.	6 6 6	18	Chalk & Talk , Spot Test Chalk & Talk, PowerPoint Presentation Chalk & Talk, PowerPoint Presentation Students Seminar

Course Designer
Dr.Mrs.S.Vijayasankari
&
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Core - III	23OPCA13	Python Programming	4	6	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives:

1. To acquire programming skills in core Python
2. To learn Strings and function
3. To develop object oriented skills in Python
4. To comprehend various Python Packages
5. To develop web applications using Django

Course Content:

Unit	Course Content	Hours	K-Level	CLO
I	Introduction: Fundamental ideas of Computer Science - Strings, Assignment, and Comments - Numeric Data types and Character sets – Expressions – Loops and Selection Statements: Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop	18	Up to K5	CLO1
II	Strings and Text Files: Accessing Characters and substrings in strings - Data 2Encryption-Strings and Number systems- String methods – Text - Lists and Dictionaries: Lists – Dictionaries – Design with Functions: A Quick review - Problem Solving with top-Down Design - Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions	18	Up to K5	CLO2

III	Design with Classes: Getting inside Objects and Classes – Data-Modeling Examples – Building a New Data Structure – The Two – Dimensional Grid - Structuring Classes with Inheritance and Polymorphism – Graphical User Interfaces - The Behavior of terminal-Based programs and GUI-Based programs - Coding Simple GUI-Based programs - Windows and Window Components - Command Buttons and responding to events.	18	Up to K5	CLO3
IV	Working with Python Packages: NumPy Library-Ndarray – Basic Operations – Indexing, Slicing and Iteration – Array manipulation - Pandas –The Series – The DataFrame - The Index Objects – Data Vizualization with Matplotlib – The Matplotlib Architecture – pyplot – The Plotting Window – Adding Elements to the Chart – Line Charts – Bar Charts – Pie charts	18	Up to K5	CLO4
V	Django: Installing Django – Building an Application – Project Creation – Designing the Data Schema - Creating an administration site for models - Working with QuerySets and Managers – Retrieving Objects – Building List and Detail Views	18	Up to K5	CLO5

Books for Study:

1. K.A. Lambert, “Fundamentals of Python: first programs”, Second Edition, Cengage Learning, 2018

   Unit – I:

   Chapter 1(Pg.no -2 to 5), Chapter 2(Pg.no 41 to 53), Chapter 3 (Pg.No 65 to 101)

   Unit – II:

   Chapter 4 (Pg .No 103 to 122,) Chapter 5, Chapter 6.

   Unit – III:

   Chapter 9, Chapter 8 (Pg.No.245 to 262)

2. Fabio Nelli, “Python Data Analytics: With Pandas, NumPy, and Matplotlib”, Second Edition, Kindle Edition, 2018

   Unit – IV:

   Chapter 3 (Pg.No 49 to 74), Chapter 4(Pg.No.92 to 112)Chapter 7 (Pg.No 235 to 297)

3. Antonio Mele, “Django 3 By Example”, Third Edition, 2020

   Unit – V:

   Chapter 1

Annexure - 3

Books for Reference :

1.Ashok Namdev Kamthane and Amit Ashok Kamthane, Programming and Problem Solving with Python , McGraw Hill Education, 2018.

2.Taneja Sheetal and Kumar Naveen , Python Programming , Pearson ,1st Edition , 2017.

3.John M.Zelle, Python Programming, An Introduction to Computer Science , FranklinBeedle & Associates Inc, 3rd Edition , 2016.

4.David Beazley, Brain K. Jones, Python Cookbook, O'Reilly Media, 3rd Edition, 2013.

5.Paul Deitel, Harvey Deitel, Intro to Python for Computer Science and Data Science , Pearson Education, 1st Edition , 2019.

Web Resources :

1. https://rupert.id.au/python/book/learn-python3-the-hard-way-nov-15-2018.pdf
2. https://barbados.desertcart.com/products/103137588-python-programming-basics-for-absolute-beginners-step-by-step-python-book-1
3. https://www.amazon.com/dp/B0C1BD46WS/ref=sspa_dk_detail_2?psc=1&pd_rd_i=B0C1BD46WS&pd_rd_w=ehiF0&content-id=amzn1.sym.eb7c1ac5-7c51-4df5-ba34-ca810f1f119a&pf_rd_p=eb7c1ac5-7c51-4df5-ba34-ca810f1f119a&pf_rd_r=AAFZJSCBME4S8WGEAMA0&pd_rd_wg=M9A34&pd_rd_r=811ba5bd-440b-49da-bdb5-93fd7b373aef&sp_csd=d2lkZ2V0TmFtZT1zcF9kZXRhaWw

e-books :

1.http://repository.itbad.ac.id/146/1/403.%20Fundamentals%20of%20Python%20First%20Programs%2C%20Second%20Edition.pdf

2.https://www.coursehero.com/file/50836140/Python-Data-Analytics-2nd-Editionpdf/

3.https://www.perlego.com/book/1443335/django-3-by-example-build-powerful-and-reliable-python-web-applications-from-scratch-3rd-edition-pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs , Assignments , Quiz.

Rationale for Nature of the Course :

To learn about Python Program language and Django students will gain knowledge of Python coding and web development tools.

Activities to be Given :

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Comprehend the programming skills in python and develop applications using conditional branches and loop	Up to K5
CLO2	python Create applications with strings and functions	Up to K5
CLO3	Understand and implement the Object Oriented Programming paradigm with the concept of objects and classes, Inheritance and polymorphism	Up to K5
CLO4	Evaluate the use of Python packages to perform numerical computations and data visualization	Up to K5
CLO5	Design interactive web applications using Django	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3– Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate, making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	3	2	3
CLO2	3	3	3	2	3	3
CLO3	3	2	3	3	2	3
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	3	3

1 –Basic Level **2 – Intermediate Level** **3- Advance Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	Introduction: Fundamental ideas of Computer Science - Strings, Assignment, and Comments –	6	18	Chalk & Talk
	Numeric Data types and Character sets – Expressions – Loops and Selection Statements:	6		Chalk & Talk , SpotTest
	Definite iteration: the for Loop - selection: if and if-else statements - Conditional iteration: the while Loop	6		Chalk & Talk
II	Strings and Text Files: Accessing Characters and substrings in strings - Data 2Encryption-Strings and Number systems- String methods –	6	18	Chalk & Talk
	Text - Lists and Dictionaries: Lists – Dictionaries – Design with Functions: A Quick review - Problem Solving with top-Down Design	6		Chalk & Talk, Spot Test
	Design with recursive Functions - Managing a Program's namespace - Higher-Order Functions	6		Chalk & Talk
III	Design with Classes: Getting inside Objects and Classes – Data-Modeling Examples – Building a New Data Structure – The Two – Dimensional Grid	6	18	Chalk & Talk, Spot Test
	Structuring Classes with Inheritance and Polymorphism – Graphical User Interfaces - The Behavior of terminal-Based programs and.	6		Chalk & Talk
	GUI-Based programs Coding Simple GUI-Based programs - Windows and Window Components - Command Buttons and responding to events	6		Chalk & Talk , Group Discussion PowerPoint Presentation
IV	Working with Python Packages: NumPy Library-Ndarray – Basic Operations – Indexing, Slicing and Iteration	6	18	Chalk & Talk
	Array manipulation - Pandas –The Series – The DataFrame - The Index Objects – Data Vizualization with Matplotlib	6		Chalk & Talk,Spot Test,
	The Matplotlib Architecture – pyplot – The Plotting			PowerPoint

	Window – Adding Elements to the Chart – Line Charts – Bar Charts – Pie charts	6		Presentation
V	Django: Installing Django – Building an Application – Project Creation – Designing the Data Schema - Creating an administration site for models Working with QuerySets and Managers – Retrieving Objects – Building List and Detail Views	6 6 6	18	Students Assignment Chalk & Talk , Spot Test Chalk & Talk, Students Seminar

Course Designer
Dr. (Mrs.) J.CHINNA

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Elective –I (DSEC - 1)	23OPCADSE1AP	Data Engineering and Management Lab	3	6	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To acquire basic scripting knowledge in MongoDB.
2.To learn CRUD Operation on MongoDB database.
3.To comprehend MongoDB using DbVisualizer.
4.To be familiar with Zoho CRM features.
5.To customize your application using Zoho CRM.

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	1.Write a script to create a MongoDB database and perform insert operation 2.Write a MongoDB script to perform query operations	18	Up to K5	CLO1
II	3.Write a MongoDB Script to perform update operations 4.Write a MongoDB Script to update documents with aggregation pipeline	18	Up to K5	CLO2
III	5. Write a MongoDB script to delete single and multiple Documents 6. Write a MongoDB script to perform string aggregation Operations	18	Up to K5	CLO3
IV	7.Design a Data Model for MongoDB using DbVisualizer 8.Perform CRUD operations using DbVisualizer	18	Up to K5	CLO4

V	9.Create a Zoho CRM account and organize your Tasks, Meetings and Deals 10. Create and maintain a project using Zoho CRM features	18	Up to K5	CLO5

Books for Study :

1.Shannon Bradshaw, Eoin Brazil, Kristina Chodorow, MongoDB: The Definitive Guide, 3rd Edition, O'Reilly Media, Inc, Edition, 2019.

2.Peter Membrey , David Hows , Eelco Plugge , MongoDB Basics, Apress; 1st ed. Edition 2014

Books for Reference:

1.Kyle Banker Peter Bakkum Shaun Verch Douglas Garrett Tim Hawkins , MongoDB in Action , Manning Shelter Island , Second Edition
2.Amit Phaltankar , Juned Ahsan , Michael Harrison , Liviu Nedov , Mongodb Fundamentals: A Hands-On Guide To Using Mongodb And Atlas In The Real World, Packt Publishing Edition 2020
3.Alex Giamas , Mastering MongoDB 4.x, Packt Publishing; 2nd Edition.
4.Daniel Coupal , Pascal Desmarets , Steve Hoberman .MongoDB Data Modeling and Schema Design, Technics Publications Edition 2023
5.Ajit Singh , Sultan Ahmad , MongoDB Simply In Depth, Priharc Innovations Pvt Ltd. Edition 2019

Web Resources :

1. https://www.mongodb.com/cloud/atlas
2. https://www.w3schools.com/mongodb/
3.https://www.mongodb.com/docs/manual/tutorial/getting-started/

e_Books :

1. https://www.openmymind.net/mongodb.pdf
2. https://pepa.holla.cz/wp-content/uploads/2016/07/MongoDB-in-Action-2nd-Edition.pdf
3. https://www.tutorialspoint.com/mongodb/mongodb_tutorial.pdf

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in software development.

Activities to be Given :

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Comprehend the scripting knowledge in MongoDB and perform basic operations in shell prompt	Up to K5
CLO2	Implement, Create, Read, Update and Delete Operations on MongoDB database	Up to K5
CLO3	Analyze MongoDB using DbVisualizer	Up to K5
CLO4	Assess Zoho CRM features for managing the customer relationships	Up to K5
CLO5	Create a customized application in Zoho CRM	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	3	3	3	2
CLO2	3	3	3	3	3	3
CLO3	3	2	3	3	2	3
CLO4	3	3	3	2	3	3
CLO5	3	3	3	3	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

UNIT	Programs	Hours	Mode of Teaching
I	1.Write a script to create a MongoDB database and perform insert operation 2.Write a MongoDB script to perform query operations	18	Demo & Practical Session
II	3.Write a MongoDB Script to perform update operations 4.Write a MongoDB Script to update documents with aggregation pipeline	18	Demo & Practical Session
III	5.Write a MongoDB script to delete single and multiple Documents 6.Write a MongoDB script to perform string aggregation operations	18	Demo & Practical Session
IV	7.Design a Data Model for MongoDB using DbVisualizer 8.Perform CRUD operations using DbVisualizer	18	Demo & Practical Session
V	9.Create a Zoho CRM account and organize your Tasks, Meetings and Deals 10. Create and maintain a project using Zoho CRM features.	18	Demo & Practical Session

Course Designer
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Elective –I (DSEC - 1)	23OPCADSE1BP	Architecture and Frameworks Lab	3	6	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To understand and implement the basic concepts of Software architecture and its functions.

2. To acquire programming skills to develop Implement various technologies and services associated with network protocols along with the challenges of data transfer.

3.To Implement the importance and functioning of Routing Protocols over communication service.

4.To acquire skills to connect two routers and any two switches.

5.To comprehend related to SSH protocols and accessing the remote device.

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	1.Find the WebID profile document and display the necessary attributes 2.Set and access the primary authentications with account recovery mechanisms	18	Up to K5	CLO1
II	3.Set and access the secondary authentications with account recovery mechanisms 4.Design authorization and web access control	18	Up to K5	CLO2
III	5.Find the content representation 6.Reading resources from HTTP REST API and WebSockets API	18	Up to K5	CLO3

IV	7.Writing resources from HTTP REST API and WebSockets API 8.Data notification using Social Web App protocol	18	Up to K5	CLO4
V	9.Managing subscriptions and friends list using Social Web App protocol 10. Managing list of followers and following list using Social Web App protocol	18	Up to K5	CLO5

Book for Study :

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

Books for Reference:

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
4.Mark Richards, Neal Ford , Fundamentals of Software Architecture , O'Reilly Media, Inc., 2020
5.Robert C. Martin , Theodore O'Brien , Upfront Books ,A Handbook of Agile Software Craftsmanship,Upfront Books,2021

Web Resources :

1.https://github.com/gg-daddy/ebooks/blob/master/software-architecture-patterns.
2.https://github.com/mhadidg/software-architecture-books
3.https://storage.pardot.com/1009792/1685141235Z8bRQIn3/Software_Architecture_Patterns.pdf

e_books :

1.https://edisciplinas.usp.br/pluginfile.php/5922722/mod_resource/content/1/2013%20-%20Book%20-%20Bass%20%20Kazman-Software%20Architecture%20in%20Practice.pdf
2.https://dl.ebooksworld.ir/books/Software.Architecture.The.Hard.Parts.Neal.Ford.OReilly.9781492086895.EBooksWorld.ir.pdf
3.https://canvas.gu.se/files/4891694/download?download_frd=1

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in software development.

Activities to be Given :

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Comprehend the programming skills of Software architecture tools and packages	Up to K5
CLO2	Understand and implement the user profiles and authentication with recovery mechanism.	Up to K5
CLO3	Comprehend and evaluate the access control and content representation use of FTP server	Up to K5
CLO4	Understand and implement reading and writing resources for various applications	Up to K5
CLO5	Identify and examine the notifications, friends, and follower list of social application protocols.	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	1	2	3
CLO2	3	2	3	3	3	2
CLO3	3	2	4	2	4	2
CLO4	3	2	1	3	2	1
CLO5	2	3	2	1	3	1

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

UNIT	Programs	Hours	Mode of Teaching
I	1.Find the WebID profile document and display the necessary attributes 2.Set and access the primary authentications with account recovery mechanisms	18	Demo & Practical Session
II	3.Set and access the secondary authentications with account recovery mechanisms 4.Design authorization and web access control	18	Demo & Practical Session
III	5.Find the content representation 6.Reading resources from HTTP REST API and WebSockets API	18	Demo & Practical Session
IV	7.Writing resources from HTTP REST API and WebSockets API 8.Data notification using Social Web App protocol	18	Demo & Practical Session
V	9.Managing subscriptions and friends list using Social Web App protocol 10. Managing list of followers and following list using Social Web App protocol	18	Demo & Practical Session

Course Designer
Dr.(Mrs.)S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Elective –II (DSEC - 2)	23OPCADSE1CP	Software Development Technologies Lab	3	6	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. To understand the concept of DevOps with associated technologies and methodologies.
2. To be familiarized with Jenkins, which is used to build & test software Applications
3. To understand Continuous integration in Devops environment.
4. To understand Docker to build, ship and run contain erized images
5. To use Docker to deploy and manage Software applications running on Container.

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	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.	18	Up to K5	CLO1
II	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.	18	Up to K5	CLO2
III	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	18	Up to K5	CLO3
IV	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.	18	Up to K5	CLO4

V	9. Install and Configure Pull based Software Configuration Management and provisioning tools using Puppet. 10. Implement LAMP/MEAN Stack using Puppet Manifest.	18	Up to K5	CLO5

Books for Study :

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.

Books for Reference:

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 Edition 2015.

3.John Ferguson Smart,"Jenkins, The Definitive Guide", O'Reilly Publication, First Edition 2011.

4. Adora Nwodo , Beginning Azure DevOps, Wiley; 1st Edition , 2023.

5. Mikael Krief , Learning DevOps, Packt Publishing; 2nd Edition 2022.

Web Resources :

1.https://azure.microsoft.com/en-in/solutions/devops/tutorial
2.https://intellipaat.com/blog/tutorial/microsoft-azure-tutorial/azure-devops-tutorial/
3.https://www.devopsschool.com/blog/azure-devops-tutorial-for-beginners-and-its-work- process/

e_books :

1,https://edu.anarcho-copy.org/GNU%20Linux%20-%20Unix-Like/DevOps/A_Practical_Guide_to_Azure_DevOps_Learn_by_doing.pdf
2.http://mukeshkumar.net/Upload/ebook/Azure-DevOps-CI-CD-Pipeline-Practical-Guide.pdf
3.https://online-pmo.com/wp-content/Education/Learning%20DevOps.pdf

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in software development.

Activities to be Given :

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	To Understand and analyse the importance of Jenkins to Build, Deploy and Test Software Applications	Up to K5
CLO2	To synthesis and summarize the importance of Software Configuration Management in DevOps	Up to K5
CLO3	To identify, analyze and illustrate the Containerization of OS images and deployment of applications over Docker	Up to K5
CLO4	To design, analyze and develop the Pull based Software Configuration Management	Up to K5
CLO5	To design, analyze and develop Puppet Manifest	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	-	2	-
CLO2	3	3	2	-	2	-
CLO3	3	3	2	-	2	-
CLO4	3	3	2	-	2	-
CLO5	3	3	2	-	2	-

1 – Basic Level 2 – Intermediate Level 3- Advanced Level

Annexure - 3

LESSON PLAN :

UNIT	Programs	Hours	Mode of Teaching
I	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.	18	Demo & Practical Session
II	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.	18	Demo & Practical Session
III	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	18	Demo & Practical Session
IV	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.	18	Demo & Practical Session
V	9. Install and Configure Pull based Software Configuration Management and provisioning tools using Puppet. 10. Implement LAMP/MEAN Stack using Puppet Manifest.	18	Demo & Practical Session

Course Designer
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Elective –II (DSEC - 2)	23OPCADSE1DP	Soft Computing Lab	3	6	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. To implement various Supervised Neural Network-based approaches
2. To apply the fuzzy-based logical operations and arithmetic operations
3. To implement unsupervised neural network approaches .
4. To solve a problem using a simple genetic algorithm
5. To implement logic gates.

Course Content :.

Unit	Contents	Hours	K-Level	CLO
I	1.Implementation of Logic gates using Artificial Neural Network. 2..Implementation of Perception Algorithm.	18	Up to K5	CLO1
II	3. Implementation of Back Propagation Algorithm. 4.Implementation of Self Organizing Maps.	18	Up to K5	CLO2
III	5. Implementation of Radial Basis Function Network. 6.Implementation of De-Morgan‟s Law.	18	Up to K5	CLO3

IV	7. Implementation of McCulloch Pits Artificial Neuron model 8.Implementation of Simple genetic algorithm	18	Up to K5	CLO4
V	9 Implementation of fuzzy based Logical operations 10. Implementation of fuzzy based arithmetic operations.	18	Up to K5	CLO5

Book for Study :

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

Books for Reference:

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 pproach 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.

Web Resources :

1. https://www.techopedia.com/best-artificial-intelligence-learning-resources-online-in
2. https://www.tutorialspoint.com/fuzzy_logic/fuzziness_in_neural_networks.htm
3. http://www.scholarpedia.org/article/Fuzzy_neural_network

E_books :

1. https://www.uc.edu/content/dam/uc/ce/docs/OLLI/Page%20Content/ARTIFICIAL%20INTELLIGENCEr.pdf
2. https://www.dcpehvpm.org/E-Content/BCA/BCA-III/artificial_intelligence_tutorial.pdf
3. https://people.engr.tamu.edu/guni/csce421/files/AI_Russell_Norvig.pdf

Pedagogy :

Projector Demonstration and Practical sessions.

Annexure - 3

Rationale for Nature of the course

Developing logic and structured program, organizing data in software development.

Activities to be Given :

- Practice to Code Programs
- Software Development

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	To apply supervised learning algorithms for real datasets	Up to K5
CLO2	To implement Unsupervised Learning techniques	Up to K5
CLO3	To apply fuzzy based arithmetic and logical operations	Up to K5
CLO4	To find solutions for problems using Genetic algorithm	Up to K5
CLO5	To implement DeMorgan's Law	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

UNIT	Programs	Hours	Mode of Teaching
I	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.	18	Demo & Practical Session
II	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.	18	Demo & Practical Session
III	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	18	Demo & Practical Session
IV	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.	18	Demo & Practical Session
V	9. Install and Configure Pull based Software Configuration Management and provisioning tools using Puppet. 10. Implement LAMP/MEAN Stack using Puppet Manifest.	18	Demo & Practical Session

Course Designer
Dr. (Mrs.) J.CHINNA

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Core - IV	23OPCA21	Data Structures and Algorithms	5	6	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To get a clear understanding of various ADT structures.
2.To understand how to implement different ADT structures with real-time scenarios.
3 To analyze the various data structures with their different implementations.
4.To get an idea of applying right models based on the problem domain.
5 To realize, and understand how and where to implement modern data structures with Python language.

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Abstract Data Types:** 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	18	Up to K5	CLO1
II	**Algorithm Analysis:** Experimental Studies-Seven Functions-Asymptotic Analysis. **Recursion:** Illustrative Examples-Analyzing Recursive Algorithms-Linear Recursion- Binary Recursion-Multiple Recursion	18	Up to K5	CLO2
III	**Stacks, Queues, and Deques:** Stacks- Queues- Double-Ended Queues. **Trees:** General Trees-Binary Trees-Implementing Trees-Tree Traversal Algorithms.	18	Up to K5	CLO3

IV	**Priority Queues:** 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.	18	Up to K5	CLO4
V	**Search Trees:** Binary Search Trees-Balanced Search Trees-AVL Trees-Splay Trees. **Sorting and Selection:** Merge sort-Quick sort--Selection. **Graph Algorithms:** Graphs-Data Structures for Graphs-Graph Traversals-Shortest Paths.	18	Up to K5	CLO5

Books for Study :

1.Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011.

Chapters :

Unit - I **:** 1.1 to 1.4, ,2.1 to 2.4,3.1 to 3.3

2.Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", John Wiley & Sons, 2013.

Chapters :

Unit - II **:** 3.1 to 3.3 ,4.1, 4.2, 4.4.1,4.4.2,4.4.3
Unit - III : 6.1 to 6.3 ,7.1 to 7.3, 8.1 to 8.4
Unit - IV **:** 9.1 to 9.4,10.1 to 10.5
Unit - V **:** 11.1 to 11.4,12.2,12.3, 12.7,14.1 to 14.3, 14.6

Books for Reference :

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, Second Edition , 2018.

2. .Benjamin Baka, Python Data Structures and Algorithms , Packet publishing, 2017

3..Kent D.Lee and Steve Hubbard, Data Structures and Algoriuthgms with Python , Springer Publication , 2015

4.. Magnus Lie Hetland, "Python Algorithms: Mastering Basic Algorithms in the Python Language", Apress Publication , 2014.

5. Narasimha Karumanchi, Data Structures and algorithms made easy, CareerMonk Publication, 2010

Annexure - 3

Web Resources :

1.https://mrcet.com/downloads/digital_notes/CSE/II%20Year/DATA%20STRUCTURES%20THROUGH%20PYTHON(R20A0503).pdf
2. https://www.geeksforgeeks.org/python-data-structures-and-algorithms/
3. https://www.tutorialspoint.com/python_data_structure/index.htm

e-books :

1 . https://edu.anarcho- copy.org/Programming%20Languages/Python/Python%20Data%20Structures%20and%20Algorithms.pdf
2.https://github.com/0bprashanthc/algorithm-books/blob/master/Data%20Structures%20and%20Algorithms%20with%20Python.pdf
3. https://donsheehy.github.io/datastructures/fullbook.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs ,Assignments , Quiz.

Rationale for Nature of the Course :

To learn about abstract data types and algorithm analysis , Students will gain knowledge about search trees and graph algorithms.

Activities to be Given :

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand various ADT concepts	Up to K5
CLO2	Familiar with implementation of ADT models with Python language and understand how to develop ADT for the various real-time problems	Up to K5
CLO3	Apply with proper ADT models with problem understanding	Up to K5
CLO4	Apply and Analyze right models based on the problem domain	Up to K5
CLO5	Evaluate modern data structures with Python language	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3– Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	1	1	1
CLO2	3	2	3	2	2	1
CLO3	3	3	3	1	1	1
CLO4	3	3	3	1	1	1
CLO5	3	3	3	1	2	2

1 – Basic Level 2 – Intermediate Level 3- Advanced Level

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	▪ **Abstract Data Types:** Introduction-Date Abstract Data Type-Bags-Iterators.	6	18	Chalk & Talk
	▪ **Arrays**: Array Structure- Python List-Two Dimensional Arrays-Matrix Abstract Data Type.	6		Chalk & Talk , SpotTest
	▪ **Sets, Maps:** Sets-Maps- Multi- Dimensional Arrays	6		Chalk & Talk
II	▪ **Algorithm Analysis:** Experimental Studies-Seven Functions-Asymptotic Analysis	6	18	Chalk & Talk
	▪ **Recursion:** Illustrative Examples-Analyzing Recursive Algorithms	6		Chalk & Talk
	▪ Linear Recursion- Binary Recursion-Multiple Recursion	6		Chalk & Talk
III	▪ **Stacks, Queues, and Deques:** Stacks- Queues-Double-Ended Queues	6	18	Chalk & Talk
	▪ Linked. **Lists:** Singly Linked Lists-Circularly Linked Lists-Doubly Linked Lists	6		Chalk & Talk ,
	▪ **Trees:** General Trees-Binary Trees-Implementing Trees-Tree Traversal Algorithms.	6		PowerPoint Presentation
IV	• **Priority Queues:** Priority Queue Abstract Data Type- Implementing a Priority Queue-Heaps-Sorting with a Priority Queue.	6	18	Chalk & Talk
	• . **Maps, Hash Tables, and Skip Lists:** Maps and Dictionaries-Hash Tables	6		Chalk & Talk, Spot Test, PowerPoint Presentation
	• Sorted Maps-Skip Lists-Sets, Multisets, and Multimaps.	6		
V	▪ **Search Trees:** Binary Search Trees-Balanced Search Trees-AVL Trees-Splay Trees.	6	18	Chalk & Talk
	• **Sorting and Selection:** Merge sort-Quick sort-Selection.	6		Chalk & Talk, PowerPoint Presentation
	• **Graph Algorithms:** Graphs-Data Structures for Graphs-Graph Traversals- Shortest Paths.	6		

Course Designer
Dr.Mrs.S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Core - V	23OPCA22	Big Data Analytics	5	6	25	75	100

Nature of the Course :

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To introduce big data tools & Information Standard formats.
2.To understand the basic concepts of big data.
3.To learn Hadoop, HDFS and MapReduce Concepts.
4.To teach the importance of NoSQL.
5.To explore the big data tools such as Hive, HBase and Pig.

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Big Data and Analytics:** Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data. **Introduction to Big Data:** Characteristics – Evolution – Definition - Challenges with Big Data –Basics of Big. **Environment Big Data Analytics**: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments - Top Analytics Tools	18	Up to K5	CLO1
II	**Technology Landscape:** NoSQL, Hadoop .**Introduction to Hadoop :** RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem	18	Up to K5	CLO2

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III	**Introduction to M0ongoDB : :** Concepts of MongoDB - Uses of MongoDB – Terms Used in RDBMS and MongoDB – Data Types in MongoDB ,MongoDB Query Language	18	Up to K5	CLO3
IV	**Introduction to Mapreduce Programming:** Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression .**Hive:** Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements – Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile .Implementation - Serialization and Deserialization - User Defined Function(UDF)	18	Up to K5	CLO4
V	**Pig:** Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Merits and Demerits of Pig- Pig at Yahoo! - Pig Versus Hive	18	Up to K5	CLO5

Book for Study :

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

Chapters :

Unit - I : 1.1 – 1.1.3 , 2.1 – 2.5 , 3.5 ,3.6 ,3.8 ,3.10 ,3.11 ,3.12 ,3.14
Unit – II : 4.1 , 4.2 ,5.4,5.5,5.7,5.10,5.11,5.12,5.13
Unit – III : 6 . 1 , 6 . 2 , 6 . 3 , 6 . 4 , 6 . 5 - 6 . 5 . 1 - 6 . 5 . 1 0
Unit – IV : 8 . 2 - 8 . 8 , 9 . 5 , 9 . 6 , 9 . 7 , 9 . 8
Unit – V : 10.1 – 10.22

Books for Reference:

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

Annexure - 3

Web Resources :

1 https://catalogimages.wiley.com/
2. https://aitskadapa.ac.in/e- books/AI&DS/BIG%20DATA/
3. https://www.immagic.com/eLibrary/ARCHIVES/EBOOKS/I111025E.pdf

e-books :

1.https://www.lpude.in/SLMs/Master%20of%20Computer%20Applications/Sem_2/DECAP456_INTRODUCTION_TO_BIG_DATA.pdf
2. http://dhoto.lecturer.pens.ac.id/lecture_notes/internet_of_things/Big%20Data%20Principles%20and%20Paradigms.
3 . https://linux-training.be/linuxfun.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs ,Assignments , Quiz.

Rationale for Nature of the Course :

Big data analytics lets organizations use colossal amounts of data in multiple formats from multiple sources to identify opportunities and risks, helping organizations move quickly and improve their bottom lines.

Activities on Knowledge and Skill

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	To understand, illustrate and evaluate the concepts and techniques of Data Science, Big Data Analytics and its tools	Up to K5
CLO2	To collaborate, apply and review the computing for big data in Hadoop, and NoSQL environment.	Up to K5
CLO3	To comprehend, implement and review the concepts of data science and big data analytics projects using MapReduce, and MongoDB	Up to K5
CLO4	To understand, use and analyze the concepts of big data analytics projects using HIVE database.	Up to K5
CLO5	To illustrate, develop and review the concepts of PIG database in Hadoop environment.	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	-	-	-	-	1
CLO2	3	-	2	-	2	1
CLO3	3	-	3	-	3	1
CLO4	3	-	3	-	3	1
CLO5	3	-	3	-	3	1

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	**Big Data and Analytics:** Classification of Digital Data: Structured Data- Semi Structured Data and Unstructured Data.	6	18	Chalk & Talk
	Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data - Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop.	6		Chalk & Talk , Spot test
	Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools	6		Chalk & Talk
II	**Technology Landscape:**NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop	6	18	Chalk & Talk
	Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop	6		Chalk & Talk,
	Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem	6		Chalk & Talk
III	**Mongodb and Mapreduce Programming:**MongoDB: Mongo DB Terms used in RDBMS and Mongo DB –	6	18	Chalk & Talk,
	Data Types - MongoDB Query Language.	6		SpotTest ,GD
	MapReduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression	6		Chalk & Talk
IV	**Hive:** Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements	6	18	Chalk & Talk
	Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile	6		Chalk & Talk,Spot Test, PPT
	Implementation - Hive User Defined Function - Serialization and Deserialization.	6		Chalk & Talk,

Annexure - 3

V	**Pig:** Introduction - Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig	6	18	Chalk & Talk, , Spot Test
	Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function - Complex Data Types - Piggy Bank - User-Defined Functions	6		Chalk & Talk, PPT
	Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive	6		PowerPoint Presentation , Students Seminar

Course Designer
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Core - VI	23OPCA21P	Data Structures and Algorithms Lab	4	6	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To understand Stack , Queue and Doubly Linked ADT structures.
2.To implement different ADT structures with real-time scenarios.
3.To analyze the recursion concepts.
4.To apply different sorting and tree techniques.
5.To implement modern data structures with Python language

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	1.Recursion concepts i) Linear recursion ii) Binary recursion. 2.Stack ADT	18	Up to K5	CLO1
II	3. Concepts of arrays, structures, unions and enumerated data types 4. Queue ADT. 5. Doubly Linked List ADT.	18	Up to K5	CLO2
III	6 .Quick sort. 7. Binary Search Tree. 8 .infix to post fix notation	18	Up to K5	CLO3
IV	9.Heaps using Priority Queues. 10.Merge sort. 11. Tree Traversals a)In order b)Pre-order c)Post order 12. Insertion, Deletion and Searching in Binary Search Tree	18	Up to K5	CLO4

V	13.Minimum Spanning Tree. 14.Depth First Search Tree traversal. 15. Graph traversals a) Breadth First Search b) Depth First Search	18	Up to K5	CLO5

Books for Study :

1.Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011. .

2.Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and ms in Python", John Wiley & Sons, 2013.

Books for Reference:

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, Second Edition , 2018.

2. .Benjamin Baka, Python Data Structures and Algorithms , Packet publishing, 2017

3..Kent D.Lee and Steve Hubbard, Data Structures and Algoriuthgms with Python , Springer Publication , 2015

4.. Magnus Lie Hetland, "Python Algorithms: Mastering Basic Algorithms in the Python Language", Apress Publication , 2014.

5.Narasimha Karumanchi, Data Structures and algorithms made easy, CareerMonk Publication, 2010

Web Resources :

1 https://mrcet.com/downloads/digital_notes/CSE/II%20Year/DATA%20STRUCTURES%20 THROUGH%20PYTHON(R20A0503).pdf

2.https://www.geeksforgeeks.org/python-data-structures-and-algorithms/

3.https://www.tutorialspoint.com/python_data_structure/index.htm

e_Books :

1 . https://edu.anarcho- copy.org/Programming%20Languages/Python/Python%20Data%20Structures%20and%20Algorithms.pdf

2.https://github.com/0bprashanthc/algorithm-books/blob/master/Data%20Structures%20and%20Algorithms%20with%20Python.pdf

3.https://donsheehy.github.io/datastructures/fullbook.pdf

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in software development.

Activities to be Given :

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Strong understanding in various ADT concepts	Up to K5
CLO2	To become a familiar with implementation of ADT models	Up to K5
CLO3	Apply sort and tree search algorithms	Up to K5
CLO4	Evaluate the different data structure models	Up to K5
CLO5	Learn how to develop ADT for the various real-time problems	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	1	1	1	1
CLO2	3	2	3	2	2	1
CLO3	3	3	3	1	1	1
CLO4	3	3	3	2	2	3
CLO5	3	3	3	3	1	2

1 – Basic Level 2 – Intermediate Level 3- Advanced Level

Annexure - 3

LESSON PLAN :

UNIT	Programs	Hours	Mode of Teaching
I	1.Write a python data structure program to perform linear recursion and binary recursion 2.Write a Python data structure program to implement stack ADT	18	Demo & Practical Session
II	3. Write a Python data structure program to Concepts of arrays, structures, unions and enumerated data types 4. Write a Python data structure program to implement queue ADT 5. Write a Python data structure program to implement Doubly linked list ADT	18	Demo & Practical Session
III	6. Write a Python data structure program to implement Quick sort 7. Write a Python data structure program to implement Binary search tree 8. Write a Python data structure program to convert infix to post fix notation	18	Demo & Practical Session
IV	9. Write a Python data structure program to implement heaps using priority queues 10.Write a Python data structure program to implement merge sort 11. Write a Python data structure program for Tree Traversals a)In order b)Pre-order c)Post order 12. Write a Python data structure program Insertion, Deletion and Searching in Binary Search Tree	18	Demo & Practical Session
V	13. Write a Python data structure program to implement Minimum Spanning Tree. 14. Write a Python data structure program to implement Depth First Search Tree traversal. 15. Write a Python data structure program to implement Graph traversals a) Breadth First Search b) Depth First Search	18	Demo & Practical Session

Course Designer
S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Elective –III (DSEC - 3)	23OPCADSE2AP	Internet of Things Lab	3	5	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To create IoT program to turn ON/OFF LED.
2.To implement IoT program for object detection.
3.To develop IoT programs for agricultural purpose.
4.To create web server program for local hosting.
5.To design IoT application for health monitoring.

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	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.)	15	Up to K5	CLO1
II	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	15	Up to K5	CLO2
III	To develop an IoT program using Soil Moisture Sensor To develop an IoT program using Ultrasonic Sensor (Distance Measurement, etc.)	15	Up to K5	CLO3

IV	To develop an real-time IoT program using Relay Module (Smart Home Automation with 230V) To develop an IoT program for Fire Detection (Home, Industry,etc.)	15	Up to K5	CLO4
V	To develop an IoT program for Gas Leakage detection (Home, Industry, etc.) To develop an IoMT program using Heartbeat Sensor	15	Up to K5	CLO5

Book for Study :

Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014

Books for Reference:

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.
4. 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)
5. Raj Kamal, Internet Of Things Architecture and Design Principles, Mcgraw Hill Education (India)Pvt Ltd,First Edition, 2017

Web Resources :

1. https://www.arenasolutions.com/blog/10-valuable-iot-web-resources/
2. https://geekflare.com/internet-of-things-iot-learning-resources/
3. https://www.techtarget.com/iotagenda/resources/Internet-of-Things-IoT-Platform

e_Books :

1.https://pg.its.edu.in/sites/default/files/KCA043%20Internet%20of%20things%20-IoT%20by%20Raj%20Kamal%20Text%20Book.pdf

2.http://uru.ac.in/uruonlinelibrary/Internet_of_Things/Architecting_the_Internet_of_Things.pdf

3.https://books.google.co.in/books?id=Vka_DwAAQBAJ&pg=PA1&source=gbs_toc_r&cad=2#v=onepage&q&f=false

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in Internet of Things

Activities to be Given:

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Implement IoT programs to turn ON/OFF LED	Up to K5
CLO2	Develop IoT programs for object detection	Up to K5
CLO3	Understand and analyse the elements of trust in a Block chain: validation, verification, and consensus.	Up to K5
CLO4	Comprehend and evaluate the alternate coin, Ethereum and smart contract.	Up to K5
CLO5	Grasp and apply the knowledge of Tools and languages for applications	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate, making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	3	3	3
CLO2	3	3	3	3	3	3
CLO3	3	2	3	3	3	3
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	2	3

1 – Basic Level 2 – Intermediate Level 3-Advanced Level

Annexure - 3

LESSON PLAN:

UNIT	Programs	Hours	Mode of Teaching
I	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.)	15	Demo & Practical Session
II	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	15	Demo & Practical Session
III	5. To develop an IoT program using Soil Moisture Sensor 6. To develop an IoT program using Ultrasonic Sensor (Distance Measurement, etc.)	15	Demo & Practical Session
IV	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.)	15	Demo & Practical Session
V	9. To develop an IoT program for Gas Leakage detection (Home, Industry, etc.) 10. To develop an IoMT program using Heartbeat Sensor	15	Demo & Practical Session

Course Designer
Dr.(Mrs.) J. CHINNA

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Elective –III (DSEC - 3)	23OPCADSE2BP	Computer Vision Lab	3	5	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To get an idea of how to build a computer vision application with Python language.
2.To learn the basic image handling and processing
3.To get familiar with various Computer Vision fundamental algorithms and how to implement and apply.
4.To get an idea of how to implement the image transforms.
5.To understand various image segmentation algorithms.

Course Content :.

Unit	Contents	Hours	K-Level	CLO
I	1.Image Loading, Exploring, and displaying an Image. 2.Access and Manipulate of Image Pixels.	15	Up to K5	CLO1
II	3. Image Transformations. i) Resizing ii)Rotation 4. Addition operation of Two Images.	15	Up to K5	CLO2
III	5.Image filtering operations i)Mean Filtering ii)Gaussian Filtering 6.Image Binarization Using Simple Thresholding method	15	Up to K5	CLO3
IV	7. Edge Detection operation using Sobel and Scharr Gradients 8.Find Grayscale and RGB Histograms of an Image.	15	Up to K5	CLO4

V	9.Segment an Image using K-means Clustering algorithm 10.Write a program to classify an Image using KNN Classification algorithm.	15	Up to K5	CLO5

Book for Study:

Richard Szeliski, Computer Vision Algorithms and Applications, Second Edition, 2021

Books for Reference:

1.Jan Erik Solem, Programming Computer Vision with Python: Tools and algorithms for analyzing images, 1st Edition, Kindle Edition
2.Manas Kamal Bhuvan , Computer Vision and Image Processing: Fundamentals and Applications , 2019
3.Pavithra. G, Sandeep Srivastava, S.Kalarani,Saravana Balaji.B, Computer Vision and Techniques , 2021
4.Forsyth/ Ponce, Computer Vision: A Modern Approach, Second edition , 2015
5.Suganya,Robert, Hariharasitaraman, Introduction to Computer Vision, 2022

Web Resources :

1.https://viso.ai/computer-vision/the-most-popular-computer-vision-tools/
2.https://www.eduonix.com/opencv-complete-dummies-guide-to-computer-vision-with-python
3.https://digitalsocietyschool.org/wp/wp-content/ uploads/2020/09/1807ESIEA _ComputerVision-1.pdf

e_Books :

1. https://www.amazon.in/Programming-Computer-Vision-Python-algorithms-book/dp/B008GCNGVE/ref=sr_1_7? keywords=computer +vision+books&qid=1695808531&sr=8-7
2. https://www.amazon.in/Computer-Vision-Principles-Algorithms-Applications-ebook/dp/B077LQ3LQC/ref=sr_1_8? keywords=computer+vision+books&qid =1695808531&sr=8-8
3. https://amazon.in/Computer-Vision-Approach-Forsyth-Ponce/dp/9332550115/ref=sr_1_13? keywords=computer+vision+books&qid=1695808531&sr=8-13

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Design programs using image transformation and image filtering, and image segmentation algorithms

. **Activities to be Given :**

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	To develop and implement the image loading and exploring	Up to K5
CLO2	To Evaluate the image transforms	Up to K5
CLO3	To apply and analyze for image processing denoising algorithms	Up to K5
CLO4	To design and develop the Image Segmentation using Edge detection and	Up to K5
CLO5	To apply and analyze image clustering and classification algorithms	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	2	1	1	1
CLO2	3	2	1	2	2	1
CLO3	3	3	3	2	2	1
CLO4	3	3-	3	2	2	1
CLO5	3	3	3	2	2	1

1 – Basic Level 2 – Intermediate Level 3- Advanced Level

Annexure - 3

LESSON PLAN :

UNIT	Programs	Hours	Mode of Teaching
I	1.Image Loading, Exploring, and displaying an Image. 2.Access and Manipulate of Image Pixels.	15	Demo & Practical Session
II	3.Image Transformations. i) Resizing ii) Rotation 4.Addition operation of Two Images.	15	Demo & Practical Session
III	5.Image filtering operations Mean Filtering Gaussian Filtering 6.Image Binarization Using Simple Thresholding method	15	Demo & Practical Session
IV	7. Edge Detection operation using Sobel and Scharr Gradients 8.Find Grayscale and RGB Histograms of an Image.	15	Demo & Practical Session
V	9.Segment an Image using K-means Clustering algorithm 10.Write a program to classify an Image using KNN Classification algorithm.	15	Demo & Practical Session

Course Designer
Dr.Mrs.S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Elective –IV (DSEC - 4)	23OPCADSE2CP	Cryptography and Network Security Lab	3	5	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1.To develop in classical encryption techniques and advanced encryption standards.
2.To acquire programming skills to implement various cryptographic algorithms including secret key cryptography.
3.To develop hashes, message digests and public key algorithms.
4.To Implement different encryption and decryption techniques.
5.To comprehend related to confidentiality and authentication techniques

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	1.Write a program that contains a string (char pointer) with a value „Hello world". The program should XOR each character in the string with 0 and display the result 2.Write a program to perform encryption and decryption using the Ceaser Cipher	15	Up to K5	CLO1
II	3.Write a program to perform encryption and decryption using the Hill Cipher 4.Write a program to perform encryption and decryption using the Substitution Cipher	15	Up to K5	CLO2
III	5. Write a program to perform encryption and decryption using the DES algorithm 6. Connect to switch with a computer and enable the port security	15	Up to K5	CLO3

IV	7.Defeating malware using Building Trojans and Rootkit hunter 8.Implement signature scheme – Digital Signature Standard	15	Up to K5	CLO4
V	9.Identify and capture the user name and password in a same network using wireshark 10.Implement Man-in-the-middle attack and Session hijacking	15	Up to K5	CLO5

Book for Study :

William Stallings, Cryptography and Network Security, Pearson Education, 7th Edition ,2018

Books for Reference:

1.Atul Kahate, *Cryptography and Network Security*,4th Edition,Tata Mc Graw Hill , 2019.
2.Behrouz A. Ferouzan, *Cryptography & Network Security* , Tata Mc Graw Hill, 2015.
3. Bernard L. Menezes and Ravinder Kumar, *Cryptography, Network Security, and CyberLaws* ,1st Edition Cengage Learning India Pvt. Ltd., 2018.
4. Gupta Prakash C, *Cryptography And Network Security*, PH Learning,1st Edition 2014.
5.William Stallings, *Cryptography and Network Security: Principles and Practice*, Pearson Education , 2018.

Web Resources :

1.http://williamstallings.com/NetworkSecurity/NetSec5e-Instructor/
2.http://williamstallings.com/NetworkSecurity/styled/
3.https://slideplayer.com/slide/7484008/

e_Books :

1. https://www.pdfdrive.com/network-security-books.html
2.https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf
3.https://indianpdf.com/cryptography-and-network-security-pdf/

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing DES algorithms and digital signature standard, performing encryption and decryption in program writing.

Activities to be Given :

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Comprehend the programming skills in classical encryption techniques and to develop advanced encryption standards	Up to K5
CLO2	Understand and implement the various cryptographic algorithms including secret key cryptography, hashes and message digests	Up to K5
CLO3	Evaluate the use of different encryption and decryption techniques	Up to K5
CLO4	Design to Solve related confidentiality and authentication problems	Up to K5
CLO5	Create public key algorithms	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	-	-	-	-	1
CLO2	3	-	2	-	2	1
CLO3	3	-	3		3	1
CLO4	3	-	3		3	1
CLO5	3	-	3		3	1

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Unit	Programs	Hours	Mode of Teaching
I	1.Write a program that contains a string (char pointer) with a value „Hello world". The program should XOR each character in the string with 0 and display the result 2,Write a program to perform encryption and decryption using the Ceaser Cipher	15	Demo & Practical Session
II	3.Write a program to perform encryption and decryption using the Hill Cipher 4. Write a program to perform encryption and decryption using the Substitution Cipher	15	Demo & Practical Session
III	5. Write a program to perform encryption and decryption using the DES algorithm 6. Connect to switch with a computer and enable the port security	18	Demo & Practical Session
IV	7.Defeating malware using Building Trojans and Rootkit hunter 8.Implement signature scheme – Digital Signature Standard	15	Demo & Practical Session
V	9.Identify and capture the user name and password in a same network using wireshark 10. Implement Man-in-the-middle attack and Session Hijacking	15	Demo & Practical Session

Course Designer
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Elective –IV (DSEC - 4)	23OPCADSE2DP	Block Chain Technologies Lab	3	5	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. To learn the basics of Blockchain and apply cryptographic algorithms
2. To design, build, and deploy smart contracts and distributed applications,
3. To deploy Private Blockchain and smart contracts on Ethereum.
4. To understand and deploy cryptocurrencies and their functions in applications
5. To implement Blockchain for various use cases.

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	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. Creating ERC20 token	15	Up to K5	CLO1
II	4. Creation of Block 5. Write Hello World smart contract in a higher programming language (Solidity) 6. Construct the Naïve block chain	15	Up to K5	CLO2
III	7. Construct and deploy your contract (Use deploy method) 8. Set up a Regtest environment 9. Peer-to-Peer implementation using Blockchain	15	Up to K5	CLO3

IV	10. Build a payment request URI 11. Hashcash implementation 12. Blockchain implementation using Merkle Trees	15	Up to K5	CLO4
V	13. Develop a toy application using Blockchain 14. Create simple wallet transaction from one account to another account using Metamask. 15. Creating Crypto-currency Wallet	15	Up to K5	CLO5

Book for Study :

ImranBashir.Mastering_Blockchain, ,Packt Publications, 2nd_Edition, 2018

Books for Reference :

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder. Bitcoin and Cryptocurrency Technologies. Princeton University Press, 2016.
2. Andreas Antonopoulos. Mastering Bitcoin: Programming the open block chain. Oreilly Publishers, 2017.
3. Joseph J.Bambara,Paul R. Allen ,A Block Chain, A Practical Guide to Developing Business, Law, and TechnologySolutions,McGraw Hill education ,2018.
4. Bikramaditya Sighal,Gautam Dhameja,Priyansu sekharPanda,,Beginning Blockchain, Apress Publications, 2018
5. Primavera DeFilippi ,Aaron Wright , Block chain and the law,the Rule of Code, Harcard University Press, London,2018

Web Resources :

1. https://geekflare.com/learn-blockchain/
2. https://www.java67.com/2020/07/top-5-websites-to-learn-blockchain-in.html
3. https://www.developerupdates.com/blog/best-websites-to-learn-blockchain-technologies-in-2022

e_Books :

1. https://drive.google.com/file/d/1jfMcmh3zMMlHFLJ5iJqOtLiqPnrk1II6/view
2. https://drive.google.com/file/d/1zAbGOkHG8N4xCroWH-Kva936-nDNW7Y4/view
3. https://drive.google.com/file/d/19NJ1WGCmEl39VLCgLtXDk4tv8oWErrxh/view

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in Block Chain development.

Activities to be Given:

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand, apply and examine the characteristics of block chain, bitcoin and consensus algorithm in centralized and decentralized methods.	Up to K5
CLO2	Comprehend and demonstrate the application of hashing and public key cryptography in protecting the block chain.	Up to K5
CLO3	Understand and analyse the elements of trust in a Block chain: validation, verification, and consensus.	Up to K5
CLO4	Comprehend and evaluate the alternate coin, Ethereum and smart contract.	Up to K5
CLO5	Grasp and apply the knowledge of Tools and languages for applications	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate, making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	2	1	2	3
CLO2	3	2	3	3	3	2
CLO3	3	3	3	3	3	3
CLO4	3	2	1	3	2	1
CLO5	2	3	2	1	3	1

1 – Basic Level 2 – Intermediate Level 3-Advanced Level

Annexure - 3

LESSON PLAN:

UNIT	Programs	Hours	Mode of Teaching
I	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 Multi Chain private Block chain 3.Creating ERC20 token	15	Demo & Practical Session
II	4. Creation of Block 5. Write Hello World smart contract in a higher programming language (Solidity) 6. Construct the Naïve block chain	15	Demo & Practical Session
III	7. Construct and deploy your contract (Use deploy method) 8. Set up a Reg test environment 9. Construct Peer-to-Peer implementation using Block chain	15	Demo & Practical Session
IV	10. Build a payment request URI 11. Hashcash implementation 12. Blockchain implementation using Merkle Trees	15	Demo & Practical Session
V	13. Develop a toy application using Blockchain 14. Create simple wallet transaction from one account to another account using Metamask. 15. Creating Crypto-currency Wallet	15	Demo & Practical Session

Course Designer
Dr.(Mrs.) J. CHINNA

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	SEC - 1	23OPCASEC21	Block Chain Technologies	2	2	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. Block chain increases trust, security, transparency, and the traceability of data shared across a business network
2. Block chain can be used to track information over time, enabling a secure, reliable audit of information
3. Block chain-verified data is highly secure and trustworthy, meaning transactions can be processed much faster than in today's world without compromising security.
4. Block chain is a database system that maintains and records data in a way that allows multiple organizations and individuals to confidently share access to the same data in real-time,
5. The encryption is done through cryptography to eliminate vulnerabilities such as unauthorized data tampering.

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Introducing Blockchain** : Beginning at the Beginning: What Blockchains Are -The Structure of Blockchains- Blockchain Applications- The Blockchain Life Cycle – Consensus : The Driving Force of Blockchains - Blockchains in Use. Blockchain-Where Blockchains Add Substance- Choosing a Solution- **Picking a Blockchain**-Where Blockchains Add Substance-Choosing a Solution	6	Up to K4	CLO1
II	**Getting Your Hands on Blockchain**-Diving into the Bitcoin Blockchain-Using Smart Contracts with Bitcoin-Building a Private Blockchain with Docker and Ethereum **Beholding the Bitcoin Blockchain:**Getting a Brief History	6	Up to K4	CLO2

	of the Bitcoin Blockchain—Debunking some common Bitcoin misconceptions -Bitcoin: The New Wild West-Mining for Bitcoins...			
III	**Encountering the Ethereum Blockchain-**Exploring the Brief History of Ethereum -Ethereum: The Open-Source World Wide Computer-Hacking a Blockchain-Getting Up and Running on Ethereum. **Regarding the Ripple Blockchain-**Getting a Brief History of the Ripple Blockchain- Ripple: It's All About Trust-Seeing How Ripple Differs from Other Blockchains-Unleashing the Full Power of Ripple	6	Up to K4	CLO3
IV	**Finding the Factom Blockchain-**A Matter of Trust - Building on Factom. **Digging into DigiByte-**Getting Familiar with DigiByte: The Fast Blockchain-Mining on DigiByte-Signing Documents on DigiByte's DiguSign Earning DigiBytes While Gaming	6	Up to K5	CLO4
V	**Powerful Blockchain Platforms : Getting Your Hands on Hyperledger** Getting to Know Hyperledger: Dreams of a Hyper Future-Focusing on Fabric-Investigating the Iroha Project-Diving into Sawtooth Lake. **Applying Microsoft Azure:** Bletchley: The Modular Blockchain Fabric Building in the Azure Ecosystem-Getting Started with Chain on Azure- Deploying Blockchain Tools on Azure	6	Up to K5	CLO5

Book for Study :

Blockchain for Dummies , Tiana Laurance, John Wiley & Sons, 2017.

Chapters

Unit I : 1, 2
Unit II : 3, 4
Unit III : 5, 6
Unit IV : 7, 8
Unit V : 9, 10

Books for Reference :

1. Arshdeep Bahga and Vijay Madisetti, Blockchain Applications –A Hands on Approachde, First Edition , 2017
2. Raymond kazuya Blockchain Technology and Blueprint Ultimate Guide -, Kindle Edition,2018
3. Ray Toffler , Blockchain Blueprint: The Complete Guide to Blockchain Technology and How it is Creating a Revolution, , Kindle Edition, 2017
4. David Blake , Blockchain Technology – How to make money with ethereum, 20 alternatives to Bit Coin, , 2017.
5. Debajani ,Mohanty ,Blockchain from Concepts to Execution -, BPB Publications; 2nd revised and updated edition 2018.

Annexure - 3

Web Resources :

1. https://www.packtpub.com/free-ebook/blockchain-by-example
2. https://www.blockchain-council.org/wp-content/uploads/2020/02/Blockchain-For-Beginners-Study-Guide-1
3. https://link.springer.com/book/10.1007/

Pedagogy :

Chalk and Talk , Group Discussion , ,Spot Test , Practical Labs ,Assignments , Quiz.

Rationale for Nature of the Course :

To learn about powerful Block chain platforms, so that Students will gain knowledge about technologies used in Block chain.

Activities to be Given :

- Practice to code programs
- Group Discussion
- PPT

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand the basic concepts of Blockchain	Up to K4
CLO2	Learn and develop Knowledge on Blockchain	Up to K4
CLO3	Identify the concept of Etherum Blockchain and Ripple Blockchain.	Up to K4
CLO4	Examine Factom Blockchain and DigiByte	Up to K5
CLO5	Know powerful Blockchain platforms	Up to K5

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3– Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	3	2	3	2
CLO2	1	2	3	2	1	2
CLO3	1	1	2	2	2	3
CLO4	2	2	3	2	2	3
CLO5	2	2	2	2	3	3

1 – Basic Level 2 – Intermediate Level 3- Advanced Level

Annexure - 3

LESSON PLAN :

Unit	Description	Hours		Mode
I	**Introducing Blockchain** : Beginning at the Beginning: What Blockchains Are- The Structure of Blockchains	2	6	Chalk and Talk
	Blockchain Applications- The Blockchain Life Cycle – Consensus : The Driving Force of Blockchains - Blockchains in Use.	2		Chalk and Talk
	Blockchain-Where Blockchains Add Substance-Choosing a Solution- **Picking a Blockchain**-Where Blockchains Add Substance-Choosing a Solution	2		Chalk and Talk, PPT Presentation
II	**Getting Your Hands on Blockchain**-Diving into the Bitcoin Blockchain-Using Smart Contracts with Bitcoin	2	6	Chalk and Talk
	Building a Private Blockchain with Docker and Ethereum. **Beholding the Bitcoin Blockchain:**Getting a Brief History of the Bitcoin Blockchain-Debunking some common Bitcoin misconceptions	2		Chalk and Talk PPT Presentation
	Bitcoin: The New Wild West-Mining for Bitcoins	2		Chalk and Talk
III	**Encountering the Ethereum Blockchain**-Exploring the Brief History of Ethereum -Ethereum: The OpenSource World Wide Computer -Hacking a Blockchain-Getting Up and Running on Ethereum	3	6	Chalk and Talk , PPT Presentation
	Regarding the Ripple Blockchain-Getting a Brief History of the Ripple Blockchain-Ripple: It's All About Trust, Seeing How Ripple Differs from Other Blockchains-Unleashing the Full Power of Ripple,	3		Chalk and Talk , PPT Presentation

Annexure - 3

IV	**Finding the Factom Blockchain-**A Matter of Trust -Building on Factom **Digging into DigiByte-**Getting Familiar with DigiByte: The Fast Blockchain Mining on DigiByte-Signing Documents on DigiByte's DiguSign Earning DigiBytes While Gaming	3 3	6	Chalk and Talk Chalk and Talk, PPT Presentation
V	**Powerful Blockchain Platforms : Getting Your Hands on Hyperledger** Getting to Know Hyperledger: Dreams of a Hyper Future- Focusing on Fabric-Investigating the Iroha Project-Diving into Sawtooth Lake. **Applying Microsoft Azure**Bletchley: The Modular Blockchain Fabric-Building in the Azure Ecosystem- Getting Started with Chain on Azure-Deploying Blockchain Tools on Azure.	2 2 2	6	Chalk and Talk Chalk and Talk , PPT Presentation Chalk and Talk

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