ACADEMIC CURRICULA

UNDERGRADUATE DEGREE PROGRAMME

Bachelor of Computer Applications

Three Years /

Bachelor of Computer Applications (Honours)

Four Years

Learning Outcomes Based Curriculum Framework (LOCF)

Choice Based Flexible Credit System

Academic Year 2023-2024

SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

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Kattankulathur, Chengalpattu District 603203, Tamil Nadu, India

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SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Kattankulathur, Chengalpattu District 603203, Tamil Nadu, India

Department of Computer Applications

1.	**Department Vision Statement**
Stmt - 1	*Creating the most conducive environment for imparting quality education in Computer Applications*
Stmt - 2	*Contributing effectively to produce globally competent quality professionals in the field of Computer Applications*
Stmt - 3	*Contributing towards preparing young minds to serve community*

2.	**Department Mission Statement**
Stmt - 1	*Impart student's essential knowledge and skills required for a successful career in Computer Applications*
Stmt - 2	*Instill confidence in the students to take up new challenges by grooming them appropriately*
Stmt - 3	*Inculcate in the students a sense of commitment to professional ethics, moral values with emphasis on team work and leadership qualities*
Stmt - 4	*Instill the students with a clear awareness of environmental issues and their relevance to their profession*
Stmt - 5	*Impress upon the students the impact of their work on the nation's economic and social progress*

3.	**Program Education Objectives (PEO)**
PEO - 1	*Offer the students those skill sets and domain knowledge based on needs of Computer Applications and dynamic business environment*
PEO - 2	*Provide the students with the capabilities in the areas of analysis, design, development and testing*
PEO - 3	*Kindle the minds of students to take up research and development in Computer Applications with missionary zeal*
PEO - 4	*Train the students to become effective communicators in professional as well as general aspects of life*
PEO - 5	*Prepare the students into balanced individuals who are keen to leave a mark by excelling in their profession*

4.	**Program Specific Outcomes (PSO)**
PSO - 1	*Graduates will acquire a comprehensive knowledge and sound understanding of fundamentals of Computer Applications.*
PSO - 2	*Graduates will develop practical, analytical and programming skills.*
PSO - 3	*Graduates will be prepared to acquire a range of general skills, to solve problems, to evaluate information, to develop software tools, to communicate with society effectively and learn independently.*

5.	**Consistency of PEO's with Mission of the Department**				
	Mission Stmt. - 1	Mission Stmt. – 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. – 5
PEO - 1	H	H	M	H	M
PEO - 2	H	M	H	H	H
PEO - 3	M	H	M	H	H
PEO - 4	H	H	H	L	M
PEO - 5	L	H	M	H	H

H – High Correlation, M – Medium Correlation, L – Low Correlation

6. Consistency of PEO's with Program Learning Outcomes (PLO)														
	Program Learning Outcomes (PLO)													
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
PEO - 1	H	H	H	H	H	L	M	L	M	M	H	H	M	H	H
PEO - 2	H	H	H	H	H	L	M	L	M	H	M	M	H	H	M
PEO - 3	H	H	H	H	H	M	H	M	M	M	H	H	H	M	M
PEO - 4	H	M	M	H	H	H	M	H	H	H	H	L	M	M	H
PEO - 5	M	M	H	H	M	H	M	H	H	H	M	M	H	M	M

H – High Correlation, M – Medium Correlation, L – Low Correlation

1. Programme Structure- B.C. A Computer Applications

1. Discipline Specific Core Courses (C)							2. Discipline Specific Elective Courses (D)						
(20 Courses)							(5 Courses)						
Course Code	Course Title	Hours/ Week				C	Course Code	Course Title	Hours/ Week				C
		L	T	P	O				L	T	P	O	
USA23101J	Programming for Problem Solving	3	0	3	2	4	UCA23D01J	Windows Programming using VB.NET	3	0	2	2	4
USA23102J	Digital Logic Fundamentals	3	0	3	2	4	UCA23D02J	Data Analysis using R					
UMS23101T	Discrete Mathematical Structures	4	0	0	2	4	UCA23D03J	Web development using Angular JS and MongoDB					
USA23201J	Object Oriented Programming	3	0	3	2	4	UCA23D04J	Introduction to Animation	3	0	3	2	4
USA23202J	Fundamentals of Data Structures and Algorithms	3	0	3	2	4	UCA23D05J	Introduction to Computer Vision					
UMS23202T	Mathematical Foundation	4	0	0	2	4	UCA23D06J	Programming Using C#					
USA23301J	Programming in Java	3	0	3	2	4	UCA23D07J	Web development using Node JS and MongoDB	3	0	3	2	4
USA23302J	Database Management System	3	0	3	2	4	UCA23D08J	Cyber Security					
UMS23303T	Numerical Methods	4	0	0	2	4	UCA23D09J	Blockchain Technology	3	0	2	2	4
UCA23401J	Open Source Technologies	3	0	3	2	4	UCA23D10J	Internet of Things					
USA23402J	Operating System	3	0	3	2	4	UCA23D11T	E-Commerce	4	0	0	2	4
UMS23404T	Resource Management Techniques	4	0	0	2	4							
UCA23501J	Python Programming	3	0	3	2	4	UCA23D12T	Artificial Intelligence					
UCA23502J	Computer Networks	3	0	3	2	4		**Total Learning Credits**					**20**
UCA23503J	Object Oriented Analysis and Design	3	0	3	2	4							
UCA23601J	Software Engineering and Testing	3	0	3	2	4							
UCA23602T	Wireless Communication & Mobile Computing	4	0	0	2	4							
USA23603T	Research Methodology	4	0	0	2	4							
UCA23701J	Cloud Computing	3	0	3	2	4							
UCA23801J	Big Data Analytics	3	0	2	2	4							
	Total Learning Credits					**80**							

4. Skill Enhancement Courses(S)						
(5 Courses)						
Course	Course Title	Hours/ Week				C
		L	T	P	O	
UCD23S01L	Quantitative Aptitude and Logical Reasoning	0	0	2	2	1
UCD23S02T	Verbal Ability and Skill Development	2	0	0	2	2
UCA23S03L	Web Programming	0	0	2	2	1
UCA23S04L	Go Programming	0	0	4	2	2
UCA23S05L	Lua Programming	0	0	2	2	1
	Total Learning Credits					**7**

3. Generic Elective Courses (G)						
(9 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P	O	
ULT23G01J	Tamil-I	2	0	2	2	3
ULH23G01J	Hindi-I					
ULF23G01J	French-I					
ULT23G02J	Tamil-II	2	0	2	2	3
ULH23G02J	Hindi-II					
ULF23G02J	French-II					
UCA23G01J	Fundamentals of Data Science	3	0	2	2	4
UCA23G02J	Serverless Database Techniques	3	0	2	2	4
UCA23G03J	Basics of Android	3	0	2	2	4
UCA23G04J	Introduction to Machine Learning	3	0	3	2	4
UCA23G05J	Data Visualization and Exploring Models	3	0	2	2	4
UCA23G06T	Basics of IOS	4	0	0	2	4
UCA23G07T	Data Wrangling	4	0	0	2	4
	Total Learning Credits					34

5. Ability Enhancement Courses (AE)						
(4 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P	O	
ULE23AE1T	English	4	0	0	2	4
ULT23AE1J	Applied Tamil - I	1	0	2	2	2
ULH23AE1J	Applied Hindi - I					
ULF23AE1J	French for Specific Purpose-I					
ULT23AE2J	Applied Tamil – II	1	0	2	2	2
ULH23AE2J	Applied Hindi - II					
ULF23AE2J	French for Specific Purpose-II					
UES23AE1T	Environmental Studies	3	0	0	2	3
	Total Learning Credits					11

6. Value Addition Course (V)						
(4 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P	O	
UCD23V01T	Universal Human Values	2	0	0	2	2
UEN23V01L	Communication Skills	0	0	4	2	2
UCD23V02T	Industry Oriented Employability Skills for Science	2	0	0	2	2
UCD23V05T	Career Readiness and Professional Skills	2	0	0	2	2
	Total Learning Credits					8

7. Internship/Apprenticeship / Project/ Community Outreach (IAPC)						
(6 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P	O	
UCA23P01L	Internship – I	0	0	0	0	1
UCA23P02L	Internship – II	0	0	0	0	1
UCA23P03L	Internship – III	0	0	0	0	2
UCA23P04L	Mini Project	0	0	4	2	2
UCA23P05L	Project Phase-I	0	0	8	2	4
UCA23P06L	Project Phase-II	0	0	12	2	6
	Total Learning Credits					16

8.Mandatory Courses(M)						
(2 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P	O	
UNS23M01L	NSS	0	0	0	0	0
UNC23M01L	NCC	0	0	0	0	0
UNO23M01L	NSO	0	0	0	0	0
UYG23M01L	YOGA	0	0	0	0	0
UMI23M01L	My India Project	0	0	0	0	0
	Total Learning Credits	0	0	0	0	0

As SRMIST strongly encourages the use of SWAYAM (Study Web of Active Learning by Learning by Young and Aspiring Minds) platform, the students are encouraged to choose at least one core/ elective course from SWAYAM on the recommendation of the faculty advisor and the credits will be transferred

Semester	Discipline Specific Core Courses (C)	Discipline Specific Elective Courses (D)	Generic Elective Courses (G)	Skill Enhancement Courses(S)	Ability Enhancement Courses (AE)	Mandatory Courses(M)	Value Addition Course (V)	IAPC	Total Credits	No. of Periods
Sem I	C-1(4) C-2 (4) C-3(4)	-	G-1 (Tamil-I) G-1 (Hindi-I) G-1 (French-I) – (3)	S-1 (1)-(Soft skills)	AE-1(4) (English)	-	V-1(2)	-	**22**	**28**
Sem II	C-4(4) C-5 (4) C-6 (4)	-	G-2 (Tamil-II) G-2 (Hindi-II) G-2 (French-II) – (3)	S-2 (2)-(Quantitative Aptitude & Reasoning)	AE-2 (3) (EVS)	NSS/NCC/NSO /Yoga(0)	V-2(2)	-	**22**	**29**
Sem III	C-7(4) C-8 (4) C-9(4)	-	G-3(4)	S-3 (1)	AE – 3(2) (IL-1/ FL-1)	-	V-3(2)	IAPC-1 (1)	**22**	**28**
Sem IV	C-10(4) C-11 (4) C-12(4)	-	G-4(4)	S-4 (2)	AE – 4(2) (IL-1/ FL-1)	My India Project(0)	V-4(2)	-	**22**	**30**
Sem V	C-13(4) C-14(4) C-15(4)	D1/D2(4)	G-5(4)	S-5 (1)	-	-	-	IAPC - 2 (1)	**22**	**30**
Sem VI	C-16(4) C-17(4) C-18(4)	D3/D4(4)	G-6(4)	-	-	-	-	IAPC - 3 (2)	**22**	**30**
Sem VII	C-19(4)	D5/D6(4)	G-7(4) G-8(4)	-	-	-	-	IAPC - 4 (2) IAPC - 5 (4)	**22**	**29**
Sem VIII	C-20(4)	D7/D8(4) D9/D10(4)	G-9(4)	-	-	-	-	IAPC - 6 (6)	**22**	**30**
Total Credits	**80**	**20**	**34**	**7**	**11**	**0**	**8**	**16**	**176**	**234**

2. Implementation Plan

Semester – I						
Course Code	Course Title	Hours/ Week				
		L	T	P	O	C
ULT23G01J	Tamil-I	2	0	2	2	3
ULH23G01J	Hindi-I					
ULF23G01J	French-I					
ULE23AE1T	English	4	0	0	2	4
USA23101J	Programming for Problem Solving	3	0	3	2	4
USA23102J	Digital Logic Fundamentals	3	0	3	2	4
UMS23101T	Discrete Mathematical Structures	4	0	0	2	4
UCD23S01L	Quantitative Aptitude and Logical Reasoning	0	0	2	2	1
UCD23V01T	Universal Human Values	2	0	0	2	2
Total Learning Credits		**18**	**0**	**10**	**14**	**22**
Total number of Hours/Week						**28**

Semester - II						
Course Code	Course Title	Hours/ Week				
		L	T	P	O	C
ULT23G02J	Tamil-II	2	0	2	2	3
ULH23G02J	Hindi-II					
ULF23G02J	French-II					
UES23AE1T	Environmental Studies	3	0	0	2	3
USA23201J	Object Oriented Programming	3	0	3	2	4
USA23202J	Fundamentals of Data Structures and Algorithms	3	0	3	2	4
UMS23202T	Mathematical Foundation	4	0	0	2	4
UCD23S02T	Verbal Ability and Skill Development	2	0	0	2	2
UEN23V01L	Communication Skills	0	0	4	2	2
UNS23M01L	NSS	0	0	0	0	0
UNC23M01L	NCC					
UNO23M01L	NSO					
UYG23M01L	YOGA					
Total Learning Credits		**17**	**0**	**12**	**14**	**22**
Total number of Hours/Week						**29**

Semester – III						
Course	Course	Hours/ Week				
Code	Title	L	T	P	O	C
USA23301J	Programming in Java	3	0	3	2	4
USA23302J	Database Management System	3	0	3	2	4
UMS23303T	Numerical Methods	4	0	0	2	4
ULT23AE1J	Applied Tamil - I	1	0	2	2	2
ULH23AE1J	Applied Hindi – I					
ULF23AE1J	French for Specific Purpose-I					
UCA23G01J	Fundamentals of Data Science	3	0	2	2	4
UCA23S03L	Web Programming	0	0	2	2	1
UCA23P01L	Internship – I	0	0	0	0	1
UCD23V02T	Industry Oriented Employability Skills for Science	2	0	0	2	2
Total Learning Credits		16	0	12	14	22
Total number of Hours/Week						28

Semester – IV						
Course	Course	Hours/ Week				
Code	Title	L	T	P	O	C
UCA23401J	Open Source Technologies	3	0	3	2	4
USA23402J	Operating System	3	0	3	2	4
UMS23404T	Resource Management Techniques	4	0	0	2	4
ULT23AE2J	Applied Tamil – II	1	0	2	2	2
ULH23AE2J	Applied Hindi - II					
ULF23AE2J	French for Specific Purpose-II					
UCA23G02J	Serverless Database Techniques	3	0	2	2	4
UCA23S04L	Go Programming	0	0	4	2	2
UCD23V05T	Career Readiness and Professional Skills	2	0	0	2	2
UMI23M01L	My India Project	0	0	0	0	0
Total Learning Credits		16	0	14	14	22
Total number of Hours/Week						30

Semester – V						
Course Code	Course Title	Hours/ Week				
		L	T	P	O	C
UCA23501J	Python Programming	3	0	3	2	4
UCA23502J	Computer Networks	3	0	3	2	4
UCA23503J	Object Oriented Analysis and Design	3	0	3	2	4
UCA23D01J	Windows Programming using VB.NET	3	0	2	2	4
UCA23D02J	Data Analysis using R					
UCA23D03J	Web development using Angular JS and MongoDB					
UCA23G03J	Basics of Android	3	0	2	2	4
UCA23S05L	Lua Programming	0	0	2	2	1
UCA23P02L	Internship – II	0	0	0	0	1
Total Learning Credits		15	0	15	12	22
Total number of Hours/Week						30

Semester - VI						
Course Code	Course Title	Hours/ Week				
		L	T	P	O	C
UCA23601J	Software Engineering and Testing	3	0	3	2	4
UCA23602T	Wireless Communication and Mobile Computing	4	0	0	2	4
USA23603T	Research Methodology	4	0	0	2	4
UCA23D04J	Introduction to Animation	3	0	3	2	4
UCA23D05J	Introduction to Computer Vision					
UCA23D06J	Programming Using C#					
UCA23G04J	Introduction to Machine Learning	3	0	3	2	4
UCA23P04L	Mini Project	0	0	4	2	2
Total Learning Credits		17	0	13	12	22
Total number of Hours/Week						30
Total Learning Credits						**132**

Semester – VII						
Course Code	Course Title	Hours/ Week				
		L	T	P	O	C
UCA23701J	Cloud Computing	3	0	3	2	4
UCA23D07J	Web Development using Node JS and MongoDB	3	0	3	2	4
UCA23D08J	Cyber Security					
UCA23G05J	Data Visualization and Exploring Models	3	0	2	2	4
UCA23G06T	Basics of IOS	4	0	0	2	4
UCA23P03L	Internship – III	0	0	0	0	2
UCA23P05L	Project Phase-I	0	0	8	2	4
Total Learning Credits		**13**	**0**	**16**	**10**	**22**
Total number of Hours/Week						**29**

Semester – VIII						
Course Code	Course Title	Hours/ Week				
		L	T	P	O	C
UCA23801J	Big Data Analytics	3	0	2	2	4
UCA23D09J	Blockchain Technology	3	0	2	2	4
UCA23D10J	Internet of Things					
UCA23D11T	E-Commerce	4	0	0	2	4
UCA23D12T	Artificial Intelligence					
UCA23G07T	Data Wrangling	4	0	0	2	4
UCA23P06L	Project Phase-II	0	0	12	2	6
Total Learning Credits		**14**	**0**	**16**	**10**	**22**
Total number of Hours/Week						**30**
Total Learning Credits						**176**

Courses for earning Additional Credits

Course Code	Course Title	Hours/ Week				
		L	T	P	O	C
Semester – II						
UCD23P01L	Internship Report– I	0	0	8	0	4
UCD23P02L	Project Work – I					
UCD23P03L	Apprenticeship – I					
Semester – IV						
UCD23P04L	Internship Report– II	0	0	8	0	4
UCD23P05L	Project Work – II					
UCD23P06L	Apprenticeship – II					
	Total Learning Credits	**0**	**0**	**8**	**0**	**4**

Note : Those students who decide to exit at the end of the First year shall register for any one of the courses mentioned under Semester – II; and decide to exit at the end of the Second year shall register for any one of the courses mentioned under Semester – IV in the above list.

3. Program Articulation Matrix

Course Code	Course Name	Programme Learning Outcomes														
		Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
USA23101J	*Programming for Problem Solving*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
USA23102J	*Digital Logic Fundamentals*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UMS23101T	*Discrete Mathematical Structures*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
USA23201J	*Object Oriented Programming*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
USA23202J	*Fundamentals of Data Structures and Algorithms*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UMS23202T	*Mathematical Foundation*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
USA23301J	*Programming in Java*	*H*	*H*	*H*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*L*	*L*	*L*
USA23302J	*Database Management System*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UMS23303T	*Numerical Methods*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UCA23401J	*Open Source Technologies*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
USA23402J	*Operating System*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*H*
UMS23404T	*Resource Management Techniques*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*H*
UCA23501J	*Python Programming*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*
UCA23502J	*Computer Networks*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UCA23503J	*Object Oriented Analysis and Design*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UCA23601J	*Software Engineering and Testing*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UCA23602T	*Wireless Communication and Mobile Computing*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
USA23603T	*Research Methodology*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UCA23701J	*Cloud Computing*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*
UCA23801J	*Big Data Analytics*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UCA23D01J	*Windows Programming using VB.NET*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UCA23D02J	*Data Analysis using R*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*
UCA23D03J	*Web development using Angular JS and MongoDB*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*
UCA23D04J	*Introduction to Animation*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
UCA23D05J	*Introduction to Computer Vision*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
UCA23D06J	*Programming Using C#*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*
UCA23D07J	*Web development using Node JS and MongoDB*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
UCA23D08J	*Cyber Security*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*M*	*H*	*H*
UCA23D09J	*Blockchain Technology*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*
UCA23D10J	*Internet of Things*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
UCA23D11T	*E-Commerce*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
UCA23D12T	*Artificial Intelligence*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*
ULT23G01J	*Tamil-I*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
ULH23G01J	*Hindi-I*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*M*	*H*	*H*
ULF23G01J	*French-I*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
ULT23G02J	*Tamil-II*	*H*	*H*	*M*	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*M*	*H*	*M*	*L*	*M*
ULH23G02J	*Hindi-II*	*H*	*H*	*M*	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*M*	*H*	*M*	*L*	*M*
ULF23G02J	*French-II*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*

UCA23G01J	Fundamentals of Data Science	H	H	M	M	L	L	L	L	L	L	L	H	M	M	M
UCA23G02J	Serverless Database Techniques	H	H	M	M	M	L	M	M	L	M	L	H	M	M	L
UCA23G03J	Basics of Android	H	M	M	M	M	L	M	L	M	M	L	H	H	H	H
UCA23G04J	Introduction to Machine Learning	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UCA23G05J	Data Visualization and Exploring Models	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UCA23G06T	Basics of IOS	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UCA23G07T	Data Wrangling	H	H	M	H	M	L	M	M	L	L	M	H	M	L	M
UCD23S01L	Quantitative Aptitude and Logical Reasoning	H	H	M	H	M	L	L	L	M	M	M	H	M	M	M
UCD23S02T	Verbal Ability and Skill Development	H	H	H	H	M	L	L	L	M	L	M	H	L	H	L
UCA23S03L	Web Programming	H	H	M	H	M	L	M	M	L	L	M	H	M	L	M
UCA23S04L	Go Programming	H	H	M	M	H	H	H	M	M	M	L	H	H	M	M
UCA23S05L	Lua Programming	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
ULE23AE1T	English	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
ULT23AE1J	Applied Tamil - I	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
ULH23AE1J	Applied Hindi - I	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
ULF23AE1J	French for Specific Purpose-I	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
ULT23AE2J	Applied Tamil – II	H	H	M	H	M	L	L	L	M	M	M	H	M	M	M
ULH23AE2J	Applied Hindi - II	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
ULF23AE2J	French for Specific Purpose-II	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UES23AE1T	Environmental Studies	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UCD23V01T	Universal Human Values	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UEN23V01L	Communication Skills	H	H	M	M	M	L	L	L	M	M	M	M	M	M	M
UCD23V02T	Industry Oriented Employability Skills for Science	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UCD23V05T	Career Readiness and Professional Skills	H	H	M	H	H	H	L	L	L	H	L	H	M	M	M
UCA23P01L	Internship – I	M	H	H	H	M	L	M	M	M	L	M	L	L	L	L
UCA23P02L	Internship – II	H	H	H	M	M	L	M	L	M	M	M	M	L	L	L
UCA23P03L	Internship – III	M	M	M	H	M	H	H	M	M	M	L	M	M	L	L
UCA23P04L	Mini Project	M	H	M	H	L	M	L	L	M	L	M	H	M	L	L
UCA23P05L	Project Phase-I	H	H	M	M	M	M	M	L	M	H	M	M	M	L	L
UCA23P06L	Project Phase-II	H	H	M	M	M	M	M	L	M	H	M	M	M	L	L
UNS23M01L	NSS	H	H	M	H	L	M	L	L	M	L	M	H	L	L	L
UNC23M01L	NCC	M	M	H	M	H	M	L	M	H	M	L	M	M	M	M
UNO23M01L	NSO	H	H	M	H	L	M	L	L	M	L	M	H	L	L	L
UYG23M01L	YOGA	M	M	H	M	H	M	L	M	H	M	L	M	M	M	M
UMI23M01L	My India Project	M	M	H	M	H	M	L	M	H	M	L	M	M	M	M
	Program Average	H	H	M	H	M	L	L	L	M	M	M	H	M	M	M

Semester – I

Course Code	ULT23G01J	Course Name	Tamil - I	Course Category	G	Generic Elective Course	L	T	P	O	C
							2	0	2	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Tamil	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	மரபிலிருந்து மாற்றம் பெற்ற புதுக்கவிதை மரபின் சிந்தனைகளை அறியச் செய்தல்	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	புதுக்கவிதையின் வழி மனித வாழ்வியல் விழுமியங்களைத் தெரியச் செய்தல்			
CLR-3 :	சிற்றிலக்கியங்கள், காப்பியங்கள் கற்பிக்கும் தமிழ்ச் சமூகத்தின் வாழ்வியலை அறியச் செய்தல்			
CLR-4 :	நவீன தமிழ் இலக்கிய வளர்ச்சி வரலாற்றைப் புரியச் செய்தல்			
CLR-5 :	மொழிப் பயிற்சி வழி மொழியின் பல்வேறு நுட்பங்களைத் தெரியச் செய்தல்			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	புதுக்கவிதை உருவாக்கித் தந்த புதிய சிந்தனைக் களங்களை அறிந்துகொள்ளுதல்	2	75	60	H	L	H	M	H	H	L	M	H	M	L	H	-	-	-
CLO-2 :	நவீன கவிதைகள் வழி மாற்றம் பெற்றுவரும் மானுட விழுமியங்களைத் தெரிந்துகொள்ளுதல்	2	80	70	H	M	H	L	M	H	L	H	M	L	H	H	-	-	-
CLO-3 :	தமிழ்ச்சமூகத்தின் இடைக்கால வாழ்வியல் முறைகளை உணர்ந்துகொள்ளுதல்	2	70	65	H	L	H	M	H	H	M	H	L	H	M	H	-	-	-
CLO-4 :	நவீன இலக்கிய வரலாறு வழி தமிழ்க் கல்வி வரலாறு, சமூக வரலாறு பெற்ற வளர்ச்சி நிலைகளைத் தெரிந்துகொள்ளுதல்	2	70	70	H	M	H	L	H	M	M	H	H	L	H	H	-	-	-
CLO-5 :	மொழியின் நுட்பங்களை அறிந்து மொழி ஆளுமையோடு செயல்பட அறிந்துகொள்ளுதல்	2	80	70	H	M	H	H	M	H	L	M	H	L	H	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	தமிழ் இலக்கியத்தின் வளர்ச்சிப் போக்குகள்	நவீன கவிதை தோற்றம்	தமிழரின் வீரமரபு	சிற்றிலக்கியத் தோற்றம்	தமிழ் உரைநடை மரபில் உ.வே.சா.

	SLO-2	இலக்கிய உத்திகள்	நவீன கவிதை வரலாறு	போர் விழுமியங்கள்	சிற்றிலக்கிய வகைமை	**ராஜ வைத்தியம்**
S-2	SLO-1	தமிழ்க் கவிதை மரபு	நவீன கவிதை செல்நெறிகள்	பரணி அறிமுகம்	சிற்றிலக்கியங்கள்	வைத்தியர்களின் சிறப்பு
	SLO-2	காலந்தோறும் கவிதையின் கரு	செல்நெறிகளில் கோட்பாடுகள்	பரணி இலக்கியங்கள்	முதன்மைச் சிற்றிலக்கியங்கள் –	**கழனியூரன் – அறிமுகம்**
S-3	SLO-1	காலந்தோறும் கவிதையின் கட்டமைப்பு	கவிதை மொழி	கலிங்கத்துப்பரணி *477,490*	பிள்ளைத்தமிழ் -உலா - தூது	சிறுதெய்வ வழிபாடு
	SLO-2	தற்கால இலக்கியம்	நவீன கவி ஆளுமைகள்	தலைவனின் வீரம்	புதுக்கவிதையில் சமூகம்	**பொன் காத்த ஐயனார்**
S-4	SLO-1	புதுக்கவிதை உருவாக்கம்	பெண் கவிஞர்கள்	தமிழ் இலக்கிய மரபில் தூது	புதுக்கவிதையும் இதழ்களும்	விருந்து – கள்ளர் செயல்கள்
	SLO-2	புதுக்கவிதை வளர்ச்சிநெறிகள்	கவிதையில் நாட்டுப்புற வடிவம்	தூது இலக்கியங்கள்	மணிக்கொடி இதழ்	பிழை நீக்கி எழுதுதல்
S-5	SLO-1	பாரதியார் – புதுக்கவிதையின் அடையாளம்	இளம்பிறை – அம்மா	தமிழ் விடு தூது *(184 – 186)*	எழுத்து இதழ்	எழுத்துப் பிழை
	SLO-2	பாரதியார் பன்முக ஆளுமைத்திறன்	பெண்களின் கல்வி நிலை	தமிழின் பெருமை	வானம்பாடி இதழ்	தொடர்பிழை
S-6	SLO-1	பாரத தேசம்	பெண் அடக்குமுறை	செய்யுள் மரபில் கலம்பகம்	சிறுகதை தோற்றம்	உயர்திணை, அஃறிணை
	SLO-2	பாரததேசத்தின் வளம்	ப. கல்பனா – கீறல் விழுந்த மாலைக் காலங்கள்	கலம்பக இலக்கியங்கள்	சிறுகதை வளர்ச்சி	பிறமொழிச் சொற்கள் வரலாறு
S-7	SLO-1	வெள்ளிப் பனிமலையின் மீதுலவுவோம்...	ஆண் பெண் சமத்துவம்	நந்திக் கலம்பகம்-வானுறு மதியை *(110)*	சிறுகதை – வரலாறு	பிறமொழிச் சொற்களை நீக்கி எழுதுதல்
	SLO-2	*20* ஆம் நூற்றாண்டுக் கவிதை மரபில் பாரதிதாசன்	விளிம்புநிலை வாழ்வியல்	கையறுநிலை	சிறுகதை ஆசிரியர்கள்	ஷ, ஜ, ஸ, ஹ மாற்றொலிகள்
S-8	SLO-1	பாரதிதாசன் - அழகின் சிரிப்பு	திருநங்கை குணவதி - சமூகப்பார்வை	குறவஞ்சி அறிமுகம்	இதழ்களும் சிறுகதையும்	தமிழ் இலக்கண நுட்பங்கள்
	SLO-2	ஆல் - ஆயிரம் கிளைகள் கொண்ட அடிமரம்	திருநர்களும் சாதனைகளும்	குறவஞ்சி இலக்கியங்கள்	புதினம் தோற்றம்	இலக்கணமும் பயன்பாடும்
S-9	SLO-1	இயற்கையின் அழகியல்	புலம்பெயர் வாழ்வியல்	குற்றாலக் குறவஞ்சி – ஆடுமர வீனுமணி *(3)*	தொடக்கக்காலப் புதினங்கள்	தமிழில் சொல் வகைகள்
	SLO-2	வானம்பாடியில் மு. மேத்தா	ஸர்மிளா ஸெய்யித் – புராதன ஊர்	மலையும் வாழ்வும்	புதினம் வளர்ச்சி	சொல்லும் பயன்பாடும்
S-10	SLO-1	மு. மேத்தா - கவிதையின் தனித்தன்மைகள்	புலம் பெயர் வாழ்வின் வலியும் நம்பிக்கையும்	காப்பிய இலக்கணம்	புதினத்தின் வகைமை	பெயர்ச்சொற்கள்

	SLO-2	மனிதனைத்தேடி – கவிதை	காலந்தோறும் கவிதை வடிவில் மாற்றங்கள்	காப்பிய வகைமைகள்	புதின ஆசிரியர்கள்	பெயர்ச்சொற்கள் அறிதல்
S-11	SLO-1	மனிதநேயம்	ஹைக்கூ, லிமரைக்கூ, சென்ரியூ – தேர்ந்தெடுத்த கவிதைகள்	சிலப்பதிகாரம் – அறிமுகம்	தமிழ் இலக்கியத்தில் உரைநடைக்கூறுகள்	வினைச்சொற்கள்
	SLO-2	தமிழ்க் கவிதையில் சுற்றுச்சூழலியல்	ஹைக்கூ – மு.முருகேஷ்	கட்டுரைக்காதை	உரைநடையின் தோற்றம்	வினைச்சொற்கள் அறிதல்
S-12	SLO-1	பழநிபாரதியின் காடு	லிமரைக்கூ – ஈரோடு தமிழன்பன்	ஊழ்வினை	தமிழில் உரைநடை	தமிழில் பெயரடை, வினையடை
	SLO-2	இயற்கையும் சமூக சமத்துவ வாழ்வியலும்	சென்ரியூ – மாமதயானை	கோவலனின் முற்பிறப்பு வரலாறு	உரைநடை வளர்த்த அறிஞர்கள்	பெயரடை, வினையடை அறிதல்

Learning Resources	*1.* **முல்லைக்காடு, தொகுப்பும் பதிப்பும் - தமிழ்த்துறை ஆசிரியர்கள், எஸ்.ஆர்.எம். அறிவியல் மற்றும் தொழில்நுட்பக் கல்விநிறுவனம், காட்டாங்குளத்தூர்,** *603203, 2023* *2.* **வல்லிக்கண்ணன், புதுக்கவிதை தோற்றமும் வளர்ச்சியும், ஆழி பதிப்பகம், சென்னை,** *2018* *3.* **கா. சிவத்தம்பி, தமிழில் சிறுகதை தோற்றமும் வளர்ச்சியும், என்.சி.பி.எச்., சென்னை,** *2013* *4.* **தமிழ் இணையக் கல்விக்கழகம் -** *http://www.tamilvu.org/* *5.* **மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம் -** *https://www.projectmadurai.org/*

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Expert from Higher Technical Institutions**	**Internal Experts**
1. Dr.P.R.Subramanian, Director, Mozhi Trust, Thiruvanmiyur, Chennai – 600 041.	*1. Dr. V. Dhanalakshmi, Associate Professor, Subramania Bharathi School of Tamil Language &Literaturel, Pondicherry University, Pondicherry*	*1. Dr.B.Jaiganesh, Associate Professor & Head, Dept. of Tamil, FSH, SRMIST, KTR.*
		2. Dr. R. Ravi, Assistant Professor and Head, Dept. of Tamil, FSH,

	SRMIST, VDP.
	3. Mr. G. Ganesh, Assistant Professor, Dept. of Tamil, FSH, SRMIST, RMP.
	4. Dr. T.R.HebzibahbeulahSuganthi, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR.
	5. Dr.S.Saraswathy, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR.

Course Code	ULH23G01J	Course Name	HINDI-I	Course Category	G	Generic Elective Course	L	T	P	O	C
							2	0	2	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*HINDI*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To Communicate in Hindi without any inhibition*			
CLR-2 :	*To appreciate the Hindi Language in its various forms*			
CLR-3 :	*To analyze the different writing styles*			
CLR-4 :	*To display moral and social values in the field of social Responsibility and Integrity*			
CLR-5 :	*To be willing listeners and Translators-where need be*			
Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*			
CLO-1 :	*To Understand the Philosophy of life and living through Stories*	2	75	80
CLO-2 :	*To Examine Travelogue writing and Sketch*	2	80	90
CLO-3 :	*To Identify Irony and essay based writing*	2	75	95
CLO-4 :	*Evaluate the various social issues depicted in the prose*	2	80	90
CLO-5 :	*To Understand the basic and fundamental principal of Translation*	2	85	90

Program Learning Outcomes (PLO)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	CommunicationSkills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*H*	*H*	*M*	*L*	*H*	*L*	*M*	*L*	*L*	*H*	*M*	-	-	-
H	*H*	*H*	*M*	*L*	*H*	*H*	*M*	*L*	*L*	*H*	*M*	-	-	-
H	*H*	*M*	*L*	*H*	*H*	*M*	*H*	*M*	*M*	*H*	*H*	-	-	-
H	*H*	*L*	*H*	*M*	*H*	*L*	*H*	*H*	*M*	*H*	*H*	-	-	-
M	*H*	*M*	*H*	*L*	*H*	*H*	*L*	*H*	*M*	*H*	*H*	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Kahani*	*Rekhachitra&Yatravitrant*	*Nibandh*	*Natak*	*Anuvad&ParibhashikShabdavali*
	SLO-2	*Avdharna*	*Avdharna*	*Nibandh Ki Avdharna*	*Avdharna*	*Arth*
S-2	*SLO-1*	*Swarup*	*Swaroop*	*Swarup*	*Natak Ka Swarup*	*Paribhasha*
	SLO-2	*Paribhasha*	*Bhumika*	*Paribhasha*	*Paribhasha*	*Swarup*
S-3	*SLO-1*	*Kahani Ke Tatva*	*Mahatva*	*Mahatva*	*Tatwa*	*Prakar*
	SLO-2	*Kahani Ka Mahatva*	*Uddeshya*	*Uddeshya*	*Prakar*	*Mahatva*
S-4	*SLO-1*	*Pariksha- Premchand*	*Gisha- Rekhachitra*	*Kutaj- Nibandh Hajari Prashad Divedi*	*Uddeshya*	*Uddeshya*
	SLO-2	*Kahani Ka Parichay*	*Lekhika Parichay*	*Lekhika Parichay*	*Rangmanch Ka Parichay*	*Anuvad Ka Prayojan*
S-5	*SLO-1*	*Visleshan*	*Path Ka Vishleshan*	*Path Ka Mahatva*	*Natak Ka Mahatva*	*Anuvad Ka Prayog*
	SLO-2	*Emandari Ka Mahatva*	*Guru Shishya Ka Sambandh*	*VipritParishthitiyon Me Jeevan Ki Ash*	*Prayojan*	*Shrot Bhasha Ka Gyan*
S-6	*SLO-1*	*Honhari Ka Parichay*	*Guru KePratiSmarpan Bhavana*	*Manav Ki Akankshayen*	*AndherNagri-(Natak) BhartenduHarishchand*	*LakshyaBhasha Ka Gyan*

	SLO-2	*Uddeshya*	*Path Ka Mahatva*	*Shangharshil Jeevan*	*LekhakParichay*	*Anuvad Ka Dayitva*
S-7	*SLO-1*	*Malbe Ka Malik- Mohan Rakesh*	*Thele Par Himalay (Yatravitrant)*	*Sangharsh Ka Parinam*	*Natak Ka Visleshan*	*Anuvad Ka Abhyash*
	SLO-2	*Lekhak Parichay*	*LekhakParichay*	*Bholaram Ka Jeev-(Vyangya) Harishankar Parshai*	*NatakAbhinay*	*Angreji Se Hindi*
S-8	*SLO-1*	*Batware Ka Yatharth Varnan*	*Yatravitrant Ka Mahatva*	*Vyangya Ki Avadharna*	*Lalch Ka Dushparinam*	*Hindi Se Angreji*
	SLO-2	*TatkalinParishthiti Ka Varnan*	*Yatra Ka YatharthChitran*	*Mahatva*	*Shishya Ki Agyanta*	*AnuvadPriyojnaKarya*
S-9	*SLO-1*	*ApniMitti Se Lagav*	*Path Ka Visleshan*	*LekhakParichay*	*Guru ShishyaSambandh*	*Punrikshan*
	SLO-2	*RajnitikVidwesh Ka Parinam*	*Himalay Ka Varnana*	*Path Ka Vihleshan*	*HashyaVyangy Se Avagat Karana*	*VividhPrayog*
S-10	*SLO-1*	*Propkar Ki Bhavana*	*Himalay Ka Lok Jeevan*	*Madhyavargi Parivar Ki Sthiti*	*Durdrishtihin*	*ParibhashikShabdavali*
	SLO-2	*Kahani Path*	*LokSamasya*	*Sarkari Tantra Ka KhokhlaRup*	*Mahattakankshi Ka Dushparinam*	*AtiMahtvapurnShabd*
S-11	*SLO-1*	*Kahani Ka Vishleshan*	*Uddeshya*	*PauranikKatha Ka Chitran*	*Guru Ki Avagya Ka Dushparinam*	*TakanikiShabdavali Ka Mhatva*
	SLO-2	*Prasho Ki Charcha*	*PrashnaAbhyash*	*Sanvedanshil Bhavana*	*TatkalinSamajikVyavastha Ki Charcha*	*Hindi Se AngreziShabd*
S-12	*SLO-1*	*PrashnAbhyash*	*Path Pricharcha*	*Paricharcha*	*Paricharcha*	*Angrezi Se Hindi Shabd*
	SLO-2	*Kahani Ka Uddeshya*	*MahatvapurnBibduon Ki Charcha*	*PrashanaAbhyash*	*Prashnabhyash*	*Shabdavali Ki Avshyakta*

Learning Resources	***Edited Book: ""SAMANYA HINDI", SRIJONLOK PUBLICATION, 2023, New Delhi.*** 1. KABIR – HAZARI PRASAD DWEDI 2. SURDAS – RAM CHANDRA SHUKL 3. BHAKTI ANDOLAN AUR SURDAS KA KAVYA – MANAGER PANDEY 4. BIHARI – VISHVNATH PRASAD MISHR ***5.*** AadhunikVigyapan aur Jansampark – Taresh Bhatia

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Shri. Santosh Kumar *Editor : Srijanlok Magazine* *Place: Vashishth Nagar, Ara – 802301*	*1. Prof.(Dr.) S.Narayan Raju, Head, Department of Hindi,CUTN, Tamilnadu*	*1. Dr.S Preeti. Associate Professor & Head, SRMIST*
		2. Dr. Md.S. Islam Assistant Professor, SRMIST
		3.Dr. S. Razia Begum, Assistant Professor, SRM IST
		4, Dr.NishaMurlidharan Assistant Professor, VDP,SRM IST

Course Code	ULF23G01J	Course Name	French-I	Course Category	G	Generic Elective Course	L	T	P	O	C
							2	0	2	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*French*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning
CLR-1 :	*Extend and expand their savoir-faire through the acquisition of current scenario*	
CLR-2 :	Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French	
CLR-3 :	Make them learn the basic rules of French Grammar.	
CLR-4 :	Develop strategies of comprehension of texts of different origin	
CLR-5 :	Strengthen the language of the students both in oral and written	

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*To acquire knowledge about French language*	2	75	80
CLO-2 :	*To strengthen the knowledge on concept, culture, civilization and translation of French*	2	80	90
CLO-3 :	*To develop content using the features in French language*	2	85	75
CLO-4 :	*To interpret the French language into other language*	2	75	80
CLO-5 :	*To improve the communication, intercultural elements in French language*	2	80	75

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	CommunicationSkills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*L*	*M*	*M*	*H*	*L*	-	-	-
CLO-2 :	*M*	*H*	*L*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*H*	*M*	-	-	-
CLO-3 :	*H*	*H*	*L*	*M*	*H*	*M*	*L*	*H*	*M*	*M*	*H*	*H*	-	-	-
CLO-4 :	*H*	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	*M*	*L*	-	-	-
CLO-5 :	*M*	*H*	*H*	*L*	*M*	*M*	*H*	*H*	*M*	*L*	*H*	*M*	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Contacts	Les verbes du premier groupe	Qu'est-ce qu'ils font ?	Portraits	Les verbes du deuxième groupe –
	SLO-2	Emma la championne	Les exemples	Les exemples	Un casting	Les exemples
S-2	SLO-1	Les nombres à partir de 31	La liaison	Où est mon sac	Les exemples	Les pronoms personnels toniques
	SLO-2	Les activités	Les activités	Les exemples	Les activités	Les exemples
S-3	SLO-1	Les pays	Entrer en contact	Quelques objets	Le Petit Spirou	Les verbes faire et lire
	SLO-2	les nationalités	Les activités	Les exemples	Les activités	Les exemples
S-4	SLO-1	Les jours de la semaine	Présenter et se présenter	Les professions	L'aspect physique	*Les Sons*
	SLO-2	Les jours	Les activités	La fiche d'identité	Les activités	Les exemples
S-5	SLO-1	Les mois de l'année	Demander et dire la date	La formation du féminin (2)	Le caractère	*Décrire l'aspect physique*
	SLO-2	Les activités	Les activités	La phrase interrogative partielle	Les exemples	*Décrire le caractère*
S-6	SLO-1	Les animaux domestiques	une rencontre.	*Qu'est-ce que c'est ?*	les états d'âme	*Demander et dire l'heure*
	SLO-2	Les activités	Les activités	*Qui est-ce ?*	Les activités	Les exemples

S-7	**SLO-1**	La famille (1)	Contacts	*C'est / Il est (1)*	Les prépositions de lieu (1)	*Elle est comment ?*
	SLO-2	Les activités	Les activités	**Les exemples**	Les exemples	Les exemples
S-8	**SLO-1**	La formation du féminin (1)	Emma la Championne	La phrase négative (1)	La famille (2)	*Portraits*
	SLO-2	Les activités	Les activités	Les exemples	Les activités	Les exemples
S-9	**SLO-1**	Les adjectifs possessifs	Mots et expressions	Les verbes aller et venir	La formation du féminin	*Mots et Expressions*
	SLO-2	Les exemples	Les activités	L'élision	Les activités	Les activités
S-10	**SLO-1**	La phrase interrogative	Grammaire -	Les formules de politesse	La formation du pluriel (2)	*Grammaire.*
	SLO-2	Les exemples	**Les** exemples	Demander des informations personnelles	Les activités	Les exemples
S-11	**SLO-1**	Les activités	Communication	C'est qui ?	*Il y a*	Les activités
	SLO-2	Les nombres	Les activités	Qu'est-ce qu'ils font ?	Les activités	*Communication*
S-12	**SLO-1**	intonation et *est-ce que*	*Les verbes du ER –groupe*	Mots et Expressions	Les articles contractés	Les activités
	SLO-2	Les exemples	Les exemples	Grammaire – Communication	Les exemples	Les exemples

Learning Resources	***Theory:*** ***1.*** "**' Nouvelle Génération-AI"** Méthode de français, Marie-Noëlle COCTON, P.DAUDA, L.GIACHINO, C.BARACCO, Les éditions Didier, Paris, 2018. ***2.*** ***Cahier d'activités avec deux discs compacts.*** ***3.*** *https://www.fluentu.com/blog/french/french-grammar* ***4.*** *https://www.elearningfrench.com/learn-french-grammar-online-free.html* ***5.*** *https://www.lawlessfrench.com/grammar* ***6.*** *https://blog.gymglish.com/2022/12/15/basic-french-grammar*

Learning Assessment											
	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
Level 2	Apply Analyze	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
Level 3	Evaluate Create	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Expert from Higher Technical Institutions**	**Internal Experts**
1. Mr. KavaskarDanasegarane *Process Expert* *Maersk Global Service Center Pvt. Ltd*	*1. Dr. C.Thirumurugan Professor, Department of French, Pondicherry University*	*1. Mr. Kumaravel K. Assistant Professor & Head, SRMIST, KTR*
2.Mr. Sharath Raam Prasad *Character Designer,Animaker Company Pvt.*		*2. Mrs. Abigail, Assistant Professor, SRMIST, VDP*

Course Code	ULE23AE1T	Course Name	English	Course Category	AE	Ability Enhancement course	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Department of English, FSH, SRMIST	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Develop an understanding and sensibility of human consciousness through gender inclusive curriculum			
CLR-2 :	Enhance the abilities of deeper understanding to stay with integrity with the fellow human beings			
CLR-3 :	Develop the overall language competency of the learner			
CLR-4 :	Develop proficient language skills			
CLR-5 :	Learn to express the thoughts clearly, develop logical arguments and enhance the overall communication skills.			
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	Analyze different literary texts to identify the representation of issues related to gender, and class	2	75	60
CLO-2 :	Apply critical thinking skills to analyze and respond to academic texts.	2	80	70
CLO-3 :	Critically evaluate and discuss contemporary issues through online articles.	2	70	65
CLO-4 :	Refine their general writing skills	2	70	70
CLO-5 :	Improve their language application skills	2	80	70

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	M	M	L	-	M	-	M	H	L	H	L	-	-	-
M	H	L	-	-	-	-	M	M	H	H	M	-	-	-
M	M	M	-	L	L	-	H	M	H	H	L	-	-	-
H	M	L	-	M	H	-	-	-	-	H	L	-	-	-
H	H	-	M	-	M	-	L	L	M	H	M	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to the poetry and the poet- Sukirtharani	Introduction to Short stories. Introducing the short story writer Katherine Mansfield.	Introduction to Creative Writing. Explaining the elements of creative writing.	Building the discourse- The significance of conversation and the key elements of discourse are the points of discussion in this class hour.	Reflecting the learning. -Review writing
	SLO- 2	Reading and recitation of the poem -Debt	Reading the story- The Doll's House	Stand-up comedy show -translate the audio content in English. (any regional language)	Art of conversation in digital and verbal discourse- Lee Mockobe's A Powerful Poem of what it means to be a Transgender. TEDX TALK- POEM RECITATION	Choosing the subject for reviewing.
S-2	SLO-1	Analysis and Critical interpretation of the poem.	Explaining the story through depiction of characters and	Students- groups -Students belonging to	Reflecting on the style and the tone of the	Planning to choose.

			representation of injustices.	*States other than Tamilnadu*	*poem.*	
	SLO- 2	*Introduction to the poet Kalki Subramaniyam.*	*Analysis and critical interpretation of the short story Doll's House.*	*Practice the writing activity -creative ways of engaging in translation.*	*Practicing conversation*	*Understand the review process how effectively a review of any work can be done.*
S-3 – S-4	***SLO-1***	*Reading and recitation of the poem Phallus I cut.*	*Introduction to the writer Haruki Murakami.*	*Correction of errors- attempting to translate.*	*Introducing Content writing in Social Media- the importance of content writing.*	*Introducing the students to the review of the various works.*
	SLO- 2	*Analysis and Critical interpretation of the poem.*	*Reading the Confessions of a Shinawaga monkey.*	*Identifying equivalent terms to certain regional words - learn the art of translation.*	*.BLOG WRITING - Subtleties Of Workplace Inclusion: Mental Health And Queer Community- Salik Ansari.* .	*Reviewing -recorded -posted in the social media pages of SRMIST*
S-5	***SLO-1***	*Introduction to the poet Imtiaz Dharker*	*Discussion and analysis of the Confessions of a Shinawaga monkey.*	*Introducing famous art works and the contexts of creation.* *Salvador Dali- The Face of War* *Pablo Picasso- Guernica* *Edward Munch- The Scream* *Pieter Bruegel- The Tower of Babel*	*writer's conversation with the readers - the blog in other blog articles..*	*Thoughtful conversation with your team member post the same in the official social media page of SRMIST.*
	SLO- 2	*Reading and reciting the poem Purdah 1*	*Introduction to Crystal Wilkinson*	*creative and/ or thoughtful writing - contemporary themes of modern day relevance*	*Practice blog writing*	*Choosing the team based on the abilities that are comfortable to match the peer members*
S-6	***SLO-1***	*Analysis and Critical interpretation of the poem- Purdah 1*	*Reading Endangered Species: Case 47401.*	*Students -writing abilities- building stories- a visual treat of variety of pictures.*	*Apprehending Life by reading the texts of influence- Chimamanda Ngozi Adiche's Notes on Grief- A BRIEF NOTE, We should all be Feminists- An Essay.*	*Choosing the topics for a thoughtful conversation*
	SLO- 2	*Reading and reciting the poem Purdah 2*	*Discussion and analysis of Endangered Species: Case 47401.*	*Elements of writing*	*Discussion- essay by the author -subjective depiction of life.* *Understand -subjective opinions - perspectives -*	*Planning and preparation for the script of conversation with a team member*
S-7 – S-8	***SLO-1***	*Analysis and Critical interpretation of the poem- Purdah 2*	*Introduction to C.S Lakshmi also known as Ambai.*	*Incorporate the elements of story in story writing.*	*Class discussion*	*Drafting , editing and revising the script of conversation and enacting the conversation with the team members*
	SLO- 2	*Introduction to the poet Arundathi Subramanian*	*Reading the short story- In a Forest, A Deer.*	*Practice -write stories -pictures given or shown .*	*Practising the task multiple times with all the students in the classroom.*	*Enactment -proper rehearsal -final performance - conversation- whole performance should be recorded.*

S-9	**SLO-1**	*Reading and reciting the poem- Home*	*Discussion and Analysis of In a Forest, A Deer.*	*A writing task to write a script is introduced in the classroom.*	*Interposing opinions in famous interviews-*	*The recording should be posted in the official media page and social handles of SRMIST.*
	SLO- 2	*Analysis and Critical interpretation of the poem- Home*	*Retrospecting the writing styles of the authors- Katherine Mansfield, Haruki Murakami, Crystal Wilkinson and Ambai.*	*creative scripts inspiring from the dialogues of their favourite films by changing the scenario to their own wish according to their own whims and fancies.*	*Interposing opinions in famous interviews- FII Interviews: Tasveer Co-Founder And Filmmaker Rita Meher On The Seattle Legislation, Minority Rights And The Fight Against Oppression- INTERVIEW*	*work for this social post - reflect on their experience of learning communicative English course and the testimonial has to be recorded and posted in the social media pages of SRMIST..*
S-10	**SLO-1**	*Recollection of study of the writing styles and intentions of the poets prescribed in the syllabus.*	*Revision- The Doll's House*	*Creative writing -writing news reports. recreated with new characters, places, scenes, incidents.*	*Students -enact as interviewer and interviewee and practice building the discourse.*	*Involving the students for the project work.* *Introducing what is project work and inculcating the interest -Giving instructions to do the project works -*
	SLO- 2	*Revision of the poems Debt and Phallus I cut*	*Revision- Confessions of a Shinawaga Monkey*	*Watch debate shows - summarising the arguments Enhance -descriptive writing skill.*	*Certain role plays like celebrity personalities, political personalities -conduct the interview and be the interviewer and interviewee.*	*Discussion of ideas and generation of creative ideas*
S 11 - S 12	**SLO-1**	*Revision of the poems Purdah 1 and 2*	*Revison- Endangered Species: Case 47401*	*Practice the* improvement *of writing skill.*	*The art of conversation and the ability to build a discourse*	*1. Assignment on any piece of creative writing (OR)* *2. Presentation- Mastering the art of Public Speaking. (OR)* *3. Project on compiling the real life influential events on gender inclusive issues and a presentation of the same. Interview Scripting /Blog writing.*
	SLO- 2	*Revision of the poem Hiome.*	*Revision- In a Forest, A Deer.*	*Repetitive practice and continuous assessment -writing skiills-master the writing skill.*	*The evaluation and assesment of the conversation -constructive feedbacks to the students.*	*Students can opt any of the project from the given choice.*

Learning Resources	1. *Horizon- English Text Book – Compiled and Edited by the faculty of English Departement, FSH, SRMIST, 2020* 2. *English Grammar in Use by Raymond Murphy* 3. *Raymond Murphy, Intermediate English Grammar, Cambridge University Press, 2007* 4. *R.P. Bhatnagar, English for Competitive Examinations, Trinity Press, 3rd Edition,2016* 5. *http://www.aptitudetests.org/verbal-reasoning-test* 6. *https://www.assessmentday.co.uk/aptitudetests_verbal.htm*

Learning Assessment											
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	50%	-
	Analyze										
Level 3	Evaluate	30 %	-	30%	-	30%	-	30 %	-	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
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Course Code	USA23101J	Course Name	*PROGRAMMING FOR PROBLEM SOLVING*	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): **The purpose of learning this course is to,**

		Learning
CLR-1 :	Introduction to programming language.	
CLR-2 :	Understanding basic element of programming language.	
CLR-3 :	Use and implement data structures like arrays and structures to obtain solutions.	
CLR-4 :	Customizing functions and procedures to encourage reusability	
CLR-5 :	Establish interaction between stored files and the application code	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Evaluation of programming language	2	85	80
CLO-2 :	Choose operators, control structures to solve the problem optimally	3	85	80
CLO-3 :	Analyze the problem thoroughly and choose the prebuilt functions/ customize functions to solve the problem	3	85	80
CLO-4 :	Able to use dynamic memory allocation concepts for problems that demand	3	85	80
CLO-5 :	Defend the need for files storage and the access privilege modes	3	85	80

Program Learning Outcomes (PLO)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	M	H	H	M	M	M	-	M	L	L	-	H	-	M	M
CLO-2 :	M	L	L	M	M	M	-	H	M	H	-	H	-	M	M
CLO-3 :	M	M	M	M	M	M	-	H	M	H	-	H	-	L	L
CLO-4 :	M	M	M	H	M	M	-	H	M	H	-	M	-	M	L
CLO-5 :	L	M	M	M	H	H	-	M	H	M	-	M	-	L	M

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Evolution of Programming Languages	Relational and logical Operators	Understanding contiguous memory allocation	Formal and Actual Parameters	File Types: text and binary, File operations: basics
	SLO-2	Problem solving through programming	Character and Numbers: Manipulation	Array : Advantages and Limitations	Functions: Returning values	File permissions and access privileges, Changing permissions
S-2	SLO-1	Writing algorithms/pseudo codes	Expressions with pre / post increment operator	String Basics	Advantages of using Functions	Writing contents to file , Reading file contents, Appending an existing file
	SLO-2	Drawing flowcharts	Expression with conditional and assignment operators	String Declaration and Initialization	Passing Array to Function	Difference: Append and write
S-3	SLO-1	Evolution of C language	Ternary operator	Understanding String Functions: gets(), puts(), getchar(), putchar(), printf()	Call by Value	Writing contents to file, Reading file contents
	SLO-2	Program structure	L value and Rvalue in expression	String Functions: atoi, strlen, strcat, strcmp	Call by Reference (An introduction on pointers shall be effective)	fscanf(),fprintf()
S 4-6	SLO-1	Lab 1: Algorithm, Flow Chart, Pseudo code	Lab 4: Operators and Expressions	Lab 7: Arrays : Multi dimensional	Lab 10: Functions	Lab 13: File: reading and writing
	SLO-2					
S-7	SLO-1	Need for file header files	Operator precedence	String Functions: sprint, sscanf, strrev, strcpy, strstr, strtok	Nested functions	fscanf(),fprintf(),fseek(),ftell(),
	SLO-2	Need for linkers and loaders	Type conversion	Need for tokenization	Functions: advantages and limitations	fputc(),
S-8	SLO-1	Input and output statements: scanf,printf	Control Statements : sequential, branching, looping and jump	Need for user-defined data types	Pointers and address operator	fgetc(),fputs(),fgets()
	SLO-2	Variables and identifiers	If, if ..else, else if ladder	Stuctures	sizeof Pointer Variable and Pointer Operator	fputw(),fgetw(),
S-9	SLO-1	Expressions	nested if, switch case	Unions	Pointer Declaration and dereferencing pointers	feof(), remove(),ferror()
	SLO-2	Single line and multiline comments	for loop	Accessing members of the structure	void Pointers and sizeof void Pointers	End_of_file in file handling
S 10-12	SLO-1	Lab 2: Input and Output Statements	Lab 5: Control Statements	Lab 8: Strings, structures and union	Lab 11: Pointers	Lab 14: File Handling fputw(),fgetw(), remove();
	SLO-2					
S-13	SLO-1	Constants, Keywords	while loop	Accessing members of the structure	Function and call by reference	Processor Directives
	SLO-2	Literals, Bitwise and sizeof operator	do while	Structure and arrays	Functions and Returning array(use of pointers)	Predefined macros and macros
S-14	SLO-1	Scope and lifetime of variables,Comma, Arrow and Assignmentoperator	goto, break, continue, exit: Jump statements	Structure and arrays	Structures and pointers :dynamic creation of data structures(list)	conditional compilation
	SLO-2	Storage clauses, Increment and decrement operator	Understanding jump statements with branch and iterative statements	Nested structures	Incrementing Pointers, Constant Pointers	Processor Directives
S-15	SLO-1	Data types classification:Basic,derived,user-definedArithmetic operators	Array Basic ,manipulating one dimensional arrays with indices, Array Declaration, Initialization Methods: sort, append, reverse,	Functions declaration and definition, Function prototypes, Defining and calling functions	Pointers and strings, Function Pointers, Array of Function Pointers	#pragma
	SLO-2	Numeric Data types: int, float, long, doubleNon-Numeric Data types: char and	traverse, Manipulating two dimensional arrays with indices, Problems: matrix manipulations	Prebuilt and user defined functions, Multiple functions, Recursion , recursive Functions, Scope of variables across functions	Null Pointers, Using sizeof(),malloc,calloc() File Handling, Open(),close()	, Creating include and macros
S 16-18	SLO-1	Lab 3: Data Types	Lab 6: Arrays – One Dimensional	Lab 9: Functions	Lab 12: Pointers	Lab 15: Creating Macros
	SLO-2					

Learning Resources	1. Zed A Shaw, (2015), "Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C)", Addison Wesley 2. W. Kernighan, Dennis M. Ritchie, (1996), "The C Programming Language", 2nd Edition. PrenticeHall of India	3. ebook: Bharat Kinariwala, TepDobry, Programming in C, 4. http://www.c4learn.com/learn-c-programming-language/

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	SABEEN S

Course Code	USA23102J	Course Name	DIGITAL LOGIC FUNDAMENTALS	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
CLR-1 :	*To learn the concepts of basics of Digital Logics*			
CLR-2 :	*To impart in-depth knowledge of Logic Gates*			
CLR-3 :	*Understand the principles of Boolean Algebra*			
CLR-4 :	*Basic knowledge of Combinational Circuits and it Applications*			
CLR-5 :	*Basic knowledge of sequential Circuits and it Applications*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*Have a thorough Understanding of the Fundamentals of Digital Logic and it Fundamentals*	*3*	*80*	*70*
CLO-2 :	*Understand the concepts of logic gates and its uses*	*3*	*85*	*75*
CLO-3 :	*Real time applications of Boolean Algebra*	*3*	*75*	*70*
CLO-4 :	*Design and implementation knowledge of CombinationalCircuits*	*3*	*85*	*80*
CLO-5 :	*Design and implementation knowledge of Sequential Circuits*	*3*	*85*	*75*

	Program Learning Outcomes (PLO)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	*H*	*M*	*H*	-	-	-	-	-	*H*	*H*	-	*L*	*M*	*M*	*M*
CLO-2 :	*H*	*M*	*H*	*M*	*H*	-	-	-	*M*	*M*	-	*L*	*M*	*M*	*M*
CLO-3 :	*M*	*H*	*H*	*M*	*H*	-	-	-	*M*	*M*	-	*L*	*M*	*M*	*M*
CLO-4 :	*M*	*H*	*H*	-	*H*	-	-	-	*M*	*M*	-	*L*	*M*	*M*	*M*
CLO-5 :	*M*	*H*	*H*	*M*	*H*	-	-	-	*M*	*M*	-	*L*	*M*	*M*	*M*

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Number System and its types	Minterms and Maxterms	Combinational Logic - Introduction	Sequential Circuit - Introduction	Counters - Introduction
	SLO-2	Base conversions	Sum of Products	Designing of a Logic Circuit Diagram	Latches	A Basic Design Counter
S-2	SLO-1	Binary codes and its types	Product of Sums methods	Adders : Quarter, Half and Full Adders	Flip Flops - Introduction	Classification of Counters
	SLO-2	Code conversions	Conversions of SOP to POS	Subtractors: Half, Full Subtractors	RS Flip Flop	Asynchronous Counters
S-3	SLO-1	Basics of Logic Gates and Derived Gates	Simplifying Boolean Expressions using theorems	Design of Adder Circuits	JK Flip Flop	Synchronous Counters
	SLO-2	Truth Tables	Derivation of a Boolean Functions	Design of Subtractor Circuits	D Flip Flop	Syn Vs Asyn Counters
S 4-6	SLO-1	Lab1 : Verification of Basic Gates and Derived Gates	Lab 4: Verifications of Distributive Law	Lab 7: Half Adder and Full Adder	Lab 10: Implementation of DeMultiplexer	Lab 13: Ring Counters
	SLO-2					
S-7	SLO-1	*Universality of NAND Gate*	*Karnaugh Map - Introduction and its uses*	*Multiplexer*	*T - Flip Flop*	*Ripple Counters*
	SLO-2	*Universality of NOR Gate*	*Types of K-Map*	*Implementation of a Boolean expression using a Multiplexer*	*Edge Triggered*	*MOD Counters*
S-8	SLO-1	*Duality of Logic Gate Representation*	*Rules for constructing K-Map*	*De Multiplexer*	*Master Slave Flip Flop*	*UP DOWN Counters*
	SLO-2	*Boolean Algebra - Introduction*	*Two and Three Variable K-Map*	*Encoder*	*Registers Architecture*	*Ring Counter*

S-9	**SLO-1**	*Logical Operations AND OR NOT*	*Four Variable K-Map*	*Decoder*	*Shift Registers*	*Shift Counters*
	SLO-2	*Hierarchy of Logic Circuits*	*Simplifying Boolean Expressions using K-Map*	*Decimal -to- BCD encoder*	*Register with parallel load*	*Decade*
S 10-12	**SLO-1**	Lab2:NAND as Universal Gate	Lab 5-Simplifying Boolean Expressions using theorems	Lab 8:Half Subtarctor and Full Subtractor	Lab 11: Implementation of Shift Registers and Serial Transfer	Lab 14: Implementation of DOWN Counter
	SLO-2	NOR as Universal Gate				
S-13	**SLO-1**	*Evaluating Logic Circuits*	*Don't Care conditions*	*Parity Generator*	*Four-bit Serial in Serial Out Shift register*	*Memory - Introduction*
	SLO-2	*Implementing Circuits from Boolean Expressions*	*Determination Prime Implicant Method*	*Parity Checker*	*Shift Registers Operations*	*Basic terms and ideas*
S-14	**SLO-1**	*Boolean Functions*	*Boolean Arithmetic - Introduction*	*Checksum*	*Serial-to-Parallel Shift Register*	*Magnetic Memories*
	SLO-2	*Duality Principle, Complements*	*Binary Addition*	*Code Conversions*	*Design of Serial to Parallel*	*Memory Addressing*
S-15	**SLO-1**	*Laws and Theorems*	*Binary Subtractions*	*Programmable Array Logic*	*Parallel-to-Serial Shift Register*	*Types of ROM*
	SLO-2	*Laws of Intersection, Union, Absorption, Involution, Demargan's Theorems*	*Various Representation of Binary Numbers*	*Programmable Logic Array*	*Design of Parallel to serial*	*Types of RAM*
S 16-18	**SLO-1**	*Lab 3:Laws of Boolean Expressions*	*Lab 6: Implementation fo Binary Addition and Subtraction*	*Lab 9: Implementation of Multiplexer*	*Lab 12: Four Bit Binary Shift Counters*	*Lab 15: Implementation of DOWN Counter*
	SLO-2					

Learning Resources	*1. AnanthiSheshasaayee, J.G. Sheshasaayee, Digital Logic Fundamentals, Margham Publications, 2005* *2. Vijayendran. V, (2003), "Digital Fundamentals", S.V. Publishers*	*3. Leach.D.P&Malvino.A.P, (2002), "Digital Principles and Applications", FifthEdition, TM.* *4. MorisMano.M,(2001),"Digital Logic and Computer Design", Forth Edition,*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	***MR.M.RAMESH***

Course Code	UMS23101T	Course Name	DISCRETE MATHEMATICAL STRUCTURES	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics and Statistics	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To provide a strong foundations in discrete mathematics			
CLR-2 :	To apply mathematical techniques for solving real life problems			
CLR-3 :	Apply Boolean algebra, truth table, logic gates, in computer science and communication.			
CLR-4 :	To enable the use of logical, graphical and algebraic techniques wherever relevant.			
CLR-5 :	Understanding of computer science through the applications of Discrete Mathematics			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	Program Learning Outcomes (PLO)														
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Problem solving in sets and relations. Gaining knowledge, solving the simple problems using elementary concepts.	3	85	80	L	M	H	H	M	M	M	M	L	L	H	-M	L	L	L
CLO-2 :	*Understand the concepts of* Graphs terminology Sub graphs, Acyclic, Euler path, Hamiltonian Path	3	80	75	H	H	M	M	H	M	M	M	L	L	L	-M	L	L	L
CLO-3 :	Logical knowledge through the Statements, connectives, arguments, validity of arguments and Normal forms using truth tables	3	85	80	H	H	L	M	M	M	M	M	L	L	H	-M	L	L	L
CLO-4 :	Gain the knowledge about Trees , Labeled Trees, Binary trees ,Rooted Trees , Spanning Trees Minimal Spanning Trees	3	85	80	M	H	H	M	L	M	M	M	L	L	H	-M	L	L	L
CLO-5 :	Apply the concepts of Boolean Algebra in real world problems related to Computer Science	3	85	80	L	H	H	M	M	M	M	M	L	L	H	-M	L	L	L

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Introduction to Sets – simple examples.*	*Logic*	*Graphs and Their Representation-*	*Trees*	*Sets concepts*
	SLO-2	*Properties of setsTypes of sets*	*Basic explanation*	*Basic Graph terminology*	*Basic Definitions*	*Partition of a set*
S-2	SLO-1	*Venn diagram.*	*Statements- simple compound*	*Simple Problems*	*Basic properties of Trees*	*Relation concepts*
	SLO-2	***Problems using Venn diagrams***	*Symbolic representation*	*Drawings of Graphs*	*properties of Trees*	*matrix representation of relation*
S-3	SLO-1	*Relation definitions*	*Connectives explanation .*	*Special Families of Graphs*	*Labeled Trees*	*Simple problems*
	SLO-2	***Problems on Relations***	*conjunction, disjunction, negation*	*Simple Problems*	*Labeled Trees*	*Hasse diagrams for partial*
S 4	SLO-1	*Types of relation*	*Simple problems*	*Incidence graphs*	*Problems based on the*	*More problems using Hasse diagrams*

					concepts	
	SLO-2	*Problems on relations*	*Problems using Truth Tables*	*Simple Problems*	*Undirected Trees*	*Lattices as posets*
S-5	SLO-1	*Equivalence relation-basic explanation*	*Tautology, contradiction*	*Adjacency Matrices*	*Simple Problems*	*Problems on Lattices as posets*
	SLO-2	*Simple problems*	*Problems using Truth tables*	*Problems using*	*Binary trees*	*Definition of Lattices-*
S 6	SLO-1	*Reflexive basic explanation*	*logical equivalence,*	*vertex Degrees matrices*	*Rooted Trees and Branches*	*Properties of Lattices*
	SLO-2	*Simple problems*	*Simple truth table problems*	*Isomorphism of Graphs*	*Rooted Trees and Branches*	*Introduction to Boolean Algebra- basic definitions.*
S-7	SLO-1	*Symmetric, Transitive basic explanation*	*Tautological implications*	*Simple Problems*	*Spanning Trees*	*Axiomatic definition of boolean Algebra, logic gates.*
	SLO-2	*Simple problems*	*Simple problems*	*Sub graphs*	*Simple problems*	*Postulates of Boolean algebra.*
S -8	SLO-1	*Function*	*Arguments- validity of arguments*	*Acyclic Graphs*	*Spanning Trees*	*Postulates of Boolean algebra.*
	SLO-2	*Comparison of Relation and functions*	*Simple problems*	*Simple Problems*	*Simple problems*	*Problems using the postulates of BooleanAlgebra*
S -9	SLO-1	*Types of functions*	*Normal forms*	*Digraphs*	*Minimal Spanning Trees*	*Problems using the basic concepts*
	SLO-2	*Simple problems*	*Minterms and maxterms*	*Problems using Graphs*	*Simple Problems*	*Properties of Boolean algebra*
S-10	SLO-1	*One- one, injective, surjective, one to many, many to one functions with example*	*Maxterms with examples*	*Euler path and circuits*	*Problems based on Minimal Spanning Trees*	*Simple Boolean algebra problems*
	SLO-2	*Simple problems*	*Problems using Truth tables*	*Eulerian cycles*	*Kruskal's Algorithm*	*Expression of a Boolean function By Truth table method.*
S-11	SLO-1	*composite of two functions*	*Principal disjunctive normal form*	*Euler path and Circuits*	*Rooted Tree*	*Boolean function in canonical form by Truth table method.*
	SLO-2	*composite of two functionsSimple problems*	*Problems using Truth tables*	*Hamiltonian Path and Circuits.*	*binary Treeand Simple Problems*	*DNF by Truth table method*
S-12	SLO-1	*composite of three functions*	*Principal conjunctive normal form*	*Problems using Hamiltonian Path*	*Expression of Trees*	*CNF by Truth table method*
	SLO-2	*Simple problems*	*Problems using Truth tables*	*Simple Problems*	*Simple Problems*	*Simple problems*

Learning Resources	*Theory:* *1.Discrete Mathematics with Graph Theory and Combinatorics by T.Veerajan, McGraw Hill Education(India) Pvt Limited, 2007* *2.Dr. A. Singaravelu, Allied Mathematics, 7th edition, A. R. Publications, 2015.*

	Learning Assessment										
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	-	30%	-	30%	-	30%	-	30%	-
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-

	Analyze										
Level 3	Evaluate Create	30%	-	30%	-	30%	-	30%	-	30%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers	
Experts from Academic	Internal Experts
1.Dr.V. Prakash, Dr. Ambedhkar Government Arts college, Chennai (AcademicExpert)	*1.Dr.L.Sivakami,SRMIST*
2.Dr.M.Vasantha,ICMR,Chennai(IndustrialExpert)	*2.Dr.S.Lakshmipriya,SRMIST*

Course Code	UCD23S01L	Course Name	Quantitative Aptitude and Logical Reasoning	Course Category	S	Skill Enhancement Course	L	T	P	0	C
							0	0	2	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Guidance Cell	Data Book / Codes/Standards	-		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	Demonstrate various principles involved in solving mathematical concepts	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Critically evaluate basic mathematical concepts related to profit, loss, interest calculations, average and interpret data			
CLR-3 :	Enable students to understand reasoning skills			
CLR-4 :	Use the basic mechanics of Grammar			
CLR-5 :	Acquire time management skills and expose students to the requirements of the job market			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	Understand the concepts of LCM, HCF, ratio and proportions, percentages and approach questions in a simpler and innovative method	3	80	70
CLO-2 :	Develop, solve, analyze, and use simple mathematical models that are relevant to daily life.	3	80	75
CLO-3 :	Solve problems on reasoning	3	85	70
CLO-4 :	Understand the different parts of speech and use them in sentences appropriately	3	85	80
CLO-5 :	Instill confidence in students and develop skills necessary to face the audience	3	85	75

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behaviour	Life Long Learning
H	M	-	M	-	M	-	H	M	H	-	M	-	-	-
H	M	-	M	L	M	-	H	M	H	-	M	-	-	-
-	M	-	-	-	M	M	H	-	H	-	H	-	-	-
H	-	-	-	-	-	M	M	-	-	-	H	H	-	M
-	-	M	-	-	M	-	-	M	-	H	M	-	H	H

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Speed Maths and Simplification	Profit and Loss-Introduction	Number Series	Most Logical Choice	Self-Introduction - Introduction
	SLO-2	Simplification Techniques and Tricks	Profit and Loss- Basic Problems	Number Series – Solving Problems	Most Logical Choice – solving problems	Self-Introduction - Session 1
S-2	SLO-1	Divisibility	Simple Interest-Introduction, Formulas &Problems	Word Series	Logical Order	Self-Introduction - Session 2
	SLO-2	Power cycle, Reminder cycle	Compound Interest-Introduction, Formulas &Problems	Word Series – Solving Problems	Logical Order – tips and tricks	Self-Introduction - Session 3
S-3	SLO-1	Problems On H.C.F and L.C.M	Averages-Introduction& Basics	Odd man out	Synonyms	Self-Introduction - Session 4
	SLO-2	Problems On H.C.F and L.C.M Solving problems	Averages-Tricky Problems	Missing number and wrong number	Antonyms	Self-Introduction - Session 5
S-4	SLO-1	Linear and Simultaneous Equation	Algebra –Introduction	Image Based Problems- Introduction	Essential Part	Self-Introduction - Session 6
	SLO-2	Linear and Simultaneous Equation – solving problems	Algebraic Expressions Concepts	Image Based Solving Problems	Parts of Speech - Worksheets	Self-Introduction - Session 7
S-5	SLO-1	Ratio and Proportions-Introduction	Data Interpretation – Bar chart, Pie	Inequalities	Spotting Error	Basics of Written Communication

			Chart			
	SLO-2	*Ratio and Proportions-Basics Problems*	*Data Interpretation – Table, Line Graph*	*Inequalities - methods*	*Spotting Error –Concord, Prepositional usage, Usage of Articles*	*Basics of Written Communication Methods*
S-6	***SLO-1***	*Percentage -Introduction*	*Quadratic Equations*	*Coding – Decoding-Introduction*	*Sentence Correction – Vocabulary based*	*Time Management Skills*
	SLO-2	*Percentage- Basic problems*	*Quadratic Equations – Formulas and Methods*	*Coding – Decoding-Different types*	*Sentence Correction – Grammar Based*	*Time Management Skills - Activity*

Learning Resources	*1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill, 5th Edition* *2. Dr. Agarwal R.S, Quantitative Aptitude for Competitive Examinations, S. Chand and Company Limited, 2018 Edition* *3. Archana Ram, Place Mentor: Tests of Aptitude for Placement Readiness, Oxford University Press, Oxford, 2018*	*4. Edgar Thrope, Test of Reasoning for Competitive Examinations, Tata McGraw Hill, 6th Edition* *5. Singh O.P., Art of Effective Communication in Group Discussion and Interview, S Chand & Company, 2014* *6. Bhatnagar R P, English for Competitive Examinations, Trinity Press, 2016*

Learning Assessment

Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**			
		CLA – 1 (20%)	**CLA – 2 (20%)**	**CLA – 3 (30%)**	**CLA – 4 (30%)#**
		Practice	**Practice**	**Practice**	**Practice**
Level 1	Remember	30%	30%	30%	10%
	Understand				
Level 2	Apply	30%	30%	30%	50%
	Analyze				
Level 3	Evaluate	40%	40%	40%	40%
	Create				
	Total	100 %	**100%**	**100%**	**100%**

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Extempore, etc.
CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. M. Ponmurugan, Executive PMOSS, Cognizant Technology Solutions India Pvt. Limited, Chennai	*Dr. G. Saravana Prabu, Asst. Professor, Department of English, Amrita Vishwa Vidhyapeedam, Coimbatore*	*Dr. Sathish K, HOD, Department of Career Guidance Cell, FSH, SRMIST*
		Ms. Deepalakshmi S, Assistant Professor, Department of Career Guidance Cell, FSH, SRMIST

Course Code	UCD23V01T	Course Name	Universal Human Values	Course Category	V	Value Addition Course	L	T	P	0	C
							2	0	0	2	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Guidance Cell	Data Book / Codes/Standards	-		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	Help the students to understand need of value education, appreciate the essential complimentarily between 'values' and 'skills' and to ensure sustained happiness and prosperity which are the core aspirations of all human beings,	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Help students initiate a process of dialog within themselves to know what they really want to be' in their life and profession.			
CLR-3 :	Help students to understand the meaning of happiness and prosperity for a human being. Understanding holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.			
CLR-4 :	Help students on right understanding of the Human reality and the rest of existence, harmony at all the levels of human living, and live accordingly.			
CLR-5 :	Highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning		
		1	2	3
CLO-1 :	Evaluate the significance of value inputs in formal education and start applying them in their life and profession	3	80	70
CLO-2 :	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	3	80	75
CLO-3 :	Analyze the value of harmonious relationship based on trust and respect in their life and profession	3	85	70
CLO-4 :	Examine the role of a human being in ensuring harmony in society and nature.	3	85	80
CLO-5 :	Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.	3	85	75

		Program Learning Outcomes (PLO)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :		M	-	-	H	-	-	-	-	-	-	M	-	-	H	H
CLO-2 :		-	M	-	H	-	L	-	-	-	-	-	-	-	H	H
CLO-3 :		-	-	-	H	-	-	-	M	L	-	-	-	-	H	H
CLO-4 :		-	-	-	H	-	-	L	-	L	L	-	L	M	H	H
CLO-5 :				L	H	L	-	-	-	-	-	-	-	M	H	H

Duration (hour)		6	6	6	6	6
S-1	SLO	Right Understanding, Relationship and Physical Facility	Understanding Human being as the Co-existence of the Self and the Body	Harmony in the Family – the Basic Unit of Human Interaction	Understanding Harmony in the Nature	Natural Acceptance of Human Values
S-2	SLO	Understanding Value Education	Distinguishing between the Needs of the Self and the Body	Trust – the Foundational Value in Relationship	Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature	Definitiveness of (Ethical) Human Conduct
S-3	SLO	Self-exploration as the Process for Value Education	The Body as an Instrument of the Self	Respect – as the Right Evaluation	Exploring the Four Orders of Nature	A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
S-4	SLO	Continuous Happiness and Prosperity – the Basic Human Aspirations	Understanding Harmony in the Self	Other Feelings, Justice in Human-to-Human Relationship	Realizing Existence as Co-existence at All Levels	Competence in Professional Ethics

S-5	***SLO***	*Happiness and Prosperity – Current Scenario*	*Harmony of the Self with the Body*	*Understanding Harmony in the Society*	*The Holistic Perception of Harmony in Existence*	*Holistic Technologies, Production Systems and Management Models-Typical Case Studies*
S-6	***SLO***	*Method to Fulfill the Basic Human Aspirations*	*Programme to ensure self-regulation and Health*	*Vision for the Universal Human Order*	*Exploring Co-existence in Existence*	*Strategies for Transition towards Value-based Life and Profession*

Learning Resources	*1. Gaur R.R., Sangal R., Bagaria G.P., 2019 (2nd Revised Edition), A Foundation Course in Human Values and Professional Ethics, Excel Books, New Delhi.* *2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.*	*3. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.* *4. A N Tripathy, 2003, Human Values, New Age International Publishers.*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)			
		CLA – 1 (20%)	**CLA – 2 (20%)**	**CLA – 3 (30%)**	**CLA – 4 (30%)#**
		Theory	**Theory**	**Theory**	**Theory**
Level 1	Remember	30%	30%	30%	30%
	Understand				
Level 2	Apply	40%	40%	40%	40%
	Analyze				
Level 3	Evaluate	30%	30%	30%	30%
	Create				
	Total	100 %	**100%**	**100%**	**100%**

CLA-1, CLA-2 and CLA-3 can be from any combination of these: MCQ Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Extempore, etc.
CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
-	-	*Dr. Supraja P, UHV University Coordinator, SRMIST*
		Dr. Sathish K, HOD, Department of Career Guidance Cell, FSH, SRMIST
		Dr. Sweety Bakyarani E, Department of Computer Science, FSH, SRMIST

SEMESTER II

Course Code	ULT23G02J	Course Name	Tamil – II	Course Category	G	Generic Elective Course	L	T	P	O	C
							2	0	2	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Tamil	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	சங்க இலக்கியங்கள் வழி தொன்மை அக, புற வாழ்வியலை அறியச் செய்தல்
CLR-2 :	தமிழ்ச்சமூகத்தின் அறவியல் குறித்து தெரியச் செய்தல்
CLR-3 :	பக்தி இலக்கியங்கள் போதித்த மனித மாண்புகளை உணரச் செய்தல்
CLR-4 :	பண்டைத் தமிழ்ச்சமூகத்தின் தொல் இலக்கியங்கள் வளர்ச்சி பெற்ற வரலாற்றைப் புரியச் செய்தல்
CLR-5 :	சிறுகதைகள் சொல்லும் வாழ்வியல் நெறி, மொழியின் நுட்பங்கள் ஆகியவற்றைத் தெரியச் செய்தல்

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	PLO 1: Fundamental Knowledge	PLO 2: Application of Concepts	PLO 3: Link with Related Disciplines	PLO 4: Procedural Knowledge	PLO 5: Skills in Specialization	PLO 6: Ability to Utilize Knowledge	PLO 7: Skills in Modeling	PLO 8: Analyze, Interpret Data	PLO 9: Investigative Skills	PLO 10: Problem Solving Skills	PLO 11: CommunicationSkills	PLO 12: Analytical Skills	PSO 1	PSO 2	PSO 3
CLO-1 :	பண்டைத் தமிழ்ச் சமூகத்தின் அக, புற வாழ்வியல் இன்றைய சமூக மேம்பாட்டிற்கு வழிகாட்டி நிற்பதை அறிந்துகொள்ளுதல்	2	75	60	H	L	H	M	H	H	L	M	H	M	L	H	-	-	-
CLO-2 :	தமிழ்ச் சமூகம் அறத்தை வலியுறுத்திய சமூகம் என்பதன் வழி மானுட அறத்தைத் தெரிந்துகொள்ளுதல்	2	80	70	H	M	H	L	M	H	L	H	M	L	H	H	-	-	-
CLO-3 :	பக்தி இலக்கியம் மூலம் இறைத் தந்துவங்களை அறிந்து மானுட ஒற்றுமை மேம்பாட்டை அறிந்துகொள்ளுதல்	2	70	65	H	L	H	M	H	H	M	H	L	H	M	H	-	-	-
CLO-4 :	தொல் தமிழ்ச்சமூகம் இலக்கியம், அரசியல், அறம், பக்தி ஆகியவற்றில் தழைத்தோங்கியதைத் தெரிந்துகொள்ளுதல்	2	70	70	H	M	H	L	H	M	M	H	H	L	H	H	-	-	-
CLO-5 :	வாழ்வியலின் நெறிகளைச் சொல்லும் கதைகளைப் படைக்கும் திறனோடு மொழி ஆளுமையையும் அறிந்துகொள்ளுதல்	2	80	70	H	M	H	H	M	H	L	M	H	L	H	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	காலந்தோறும் தமிழ் அகத்திணை மரபு	சங்க மருவிய காலம்	பல்லவர் காலம்	பண்டைக்காலத் தமிழகம்	தமிழ்ச் சிறுகதைப் போக்குகள்
	SLO-2	அக இலக்கியத்தின் கட்டமைப்பு/	அறமும் வாழ்வியலும்	பல்லவர் கால இலக்கியங்கள்	சங்ககால மக்களின் வாழ்வியல்	தமிழ்ச் சிறுகதையும் தமிழ்ச் சமூக

		உள்ளடக்கம்				வாழ்வியலும்
S-2	**SLO-1**	எட்டுத்தொகை நூல்களும் பகுப்புமுறையும்	உலகப்பொதுமறை - திருக்குறள்	பக்தியும் தமிழும்	முச்சங்கம் – அறிமுகம்	புதுமைப்பித்தன் - சங்குத்தேவனின் தர்மம்
	SLO-2	ஐங்குறுநூறு *(375)*	திருக்குறளின் கட்டமைப்பு	பக்தி இலக்கியத் தோற்ற நிலை	முச்சங்க வரலாறு	கள்வனின் தர்மம்
S-3	**SLO-1**	உடன்போக்கும் நற்றாய் புலம்பலும்	திருக்குறள் வான்சிறப்பு *(2)*	சைவ சமய இலக்கியங்கள்	பத்துப்பாட்டும் எட்டுத் தொகையும்	ந.பிச்சமூர்த்தி – வேப்பமரம்
	SLO-2	ஐங்குறுநூறு *(391)*	மழையும் வாழ்வும்	சைவக்குரவர் நால்வர்	சங்க கால மக்களின் வாழ்வியல்	மரபும் நம்பிக்கைகளும்
S-4	**SLO-1**	உடன் போக்கும் தமிழர் பறவையியல் அறிவும்	திருக்குறள் – புலவி நுணுக்கம்	தேவாரம் – திருஞான சம்பந்தர் - பாடல் – *2834*	எட்டுத்தொகை நூல்களின் வரலாறு	தமிழருவி மணியன் – ஒற்றைச் சிறகு
	SLO-2	குறுந்தொகை *(02)*	ஊடலின் அழகியல்	தேவாரம் – திருநாவுக்கரசர் – பாடல் - *4262*	எட்டுத்தொகை நூல்களின் கட்டமைப்பு	உறவின் மேன்மை
S-5	**SLO-1**	இயற்கைப் புணர்ச்சியும் தலைவி நலம் பாராட்டலும்	நீதி இலக்கியங்கள்	திருவாசகம் அறிமுகம்	பத்துப்பாட்டு நூல்களின் வரலாறு	ஆர். சூடாமணி – மூடநம்பிக்கை
	SLO-2	குறுந்தொகை *(03)*	நாலடியார்	மாணிக்கவாசகர் பாடல் - ஆனந்த பரவசம் – பாடல் *10*	பத்துப்பாட்டும் தமிழர் வாழ்வியலும்	சமூகத்தில் மூடநம்பிக்கைகள்
S-6	**SLO-1**	தலைவனின் மேன்மைத் தன்மையும் இயற்கையும்	வைகலும் - பாடல் *(39)*	வைணவ சமயம்	பதினெண் கீழ்க்கணக்கு நூல்கள்	மூடநம்பிக்கைகளின் சிக்கல்கள்
	SLO-2	அகநானூறு *(238)*	நிலையாமையும் அறமும்	வைணவ சமய வளர்ச்சிப்போக்கு	பதினெண் கீழ்க்கணக்கும் தமிழர் அற மரபும்	கிருஷ்ணா டாவின்ஸி – காலா அருகே வாடா
S-7	**SLO-1**	இயற்கையும் அகவாழ்வுச் சித்திரிப்பும்	தமிழர் மருத்துவம்	நாலாயிரத் திவ்யப் பிரபந்தம்	நீதி இலக்கியங்கள்	மனித வாழ்வில் மருத்துவம்
	SLO-2	நள்ளியின் கொடைத்திறம்	நீதி இலக்கியத்தில் மருந்து நூல்கள்	குலசேகராழ்வார் பாடல் - *678*	நீதி இலக்கியங்களின் பன்முகத் தன்மைகள்	பாரம்பரிய மருத்துவம்
S-8	**SLO-1**	கலித்தொகைப் பாடல் –*(11)*	சிறுபஞ்சமூலம் *(64)*	ஆண்டாள் பாடல் – *574.*	காப்பிய இலக்கணம்	மொழிப்பயிற்சி
	SLO-2	அறம் பொருள் இன்பம் சிறப்பு	ஈகையின் சிறப்பு	திருமழிசை ஆழ்வார் பாடல் – கணிகண்ணன்	காப்பியத்தின் போக்குகள்	சொற்களை உருவாக்குதல்
S-9	**SLO-1**	சூழலியலும் மனித வாழ்வும்	பழமொழி நானூறு அறிமுகம்	தமிழில் இஸ்லாமிய இலக்கியங்கள்	காப்பியங்களின் வகைமை	எழுத்துகளில் இருந்து சொற்களைக் கண்டுபிடித்தல்
	SLO-2	தமிழர் புறமரபு	பழமொழி நானூறு – தனித்தன்மைகள்	இஸ்லாமிய இலக்கியங்களின் கொடை	ஐம்பெருங்காப்பியங் களின் தனித்தன்மைகள்	படம் பார்த்துக் கதை எழுதுதல்
S-10	**SLO-1**	புறநானூறு *(107)* பாரியும் மாரியும்	பழமொழி நானூறு *(184)*	சீறாப்புராணத்தின் அமைப்பு	தமிழ்ச் சமூகமும் சமயத் தத்துவங்களும்	படம் பார்த்துக் கவிதை எழுதுதல்
	SLO-2	புறநானூறு *(110)* பாரியின் வள்ளல் தன்மை	பழமொழியும் அறிவுரையும்	விடமீட்டப் படலம் *(10*	சமயத் தத்துவங்களும் வாழ்வியல் விழுமியங்களும்	கற்பனைத்திறன் – வளர்த்தல்

				பாடல்கள்)		
S-11	**SLO-1**	புறநானூறு *(112)* கையறுநிலை	பண்டைக்காலப் போரும் வாழ்வும்	கிறித்தவ சமய இலக்கியங்கள்	சைவத் திருமுறை – அறிமுகம்	கற்பனையும் படைப்பும்
	SLO-2	சிறுபாணாற்றுப்படை *(84-115)*	புற இலக்கியங்கள்	கிறித்தவ இலக்கியங்களின் தமிழ்க் கொடை	பன்னிரு திருமுறை – வரலாறு	தமிழில் வாசகம்
S-12	**SLO-1**	கடையெழு வள்ளல்களின் சிறப்புகள்	களவழி நாற்பது *(40)*	கிறித்துவின் அருள்வேட்டல் – திரு.வி.க	நாலாயிரத் திவ்வியப் பிரபந்தம் – அறிமுகம்	விளம்பரத்திற்கு வாசகம் எழுதுதல்
	SLO-2	பட்டினப்பாலை *(40-50)* அட்டில் சாலைகளின் நிலை	போர்க்களமும் யானைப்படையும்	அலகிலொளி – *5* பாடல்கள்	வைணவ ஆழ்வார்கள் வரலாறு	வாசகம் எழுது முறைகள்

Learning Resources	1. *கொன்றை, தொகுப்பும் பதிப்பும் - தமிழ்த்துறை ஆசிரியர்கள், தமிழ்த்துறை, எஸ்.ஆர்.எம். அறிவியல் மற்றும் தொழில்நுட்பக் கல்விநிறுவனம், காட்டாங்குளத்தூர்*, 603203, 2023 2. *தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை*, 2017 3. *மு. அருணாசலம், தமிழ் இலக்கிய வரலாறு, நூற்றாண்டு முறை* (9*ஆம் நூ. முதல்* 16 *வரை*), *தி பார்க்கர், சென்னை*, 2005 4. *தமிழ் இணையக் கல்விக்கழகம்* - http://www.tamilvu.org/ 5. *மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம்* - https://www.projectmadurai.org/

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
Level 2	Apply Analyze	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
Level 3	Evaluate Create	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
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		2. Dr. R. Ravi, Assistant Professor and Head, Dept. of Tamil, FSH, SRMIST, VDP.
		3. Mr. G. Ganesh, Assistant Professor,

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	4. Dr.T.R.HebzibahbeulahSuganthi, *Assistant Professor, Dept. of Tamil,* *FSH, SRMIST, KTR.*
	5. Dr.S.Saraswathy, Assistant Professor, *Dept. of Tamil, FSH, SRMIST, KTR.*

Course Code	ULH23G02J	Course Name	HINDI-II	Course Category	G	Generic Elective Course	L	T	P	O	C
							2	0	2	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*HINDI*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning
CLR-1 :	*They get to learn Ancient ,Medieval,and Modern poetry*	
CLR-2 :	*To understand the Significance of poems of great poets like Kabir,Tulsidas,Bihari and Dhananand*	
CLR-3 :	*To Enhance and Enrich their knoeledge through poetry*	
CLR-4 :	*Media based understanding for employability*	
CLR-5 :	*Job Oriented writing skills*	

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 Expected Attainment (%)
CLO-1 :	*To provide a brief Introduction of Hindi poetry(Bhaktikal,Reetikal and Aadhunikkal)*	2	75	80
CLO-2 :	*To Discuss the origin and development of various forms of poetry in Hindi*	2	80	90
CLO-3 :	*Focus on Evaluating the social changes through poetry*	2	75	95
CLO-4 :	*To Examine Transcreation in advertisement*	2	80	90
CLO-5 :	*To guide the students in the learning of the technical aspect of the Hindi Languge,this would help them in the field administration*	2	85	90

Program Learning Outcomes (PLO)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 CommunicationSkills	12 Analytical Skills	13 PSO -1	14 PSO -2	15 PSO-3
CLO-1 :	*H*	*H*	*H*	*M*	*L*	*H*	*L*	*M*	*L*	*L*	*H*	*M*	-	-	-
CLO-2 :	*H*	*H*	*H*	*M*	*L*	*H*	*H*	*M*	*L*	*L*	*H*	*M*	-	-	-
CLO-3 :	*H*	*H*	*M*	*L*	*H*	*H*	*M*	*H*	*M*	*M*	*H*	*H*	-	-	-
CLO-4 :	*H*	*H*	*L*	*H*	*M*	*H*	*L*	*H*	*H*	*M*	*H*	*H*	-	-	-
CLO-5 :	*M*	*H*	*M*	*H*	*L*	*H*	*H*	*L*	*H*	*M*	*H*	*H*	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*BHAKTI* KALIN KAVITA	RITI *KALIN* KAVITA	*ADHUNIK KAVITA*	*VIGYAPAN*	PATRA *LEKHAN&PARIBHASHIK* SHABDAVALI
	SLO-2	*BHAKTIU KALIN KAITA KI AVADHARNA*	*AVADHARNA*	*AVADHARNA*	*AWADHARNA*	*AVADHARNA*
S-2	SLO-1	*SWARUP*	*SWARUP*	*SWARUP*	*ARTH*	*ARTH*
	SLO-2	*MAHATVA*	*RITI KAL VIBHAJAN*	*MAHATVA*	*PARIBHASHA*	*SWARUP*
S-3	SLO-1	*UDDESHYA*	*MAHATVA*	*UDDESHYA*	*SWARUP*	*PARIBHASHA*
	SLO-2	*BHAKTIKAL KI PRASANGIKTA*	*UDDESHYA*	*MATHLI SHARAN GUPT- NAR HO NA NIRASH KARO MAN KO*	*VIGYAPAN KE PRAKAR*	*PRAYOJAN*
S-4	SLO-1	*DOHE- KABIRDAS*	*DOHE- BIHARI*	*KAVI PARICHAYA*	*VIGYAPAN KI VISHESHTAYEN*	*PRAYOG*
	SLO-2	*SANT PARICHAY*	*KAVI PARICHAYA*	*KAVITA KA VISLESHAN*	*VIGYAPAN MANG*	*MAHATVA*
S-5	SLO-1	*DOHE KA VISLESHAN*	*DOHE KA VISLESHAN*	*ASHAVADI DRISHTIKON*	*VIGYAPAN KA PRABHAV*	*PATRALEKHAN KALA*

	SLO-2	*GURU KA MAHATVA*	*KANAK KA MAHATVA*	*SANGHARSH KI AOR PRERNA*	*VIGYAPAN MAHATVA*	*PRAKAR*
S-6	SLO-1	*GURUTVA SE ISHVARATVA KI AOR*	*VIPRIT SWABHAV KI CHARCHA*	*SURYAKANT TRIPATHI NIRALA- VAR DE*	*VIGYAPAN KI BHASHA*	*VYAKTIGAT PATRA*
	SLO-2	*GURUTVA SE ISHVARATVA KI AOR*	*PRAKRITI KA ATAL RUP*	*KAVI PARICHAYA*	*VIGYAPAN AUR BAZAR*	*AUPCHARIK PATRA*
S-7	SLO-1	*BAHYA ADAMBAR KA VIRODH*	*YAMAK ALANKAR KA PRAYOG*	*KAVITA KA VISLESHAN*	*VIGYAPAN AUR ROZGAR*	*SARKARI PATRA*
	SLO-2	*MURTI POOJA KA VIRODH*	*SNEH KE MAHATVA KI CHARCHA*	*SARSHWATI KE PATRI SAMARPAN*	*PRINT VIGYAPAN*	*ARDHA SARKARI PATRA*
S-8	SLO-1	*GHARELU VASHTUON KI UPYOGITA*	*BIHARI KI KAVYA SHAILI KA MAHATVA*	*BHAKTI KI BHAVANA*	*ELECTRONIC VIGYAPAN*	*PARIBHASHIK SHABDAVALI*
	SLO-2	*AHNKAR KA PARITYAG*	*DOHE- GHANANAND*	*NAGARJUN-- AKAL AUR USKE BAD*	*VIGYAPAN PARIYOJANA*	*AVADHARNA*
S-9	SLO-1	*DOHE- TULSHIDAS*	*KAVI PARICHAYA*	*AKAL KA VASHTAVIK CHITRAN*	*VIGYAPAN AUR SAMAJ*	*SHABDAVALI KI AVSHYAKTA*
	SLO-2	*PAROPKAR KI BHAVANA*	*DOHE KA VISLESHAN*	*AKAL KE PURVA KA CHITRAN*	*VIGYAPAN KI VYAPAKTA*	*KARYALYIN SHABDAVALI*
S-10	SLO-1	*DAYA KA MAHATVA*	*SNEH KI SARLTA KA VARNAN*	*AKAL KE BAD KA CHITRAN*	*VIGYAPANLEKHAN KALA*	*E EK DIN EK SHABD*
	SLO-2	*ISHVAR KI MHATTA*	*PREM KA MAHATVA*	*KATTIS- BADRINARAYAN*	*VIGYAPAN AUR JAGRUPTA*	*HINDI SE ANGREJI SHABD*
S-11	SLO-1	*MADHUR VAHAN KI UPYOGITA*	*NAYIKA KE PRATI SMARPAN*	*SAMBAND VICCHED KI PARICHARCHA*	*UDDESHYA*	*ANGREJ SE HINDI SHABD*
	SLO-2	*RAM KI MAHIMA*	*GHANANAND KI KAVYA SHAILI KA MAHATVA*	*SWARTH NIHIT BHAVANA*	*VIGYAPAN KI SPASTTA*	*ABHYASH KARYA*
S-12	SLO-1	*DHOHA PARICHARCHA*	*DHOHA PARICHARCHA*	*KAVYA PARICHARCHA*	*VIGYAPANPARICHARCHA*	*PARICHARCHA*
	SLO-2	*PRASHNAABHYASH*	*PRASHNAABHYASH*	*PRASHNAABHYASH*	*PRASHNAABHYASH*	*PRASHNAABHYASH*

Learning Resources	***Edited Book: ""SAMANYA HINDI", SRIJONLOK PUBLICATION, 2023, New Delhi.*** 1. KABIR – HAZARI PRASAD DWEDI 2. SURDAS – RAM CHANDRA SHUKL 3. BHAKTI ANDOLAN AUR SURDAS KA KAVYA – MANAGER PANDEY 4. BIHARI – VISHVNATH PRASAD MISHR ***5.*** AadhunikVigyapan aur Jansampark – Taresh Bhatia

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
Level 2	Apply Analyze	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
Level 3	Evaluate Create	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
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		2. Dr. Md.S. Islam Assistant Professor, SRMIST
		3.Dr. S. Razia Begum, Assistant Professor, SRM IST
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Course Code	ULF23G02J	Course Name	French-II	Course Category	G	Generic Elective Course	L	T	P	O	C
							2	0	2	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*French*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Strengthen the language of the students both in oral and written			
CLR-2 :	Express their sentiments, emotions and opinions, reacting to information, situations			
CLR-3 :	Make them learn the basic rules of French Grammar.			
CLR-4 :	Develop strategies of comprehension of texts of different origin			
CLR-5 :	Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*To acquire knowledge about French language*	*2*	*75*	*80*
CLO-2 :	*To strengthen the knowledge on concept, culture, civilization and translation of French*	*2*	*80*	*90*
CLO-3 :	*To develop content using the features in French language*	*2*	*75*	*80*
CLO-4 :	*To interpret the French language into other language*	*2*	*75*	*90*
CLO-5 :	*To improve the communication, intercultural elements in French language*	*2*	*80*	*75*

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*M*	*H*	*H*	*M*	*H*	*H*	*L*	*M*	*M*	*H*	*L*	-	-	-
M	*H*	*L*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*H*	*M*	-	-	-
H	*H*	*L*	*M*	*H*	*M*	*L*	*H*	*M*	*M*	*H*	*H*	-	-	-
H	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	*M*	*L*	-	-	-
M	*H*	*H*	*L*	*M*	*M*	*H*	*H*	*M*	*L*	*H*	*M*	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	**Temps libre**	Le pronom indéfini *on*	**Vendre**	Il faut	Les gallicismes
	SLO-2	Les activités quotidiennes	Les activités	Les exemples	C'est / Il est	Les activités
S-2	SLO-1	Les exemples	Les adjectifs interrogatifs	**Acheter**	Le verbe devoir	Les pronoms personnels COI
	SLO-2	Les activités	Les activités	Les exemples	Les activités	Les exemples
S-3	SLO-1	Les moments de la journée	Les prépositions avec les noms géographiques	Les aliments	Le verbe pouvoir	Le pronom *y*
	SLO-2	Les exemples	Les activités	Les exemples	Le verbe savoir	Les exemples
S-4	SLO-1	Les matières scolaires	Les verbes prendre et sortir	Les emballages	Le verbe vouloir	Des pronoms compléments
	SLO-2	Les exemples	Les activités	Les exemples	Les sons	Les activités
S-5	SLO-1	Les activités	Les sons	Les quantités	Demander et dire le prix	Les nombres ordinaux
	SLO-2	Les loisirs	Les activités	Les exemples	Les activités	Les exemples
S-6	SLO-1	Les exemples	Parler de ses gouts	Les commerces	Faire des achats	Les verbes écrire et voir

	SLO-2	Les activités	Les activités	Les activités	Expliquer une recette de cuisine	Les activités
S-7	**SLO-1**	La fréquence	Parler de ses préférences	les commerçants	Les activités	Le E caduc ou instable
	SLO-2	Les exemples	Les activités	Les exemples	Les courses	Les exemples
S-8	**SLO-1**	Les activités	Parler de sa routine	L'impératif	Les activités	Présenter ses vœux
	SLO-2	Les verbes pronominaux	Les activités	Les activités	Vendre et acheter	Présenter ses souhaits
S-9	**SLO-1**	Les exemples	A la recherche d'un cadeau –.	Les articles partitifs	Mots et expressions	Présenter ses félicitations
	SLO-2	Les activités	Les activités	Les exemples	Grammaire	inviter à une invitation
S-10	**SLO-1**	Les pronoms personnels COD	Temps libre	*Très* ou *beaucoup* (de)	Communication	répondre à une invitation
	SLO-2	Les exemples	Les activités	Les exemples	Tout le monde s'amuse	Les exemples
S-11	**SLO-1**	Les activités	Mots et expressions	Le pronom en (la quantité)	Les sorties	Écrire un message amical
	SLO-2	Les adjectifs démonstratifs	Les activités	Les exemples	Les saisons	Les exemples
S-12	**SLO-1**	Les exemples	Grammaire –Communication	La phrase négative (2	Les fêtes	Parler au téléphone
	SLO-2	Les activités	Les activités	Les exemples	Les messages	Un coup de fil

Learning Resources	***Theory:*** ***1.*** " **Nouvelle Génération-AI"** Méthode de français, Marie-Noëlle COCTON, P.DAUDA, L.GIACHINO, C.BARACCO, Les éditions Didier, Paris, 2018. ***2.*** ***Cahier d'activités avec deux discs compacts.*** ***3.*** *https://www.fluentu.com/blog/french/french-grammar* ***4.*** *https://www.elearningfrench.com/learn-french-grammar-online-free.html* ***5.*** *https://www.lawlessfrench.com/grammar* ***6.*** *https://blog.gymglish.com/2022/12/15/basic-french-grammar*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment(50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
Level 2	Apply Analyze	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
Level 3	Evaluate Create	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
1. Mr. KavaskarDanasegarane *Process Expert* *Maersk Global Service Center Pvt. Ltd*	*1. Dr. C.Thirumurugan Professor, Department of French, Pondicherry University*	*1. Mr. Kumaravel K. Assistant Professor & Head, SRMIST, KTR*
2.Mr. Sharath Raam Prasad, Character Designer, Animaker Company Pvt.		*2. Mrs. Abigail, Assistant Professor, SRMIST, VDP*

Course **Code	UES23AE1T	Course Name	ENVIRONMENTAL STUDIES	Course Category	AE	Ability Enhancement Courses	L	T	P	O	C
							3	0	0	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	*To create awareness on Environment and Renewable and Non-renewable resources*
CLR-2 :	*To understand about ecosystem and Biodiversity*
CLR-3 :	*To understand the natural and anthropogenic impact of the environmental pollution*
CLR-4 :	*To create awareness on different environmental problems*
CLR-5 :	*To create awareness on various Environment Protection acts and the impact of human population on environment*

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	*Applying knowledge on Renewable and Non-renewable resources*	*2*	*80*	*65*	*L*	*H*	*L*	*M*	*L*	*H*	*L*	*L*	*L*	*H*	*L*	*M*	-	-	*M*
CLO-2 :	*Understanding about ecosystem and Biodiversity*	*2*	*80*	*70*	*M*	*H*	*L*	*M*	*L*	*H*	*L*	*L*	*L*	*H*	*L*	*M*	-	-	*M*
CLO-3 :	*Gathering knowledge on impact of environmental pollution*	*2*	*80*	*70*	*L*	*H*	*L*	*M*	*L*	*H*	*M*	*M*	*M*	*H*	*L*	*M*	-	-	*M*
CLO-4 :	*Understanding of different environmental problems*	*2*	*80*	*70*	*M*	*H*	*L*	*M*	*L*	*H*	*M*	*M*	*M*	*H*	*L*	*M*	-	-	*M*
CLO-5 :	*Having knowledge on various Environment Protection acts and the impact of human population on environment problems*	*2*	*80*	*65*	*M*	*H*	*L*	*M*	*L*	*H*	*L*	*M*	*L*	*H*	*L*	*M*	-	-	*M*

Duration (hour)		9	9	9	9	9
S-1	SLO-1	*Multidisciplinary nature of environmental studies*	*Energy flow in the ecosystem*	*Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity*	*Disaster management- Nature Floods, Earthquakes*	*Environment Protection Act*
	SLO-2	*Definition, Scope and Importance of Environmental Studies*	*Energy flow in the ecosystem*	*Environmental Pollution- Definition*		*Air (Prevention and Control of Pollution) Act*
S-2	SLO-1	*Need for public awareness.*	*Ecological succession*	*Causes, Effects and Control Measures of Air Pollution*	*Cyclones Landslides*	*Water (Prevention and control of Pollution) Act*
	SLO-2	*Institutions in Environment*	*Food chains, Food webs and Ecological pyramids*			*Wildlife Protection Act*
S-3	SLO-1	*People in Environment*	*Ecosystem, Introduction, Types, Characteristic features, Structure and functions*	*Causes, Effects and Control Measures of Water Pollution*	*Social Issues and the Environment: From Unsustainable to Sustainable Development*	*Forest Conservation Act*
	SLO-2	*Introduction to natural resources- Associated Problems*	*Forest ecosystem*			*Issues involved in enforcement of environmental legislation*
S-4	SLO-1	*Renewable and Nonrenewable resources*	*Grassland ecosystem*	*Causes, Effects and Control Measures of Soil Pollution*	*Urban problems related to energy*	*Public awareness*

	SLO-2	*Forest resources*	*Desert ecosystem*		*WaterConservation*	
S-5	**SLO-1**	*Water Resources*	*Aquatic ecosystems (ponds, lakes, streams)*	*Causes, Effects and Control Measures of Marine pollution*	*Rain Water Harvesting, Watershed*	*Human Population and the Environment:Population growth, variation among nations*
	SLO-2	*Mineral Resources*	*Aquatic ecosystems (rivers, estuaries, oceans)*			
S-6	**SLO-1**	*Food Resources*	*Biodiversity and its conservation-genetic, species and ecosystem diversity*	*Causes, Effects and Control Measures of Noise Pollution*	*Environmental Ethics: Issues and Possible Solutions*	*Population explosion – Family Welfare Programme*
	SLO-2	*Energy Resources*	*Biogeographical classification of India*			*Environment and human health*
S-7	**SLO-1**	*Land Resources*	*Value of Biodiversity*	*Causes, Effects and Control Measures of Thermal Pollution*	*Climate change & Global warming*	*Human Rights*
	SLO-2	*Role of an individual in conservation of natural resources*	*Biodiversity at Global, National and Local Levels*			*Value Education*
S-8	**SLO-1**	*Equitable use of resoureces for sustainable lifestyles*	*India as a Mega Diversity Nation*	*Causes, Effects and Control Measures of Nuclear hazards*	*Acid rain & Ozone layer depletion*	*HIV/AIDS*
	SLO-2	*Concept of an ecosystem*	*Hot-spots of biodiversity*			
S-9	**SLO-1**	*Structure and Functions of an ecosystem*	*Threats to biodiversity: habitat loss, poaching of wildlife man-wildlife conflicts*	*Solid Waste Management Causes, Effects and Control Measures of Urban and Industrial Waste*	*Nuclear Accidents and Nuclear Holocaust*	*Women and Child Welfare*
	SLO-2	*Producers, consumers and decomposers*	*Endangered and endemic species of India*	*Role of Individuals In Pollution Prevention*	*Wasteland Reclamation*	*Role of Information Technology in Environment and human health*

Learning Resources	**Theory:** 1. Bharucha Erach, (2013), Textbook of Environmental Studies for Undergraduate Courses (Second edition). Telangana, India: Orient BlackSwan. 2. Basu Mahua, Savarimuthu Xavier, (2017), SJ Fundamentals of Environmental Studies. Cambridge, United Kingdom: Cambridge University Press 3. R.Jeyalakshmi (2014),Text book of Environmental Studies, Devi publications, Chennai. 4. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India, Email:mapin@icenet.net (R)

Learning Assessment

Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	40%	-	40%	-	40%	-	40%	-	40%	-
	Understand										
Level 2	Apply	30%	-	30%	-	30%	-	30%	-	30%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Academic**	**Internal Experts**
Dr.Arumugam Perumal, Director ARMATS BIOTEK Training and Research Institute, Chennai	*Dr.N.Banu, Assistant Professor Bharathi Womens College (Autonomous), Chennai*	*1. Dr. P. Parthipan, Assistant Professor, Department of Biotechnology, FSH, SRMIST*
		2.Dr. D. Sankari, Professor and Head, Department of Biotechnology, FSH, SRMIST

Course Code	USA23201J	Course Name	OBJECT ORIENTED PROGRAMMING	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	Introduction to object oriented programming.	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Utilize method overloading and operator overloading for real-time application development programs			
CLR-3 :	Utilize inline, friend and virtual functions and create application development programs			
CLR-4 :	Utilize exceptional handling and collections for real-time object oriented programming applications			
CLR-5 :	Create programs using object oriented approach and design methodologies for real-time application development			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	Understanding the object oriented programming	3	80	70
CLO-2 :	Construct programs using method overloading and operator overloading	3	85	75
CLO-3 :	Create programs using inline, friend and virtual functions, construct programs using standard templates	3	75	70
CLO-4 :	Construct programs using exceptional handling and collections	3	85	80
CLO-5 :	Construct programs using object oriented concepts	3	85	75

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
H	H	M	M	M	M	M	H	M	M	L	M	M	L	L
M	H	M	M	H	M	M	M	M	H	L	M	M	L	L
M	M	M	M	M	M	M	H	H	H	L	M	M	L	L
M	M	M	M	M	M	M	H	H	H	L	M	M	L	L
M	M	M	M	M	M	M	H	H	H	L	M	M	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Comparison of Procedural and Object Oriented Programming	Constructor Types: Default and Parameterized constructor	Inheritance and its types	Introduction to Files	Templates : Introduction
	SLO-2	List of OOPS languages and its features	Example Programs	Inheritance: Single	Classes For File Stream Operations	Types of templates
S-2	SLO-1	Features: Classes, Objects, Inheritance, Polymorphism, Encapsulation	Constructor Types: Copy and Static, Private.	Inheritance: Multiple, Example program	Types of files,Opening and Closing a File, Example Program	Class Templates Example for class templates
	SLO-2	Data Hiding, Message Passing, Reusability	Example Programs	Inheritance: Multilevel	Detecting End Of File	Function templates

S-3	SLO-1	I/O Operations, Data Types	Destructor	Example program	Example program	Introduction to STL – Containers and Iterators
	SLO-2	Variables, Constants and Type Conversion,Operators,Special operators	Static Data members,Static member functions, Example program	Visibility of access specifier	Read and write functions- character and string	Simple example for STL, Example program
S4-6	SLO -1	Lab 1: I/O operations and operators	Lab 4: Parameterized Constructor and Constructor Overloading	*Lab 7: Inheritance*	Lab 10 : Simple file programs	Lab13 :Templates
	SLO -2					
S 7	SLO-1	Control Structures	Overloading Concept in OOP	Inheritance : Hierarchical	*File Open Modes*	Exceptional Handling: Types of exceptional handling
	SLO-2	Examples of Control Structures	Overloading types	*Example program*	*Example program*	Exceptional Handling :Try and Catch, Example program
S-8	SLO-1	Functions and types	Function Overloading: Different parameter with same data type	Inheritance : Hybrid	*File Pointer Manipulations*	Exceptional Handling : Standard exceptions
	SLO-2	Function declaration and definition	Example Program	Example program	*Example Program*	Example program
S-9	SLO-1	Passing arguments, returning values,default arguments, Constant arguments	Function Overloading: Different parameter with different argument types,Example Program	Constructors and destructors in inheritance, Example Program	*Sequential Input and Output Operations*	Exceptional Handling: Multilevel exceptional
	SLO-2	Call by value , Call by reference,Return by reference, Inline Functions	Function Overloading: Different parameter with different return values,Example Program	Constructors and types of inheritance, Example program	*Functions to handle file pointer, Example Program*	throw and throws, Example program
S-10-12	SLO-1	Lab 2: Control structures and Functions	Lab 5 : Function Overloading	Lab 8 : Multiple ,Multilevel Inheritance	*Lab 11 : Working with files*	Lab 14 :Multilevel exceptional programs
	SLO-2					
S-13	SLO-1	Class and Objects	Operator Overloading Concept, Types of operator overloading	Virtual Base Classes	Reading a class object, *Example Program*	Exceptional Handling: finally
	SLO-2	Access specifier	Operator Overloading: Unary Operators, Example program	Example Program	Random Access –Updating a File	User defined exceptions
S 14	SLO-1	Visibility of access specifier Example program	Operator Overloading: binary Operators	Abstract Classes, Example Program	Example program	Programs for user defined exceptions, Example program
	SLO-2	Friend Function Example program	Example program	Virtual Functions, Example Program	Error Handling in File Operations	Exception Handling class, Example program
S-15	SLO-1	Inline functions Example program	Operator Overloading: Assignment Operator	this pointer	Example program	User defined exceptional class
	SLO-2	Constructor,Destructor Example program	Example program	Example Program	Command Line Arguments, Example program	Example Programs using CPP
S-	SLO-1	Lab 3: Classes and Objects	Lab 6 : Operator Overloading	*Lab 9 : Abstract classes and*	*Lab 12: command line arguments*	Lab 15:User defined Exceptions

16-18	SLO-2			*Virtual Functions*	*program*	and simple CPP application.

Learning Resources	1. *E Balagurusamy, Object Oriented Programming in C++, 7th ed., Tata McGraw-Hill , 2017* 2. Reema Thareja, Object Oriented Programming with C++, 1st ed., Oxford University Press, 2015 3. *R S Salaria, Mastering Object Oriented Systems Development Programming in C++", 6th ed., Khanna Publishing,2016*	4. Robert Lafore, Object-Oriented Programming in C++, 4th ed., SAMS Publishing, 2008 5. Sourav Sahay, Object Oriented Programming with C++, 2nd ed., Oxford University Press, 2017

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	*Dr.S.Gopinathan, Professor, University of Madras, Chennai*	*Dr.R.Thilagavathy, SRMIST*

Course Code	USA23202J	Course Name	Fundamentals of Data Structures and Algorithms	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisiteCourses	Nil	Co-requisiteCourses	Nil	ProgressiveCourses	Nil
CourseOfferingDepartment	Computer Applications	DataBook/Codes/Standards		Nil	

CourseLearningRationale(CLR):	Thepurposeoflearningthiscourseisto:
CLR-1 :	*Utilize the different data types; Utilize searching and sorting algorithms*
CLR-2 :	*Utilize linked list in developing applications*
CLR-3 :	*Utilize stack and queues in processing data for real-time applications*
CLR-4 :	*Utilize tree data storage structure for real-time applications*
CLR-5 :	*Utilize algorithms to find shortest data search in graphs for real-time application development*

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning 1 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 Expected Attainment (%)	ProgramLearningOutcomes(PLO) 1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	*Identify linear and non-linear data structures. Create algorithms for searching and sorting*	2	80	70	M	M	M	H	M	M	M	H	M	H	L	M	L	L	M
CLO-2 :	*Create the different types of linked lists and evaluate its operations*	2	85	75	M	M	M	M	L	M	M	H	M	H	L	H	L	L	M
CLO-3 :	*Construct stack and queue data structures and evaluate its operations*	2	75	70	M	L	M	L	M	M	M	H	M	H	L	H	L	L	M
CLO-4 :	*Create tree data structures and evaluate its types and operations*	2	85	80	M	H	M	M	M	M	M	H	M	M	L	H	L	L	M
CLO-5 :	*Create graph data structure, evaluate its operations, implement algorithms to identify shortest path*	2	85	75	M	M	M	L	M	M	M	H	M	H	L	H	L	L	M

Duration(hour)		*18*	*18*	*18*	*18*	*18*
S-1	SLO-1	*Introduction to theory ofdatastructures*	*Introductiontostack*	*TreeTraversals–In order,preorder*	*Introductiontosorting*	*GraphTerminology*
	SLO-2	*Datarepresentation*	*Representationofstackthrougharray*	*TreeTraversals-Post order*	*Differenttypesofsorting*	*Representationofgraph–Arrays*
S-2	SLO-1	*AbstractDatatype*	*Representationofstackthroughlinked list*	*BinarySearchTree*	*Bubblesort*	*Representationofgraph–Linkedlist*
	SLO-2	*Classificationofdatatypes*	*Operationsonstack*	*ThreadedBinarySearchTree*	*Example*	*GraphTraversal–BFS*
S-3	SLO-1	*AsymptoticNotation*	*DisadvantagesofStack,Polish notations*	*BinarySearchTree:Construction*	*InsertionSort*	*Example*
	SLO-2	*AlgorithmAnalysis, Recursion*	*Applications–Evaluationof Expression, TowerofHanoi,InfixtoPostfixexpression*	*BinarySearchTree:Insertion, Searching*	*Quicksort Example*	*GraphTraversal*
S 4-6	SLO-1	*Lab1:Recursion*	*Lab4:Implementation ofstackanditsapplications*	*Lab7: Implement all the three type of TreeTraversals*	*Lab10:ImplementationofBubbleandInsertionsort*	*Lab13:ImplementationofGraphusingArray*
S-7	SLO-1	*IntroductiontoDatastructures*	*Queue*	*Applicationsoftrees*	*Selectionsort*	
	SLO-2	*DataStructuresanditsuses*	*RepresentationofQueueusingArrays*	*ApplicationsofBST*	*Example*	*DFS, TopologicalSorting*

			andLinkedlist			
S-8	**SLO-1**	*LinearandNonLinearDataStructures*	*OperationsonQueue*	*Expressiontrees*	*Mergesort*	*BFS - TopologicalSorting*
	SLO-2	*Operationsondatastructure*	*CircularQueue*	*Example*	*Example*	*Example*
S-9	**SLO-1**	*Arraytypes*	*DoubleendedQueue*	*AVLTree*	*Radixsort*	*Minimumspanningtree–Prims*
	SLO-2	*Arrayoperations, Applications ofarrays Dynamicmemoryallocation*	*PriorityQueue, ReversingaQueueusinganother queue, ApplicationsofQueue*	*AVLTreeRotations, ApplicationsofAVLtree*	*HeapSort Example, Comparisonofsorts*	*MinimumSpanningTree–Kruskals*
S 10-12	**SLO-1**	*Lab2:Arrays*	*Lab 5:Queue implementation usingarrayandpointers*	*Lab8:ImplementationofBST HeapDataStructure*	*Lab11:ImplementationofQuicksortandmergesort*	*Lab14:Implementationofshortestpathalgorithm*
	SLO-2					
S-13	**SLO-1**	*Introductiontolists*	*Introductiontononlineardata structures*	*MinimumHeapConstruction*	*Introduction to searching , Linearsearch*	*Algorithm Design And Analysis*
	SLO-2	*Linkedlistoperations*	*TreeADTandTerminologies*	*Example*	*Binarysearch*	*Greedy Algorithms*
S-14	**SLO-1**	*TypesofLinkedLists*	*TreeTerminologies*	*MinimumHeapDeletionConstruction*	*Comparisonofdifferentsearch*	*Backtracking*
	SLO-2	*Linkedlistvs.Arrays*	*TreeRepresentation*	*Example*	*DefineHashing, Hashfunctions*	*Example*
S-15	**SLO-1**	*Applicationoflinkedlist, Performance Analysis andMeasurement of algorithm*	*TreeTypesandOperations*	*MaximumHeapConstruction*	*Hashing:Collisionavoidance Hashing:Separatechaining,*	*Divide And Conquer*
	SLO-2	*Efficiencyofalgorithm, Timecomplexityandspacecomplexity*	*BinaryTreeRepresentation, Propertiesofbinarytree*	*MaximumHeapDeletionConstruction ApplicationsofHeapsandAVLtrees*	*Openaddressing, AdvantagesofHashing*	*Example*
S 16-18	**SLO-1**	*Lab3: Implementation of LinkedList*	*Lab6:ImplementationofbinarytreeusingArrays*	*Lab9:Implementation of Min and Max Heap*	*Lab12:LinearsearchandBinarysearch*	*Lab15:Implementationofminimumspanningtree*
	SLO-2					

LearningResources	1. *SeymourLipschutz,(2014),"DataStructureswithC",McGrawHillEducation,SpecialIndianEdition* 2. *SRDGroup,(2013),"DatastructuresusingC",McGrawHill,2nd Edition,* 3. *R.F.Gilberg,B.A.Forouzan,(2005),"DataStructures",ThomsonIndi,2nd Edition,* 4. *A.V.Aho,J.EHopcroft,J.D.Ullman,(2003),"DatastructuresandAlgorithms",1st Edition,PearsonEducation*	5. *MarkAllenWeiss,"DataStructuresandAlgorithmAnalysisinC",2nd Edition,PearsonEducation* 6. *ReemaThareja,(2011),"DataStructuresUsingC",1st Edition,OxfordHigherEducation*

LearningAssessment											
Level	**Bloom'sLevelofThinking**	**ContinuousLearningAssessment(50%weightage)**								**FinalExamination(50%weightage)**	
		CLA–1(10%)		**CLA–2(10%)**		**CLA–3(20%)**		**CLA–4(10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level1	Remember Understand	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
Level2	Apply Analyze	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Level3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%

	Create										
	Total	100%		100%		100%		100%		100%	

#CLA–4canbefromanycombinationofthese:Assignments,Seminars,TechTalks,Mini-Projects,Case-Studies,Self-Study,MOOCs,Certifications,Conf.Paperetc.,

CourseDesigners

ExpertsfromIndustry	ExpertsfromHigherTechnicalInstitutions	InternalExperts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	*Dr.S.Gopinathan,Professor,UniversityofMadras,Chennai*	*Dr. S. Aruna Rani*

Course Code	UMS23202T	Course Name	Mathematical Foundation	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics and Statistics	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To apply the basic concepts and theorems of matrices			
CLR-2 :	To learn the concepts of polynomial equations, reciprocal equations and approximation of roots.			
CLR-3 :	To learn the basic concepts of differentiation, successive differentiation and partial differentiation			
CLR-4 :	To learn the basic concepts of integration and to apply Bernoulli's formula and reduction formula.			
CLR-5 :	To understand how a function is transformed by Laplace and inverse Laplace methods and how they are related.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Gaining knowledge in basic concepts of matrix method.	3	85	80
CLO-2 :	Gaining knowledge in the concepts of polynomial equations and reciprocal equations and applying Horner's and Newton's methods for finding roots	3	80	75
CLO-3 :	Understanding the concepts of differentiation and to solve the problems of Radius of curvature and Euler's theorem	3	85	80
CLO-4 :	Understanding the concepts of integration and to evaluate reduction formula.	3	85	80
CLO-5 :	Getting the knowledge of Laplace and Inverse Laplace transformation and their application.	3	85	80

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Scientific Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
L	M	H	H	H	M	L	M	M	L	M	M	L	L	L
H	H	L	M	L	M	M	M	H	L	M	M	L	L	L
L	H	M	H	L	M	M	M	M	L	H	M	L	L	L
M	H	M	M	H	M	M	M	H	L	M	M	L	L	L
H	H	L	M	M	M	M	M	H	L	M	M	L	L	L

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Definition and types of matrix	Introduction to algebraic equations	Introduction to Differentiation	Introduction to integration	Introduction to Laplace Transforms
	SLO-2	Examples of types of matrix.	Types of algebraic equations	Solving basic problems	Basic problems on integration	Basic properties
S-2	SLO-1	Symmetric matrix	Relation between roots and coefficients of equation	More examples	Integration of polynomial functions	Problems on Laplace Transforms
	SLO-2	Skew symmetric matrix	Simple problems	More examples	Integration of polynomial functions	Problems on Laplace Transforms
S-3	SLO-1	Hermitian matrix	Problems on irrational roots	Minima of functions of single variable	Integration of irrational functions	Problems based on Shifting property
	SLO-2	Skew hermitian matrix	Problems on complex roots	Maxima of functions of single variable	Integration of irrational functions	Solving problems of type $L\left[e^{at} f(t)\right]$
S 4	SLO-1	Orthogonal matrix	Reciprocal equations-Definition	Minima and maxima of functions of single variable	Integration of irrational functions	Solving problems of type $L\left[tf(t)\right]$

	SLO-2	*Unitary matrix*	*Solving Reciprocal equation of degree four with like and unlike signs for its coefficients-Type I*	*Minima and maxima of functions of single variable*	*Integration of irrational functions*	*Problems based on Derivative methods*
S-5	**SLO-1**	*Eigen values of a matrix*	*Solving reciprocal equation of odd degree with like signs for its coefficients-Type II*	*More examples on maxima and minima*	*Integration by the method of partial fractions type I*	*Solving problems of type* $L[tf(t)]$
	SLO-2	*Eigen values of a matrix*	*Solving reciprocal equation of odd degree with like signs for its coefficients-Type II*	*More examples on maxima and minima*	*Integration by the method of partial fractions type I*	*Solving problems of type* $L[t^n f(t)]$
S-6	**SLO-1**	*Eigen vectors of a matrix*	*Solving reciprocal equation of odd degree with unlike signs for its coefficients-Type III*	*Introduction to curvature*	*Integration by the method of partial fractions type II*	*Solving problems of type* $L[e^{at}tf(t)]$
	SLO-2	*Eigen vectors of a matrix*	*Solving reciprocal equation of odd degree with unlike signs for its coefficients-Type III*	*Radius of curvature*	*Integration by the method of partial fractions type II*	*Solving problems of type* $L[e^{at}tf(t)]$
S -7	**SLO-1**	*Eigen values and eigen vectors of a matrix*	*Solving reciprocal equation of even degree with unlike signs for its coefficients and the middle term is absent-Type IV*	*Problems based on radius of curvature*	*Integration by the method of partial fractions type III*	*Solving problems of type* $L[e^{at}tf(t)]$
	SLO-2	*Eigen values and eigen vectors of a matrix*	*Solving reciprocal equation of even degree with unlike signs for its coefficients and the middle term is absent-Type IV*	*Problems based on radius of curvature*	*Integration by the method of partial fractions type III*	*Solving problems of type* $L[e^{at}tf(t)]$
S -8	**SLO-1**	*Eigen values and eigen vectors of a matrix*	*Problems based on Type I and II*	*Problems based on radius of curvature*	*Bernoulli's formula*	*Solving problems of type* $L\left[\frac{f(t)}{t}\right]$
	SLO-2	*Eigen values and eigen vectors of a matrix*	*Problems based on Type III and IV*	*Problems based on radius of curvature*	*Simple problems*	*Solving problems of type* $L\left[\frac{f(t)}{t}\right]$
S-9	**SLO-1**	*Cayley Hamilton theorem*	*Newton-Raphson method.*	*Partial differentiation-Introduction*	*Reduction formula for* $\int \sin^n x dx$	*Introduction of Inverse Laplace transforms*
	SLO-2	*Problems based on Cayley Hamilton theorem*	*Problems on Newton-Raphson method.*	*Simple problems*	*Reduction formula for* $\int \sin^n x dx$	*Simple problems*
S-10	*SLO-1*	*Problems based on Cayley Hamilton theorem*	*Problems on Newton-Raphson method.*	*Euler's theorem*	*Reduction formula for* $\int \cos^n x dx$	*Basic problems on Inverse Laplace Transforms*
	SLO-2	*Problems based on Cayley Hamilton theorem*	*Problems on Newton-Raphson method.*	*Problems on Euler's theorem*	*Reduction formula for* $\int \cos^n x dx$	*Basic problems on Inverse Laplace Transforms*

S-11	*SLO-1*	*Cramer's rule*	*Horner's method*	*Problems on Euler's theorem*	*Reduction formula for* $\int_0^{\frac{\pi}{2}} \sin^n x dx$	*Finding inverse Laplace transforms by the method of partial fractions*
	SLO-2	*Problems based on Cramer's rule.*	*Problems on Horner's method*	*Problems on Euler's theorem*	*Reduction formula for* $\int_0^{\frac{\pi}{2}} \sin^n x dx$	*Finding inverse Laplace transforms by the method of partial fractions*
S-12	*SLO-1*	*Problems based on Cramer's rule.*	*Problems on Horner's method*	*Problems on Euler's theorem*	*Reduction formula for* $\int_0^{\frac{\pi}{2}} \cos^n x dx$	*Finding inverse Laplace transforms by the method of partial fractions*
	SLO-2	*Problems based on Cramer's rule.*	*Problems on Horner's method*	*Problems on Euler's theorem*	*Reduction formula for* $\int_0^{\frac{\pi}{2}} \cos^n x dx$	*Finding inverse Laplace transforms by the method of partial fractions*

Learning Resources	***TEXT BOOKS:*** *1. Dr.A.Singaravelu, Allied Mathematics, 7th edition, A.R.S.Publicatiions, 2015* *2. , P.R.Vittal, <edition>, Margham Publications, <year of publication>*

		Learning Assessment									
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	-	30%	-	30%	-	30%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	40%	-	40%	-
Level 3	Evaluate Create	30%	-	30%	-	30%	-	30%	-	30%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Course Designers	
Experts from Academic	Internal Experts
1.Dr.V. Prakash, Dr. Ambedhkar Government Arts college, Chennai (AcademicExpert)	*1.Dr.S.Lakshmipriya,SRMIST*
2.Dr.M.Vasantha,ICMR,Chennai(IndustrialExpert)	*2.Dr.L.Sivakami,SRMIST*

Course Code	UCD23S02T	Course Name	Verbal Ability and Skill Development	Course Category	S	Skill Enhancement Course	L	T	P	O	C
							2	0	0	2	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Guidance Cell	Data Book / Codes/Standards	-		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	Critically evaluate basic mathematical concepts related to mixtures and alligations, Numbers, time and work	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Use their logical thinking and analytical abilities to solve reasoning problems			
CLR-3 :	Develop soft skills relating to the need for job recruitment			
CLR-4 :	Provide students with the necessary skills to generate and interpret data sufficiency, problems on Chain Rule, Pipes and Cisterns, Boats and streams,			
CLR-5 :	Enable students to understand problems on graphs and also increase their ability in language skills			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO)														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behaviour	Life Long Learning
CLO-1 :	Understand the concepts of mixtures and alligations, Numbers, time and work and to approach questions in a simpler and innovative method	3	80	70	M	H	-	L	-	M	-	M	M	H	-	H	-	-	-
CLO-2 :	Establish a student's interest and awareness in seating arrangements, mathematical operations, logical reasoning	3	80	75	M	H	-	L	-	M	-	M	M	H	-	H	-	-	-
CLO-3 :	Acquire soft skills that will help for applying jobs	3	85	70	-	-	M	H	M	-	L	-	-	-	H	-	M	M	H
CLO-4 :	Demonstrate various principles involved in aptitude problems	3	85	80	-	-	-	-	M	-	L	H	-	H	-	H	-	-	L
CLO-5 :	Ability to solve problems on reasoning and to interpret English language	3	85	75	-	H	-	L	-	H	-	M	M	-	H	--	M	-	M

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Time and Distance – Introduction	Seating Arrangements (Circular and table) Introduction	Resume Building - Introduction	Chain Rule, Pipes and Cistern – Introduction	Functions and Graphs Introduction
	SLO-2	Time and Distance – Problems	Seating Arrangements (Circular and table) – Problems	Resume Building	Chain Rule, Pipes and Cistern – Problems	Functions and Graphs – Problems
S-2	SLO-1	Time & Work- Introduction	Mathematical Operations – Basic Problems	Group Discussions - Introduction	Data Sufficiency – Introduction	Comprehension
	SLO-2	Time & Work – Problems	Mathematical Operations – Tricky Problems	Group Discussions – Mock GD	Data Sufficiency – Problems	Comprehension – Practise session
S-3	SLO-1	Alligation or Mixture – Introduction	Data Arrangements - Introduction	Group Discussions - Activity 1	Logarithms – Introduction	Idioms and Idiomatic Expressions – Introduction
	SLO-2	Alligation or Mixture - Problems	Data Arrangements – Problems	Group Discussions - Activity 1	Logarithms – Problems	Idioms and Idiomatic Expressions – Practise Session
S-4	SLO-1	Numbers – Basic Problems	Logical Deductions – Introduction	Group Discussions - Activity 2	Boats and Streams – Basic Problems	Cause and Effect - Introduction

	SLO-2	Numbers – Tricky Problems	Logical Deductions – Problems	Group Discussions - Activity 2	Boats and Streams – Tricky Problems	Cause and Effect – Practise Session
S-5	**SLO-1**	Problems on Trains – Introduction	Letter and Symbol Series – Basic Problems	Leadership Skills Introduction	True Discount – Introduction	Theme detection – Introduction
	SLO-2	Problems on Trains – Problems	Letter and Symbol Series – Tricky Problems	Leadership Skills	True Discount – Problems	Theme detection – Activity
S-6	**SLO-1**	Races and Games – Basic Problems	Input Output Tracing Introduction	How to Handle Criticism and Feedback	Geometry and Mensuration Introduction	Ordering of words _ Introduction
	SLO-2	Races and Games – Tricky Problems	Input Output Tracing – Problems	How to Handle Criticism and Feedback	Geometry and Mensuration – Problems	Ordering of words – Practise Session

Learning Resources	1. James Barrett & Tom Barrett - Ultimate aptitude tests: over 1000 practice questions for abstract visual, numerical, verbal, physical, spatial and systems tests, Kogan Page, London, 2018. Fourth edition 2. Kathy A. Zahler& Over Drive, Inc (Distributor) Conquering GRE verbal reasoning and analytical writing, McGraw-Hill Education, New York, 2020 Second Edition 3. Archana Ram, Place Mentor: Tests of Aptitude for Placement Readiness, Oxford University Press, Oxford, 2018	4. David Bartlett, The art of general practice: soft skills to survive and thrive, Scion, Banbury, 2018, eBook, 2018 5.Zsolt Nagy, Soft skills to advance your developer career: actionable steps to help maximize your potential,A press, Berkeley, CA, 2019, eBook, 2022

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)			
		CLA – 1 (20%)	**CLA – 2 (20%)**	**CLA – 3 (30%)**	**CLA – 4 (30%)#**
		Theory	**Theory**	**Theory**	**Theory**
Level 1	Remember	30%	20%	30%	30%
	Understand				
Level 2	Apply	30%	50%	30%	30%
	Analyze				
Level 3	Evaluate	40%	30%	40%	40%
	Create				
	Total	**100%**	**100%**	**100%**	**100%**

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Mock interviews, etc.

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. M. Ponmurugan, Executive PMOSS, Cognizant Technology Solutions India Pvt. Limited, Chennai	*Dr. G. Saravana Prabu, Asst. Professor, Department of English, Amrita Vishwa Vidhyapeedam, Coimbatore*	*Dr. Sathish K, HOD, Department of Career Guidance Cell, FSH, SRMIST* *Dr. Muthu Deepa M, Assistant Professor, Department of Career Guidance Cell, FSH, SRMIST*

Course Code	UEN23V01L	Course Name	COMMUNICATION SKILLS	Course Category	V	Value Addition Course	L	T	P	O	C
							0	0	4	2	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Department of English, FSH, SRMIST	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

CLR-1 :	Develop fluency in spoken English by practicing and engaging in various speaking activities.
CLR-2 :	Improve pronunciation and intonation to enhance clarity and effectiveness in oral communication.
CLR-3 :	Expand vocabulary and idiomatic expressions to communicate more accurately and expressively.
CLR-4 :	Enhance listening skills to understand and respond appropriately to spoken English in different situations.
CLR-5 :	Employ effective communication strategies, such as active listening, summarizing, paraphrasing, and asking clarifying questions, to enhance interpersonal and intercultural communication.

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 Expected Attainment (%)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 PSO -1	14 PSO -2	15 PSO-3
CLO-1 :	Demonstrate improved fluency in spoken English by expressing ideas and thoughts confidently and coherently.	2	75	60	H	M	M	L	-	M	-	M	H	L	H	L	-	-	-
CLO-2 :	Pronounce English words and phrases accurately, using appropriate intonation and stress patterns.	2	80	70	M	H	L	-	-	-	-	M	M	H	H	M	-	-	-
CLO-3 :	Expand and effectively use a range of vocabulary and idiomatic expressions to enhance communication.	2	70	65	M	M	M	-	L	L	-	H	M	H	H	L	-	-	-
CLO-4 :	Understand and comprehend spoken English in various contexts, including informal conversations, lectures, and presentations.	2	70	70	H	M	L	-	M	H	-	-	-	-	H	L	-	-	-
CLO-5 :	Deliver well-structured and engaging oral presentations, incorporating effective body language and visual aids.	2	80	70	H	H	-	M	-	M	-	L	L	M	H	M	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Listening Skills.	Introduction to Reading Skills. Discussion of techniques of Reading Skill	Introduction to Speaking Skills. Explaining the importance of phonetics and vocabulary	Introduction to Writing Skills Importance of writing skills	Introduction to appreciation of texts.
	SLO- 2	Exploring Effective Ways of Listening. Barriers of Listening. Active and Passive Listening.	Identifying common reading problems in students after making them read a few passages.	Explaining the usage of the Oxford Learner's Dictionary to learn phonetics of the words at the fundamental level.	Explaining various forms of writing with examples:.	Encouraging the students to share a few of their favourite lines from any sources they have read or sharing a few lines from paditthadhilpiditthadhu.
S-2	SLO-1	Introduction to Digital language lab/ usage of mobile	Learners are enabled to record their speech and listen to it in order to	The right enunciation of certain words to be	Introduction to letter writing. Types of letters- Formal and Informal letters with	Explaining why appreciating texts creates a good reader.

		applications	*correct their problematic areas*	*taught through phonetic representation and decoding the phonetic symbols by learning to use the dictionary..*	*examples.* *Learning E-mail etiquette.*	
	SLO- 2	*Equipping the listening skill of the learners*	*Repetitive practices of reading select paragraphs from web resources, their standard will be measured.*	*Observe and repeat and learn the phonetic pronunciation of words by practicing continuously.*	*Class Assignment - write a formal letter and informal letter and check for e-mail etiquettes in writing.*	*Enabling the students to reflect in the classroom about any of their favourite books/ articles or magazines.*
S-3 – S-4	**SLO-1**	*Introducing google podcasts.*	*The speed, fluency, pronunciation, comprehension of the words in the paragraph*	*Teaching the usage of Thesaurus to understand and develop various words and improve vocabulary.*	*Enabling the students to unleash their potentials in creative writing through writing transcripts for advertisements of any product.*	*Introducing the text of Letters by Mathrubootham published in the Hindu.*
	SLO- 2	*Task to write down the words from the audio they have listened to. This activity should be done in two steps. 1. Jotting down the words simultaneously as they listen to the speaker. 2. Writing the transcript of the audio through repetitive play and pause.*	*hints and tricks to follow where the pauses are to be followed.*	*Identifying common errors in concord, preposition, direct speech and indirect speech.*	*write a review of any book or a movie or an interview or a debate.*	*Reading and recitation of the text of the first letter-Enjoy within limits, says Mr. Mathrubootham* *Understanding characters by analyzing the usage of their style of language*
S-5	**SLO-1**	*Imitating the speakers by listening to them and attempting to learn the pronunciation of the words uttered in the audio.*	*Students group 1- reads – group 2 identifies the flaws in reading.*	*Identifying common errors in tenses, punctuation, and syntactical errors..*	*Mechanics of writing like capitalization, punctuation, spelling, correct pronoun, preposition, concord usage can be taught.*	*Reading of the second letter- Nobel? What Nobel, asks Mr. Mathrubootham.*
	SLO- 2	*Repetitive listening to enhance pronunciation skills*	*The roles have to be exchanged between the two groups and the activity should be practiced.*	*Rectifying the common errors and instructing the learners about the right usage in order to avoid common errors.*	*meachnaics of writing - assessed and evaluated.*	*Mathrubootham'shumour and the language of code switching from Tamil to English and vice –versa.*
S-6	**SLO-1**	*Introducing to the audios of TED TALK American Speakers. Listening to the native speakers of English Language through TED TALKS.*	*Identify the key arguments in a passage -introductory point, lead point, supportive argument statement, concluding point and the common connecting word between all the key words in the passage.*	*Practicing how to avoid common errors.*	*Teaching effective writing by learning to avoid common errors in concord, preposition, conjunction, relative pronouns, question tags.*	*Reading of the third letter -Mr. Mathrubootham is fully supporting all new technologies*
	SLO- 2	*Introducing to the audios of TED TALK British Speakers. Listening to the native speakers of English Language through TED TALKS.*	*Encouraged to identify the key arguments in other passages on their own.*	*The learners are introduced to collocations for quick choice of learning how to speak in short time and how to speak effectively.*	*Practicing effective writing by learning to avoid common errors in concord, preposition, conjunction, relative pronouns, question tags.*	*Mathrubootham's frustration over the failure of technologies and the language that he positively uses to denote hopelessness over technologies.*
S-7 – S-8	**SLO-1**	*American and British styles can be differentiated.*	*Guiding the act of reading through scanning and skimming by model reading of the passages by the instructor.*	*Practice collocations*	*Common errors in tenses, direct and indirect speech and syntax structure.*	*Reading of the fourth letter in the classroom and discussion* *Pizza maavu: Welcome to Mr. Mathrubootham food recipe*

						website,
	SLO- 2	*The recognition of different accents should be practiced by speaking after listening.*	*scanning and skimming activities*	*Idioms and phrases*	*Practicing effective writing by learning to avoid common errors in tenses, direct and indirect speech and syntax structure.*	*Mathrubootham's love for food and the miscommunication about food.*
S-9	**SLO-1**	*Learning advanced pronunciation and vocabulary through various computer applications like Woodpecker.*	*Loud reading and slow mind reading*	*A speaking task to learn- collocations, idioms and phrases, vocabulary and phonetic pronunciation*	*Teaching how to write statement of purpose for admission to higher educations, and practicing the same.*	*Analyisng the text for regional relevance and National significance.*
	SLO- 2	*Imitate the different sounds and accents - repeat it after listening to any of the videos from the library based on individual interest.*	*Pauses, pronunciation, comprehension and fluency can be checked for improvement at this stage through repetitive practices.*	*Their speaking activity is to be recorded and played again to rectify the errors and highlight the problematic areas in speaking.*	*Teaching how to write a story by looking at a picture.* *Developing the writing skill through word ladders.*	*Appreciating the aesthetics of the comic element and the embodiment of humour in the narrative in the letter*
S-10	**SLO-1**	*Repeat listening to the same time frames and move from 02.01 to 03.00*	*Students -groups -checking the comprehension skills. Analyse the text of a passage.*	*Automating vocabulary through engaging the students in various activity games like solving crossword puzzle and playing scattergories.*	*Introduction to blog writing and steps to become an effective blog writer.*	*Importance of bringing in the Indianized way of speaking the English Language in order to depict the character called Mathrubootham.*
	SLO- 2	*Choosing any particular time frame and practicing it.*	*Brainstorming the comprehension skills-questioning the key points in the passage.*	*Engaging the students to play the games in order to learn the vocabulary.*	*Encourage the readers to create their own blogs and post articles on a regular basis.*	*Relatable characters of both formal and informal everyday life experiences.*
S 11 - S 12	**SLO-1**	Interested students can complete listening and reflecting the complete audio listening practice and speaking.	*Cross check with misunderstanding if any and rectify- match the question and answers.*	*Spur of the moment speech.:*	*Selecting any news article and learning the writing style in it.*	*Talk about their favourite letter from the letters of Mathrubootham by recollecting the appreciation of the text according to their perception and understanding.*
	SLO- 2	*Group activities and games can be conducted to test the listening skills by responding to the speech given by other students*	*Passages for reading comprehension are to be given for practice that tests their reading skills.*	*Prepared speech :* *Giving a speaking task to the students to speak on their own choice*	*Students are given chances to write reports on various topics.*	*Enabling the students to share their appreciation of any of their favourite lines form the books they have read.*

Learning Resources	1. Horizon- English Text Book – Compiled and Edited by the faculty of English Departement, FSH, SRMIST, 2020 2. ***English Grammar in Use by Raymond Murphy*** 3. *Raymond Murphy, Intermediate English Grammar, Cambridge University Press, 2007* 4. *R.P. Bhatnagar, English for Competitive Examinations, Trinity Press, 3rd Edition,2016* 5. http://www.aptitudetests.org/verbal-reasoning-test 6. https://www.assessmentday.co.uk/aptitudetests_verbal.htm
Learning Assessment	

Level	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)			
		CLA – 1 (20%)	CLA – 2 (20%)	CLA – 3 (30%)	CLA – 4 (30%) #
		Practice	Practice	Practice	Practice
Level 1	Remember Understand	10%	10%	30%	15%
Level 2	Apply Analyze	50%	50%	40%	50%
Level 3	Evaluate Create	40%	40%	30%	35%
	Total	100 %	100 %	100 %	100 %

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Krishna Raj *Sutherland* *Krishna.Raj1@sutherlandglobal.com*	*Dr. J Mangayarkarasi* *Associate Professor and Head, Dept. of English EthirajCollege for Women* *Chennai* *jmbwilson97@gmail.com*	*1. Dr. Shanthichitra, Professor, & Head, Department of English, FSH,SRMIST*
Ann Mariya Thomson *RA2232105010015* *II M.A English Literature* *CSH, SRM IST* *az1160@srmist.edu.in*	*Dr. K S Antonysamy* *Associate Professor and Head, Dept. of English Loyola College* *Chennai* *antonysamyks@loyolacollege.edu*	*2.Dr. PushpanjaliSampathkumar, Assistant Professor, Department of English, FSH, SRMIST* *3.Dr Anchal Sharma, Prof & Hod EFL SRMIST NCR Campus* *4.Dr T Sridevi, Assistant Professor English, FSH Ramapuram SRM* *5.Dr Shanmuga Priya, Assistant Professor SRMIST Trichirapalli Campus*

Course Code	UNS23M01L/ UNC23M01L UNO23M01L/ UYG23M01L	Course Name	*NSS/NCC/NSO/YOGA*	Course Category	M	*Mandatory Courses*	L	T	P	O	C
							0	0	0	0	0

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	NSS/NCC/NSO/YOGA	Data Book / Codes/Standards	*Nil*		

Assessment is Fully Internal

Learning Assessment	
Assessment Tools	**Marks**
Continuous Learning Assessment –I (CLA-I)	20 Marks
Continuous Learning Assessment –II (CLA-II)	30 Marks
Continuous Learning Assessment –III (CLA-III)	30 Marks
Continuous Learning Assessment –IV (CLA-IV)	20 Marks
Total Marks	100 Marks

SEMESTER-III

Course Code	USA23301J	Course Name	PROGRAMMING IN JAVA	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*An overview of Java and Buzz words*			
CLR-2 :	*Understand the object oriented features in Java*			
CLR-3 :	*Create and understand the Java program structure*			
CLR-4 :	*Understand the Java packages and Interfaces*			
CLR-5 :	*Use the multithreading programming scenario*			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	*Understand the difference between C++ and Java*	2	85	80	H	M	H	M	M	M	M	M	L	L	M	L	M	L	M
CLO-2 :	*Develop Java program using JVM*	3	85	80	M	H	H	H	M	M	M	M	M	L	M	L	M	L	M
CLO-3 :	*Use the various kinds of packages and interfaces*	3	85	80	M	H	H	H	M	M	M	M	M	L	M	L	M	L	M
CLO-4 :	*Apply the Exception handling methods in Java program.*	3	85	80	M	H	H	H	M	M	M	M	M	L	M	L	M	L	M
CLO-5 :	*Apply AWT controls I/O streams application programming*	3	85	80	M	H	H	H	M	M	M	M	M	L	M	L	M	L	M

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Basic concepts in OOP.: Major principles - encapsulation, Abstraction, inheritance, polymorphism.	Constructors- Characteristics of constructors	Method Overriding	Introduction to Java Thread model-Creating a Thread by Extending Thread Class	Introduction to Event Handling - Understanding Action Event & Item Event
	SLO-2	Benefits of OOP. Applications of OOP	Types of Constructors -Using this Keyword	Dynamic method dispatch - Abstract keyword	Creating a Thread by implementing Runnable Interface	Understanding Key Event & Mouse Event
S2	SLO-1	The Genesis of Java How java changed the internet-Java's magic: Byte Code	Introduction to Garbage Collection, Using Finalize () method	Abstract class	Thread Class -Creating multiple threads	Text Event, Window Event, Component Event- ,

	SLO-2	Introduction to Java Buzzword- Understanding Java Buzzwords	Overloading methods	Working with Abstract class and Method	Assigning Thread priorities	Introduction to Event Listener Interfaces Working with Action Listener &, Adjustment Listener
S3	**SLO-1**	Understanding Encapsulation, Polymorphism, Inheritance	Overloading constructors Using objects as parameters- Argument Passing	Dynamic Binding	Applying Synchronization- Inter-thread communication	Working with Container Listener Working with Key Listener & Mouse Listener
	SLO-2	Introduction to Lexical Issues of Java Understanding Whitespaces, Identifiers, Literals Comments, Separators, Keywords	Returning Objects- Recursion Introducing Access Control	Using final with inheritance	Introduction to Legacy Calsses	Item Listener, Component Listener
S4 – S6	**SLO-1**	**Lab1:** Basic Java Programs	**Lab** 4: Classes and Objects	**Lab7:** Inheritance, Method Overriding, Abstract classes and methods	**Lab**10: Multithreading	**Lab** 13: Event Handling
S7	**SLO-1**	Data types - byte, short, int, long, float, double, chars, Boolean	Static variables and methods	Introduction to Package	Vector class	Introduction AWT Controls Working with Label controls
	SLO-2	Variable- Declaring a variable, dynamic initialization of variables, Scope and lifetime of variables	Final variables and methods Working with Nested Class	Creating a Package	Stack class	Working with Buttons controls
S8	**SLO-1**	Introduction to Operators, Working with Arithmetic, Relational, Logical, Bitwise, Conditional, Assignment operators	Inner Class, String Class	Understanding Access Protection- Importing packages	Introduction to Legacy Interfaces Understanding Enumeration Interface	Working with Check Boxes
	SLO-2	Array- Initialization of Arrays, Types of Arrays	String array	Introduction to Interfaces	Introduction to Utility classes	Working with Check Box Group controls Working with Choice controls controls
S9	**SLO-1**	Introduction to Control Statements IF, IF the else statements	String Handling Methods	Defining an interface	Working with String Tokenizer	Working with Lists controls Working with Text Field controls
	SLO-2	Selection Statements, All forms of if & Switch		How Interfaces are extended		Introduction to Layout Manager
S10-12	**SLO-1**	**Lab** 2: Operators	**Lab** 5: Overloading Methods and Constructors	**Lab** 8: Packages and Interfaces	**Lab**11: Legacy Classes and Interfaces	**Lab** 14: AWT Controls
	SLO-2					
S-13	**SLO-1**	Iterative Statements,	Command Line arguments, finalize()	Implementing Interfaces	Introduction Working with Date class	Flow Layout

	SLO-2	Working with while, do-while, for, for each statements	method	Introduction to Exception handling	Introduction Working with Gregorian Calendar	Border Layout
S-14	**SLO-1**	Jump Statements- break statements, continue and return statements	Single linearguments, Double line arguments	try and catch	Working with Date class- Working with Calendar	Grid Layout
	SLO-2	Introducing classes- Class fundamentals	Inheritance Basics	multiple catch clauses ,Finally ,Throw and throws	Working with Gregorian Calendar- Working with Random Class	Byte Streams classes
S-15	**SLO-1**	Declaring Objects- Assigning object Reference variables-	Types of Inheritance: Single, Multilevel, Hierarchical Inheritance	Exception Types	Working with Scanner Class	Introduction to I/O Streams
	SLO-2	Introducing method	using Super keyword	Built-in Exceptions ,Creating user defined Exceptions	utility classes	Character Streams classes
S16-18	**SLO-1**	**Lab** 3: Arrays, Control Statements	**Lab** 6: String Class, Command Line Arguments	**Lab** 9: Exception Handling	**Lab** 12: Utility Classes	**Lab** 15: Layout Managers, Byte and Character Streams
	SLO2					

Learning Resources	1. Herbert Schildt (2007), Java: The Complete Reference, Tata McGraw-Hill, Seventh Edition, New Delhi.	1. Horstmann S., Gray Cornell (2001), Core Java 2 Volume In, Fundamentals, Addition Wesley, New York. 2. Arnold and Gosling, J. (2000), The Java Programming Language, Addition Wesley, 2nd Edition, New Delhi. 3. Art Gittleman (2002), Ultimate Java Programming, Wiley Publications, New York.

Learning Assessment											
Bloom's Level of Thinking		Continuous Learning Assessment(50% Weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4(10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	**Dr.S.P.Angelin Claret**

Course Code	USA23302J	Course Name	DATABASE MANAGEMENT SYSTEMS	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

		Learning			Program Learning Outcomes (PLO)													
Course Learning Rationale (CLR):	The purpose of learning this course is to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLR-1 :	Understand the fundamentals of Database Management Systems, Architecture and Languages																		
CLR-2 :	Conceive the database design process through ER Model and Relational Model																		
CLR-3 :	Design Logical Database Schema and mapping it to implementation level schema through Database Language Features																		
CLR-4 :	Familiarize queries using Structure Query Language (SQL) and PL/SQL																		
CLR-5 :	Familiarize the Improvement of the database design using normalization criteria and optimize queries																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	Acquire the knowledge on DBMS Architecture and Languages	3	80	70	H	H	M	M	M	L	M	M	M	L	M	M	L	L	L
CLO-2 :	Apply the fundamentals of data models to model an application's data requirements using conceptual modeling tools like ER diagrams	3	85	75	M	H	H	M	M	L	M	M	M	L	M	M	L	L	L
CLO-3 :	Apply the method to convert the ER model to a database schema based on the conceptual relational model	3	75	70	H	H	H	M	M	L	M	M	M	L	M	M	L	L	L
CLO-4 :	Apply the knowledge to create, store and retrieve data using Structure Query Language (SQL) and PL/SQL	3	85	80	H	H	H	M	M	L	M	M	M	L	M	M	L	L	L
CLO-5 :	Apply the knowledge to improve database design using various normalization criteria and optimize queries	3	85	75	H	H	L	M	M	L	M	M	M	L	M	M	L	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	What is Database Management System	Design process	Application of SQL Commands (Structure Creation, alternation)	Relational Model - Codd Rules	*Transaction Management* *Transaction Concept*
	SLO-2					
S-2	SLO-1	Advantage of DBMS over File Processing System	Entity Relation Model and ER diagram	Defining Constraints-Primary Key, Foreign Key, Unique, not null, check, IN operator	Normalization – 1Nf, 2NF, 3NF, BCNF, 4NF and 5NF	*Transaction States*
	SLO-2					
S-3	SLO-1	Introduction and applications of DBMS, Views of data and *Data Independence*	Case study for ER Diagram	Aggregate Functions	PL/SQL: variable declaration and control structures	Concurrency Control: Lock based Protocols Two Phase Control Commit Protocol
	SLO-2			Built-in Functions-Numeric, Date, String Functions- SQL: Joins Basics		
S 4-6	SLO-1	Lab 1: Data Definition Language Commands on sample exercise	Lab4 Inbuilt functions in SQL on sample Exercise.	Lab 7 : Join Queries on sample exercise. Demonstration for all Join Commands with SQL queries	Lab 10: PL/SQL Conditional and Iterative Statements	*Lab:13 Authenticating the user (Users Credential ability)*
	SLO-2					
S-7	SLO-1	: SQL Data types and Schemas, Database system Architecture	Keys, Attributes and Constraints	Left Inner and Right Outer Joins with suitable examples	PL/SQL: Query Processing and Stored Procedure	Deadlock concepts in Database

	SLO-2	Database Users and Administrators			*PL/SQL: Exceptional Handling*	
S-8	SLO-1	*Roles of Database Administrator*	Mapping Cardinality	Inner and Outer Joins with suitable examples Correlated sub queries	*PL/SQL Cursor*	Recovery mechanism- *Recovery Concepts, Deferred update technique,*
	SLO-2					
S-9	SLO-1	Overview of SQL, *Comparison of Data Models,* DDL (Data Definition Language) Command	*Extended ER - Aggregation*		*PL/SQL: Functions and statements to handle Cursor*	Recovery mechanism - *Immediate update technique, Shadow paging, check point*
	SLO-2		*Generalization and Specialization, ER Diagram Issues*			
S 10-12	SLO-1	*Lab 2: SQL Data Manipulation Language Commands*	*Lab:5 SQL Queries and Set operation SQL*	*Lab8: Correlated Subqueries*	*Lab 11: PL/SQL Exceptional Handling*	*Lab 14: Implementation by Using Tools Frontend (VB 10.0) and Backend (Oracle12g)*
	SLO-2					
S-13	SLO-1	*SQL : Data Manipulation Commands*	*SQL Queries and SQL: Set Operations*	*Pitfalls in Relational database*	*PL/SQL: Trigger* *PL/SQL: Application Programs*	*Implementation by Using Tools Frontend (VB 10.0) and Backend (Oracle12g)*
	SLO-2					
S-14	SLO-1	*SQL: Data Control Commands*	*Conversion of ER to Relational Table*	*Functional Dependency*	*ISAM, B-trees Introduction*	*Mandatory Access control and Multilevel Security*
	SLO-2					
S-15	SLO-1	, SQL: Transaction Control Commands	*SQL: Nested Queries*	*definition, trivial and non-trivial FD*	*File Organization, Indexing Methods – Primary, Secondary, Multilevel Indices*	*Database security and Authorization Need for Database security*
	SLO-2					
S 16-18	SLO-1	*Lab 3: SQL Data Control Language Commands and Transaction control commands to the sample exercises*	*Lab 6: Nested Queries on sample exercise* ** Construction of Relational Table from the ER Diagram*	*Lab9:* Decomposition using FD-dependency preservation,	*Lab 12: PL/SQL Trigger*	*Lab 15 Project: :* *i)Employee payroll processing system* *ii)Student Marksheet processing system* *iii)Banking system*
	SLO-2					

Learning Resources	1. *Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Database System Concepts*ll*, Sixth Edition, Tata McGraw Hill,2011.* 2. *RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems*ll*, Sixth Edition, Pearson Education,2011.* 3. *CJ Date,AKannan,SSwamynathan, An Introduction to Database Systems, Eight Edition, Pearson Education,2006.* 4. *Rajesh Narang, Database Management Systems, 2nded., PHI Learning Private Limited,2011.*	5. *Martin Gruber, Understanding SQL, Sybex,1990* 6. *SharadMaheshwari,Introduction to SQLandPL/SQL,2ded.,LaxmiPublications,2016.* 7. *RaghuramaKrishnan,JohannesGehrke,Database Management Systems,3rdEdition,McGrawHill Education,2003.*

Learning Assessment											
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	1. Mr. M. Ramesh (Assistant Professor, Department of Computer Science and Applications Vadapalani Campus

Course Code	UMS23303T	Course Name	Numerical Methods	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics and Statistics	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1:	*Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLR-2:	*Apply numerical methods to obtain approximate solutions to mathematical problems*																		
CLR-3:	*Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations*																		
CLR-4:	*Analyze and evaluate the accuracy of common numerical methods.*																		
CLR-5:	*Understand and solve problems on numerical differentiation, numerical integration& Milne's predictor-correctorr method*																		
Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*																		
CLO-1:	*Gain knowledge about Bisection, Regulafalsi Newton's method*	3	85	80	L	H	H	M	L	M	M	L	H	L	M	M	L	L	L
CLO-2:	*Appreciate the concepts of simultaneous equations*	3	80	75	L	M	M	H	H	M	M	L	M	L	H	L	L	L	L
CLO-3:	*Understand the basic ideas about Interpolation and extrapolation*	3	85	80	H	L	H	M	M	M	M	M	M	L	H	L	L	L	L
CLO-4:	*Acquire the knowledge on Numerical solutions of Ordinary differential equations of first and second order*	3	85	80	M	H	L	H	M	M	M	M	L	L	H	L	L	L	L
CLO-5:	*Understand and solve the problems on Euler's and Improved Euler's Method - Modified Euler's Method,Runge-Kutta method of second and fourth order – Milne's predictor corrector method*	3	85	80	H	H	H	M	L	M	L	M	M	L	M	M	L	L	L

Duration (hour)		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
		12	12	12	12	12
S-1	SLO-1	*Basic concepts of the algebraic equation*	*Numerical solution of simultaneous equations*	*Finite difference operator - introduction*	*Numerical differentiation -Introduction*	*Numerical solution of ordinary differential equation*
	SLO-2	*Basic concepts of the transcendental equations*	*solution of simultaneous linear algebraic equations*	Forward and Backward difference operator	*Newton's forward difference formula to get the derivative*	Point wise methods
S-2	SLO-1	*Finding of the range of the given equation*	*Gauss elimination method*	*Relation between the operators*	*Newton's backward difference formula to get the derivative*	*Solution by Taylor series method*
	SLO-2	*Bisection method explained*	Direct method explanation	Relation between d and delta	*First derivative*using*Stirling's formula*	*Taylor series method for simultaneous first order differential*

Duration (hour)		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
		12	12	12	12	12
						equations
S-3	**SLO-1**	*Solving Bisection method based problems with two decimal places*	Problems solved based on Gauss elimination method	Newton-Gregory forward interpolation definition	Problems solved based on *First derivative*Stirling's formula	*Taylor series method for simultaneous second order differential equations*
	SLO-2	*Problems solved based on Bisection method*	*Gauss elimination method with unique solution*	*Newton-Gregory forward difference table explanation*	Problems solved based on *second derivative*Stirling's formula	Problems solved based on*Taylor series method*
S 4	**SLO-1**	*Bisection method based problems upto three decimal places*	*Gauss elimination method with negative roots*	*Newton-Gregory forward interpolation concept*	Problems solved based on*First and second derivative using* Stirling's formula	Problems solved based on*Taylor series method*
	SLO-2	*Bisection method based problems upto four decimal places*	*Computation of the inverse of a matrix using Gauss elimination method*	*Expression of any value y in terms of* y_n and the corresponding backward*differences*ofy_n	*Numerical integration basic concept*	*Euler's method*
S-5	**SLO-1**	*Problems solved based on the above concept*	*Computation of the inverse of a matrix using Gauss elimination method*	*Newton - Gregory forward interpolation table based problems*	*A general quadrature formula for equidistant ordinates*	*Improved euler's method*
	SLO-2	*Successive approximation method*	*More problems solved by this method*	*Newton-Gregory backward interpolation concept explanation*	*Numerical integration using Trapezoidalrule*	*Modified euler's method*
S-6	**SLO-1**	The condition for the convergence method	*More problems solved by this method by Gauss elimination method*	*Newton-Gregory backward interpolation based problems solved*	*Trapezoidalrule formula given*	Problems solved based on*Modified euler's method*
	SLO-2	*Order of convergence of an iterative method*	*Jacobi method of iteration (Gauss-Jacobi Method)*	Problems solved based on the above two concept	Geometrical interpretation of *Trapezoidalrule*	Problems solved based on*Euler's method*
S-7	**SLO-1**	*Problems solved based on Successive approximation method*	*Difference between the above methods*	*Newton's divided difference formula*	Truncation error in *Trapezoidalrule*	Problems solved based on*ImprovedEuler's method*
	SLO-2	*Regular falsi method Introduction*	*Iterative methods*	Problems solved based on *Newton's divided difference formula*	Problems solved based on*Trapezoidalrule*	*Runge-Kutta method*
S-8	**SLO-1**	*Basic concepts of Regular falsi method*	*Jacobi method of iteration (Gauss-Jacobi Method)*	Problems solved based on *Newton's divided difference formula*	*Simpson's 1/3 rule -introduction*	*second -order Runge-Kutta method*
	SLO-2	*Regular falsi method method by MATLAB*	*Convergence condition for Gauss-Jacobi Method*	*Lagrange's interpolation formula for uneven intervals*	*Difference between Trapezoidalrule Simpson's 1/3 rule*	Concept- based Simple Problems on *second -order Runge-Kutta method*
S - 9	**SLO-1**	*Problems solved based on Regular falsi method by two decimal places*	*Gauss-Jacobi Method based problems up to two decimal places*	*Lagrange's interpolation formula for even intervals - difference*	Truncation error in*Simpson's 1/3 rule*	*Two decimal places based simple problems on second -order Runge-Kutta method*
	SLO-2	*Problems solved based on Regular falsi method by three decimal places*	*Gauss-Jacobi Method based problems up to three decimal places*	Problems solved based on the *Lagrange's interpolation*	Truncation error in*Simpson's rules*	*four decimal places based simple problems on second -order Runge-Kutta method*
S-10	**SLO-1**	*Problems solved based on Regular falsi method by four decimal places*	*Gauss-Jacobi Method based problems up to three decimal places*	Problems solved based on *Lagrange's interpolation*	Problems solved based on*Trapezoidalruleand Simpson's 1/3 rule*	Problems solved based on*second -order Runge-Kutta method*
	SLO-2	*More problems based on Regular falsi method*	Problems solved based on the above concept	*Lagrange's inverse interpolation formula for uneven intervals*	Problems solved based on*Trapezoidalruleand Simpson's 1/3*	Problems solved based on*second -order Runge-Kutta method*

Duration (hour)		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
		12	12	12	12	12
					rule	
S-11	**SLO-1**	*Problems solved based on Regular falsi method*	*Gauss Seidel iteration method.*	*Lagrange's inverse interpolation formula for even intervals - explanation*	*Numerical integration usingSimpson's 3/8 rule*	*Runge-Kutta method of fourth order*
	SLO-2	*Newton-Raphsonmethod.Introductio n*	*Introduction and formula explanation*	Problems solved based on the *Lagrange's inverse interpolation*	Truncation error in*Simpson's 3/8 rule*	*Formula given for Runge-Kutta method of fourth order*
S-12	**SLO-1**	*Geometrical meaning of Newton-Raphson method.*	*Procedure and difference between the above two methods explanation*	Problems solved based on the *Lagrange's inverse interpolation*	Problems solved based on *Simpson's 3/8rule*	Problems solved based on fourth-*order Runge-Kutta method*
	SLO-2	*Criterian for the convergence in the above methodand problems solved*	*Finding the solution byGauss Seidel iteration method.*	More Problems solved based on the *Lagrange's forward and inverse interpolation*	Problems solved based on the above three methods	Problems solved based on fourth-*order Runge-Kutta method*

Learning Resources	**Book for study:** 1. Numerical methods, Dr.P. Kandasamy, Dr. K.Thilagavathy, Dr. K.Gunavathy, S Chand and Company Reprint 2020 **Books for References:** 1. Kandasamy P, Thilagavathy. K and G. Gunawathy, Numerical Methods, S.Chand& Sons, 3rd Revised Edition, 2013 2. Isaacson E. and Keller, H.B., "Analysis of Numerical Methods" Dover Publication, 1994 3. Philips G.M and Taylor P.J., "Theory and Applications of Numerical Analysis", Academic Press, 1996

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	50%	-
	Analyze										
Level 3	Evaluate	30 %	-	30%	-	30%	-	30 %	-	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers	
Experts from Academic	Internal Experts
1. **Dr.V.Prakash, Dr.Ambedhkar Government arts college, Chennai (academic Expert)**	2. **Dr.S.Lakshmipriya, Assistant Professor, Department of mathematics & Statistics, FSH, SRM IST, Kattankulathur**
3. **Dr. M. Vasantha, ICMR, Chennai(Industrial Expert)**	4. **Dr.L.SIVAKAMI, Assistant Professor, Department of mathematics & Statistics, FSH, SRM IST, Kattankulathur**

Course Code	ULT23AE1J	Course Name	Applied Tamil – I	Course Category	AE	Ability Enhancement Courses (AE)	L	T	P	O	C
							1	0	2	2	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Tamil*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
CLR-1 :	தமிழின் எழுத்து, சொல் வளர்ச்சி வரலாற்றை அறியச் செய்தல்	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	மொழியைப் பிழையின்றி எழுதும் ஆற்றலை அடையச் செய்தல்			
CLR-3 :	வாய்மொழி வழக்காறுகளின் நுட்பங்களைத் தெரியச் செய்தல்			
CLR-4 :	கடிதம் எழுதும் முறை, கட்டுரை வரையும் முறை அறியச் செய்தல்			
CLR-5 :	படைப்பாற்றல் திறனை வளரச் செய்தல்			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	சொற்களைச் சரியான பொருண்மையில் பயன்படுத்தும் திறன் பெறுதல்	2	75	60	H	L	H	M	H	H	L	M	H	M	L	H	-	-	-
CLO-2 :	மொழியைப் பிழையின்றி எழுதுவதன் வழி மொழி ஆளுமை பெறுதல்	2	80	70	H	M	H	L	M	H	L	H	M	L	H	H	-	-	-
CLO-3 :	வாய்மொழி மரபின் கூறுகள் வழி, மக்களின் வாழ்வியல் விழுமியங்களை அறிந்துகொள்ளுதல்	2	70	65	H	L	H	M	H	H	M	H	L	H	M	H	-	-	-
CLO-4 :	அலுவலகப் பயன்பாடு, திறன் மேம்பாடு ஆகியவற்றை நுட்பமாகத் தெரிந்துகொள்ளுதல்	2	70	70	H	M	H	L	H	M	M	H	H	L	H	H	-	-	-
CLO-5 :	கவிதை, கதை படைக்கும் ஆற்றலை அறிந்துகொள்ளுதல்	2	80	70	H	M	H	H	M	H	L	M	H	L	H	H	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	தமிழின் தொன்மை	மெய்யெழுத்துகளின் வகைகள்	வாய்மொழி மரபு, எழுத்து மரபு	தொடர் அமைப்பு	காலந்தோறும் கவிதை
	SLO-2	தமிழின் சிறப்புகள்	மூவினம்	வாய்மொழி மரபில் அனுபவம்	எளிய தொடர்	கவிதை வடிவம்
S-2	SLO-1	கருத்து – பரிமாற்றம்	ஒற்று இடுதல்	வாழ்வியல் தத்துவம்	நெடுந்தொடர்	மரபுக்கவிதை
	SLO-2	பயன்பாட்டுத்தமிழ்	வல்லினம் மிகும் இடங்கள்	பழமொழிகள்	பத்தி எழுதுதல்	வசனகவிதை
S-3	SLO-1	காலந்தோறும் தமிழ்	வல்லினம் மிகா இடங்கள்	பழமொழியும் மனித வாழ்வியலும்	ஒரு பொருளை மையமாகக் கொண்டு எழுதுதல்	புதுக்கவிதை/புதிய வடிவக் கவிதைகள்

	SLO-2	எழுத்துகள் - அறிமுகம்	எழுத்துப்பிழை நீக்கம்	பழமொழியின் வடிவம்	காலந்தோறும் கடிதங்கள்	கவிதைக் களங்கள்
S-4	SLO-1	தமிழ் எழுத்து வரலாறு	பிழை நீக்கி எழுதுதலின் அவசியம்	வட்டார மொழி	தமிழில் கடித இலக்கியம்	கவிதை உள்ளடக்கம்
	SLO-2	எழுத்துகளின் வரிவடிவம்	பிழைகளும் மொழிச் சிக்கல்களும்	வட்டார மொழியில் சொலவடை	கடித வகைகள்	கவிதை எழுதும் முறை
S-5	SLO-1	எழுத்துகளின் பிறப்பு	எதிர்ச்சொல் வரலாறு	பழமொழியும் சொலவடையும்	கடிதம் எழுதும்முறை	தன்னுணர்ச்சிக் கவிதை
	SLO-2	உயிர் எழுத்துப் பிறப்பு	எதிர்ச்சொல்லின் உருவாக்கம்	பேச்சுநடையும் சொலவடையும்	அலுவல் கடிதம்	இயற்கை/சமூகம் - கவிதை
S-6	SLO-1	மெய்யெழுத்துப் பிறப்பு	இணைச்சொல்லும் எதிர்ச்சொல்லும்	மரபுத்தொடர்	வாழ்த்து/பாராட்டுக் /நட்புக் கடிதம்	காலந்தோறும் கதைகள்
	SLO-2	மொழி முதல் எழுத்துகள்	தமிழில் எதிர்ச்சொற்கள்	பழமொழி மரபுத் தொடர் வேறுபாடு	கட்டுரை வகைகள்	கதைகளில் கற்பனையும் உண்மையும்
S-7	SLO-1	மொழி இறுதி எழுத்துகள்	ஓரெழுத்து ஒருமொழி – அறிமுகம்	தமிழில் மரபுத்தொடர்	கட்டுரை எழுதும் முறை	வாய்மொழிக் கதை
	SLO-2	எழுத்து வேறுபாடும் பொருளும்	ஓரெழுத்து ஒருமொழியும் பொருளும்	விடுகதை	கட்டுரைக் களங்கள்	ஒரு பக்கக் கதை
S-8	SLO-1	ணகர - னகர - நகர வேறுபாடு	சொற்களின் தன்மைகள்	நுண்ணறிவு வெளிப்படுதல்	போட்டிக் கட்டுரை	சிறுகதை
	SLO-2	லகர – ளகர - ழகர வேறுபாடு	ஒரு சொல் பல பொருள்	கதை மரபில் நாட்டுப்புறக் கதைகள்	அனுபவக் கட்டுரை	கதை எழுதும் முறை
S-9	SLO-1	சொல்லும் பொருளும்	ஒரு பொருள் பல சொல்	தமிழில் நாட்டுப்புறக் கதைகள்	பயணக் கட்டுரை	சமூக உணர்வின் வெளிப்பாடு
	SLO-2	காலந்தோறும் சொற்கள்	சொல் உருவாக்கத்தின் பயன்கள்	நாட்டுப்புறக் கதைகளும் சமூக வரலாறும்	இதழியல் கட்டுரைகள்	நிகழ்வைக் கதை வழியே வெளியிடல்

Learning Resources	1. நல்ல தமிழ் எழுத வேண்டுமா?, அ. கி. பரந்தாமனார், பாரி நிலையம், 2010. 2. நாட்டுப்புற இயல் ஆய்வு, சு. சக்திவேல், மணிவாசகர் பதிப்பகம், சென்னை, 2006. 3. படைப்புக்கலை, மு. சுதந்திரமுத்து, அறிவுப் பதிப்பகம், சென்னை, 2008. 4. கதையியல், க. பூரணச்சந்திரன், அடையாளம் பதிப்பகம், சென்னை, 2012. 5. இணைய வழித் தரவுகள் : https://tamilheritage.org/

Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**				**Final Examination (50% weightage)**
		CLA – 1 (10%)	**CLA – 2 (10%)**	**CLA – 3 (20%)**	**CLA – 4 (10%)#**	

		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Expert from Higher Technical Institutions**	**Internal Experts**
1. Dr.P.R.Subramanian, Director, Mozhi Trust, Thiruvanmiyur, Chennai – 600 041.	*1. Dr. V. Dhanalakshmi, Associate Professor, Subramania Bharathi School of Tamil Language &Literaturel, Pondicherry University, Pondicherry*	*1. Dr.B.Jaiganesh, Associate Professor & Head, Dept. of Tamil, FSH, SRMIST,KTR*
		2. Dr. R. Ravi, Assistant Professor and Head, Dept. of Tamil, FSH, SRMIST, VDP.
		3. Mr. G. Ganesh, Assistant Professor, Dept. of Tamil, FSH, SRMIST, RMP.
		4. Dr. T.R.HebzibahbeulahSuganthi, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR.
		5. Dr.S.Saraswathy, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR.

Course Code	ULH23AE1J	Course Name	APPLIED HINDI-I	Course Category	AE	Ability Enhancement Courses (AE)	L	T	P	O	C
							1	0	2	2	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*HINDI*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

CLR-1 :	*Explain and appreciate the Constant moral values of India*
CLR-2 :	*Focus on Evaluating the social changes through prose*
CLR-3 :	*To Display moral and social values in the field of religion and communal Unity*
CLR-4 :	*To make translation of good literature and any relevant document from the Hindi Language to English and vice –versa*
CLR-5 :	*To help the learners to tackle Administrative terminology*

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	***Understand the various forms of Prose and different aspects of social issues***	*2*	*75*	*80*
CLO-2 :	***To create an awerness on Ramayanan***	*2*	*80*	*90*
CLO-3 :	***To Examine the accuracy in Translation***	*2*	*75*	*95*
CLO-4 :	*To Provide technical writing skills*	*2*	*80*	*90*
CLO-5 :	***To evaluate the nuance in essays***	*2*	*85*	*90*

Program Learning Outcomes (PLO)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*H*	*H*	*M*	*L*	*H*	*L*	*M*	*L*	*L*	*H*	*M*	-	-	-
H	*H*	*H*	*M*	*L*	*H*	*H*	*M*	*L*	*L*	*H*	*M*	-	-	-
H	*H*	*M*	*L*	*H*	*H*	*M*	*H*	*M*	*M*	*H*	*H*	-	-	-
H	*H*	*L*	*H*	*M*	*H*	*L*	*H*	*H*	*M*	*H*	*H*	-	-	-
M	*H*	*M*	*H*	*L*	*H*	*H*	*L*	*H*	*M*	*H*	*H*	-	-	-

Duration (hour)		9	9	9	9	9
S-1	**SLO-1**	*KAHANI*	*NIBANDH*	*BAL RAMAYAN*	*ANUVAD*	*PARIBHASHIK SHABDAVALI*
	SLO-2	*AVDHARNA*	*AVDHARNA*	*KHATHA VASHTU*	*AVDHARNA*	*ARTH*
S-2	*SLO-1*	*ARTH*	*ARTH*	*AVADHPURI MEN RAM*	*ARTH*	*PARIBHASHA*
	SLO-2	*SWARUP*	*SWARUP*	*RAM KE ADARSH KE PRATI PRERIT KARNA*	*SWARUP*	*SWARUP*
S-3	*SLO-1*	*PARIBHASHA*	*PARIBHASHA*	*RAMAYAN KE PRATI RUCHI JAGANA*	*PARIBHASHA*	*PRAKAR*
	SLO-2	*KAHANI KE TATVA*	*MAHABHARAT KE SAMAY KA BHARAT- BHALKRISHNA BHATT*	*RAMAYAN KA SAMAJ MEN MAHATVA*	*PRAKAR*	*AVADHARNA*
S-4	*SLO-1*	*UDDESHYA*	*LEKHAK PARICHAYA*	*LOKJEEVAN KE PRATI JAGRUP KARNA*	*MAHATVA*	*PRAYOJAN*

	SLO-2		*PATH KA VISLESHAN*	*JANGAL AUR JANKPUR*	*UDDESHYA*	*UDDESHYA*
S-5	*SLO-1*	*ANTASH MAN KI JAGRITI*	*UDDESHYA*	*GURU KE PRATI ADAR BHAV*	*ANUBAD PRAKRIYA*	*MAHATVA*
	SLO-2	*EIDGAH – KAHANI PREMCHAND*	*SAMAJIK SAMRASTA*	*VIRTA KE BHAV KO JAGANA*	*VIVIDH PRAYOG*	*PRAYOG*
S-6	*SLO-1*	*KAHANI KA PARICHAYA*	*PAURANIK KAHANIYO SE AVAGAT KARANA*	*VIDHARM KA PRATIFAL*	*HINDI SE ANGREZI ANUVAD*	*UDDESHYA*
	SLO-2	*KAHANI VISLESHAN*	*MAHABHARAT EVAM RAMAYAN KE SAMAJ KI TULNA*	*VAN JEVAN SE AVAGAT KARANA*	*ANGREZI SE HINDI ANUVAD*	*TAKANIKI SHABDAVALI KA MHATVA*
S-7	*SLO-1*	*BAL MANOVIGYAN*	*BABUL AUR KAKTASH- RAMDARASH MISHRA*	*SITA KE ADARSH CHARITRA SE AVAGAT KARANA*	*ANUVAD KA PRAYOJAN*	*HINDI SE ANGREZI SHABD*
	SLO-2	*ASMANTA KA CHITRAN*	*LEKHAK PARICHAY*	*RAM KE CHARITRA SE AVAGAT KARANA*	*ANUVAD KA PRAYOG*	*ANGREZI SE HINDI SHABD*
S-8	*SLO-1*	*DIP SE DIP JALE- USHA YADAV*	*PATH KA VISLESHAN*	*VIRTA KE BHAV JAGANA*	*SHROT BHASHA KA GYAN*	*EK DIN EK SHABD*
	SLO-2	*SAPNE KE LIYE SANGHARSH*	*MANVATA KO JIVIT RAKHANE KI PRERNA*	*PATH KA VISLESHAN*	*LAKSHYA BHASHA KA GYAN*	*SHABDON KA VISLESHAN*
S-9	*SLO-1*	*SAMASYA KA SMADHAN JAD MEN HOTA HAI*	*AAJ KE SANDARBH ME MAHABHARAT KI UPYOGITA*	*PATH PRICHARCHA*	*ANUVAD KA DAYITVA*	*PATH PRICHARCHA*
	SLO-2	*PRASHNABHAYASH*	*PRASHNABHAYASH*	*PRASHNABHAYASH*	*ANUVAD KA ABHYASH*	*PRASHNABHAYASH*

Learning Resources	***Edited Book: "PRAYOJAN MULOK HINDI", SRIJONLOK PUBLICATION, 2023, New Delhi.*** 1. Srijanlok Literary Magazine, Ara (Bihar – 802301) 2. https://hindisamay.com/ 3. https://ncert.nic.in/textbook.php?fhbr1=0-12 ***4.*** Prayojanmulak Hindi, Dr.Sontakke ***5.*** https://rajbhasha.gov.in/hi/ol_clause				*PUNRIKSHAN*

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-

Level 2	Apply	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Shri. Santosh Kumar Editor : Srijanlok Magazine Place: Vashishth Nagar, Ara – 802301	*1. Prof.(Dr.) S.Narayan Raju, Head, Department of Hindi,CUTN, Tamilnadu*	*1. Dr.S Preeti. Associate Professor & Head, SRMIST*
		2. Dr. Md.S. Islam Assistant Professor, SRMIST
		3.Dr. S. Razia Begum, Assistant Professor, SRM IST
		4, Dr.NishaMurlidharan Assistant Professor, VDP,SRM IST

Course Code	ULF23AE1J	Course Name	French for Specific purpose-I	Course Category	AE	Ability Enhancement Courses (AE)	L	T	P	O	C
							1	0	2	2	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*French*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Strengthen the language of the students both in oral and written			
CLR-2 :	Express their sentiments, emotions and opinions, reacting to information, situations			
CLR-3 :	Make them learn the basic rules of French Grammar.			
CLR-4 :	Develop strategies of comprehension of texts of different origin			
CLR-5 :	Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*To acquire knowledge about French language*	2	75	80
CLO-2 :	*To strengthen the knowledge on concept, culture, civilization and translation of French*	2	80	90
CLO-3 :	*To develop content using the features in French language*	2	75	80
CLO-4 :	*To interpret & Translate the French language into other language*	2	75	90
CLO-5 :	*To improve the communication, intercultural elements in French language*	2	80	75

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*M*	*H*	*H*	*M*	*H*	*H*	*L*	*M*	*M*	*H*	*L*	-	-	-
M	*H*	*L*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*H*	*M*	-	-	-
H	*H*	*L*	*M*	*H*	*M*	*L*	*H*	*M*	*M*	*H*	*H*	-	-	-
H	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	*M*	*L*	-	-	-
M	*H*	*H*	*L*	*M*	*M*	*H*	*H*	*M*	*L*	*H*	*M*	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	TP de chimie	Le jour des examens	L'impératif négatif	Comprendre une lettre de motivation	Comprendre la structure d'un rapport de stage
	SLO-2	Les exemples	Les activités	-Le passé composé avec être	Les exemples	Trouver des mots clés-
S-2	SLO-1	- Un TP au laboratoire-	Le sms à la française -	Les exemples	Repérer le présent	Les activités
	SLO-2	Les exemples	Les activités	Le passé composé des verbes pronominaux	Les activités	Comprendre un texte technique-
S-3	SLO-1	Comprendre un TP	Les examens	-La recherche de stage -	, le passé composé et	Les activités
	SLO-2	Les exemples	Les activités	Les exemples	Les activités	Les exemples
S-4	SLO-1	-Suivre un protocole expérimental -	-Donner des conseils	Les activités	le futur dans un texte	Relever des arguments dans un texte-
	SLO-2	Les activités	Les exemples	Le stage en France	Les exemples	Les activités

S-5	**SLO-1**	Lire des équations chimiques -	-Écrire et comprendre un sms -	Les activités	- Le rapport de stage et le domaine des carburants -	Les exemples
	SLO-2	Les activités	Comprendre une interdiction	Le CV français	Les activités	Les activités
S-6	**SLO-1**	Identifier des formules chimiques à l'oral	Les activités	Les exemples	Le stage	Les activités
	SLO-2	Les exemples	-Donnez des consignes -	La lettre de motivation-	Les exemples	Les pronoms COI
S-7	**SLO-1**	- L'infinitif pour exprimer un ordre ou	Les exemples	Comprendre une offre de stage	La méthode du plan détaillé-	Les exemples
	SLO-2	Les activités	Comprendre	Les exemples	Les activités	Les exemples
S-8	**SLO-1**	un conseil (dans les consignes) -	Les exemples	Les activités	Les exemples	Les activités
	SLO-2	Les exemples	et parler d'actions passées-	Comprendre et réaliser un CV	Le contenu du rapport de stage	Quelques verbes et leur préposition
S-9	**SLO-1**	La nominalisation	Les exemples	Les activités	Les exemples	Les activités
	SLO-2	Les exemples	L'impératif des verbes pronominaux	Les exemples	Les activités	Les exemples

Learning Resources	***Theory:*** 1. **"*Tech French*"** French for Science and Technology, Ingrid Le Gargasson, Shariva Naik, Claire chaize, Les éditions Didier, India, 2011. ***2.*** *https://www.fluentu.com/blog/french/french-grammar* ***3.*** *https://www.elearningfrench.com/learn-french-grammar-online-free.html* ***4.*** *https://www.lawlessfrench.com/grammar* ***5.*** *https://blog.gymglish.com/2022/12/15/basic-french-grammar*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment(50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
Level 2	Apply Analyze	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
Level 3	Evaluate Create	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
1. Mr. KavaskarDanasegarane Process Expert Maersk Global Service Center Pvt. Ltd	*1. Dr. C.Thirumurugan Professor, Department of French, Pondicherry University*	*1. Mr. Kumaravel K. Assistant Professor & Head, SRMIST, KTR*
2.Mr. Sharath Raam Prasad, Character Designer, Animaker Company Pvt.		*2. Mrs. Abigail, Assistant Professor, SRMIST, VDP*

Course Code	UCA23G01J	Course Name	FUNDAMENTALS OF DATA SCIENCE	Course Category	G	Generic Elective Courses	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Understand the basics of Data Science
CLR-2 :	Learning and implementing the fundamentals of Python for data science
CLR-3 :	Exploring python libraries and data analysis methodologies like Exploratory Data Analysis
CLR-4 :	Acquiring the concepts of user defined modules and packages in python
CLR-5 :	Understanding Matplotlib and Data Visualization

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Learn the fundamentals of data science and its methodologies	2	85	80
CLO-2 :	Implement the data science concepts using python	3	85	80
CLO-3 :	Employ efficient storage and data operations using NumPy arrays	3	85	80
CLO-4 :	Apply powerful data manipulations using Pandas	3	85	80
CLO-5 :	Explore the data using various visualization and Matplotlib	3	85	80

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
H	H	M	M	M	L	M	M	M	L	M	L	L	L	L
M	H	H	H	M	L	M	M	M	L	M	L	L	L	L
M	H	M	H	H	L	M	M	M	L	M	L	L	L	L
M	H	H	H	M	L	M	M	M	L	M	L	L	L	L
M	H	H	H	M	L	M	M	M	L	M	L	L	L	L

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Data science in a big data world	Python Language Basics	NumPy Basics	Getting Started with pandas	Data Cleaning and Preparation
	SLO-2	Benefits and uses of data science and big data	Scalar Types	The NumPy ndarray: A Multidimensional Array Object	Series	Handling Missing Data
S-2	SLO-1	Facets of data	Numeric types	Creating ndarrays	DataFrame	Filtering Out Missing Data
	SLO-2	Structured data and Unstructured data	Strings	Data Types for ndarrays	Index Objects	Filling In Missing Data
S-3	SLO-1	Natural language and Machine-generated data	List	Arithmetic with NumPy Arrays	Essential Functionality	Data Transformation
	SLO-2	Graph-based or network data And Audio, image, and video, Streaming data	Tuples	Basic Indexing and Slicing	Reindexing	Transforming Data Using a Function or Mapping
S	SLO-1	***Lab 1: Perform Analysis on***	***Lab 4: Apply Python built-in data***	***Lab 7: Manipulation of NumPy***	***Lab 10:Perfom operations on Data***	***Lab 13: Perform data transformations***

4-5	**SLO-2**	***Simple Dataset I for Data Science***	***types: Strings, List, Tuples, Dictionary, Set and their methods to solve any given problem***	***arrays- Indexing, Slicing, Reshaping, Joining and Splitting***	***Frames using Python***	***using python***
S-6	**SLO-1**	The data science process	Dictionary	Boolean Indexing	Dropping Entries from an Axis	Replacing Values
	SLO-2	The big data ecosystem and data science	Sets	Fancy Indexing	Indexing, Selection, and Filtering	Renaming Axis Indexes
S-7	**SLO-1**	Overview of the data science process	Type Conversion	Transposing Arrays and Swapping Axes	Selection with loc and iloc	String Manipulation
	SLO-2	Defining research goals and creating a project charter	Operators	Universal Functions: Fast Element-Wise Array Functions	Integer Indexes	Vectorized String Functions in pandas
S-8	**SLO-1**	Retrieving data	Control Flow	Array-Oriented Programming with Arrays	Arithmetic and Data Alignment	Plotting and Visualization
	SLO-2	Cleansing, integrating, and transforming data	Looping- Loop Control statement	Expressing Conditional Logic as Array Operations	Arithmetic methods with fill values	Brief matplotlib API Primer
S 9-10	**SLO-1**	***Lab 2: Create and upload dataset for data analytics***	***Lab 5: Solve problems using decision and looping statements***	***Lab 8: Perform array operations***	***Lab 11:Perfom operations on Data Frames using Python***	***Lab 14: Install, Import Matplotlib. Explore all the Data Visualization Graphs***
	SLO-2					
S-11	**SLO-1**	Combining data from different data sources	Built-in Sequence Functions	Mathematical and Statistical Methods	Operations between DataFrame and Series	Colors, Markers, and Line Styles
	SLO-2	Transforming data	List, Set, and Dict Comprehensions	Methods for Boolean Arrays	Function Application and Mapping	Ticks, Labels, and Legends
S-12	**SLO-1**	Exploratory data analysis	Functions	Sorting	Sorting and Ranking	Annotations and Drawing on a Subplot
	SLO-2	Build the models	Namespaces, Scope, and Local Functions	Unique and Other Set Logic	Axis Indexes with Duplicate Labels	Saving Plots to File
S-13	**SLO-1**	Presenting findings and building applications on top of them	Returning Multiple Values, Errors and Exception Handling	File Input and Output with Arrays, Pseudorandom Number Generation Example: Random Walks	Summarizing and Computing Descriptive Statistics, Correlation and Covariance,	Getting Started with SciPy
	SLO-2	Pyhton Data Analysis,Packages	Files and the Operating System, Constructors		Unique Values, Value Counts, and Membership	SciPy Constants, SciPy Optimizers SciPy Graphs, with Machine Learning with Scikit-Learn
S 14-15	**SLO-1**	***Lab 3: Install Python IDE and perform basic python programs***	***Lab 6: Apply all basic python OOP Concepts***	***Lab 9: Implement Random Walks***	***Lab 12: : Install, Import Pandas Learn and Explore a Sample Dataset with it***	***Lab 15: Install, Import Scikit Learn and Explore Iris Dataset with Pandas for ML Modelling***
	SLO-2					

Learning Resources	*Cielen, D., &Meysman, A. (2016). Introducing Data Science, Manning Publications*	*Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition,2018.*

Learning Assessment												
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**									**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**				
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**		**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%		15%	15%

	Understand											
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%		20%	20%
	Analyze											
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%		15%	15%
	Create											
	Total	100 %		100 %		100 %		100 %			100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	*Dr.S.Gopinathan, Professor, University of Madras, Chennai*	*Dr. J. JebamalarTamilselvi, FSH, SRMIST, RPM*
		Dr V Saravanan, FSH, SRMIST, RPM

Course Code	*UCA23S03L*	Course Name	Web Programming	Course Category	S	Skill Enhancement Courses	L	T	P	O	C
							0	0	2	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	BCA – Data Science	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLR-1 :	To learn the language of the web: HTML and CSS.																		
CLR-2 :	To use cascading style sheets to design web pages																		
CLR-3 :	To understand, analyze and build web applications using PHP																		
CLR-4 :	To personalize web site content using Session and Cookies																		
CLR-5 :	To develop an ability to design and implement static and dynamic website																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	Design and implement dynamic websites with good aesthetic sense of designing	3	90	90	H	H	H	M	M	L	L	M	M	M	M	M	L	L	L
CLO-2 :	Create web pages using HTML and Cascading Styles sheets	3	85	85	M	M	M	M	M	L	L	M	M	M	M	M	L	L	L
CLO-3 :	Analyze a web page and identify its elements and attributes	3	85	85	H	M	M	H	H	L	L	M	M	M	M	M	L	L	L
CLO-4 :	Manage web site content using Session and Cookies	3	85	85	H	M	H	H	H	L	L	M	M	M	M	M	L	L	L
CLO-5 :	Build web applications using PHP	3	90	90	H	H	H	M	M	L	L	M	M	M	M	M	L	L	L

Duration (hour)		6	6	6	6	6
S-1	**SLO-1**	Introduction to HTML	Types of style sheet	Working with Forms and Form Data	MySQL Basics	Retrieving data from MySQL
	SLO-2	Structure of HTML	About CSS Selectors	Building forms	MySQL introduction	Working with retrieved data
S-2	**SLO-1**	Attributes & Values	About CSS Properties	Single-page form processing	Creating a database	Creating records with PHP
	SLO-2	Comments, Header Tags	Background Properties	Validating form values	Creating a database table	
S-3	**SLO-1**	Image Tag & Link Tags (Text & Image)	Box Properties	Custom validation functions	CRUD in MySQL	Updating and deleting records with PHP
	SLO-2	Marquee Tag	Border Properties	Single-page form with validations	Populating a MySQL database	
S-4	**SLO-1**	List Tag (Ordered & Unordered)	Positioning Properties	Working with Cookies and Sessions	Relational database tables	SQL injection
	SLO-2	Table Tag		Working with Cookies	Populating the relational table	
S-5	**SLO-1**	Form Tags	CSS Menu Design	Setting cookie values	Using PHP to Access MySQL	Escaping strings for MySQL
	SLO-2	Audio, Video Tags		Reading cookie values	Database APIs in PHP	
S-6	**SLO-1**	Embedding PHP code on a page	Creating a Web Layout using Divs, CSS	Unsetting cookie values Working with sessions	Connecting to MySQL with PHP	Introducing prepared statements
	SLO-2	Building Web Pages with PHP				

Learning Resources	*Learning PHP, MySQL & JavaScript, 6th Edition by Robin Nixon, O'Reilly Media, Inc., 2021, ISBN: 9781492093824*	*Microsoft® HTML5 Step by Step, by FaitheWempen, Microsoft Press ISBN: 9780735656543, 2011*

Learning Assessment					
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**			
		CLA – 1 (20%)	**CLA – 2 (20%)**	**CLA – 3 (30%)**	**CLA – 4 (30%)**
		Practice	**Practice**	**Practice**	**Practice**
Level 1	Remember	30%	30%	30%	10%
	Understand				
Level 2	Apply	30%	30%	30%	50%
	Analyze				
Level 3	Evaluate	40%	40%	40%	40%
	Create				
	Total	100 %	**100%**	**100%**	**100%**

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr.J.JebamalarTamilselvi, SMIST, RPM*
		Dr V Saravanan, SRMIST, RPM

Course Code	UCA23P01L	Course Name	INTERNSHIP - I	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	0	0	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	Demonstrate skills learnt in the real time environment.	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To get an insight of an industry and organization/company	3	80	70
CLO-2 :	To gain valuable skills and knowledge	3	85	75
CLO-3 :	To make professional connections and enhance networking	3	75	70
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75

	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	L	H	-	H	L	-	-	-	L	L	-	H	-	H	H
CLO-2 :	M	H	L	M	L	-	-	-	M	L	-	H	-	H	H
CLO-3 :	M	H	M	H	L	-	-	-	M	L	-	H	-	H	H
CLO-4 :	M	H	M	H	L	-	-	-	M	L	-	H	-	H	H
CLO-5 :	H	H	M	H	L	-	-	-	M	L	-	H	-	H	H

Students can choose a company of their own interest for internship for a period of minimum four weeks to learn about the application of IT in real time environment. In the first week of July, all the students have to give a presentation about their observations made by them in internship. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

Learning Assessment				
Project Work / Internship	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Internship Report	Viva-Voce
	20%	30 %	30 %	20 %

Course Code	UCD23V02T	Course Name	Industry Oriented Employability Skills for Science	Course Category	V	Value Addition course	L	T	P	O	C
							2	0	0	2	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Guidance Cell	Data Book / Codes/Standards	-		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	Demonstrate various principles involved in solving mathematical concepts related to permutation and combination and probability and interpret data	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Learn the basic mechanics of grammar and develop resume-building practice and presentation skills in students			
CLR-3 :	Understand the object oriented features			
CLR-4 :	Prepare students for job interviews			
CLR-5 :	Instill confidence in students and develop the necessary skills to face interview			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning		
		1	2	3
CLO-1 :	Understand the concepts of permutation and combinations, probability and approach questions in a simpler and innovative method	3	80	70
CLO-2 :	Understand the different parts of speech and use them in sentences appropriately and also the importance of resume preparation	3	85	75
CLO-3 :	Understand the importance of object oriented features	3	85	80
CLO-4 :	Face interviews confidently	3	85	80
CLO-5 :	Develop their domain skills to face the interview	3	85	80

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behaviour	Life Long Learning
CLO-1 :	M	M	-	M	-	H	-	M	H	M	-	H	-	-	-
CLO-2 :	M	-	-	M	-	H	-	-	-	-	H	-	-	L	H
CLO-3 :	H	M	M	M	M	H	L	-	-	-	-	-	M	-	H
CLO-4 :	M	M	H	M	M	H	L	-	-	-	-	-	M	-	H
CLO-5 :	M	M	H	M	M	H	L	-	-	-	-	-	M	-	H

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Permutation and Combination – Introduction	Change of voice	Object Oriented Programming - Introduction	Overloading & Overriding – Introduction	Time Complexity – Introduction
	SLO-2	Permutation and Combination – Problems	Change of voice	Introduction to Monolithic, POP, Structures, OOP	Overloading & Overriding	Time Complexity
S-2	SLO-1	Probability – Introduction	Change of speech	Translators – Introduction	Virtual Functions & Abstract Class – Introduction	Stacks & Queue - Applications
	SLO-2	Probability – Problems	Change of speech	Translators	Virtual Functions & Abstract Class	Stacks & Queue - Applications

S-3	**SLO-1**	*Data Sufficiency – Introduction*	*Resume Writing - Introduction*	*Class – Introduction*	*Dangling Pointer – Introduction*	*Linked List & Operations – Introduction*
	SLO-2	*Data Sufficiency – Problems*	*Resume Writing - Introduction*	*Class*	*Dangling Pointer*	*Linked List & Operations*
S-4	**SLO-1**	*Puzzles - Selections*	*Resume Writing - Session 1*	*Object Abstraction – Introduction*	*Garbage Collector – Introduction*	*Types of Trees & BST – Introduction*
	SLO-2	*Puzzles - Selections*	*Resume Writing - Session 1*	*Object Encapsulation*	*Garbage Collector*	*Types of Trees & BST*
S-5	**SLO-1**	*Puzzles - Distribution*	*Types of Interviews - Group / Stress / HR*	*Polymorphism, Inheritance and Dynamics Binding – Introduction*	*Algorithm and Data Structures - Introduction*	*AVL Tree Operations – Introduction*
	SLO-2	*Puzzles - Distribution*	*Types of Interviews - Group / Stress / HR*	*Polymorphism, Inheritance and Dynamics Binding*	*Logical Thinking & Arrays*	*AVL Tree Operations*
S-6	**SLO-1**	*Cubes & Cuboids*	*Presentations - Introduction*	*Function Execution Sequence - Introduction*	*Structures & Pointers – Introduction*	*Introduction to P, NP, NP-Hard & NP-Complete Problems*
	SLO-2	*Cubes & Cuboids*	*Presentations - Activity*	*Stack & In Line Functions - Introduction*	*Structures & Pointers*	*Introduction to P, NP, NP-Hard & NP-Complete Problems*

Learning Resources	*1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill, 5th Edition* *2. Scott Bennett, The Elements of Resume Style: Essential Rules for Writing Resumes and Cover Letters That Work, AMACOM, 2014* *3. Raymond Murphy, Intermediate English Grammar, Cambridge University Press, 2007*	*4. Greg Perry, Dean Miller, C Programming Absolute Beginne, Que Publishing, 3rd Edition* *5. Cay S. Horstmann, Core Java Fundamentals, Volume 1, 11th Edition, Prentice Hall, 2018* *6. Langsam, Augenstein, Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.*

Learning Assessment					
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**			
		CLA-1 (20%)	**CLA-2 (20%)**	**CLA-3 (30%)**	**CLA-4 (30%) #**
		Theory	**Theory**	**Theory**	**Theory**
Level 1	Remember	10%	10%	30%	30%
	Understand				
Level 2	Apply	50%	50%	40%	40%
	Analyze				
Level 3	Evaluate	40%	40%	30%	30%
	Create				
	Total	**100 %**	**100 %**	**100 %**	**100 %**

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Mock interviews, etc.

#CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. M. Ponmurugan, Executive PMOSS, Cognizant Technology Solutions India Pvt. Limited, Chennai	*Dr. G. Saravana Prabu, Asst. Professor, Department of English,* *Amrita Vishwa Vidhyapeedam, Coimbatore*	*Dr. Sathish K, HOD, Department of Career Guidance Cell, FSH, SRMIST* *Dr. Muthu Deepa M, Assistant Professor, Department of Career Guidance Cell, FSH, SRMIST*

SEMESTER – IV

Course Code	*UCA23401J*	Course Name	Open Source Technologies	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To gain knowledge about Open Source Software*			
CLR-2 :	*To Learn basic file and directory commands in Linux*			
CLR-3 :	*To develop simple PHP programs*			
CLR-4 :	*To understand working with arrays and functions*			
CLR-5 :	*To learn various MySQL queries*			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	*Create files using Vi editor*	2	85	80	M	M	H	H	H	L	M	M	M	L	M	M	L	L	L
CLO-2 :	Write PHP scripts to handle HTML forms.	3	85	80	M	M	H	H	H	L	M	M	M	L	M	M	L	L	L
CLO-3 :	*Write regular expressions including modifiers, operators, and metacharacters.*	3	85	80	M	M	H	H	H	L	M	M	M	L	M	M	L	L	L
CLO-4 :	*Create PHP programs that use various PHP library functions, and that manipulate files and directories*	3	85	80	M	M	H	H	H	L	M	M	M	L	M	M	L	L	L
CLO-5 :	*Analyze and solve various database tasks using the PHP language*	3	85	80	M	M	H	H	H	L	M	M	M	L	M	M	L	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to Linux	What Does PHP Do?	Introduction to Function	Introduction to Arrays	Introduction to MySQL Database

	SLO-2	Features of Linux	A Brief History of PHP	Calling a Function	Indexed Versus Associative Arrays	Connecting to and disconnecting from the server
S-2	**SLO-1**	Introduction to Linux Distributions	Language Basics	Defining a Function	Identifying Elements of an Array	Creating and using a database
	SLO-2	Widely used Linux distros	Lexical Structure	Variable scope	Storing Data in Arrays	Selecting a database
S-3	**SLO-1**	Open Source software	Introduction to Data Types	Passing parameters by value	Multidimensional Arrays	Creating a table
	SLO-2	Benefits of Open Source software, **Linux Files**	Scalar Types, Compound Types, Special Types	Passing parameters by reference, Default Parameters, Variable Parameters	Extracting Multiple Values, Converting Between Arrays and Variables, Traversing Arrays	Loading data into a table, Retrieving information from a table
S 4-6	**SLO-1** / **SLO-2**	**Lab 1 : Basic Linux Commands**	**Lab 4: Writing Simple PHP Programs**	**Lab 7: Passing parameters to a function**	**Lab 10: Arrays**	**Lab 13: Creating Database, tables**
S-7	**SLO-1**	Listing files	Defining Variables	Missing Parameters	Sorting	Selecting particular rows
	SLO-2	Working with ls command	Variable Scope	Return Values	Reversing an array	Selecting particular columns
S-8	**SLO-1**	Displaying Files Working with cat, more, less command	Introduction to Expressions and Operators	Variable Functions	Introduction to Object	Sorting rows
	SLO-2		Arithmetic operators, Comparison operators, Bitwise operators	Anonymous Functions	Creating an Object	Date Calculation
S-9	**SLO-1**	Printing Files, Working with lpr	Logical operators, Casting operators & Miscellaneous Operators	Introduction to Strings	Accessing Properties and Methods	Working with Null values
	SLO-2	Managing Directories, Working with mkdir, rmdir, cd and pwd commands	Operator precedence, Introduction to Flow-Control Statements	Quoting String Constants, Variable Interpolation	Declaring a Class, Declaring methods and properties	Pattern Matching, Counting Rows, Using more than one table
S 10-12	**SLO-1** / **SLO-2**	**Lab 2: Creating Directory and file in Linux**	**Lab 5: Operators & Control Statements**	**Lab 8: Functions & Strings**	**Lab 11: Arrays & Objects**	**Lab 14: Working with various MySQL Queries**
S-13	**SLO-1**	Listing directories	Working with While, for, foreach,	Accessing Individual Characters	Inheritance	Introduction to Working with MySQl Database using PHP
	SLO-2	ls command	Using exit, return, goto statements	Cleaning Strings	Interfaces	Connecting to MySQL database
S-14	**SLO-1**	File and directory operations	Including Code form another module	Encoding and Escaping	Traits	Querying database
	SLO-2	find, cp, mv, rm and ln commands	Working with include and require construct	Comparing Strings	Abstract Methods	Retrieving and displaying the results
S-15	**SLO-1**	Controlling Access to directories and files	Embedding PHP in Web Pages	Manipulating and Searching Strings	Constructors	Modifying data
	SLO-2	Working with chmod command, working with Vi editor	Standard (XML) Style, SGML Style, ASP Style, Script Style	Introduction to Regular expression, Pattern matching and substituting new text for matching text	Destructors, Introduction to Introspection, Examining an Object	Deleting data, Designing simple database application
S-16-18	**SLO-1** / **SLO-2**	**Lab 3: Working with file commands, Creating and modifying files using Vi Editor**	**Lab 6: Embedding PHP script in HTML**	**Lab 9: String Manipulation**	**Lab 12:: Introspection and Serialization**	**Lab 15: Developing Simple Database Applications**

Learning Resources	1. *Richard Petersen - Linux : The Complete Reference ,Sixth edition (2006)* 2. Rasmus Lerdorf, Kevin Tatroe, Bob Kaehms, Ric McGredy (2002), Programming PHP, O'REILLY(SPD)	3. Lee Babin, Nathan A. Good, Frank M. Kromann, Jon Stephens (2005), "PHP 5 Recipes, A problem solution approach", après 4. *Vikram Vaswani (2008), PHP: A BEGINNER'S GUIDE, McGraw-Hill.*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr.V.Raja*

Course Code	*USA23402J*	Course Name	OPERATING SYSTEM	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	Utilize operating systems based on its features and utility			
CLR-2 :	Utilize the Process Management functions of an Operating system			
CLR-3 :	Utilize the features of Memory Management concepts of an Operating system			
CLR-4 :	Analyze how Device Management part of an Operating system functions			
CLR-5 :	Utilize the File Management functions of an Operating system			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Identify functions of an operating system, analyze the process management functions	2	85	80
CLO-2 :	Analyze CPU scheduling and synchronization process of an operating system	3	85	80
CLO-3 :	Analyze the need of Memory management functions of an operating system	3	85	80
CLO-4 :	Identify the significance of device management and file management's role of an operating system	3	85	80
CLO-5 :	Identify the essentials of inter process communication in an operating system, evaluate hypervisors	3	85	80

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	H	H	M	M	M	M	L	M	M	H	L	M	M	L	L
CLO-2 :	H	H	M	M	M	M	L	M	M	H	L	M	M	L	L
CLO-3 :	H	H	M	M	M	M	L	M	M	H	L	M	M	L	L
CLO-4 :	H	H	M	M	M	M	L	M	M	H	L	M	M	L	L
CLO-5 :	H	H	M	M	M	M	L	M	M	H	L	M	M	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction Operating Systems (OS): Operating System overview	Process concept : Introduction	Process Synchronization - Background	Deadlocks -	Memory management:
	SLO-2	Operating system as a resource management	Process states : Process creation and process termination	The Critical section problem	System model	introduction
S-2	SLO-1	Operations, Assembler, Compiler, loader, linker	Process state transition diagram	Two process Solutions	Deadlock characterization	Logical, physical address space
	SLO-2	Evolution of Operating Systems ,serial processing and batch processing	Operation on process	Multi process Solutions	Necessary conditions	Comparison of Logical, physical Address
S-3	SLO-1	Batch: Simple, Multiprogramming	Symmetric	Synchronization	Resource Allocation Graph	Swapping

	SLO-2	Multiprocessor, Time Sharing, parallel systems	multiprocessing	hardware solution	Methods for handling deadlocks	Organization : physical and logical organization
S -4-6	SLO-1	Lab 1: Comparison between various Operating Systems	Lab 4: Simulation of FCFS CPU scheduling algorithm Usage	Lab 7: Write a procedure for timer interrupt handler	Lab 10: Program to implement Bankers Algorithm	Lab 13: multiple partition (dynamic Memory allocation method)
	SLO-2					
S-7	SLO-1	Distributed (client-server, peer-to-peer),	Concurrent process	Semaphores	Deadlock Prevention	Memory allocation method
	SLO-2	Real-Time (hard, soft Clustering (symmetric, asymmetric, parallel)) , Network,)	Usage	Usage	Mutual exclusion, Hold and Wait No Preemption, Circular Wait	Single partition allocation
S-8	SLO-1	Microkernel: Architecture, Kernel mode, user mode, Monolithic, differences	CPU Scheduling: Process Scheduler (long, short, medium term)	Semaphores –Implementation	Deadlock Avoidance Safe state	Multiple partition memory management
	SLO-2	System Call Types	Scheduling criteria	Binary semaphores	Resource Allocation Graph Algorithm	contiguous (fixed, dynamic)
S-9	SLO-1	process control: fork(), exit(), wait()	CPU utilization, throughput, time: (a) turnaround (b) waiting (c) response	Classic Problems of Synchronization - The Bounded Buffer problem	Banker's Algorithm	Contiguous Types: memory protection, allocation, fragmentation , partitioned
	SLO-2	file manipulation: open(), close()	Scheduling Types: FCFS, SJF	The Readers - Writers Problem	Safety Algorithm	Compaction
S-10-12	SLO-1	Lab 2: Booting process in GNU/Linux OS	Lab 5: Priority CPU scheduling algorithm	Lab 8: classical inter process communication problem (Producer consumer)	Lab 11: Program to implement memory allocation with pages	Lab 14 : Simulation of FIFO page replacement algorithm **Paging**
	SLO-2					
S-13	SLO-1	File operations	Priority	The Dinning philosophers problem	Resource request algorithm	Paging
	SLO-2	read(), write()	Round Robin Scheduling	Examples	Examples	Segmentation
S-14	SLO-1	Operating System services	Other Scheduling Types	Critical Regions: Race condition	Deadlock Detection -	Page Replacement Algorithms
	SLO-2	System Programs:	Real Time Scheduling	and process synchronization	introduction	Types of Replacement algorithms
S-15	SLO-1	file management	multilevel queue	Implementation of Critical region	Single instance of each resource type	, Examples
	SLO-2	status information	multilevel feedback queue	Mutual Exclusion Algorithm: Peterson , Monitors	Several instances of a Resource type	Demand paging
S-16-18	SLO-1	Lab 3: Multi-thread Programming	Lab 6: Simulation of Round Robin CPU scheduling algorithm	Lab 9: Write a procedure to make message passing in inter process communication	Lab 12: Simulation of FIFO page replacement algorithm	Lab 15: Simulation of optimal page replacement algorithm
	SLO-2					

Learning Resources	1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating systems, 9th ed., John Wiley & Sons, 2013 2. William Stallings, Operating Systems-Internals and Design Principles, 7th ed., Prentice Hall, 2012	3. Andrew S. Tanenbaum, Herbert Bos, Modern Operating systems, 4th ed., Pearson, 2015 4. Bryant O'Hallaxn, Computer systems- A Programmer's Perspective, Pearson, 2015

Learning Assessment											
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr.M. R..Sudha*

Course Code	UMS23404T	Course Name	Resource Management Techniques	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics and Statistics	Data Book / Codes/Standards	Graph sheet needed		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To provide foundations in Operations Research			
CLR-2 :	To apply basic concepts of Linear programming problems			
CLR-3 :	To learn and understand Operations research approach to various applications			
CLR-4 :	To provide a set of algorithms for solving sequencing problems			
CLR-5 :	To employ appropriate methods of Game theory			
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	To recognize the scope and models of Operations research methods for decision making process.	3	85	80
CLO-2 :	To apply Operations research techniques for solving real life problems	3	80	75
CLO-3 :	To know optimization through various transportation and assignment problems	3	85	80
CLO-4 :	To schedule jobs through machines using the prescribed algorithm	3	85	80
CLO-5 :	To calculate saddle point, strategy and value of the game by various methods	3	85	80

Program Learning Outcomes (PLO)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
L	*H*	*M*	*M*	*M*	*M*	*M*	*M*	*H*	*L*	*H*	*M*	*L*	*L*	*L*
H	*H*	*M*	*M*	*H*	*M*	*M*	*M*	*M*	*L*	*L*	*M*	*L*	*L*	*L*
H	*H*	*L*	-	*M*	*M*	*M*	*M*	*H*	*L*	-	*M*	*L*	*L*	*L*
M	*H*	*M*	*M*	*L*	*M*	*M*	*M*	*H*	*L*	*H*	*M*	*L*	*L*	*L*
L	*H*	*M*	*H*	*M*	*M*	*M*	*M*	*M*	*L*	*H*	*M*	*L*	*L*	*L*

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Operations Research(O.R)	Introduction to Linear Programming Problem (LPP)	Transportation Problems(TP) - Examples, Definitions – decision variables, supply and demand constraints	Sequencing Problems: Introduction	Game theory: Definitions, Examples
	SLO-2	Scope of O.R	Mathematical formulation of LPP	Mathematical formulation of TP	Assumptions made while solving Sequencing problem	Characteristics of Game theory
S-2	SLO-1	Some O.R. Models	Basic assumptions to formulate LPP	Balanced and Unbalanced TP	Total elapsed time, Idle time, No passing Rule	Pure Strategies: Maximin - Minimax Principle
	SLO-2	Iconic Models, Analogue Models	Procédure for forming a LPP model	Methods for finding Initial basic feasible solution	Procedure for sequencing n jobs on 2 machines	Saddle point and value of the game
S-3	SLO-1	Mathematical Models	Formulation of LPP Model	North West Corner Rule	Sequencing n jobs on 2 machines	Mixed Strategies: Games without saddle points
	SLO-2	Static Models ,Dynamic Models	Formulation of LPP Model	North West Corner Rule	Sequencing n jobs on 2 machines	Solving 2x2 games
S 4	SLO-1	Deterministic Models, Stochastic Models	Graphic method of solving LPP	Row Minima Method	Sequencing n jobs on 2 machines	Solving 2x2 games
	SLO-2	Classification of Models	Graphic method Special Cases: Infeasibility	Column Minima Method	Procedure for sequencing n jobs on 3 machines	Matrix oddment method for 3x3 games
S-5	SLO-1	Characteristics of O.R.	Graphic method Special Cases: Unboundedness	Least Cost Method	Sequencing n jobs on 3 machines	Matrix oddment method for nxn games

	SLO-2	Principles of Modelling	Graphic method Special Cases: Redundancy	Least Cost Method	Sequencing n jobs on 3 machines	Matrix oddment method for nxn games
S 6-7	**SLO-1**	General methods for solving O.R. Models	Graphic method Special Cases	Vogel's Approximation Method(VAM)	Procedure for sequencing n jobs on m machines	Dominance property
	SLO-2	Main phases of O.R: Formulation of the problems:	Graphic method Special Cases	VAM Computational details	Sequencing n jobs on m machines	Dominance property: Computational details
S-8	**SLO-1**	Construction of a mathematical model	Advantages of LPP	VAM Computational details	Sequencing n jobs on m machines	Dominance property: Computational details
	SLO-2	Solving the model constructed	Limitations of LPP	Unbalanced Transportation Problem	Sequencing n jobs on m machines: computational details	Dominance property: Computational details
S 9	**SLO-1**	Controlling and updating	General Linear Programming Problem	Unbalanced Transportation Problem	Sequencing n jobs on m machines: computational details	Graphical method for 2x3 games
	SLO-2	Testing the model and its solution, Implementation	Types of Solutions	Maximization case in Transportation Problem	Processing of 2 jobs on n machines	Graphical method for 2xn games
S 10	**SLO-1**	Role of O.R in industry	Canonical form of LPP	Assignment Problem(AP): Examples, Definitions – decision variables, supply and demand constraints	Processing of 2 jobs on n machines: Computational details	Graphical method for 2xn games
	SLO-2	Role of O.R. in Various fields	Standard form of LPP	Mathematical formulation of AP, Balanced and Unbalanced AP	Processing of 2 jobs on n machines: Computational details	Graphical method for 3x2 games
S-11	**SLO-1**	O.R and decision making	Simplex Algorithm Introduction	Assignment Algorithm: Hungarian Method	Processing of 2 jobs on n machines: Computational details	Graphical method for mx2 games
	SLO-2	Role of computers in O.R.	Simplex method: non-degenerate basic solution, degenerate basic solution	Hungarian Method: Computation details	Processing of 2 jobs on n machines: Computational details	Graphical method for mx2 games
S-12	SLO-1	Role of computers in O.R.	Simplex method: basic feasible solution	Solving Unbalanced AP	Processing of 2 jobs on n machines: Computational details	Graphical method for 2xn and mx2 games
	SLO-2	Limitations of O.R.	Simplex Algorithm: Computational details	Maximization case in AP	Graphical method	Limitations of game theory

Learning Resources	**Theory:** **1.** Resource Management Techniques by Prof.V.Sundaresan, K.S.Ganapathy Subramanian, K. Ganesan. **2.** Operations Research: An Introduction.H.A. Taha **3.** Linear Programming. K.G. Murthy **4.** Operations Research. KantiSwarup, Gupta, P.K. and Manmohan

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*30%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*	-
Level 2	Apply Analyze	*40%*	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-
Level 3	Evaluate	*30%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*	-

	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers	
Experts from Academic	Internal Experts
1.Dr.V. Prakash, Dr. Ambedhkar Government Arts college, Chennai (AcademicExpert)	1. Dr.L.Sivakami,SRMIST
2.Dr.M.Vasantha,ICMR,Chennai(IndustrialExpert)	2.Dr.S.Lakshmipriya,SRMIST

Course Code	ULT23AE2J	Course Name	Applied Tamil – II	Course Category	AE	Ability Enhancement Courses (AE)	L	T	P	O	C
							1	0	2	2	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
;Course Offering Department	Tamil	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	அகராதி, கலைச்சொல் குறித்த நுட்பங்களை அறியச் செய்தல்
CLR-2 :	நேர்காணல் செய்யும் திறனும் செய்தி வாசிப்பு முறைகளையும் தெரியச் செய்தல்
CLR-3 :	விமர்சனத்தின் தன்மைகளும் செய்தியறிக்கை தயாரிக்கும் முறையையும் அறியச் செய்தல்
CLR-4 :	பேச்சுக்கலையின் தனித்துவங்களைப் புரியச் செய்தல்
CLR-5 :	கணினித்தமிழின் பல்வேறு நுட்பங்களைத் தெரியச் செய்தல்

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	அகராதித்துறை, கலைச்சொல்லாக்கத் துறையைத் தெரிந்துகொள்ளுதல்	2	75	60	H	L	H	M	H	H	L	M	H	M	L	H	-	-	-
CLO-2 :	ஊடகங்களில் மொழி ஆளுமையோடு செயல்படும் திறன் பெறுதல்	2	80	70	H	M	H	L	M	H	L	H	M	L	H	H	-	-	-
CLO-3 :	கலை, இலக்கிய விமர்சன முறைகளையும், செய்தியறிக்கை தயாரிக்கும் நுட்பங்களையும் தெரிந்துகொள்ளுதல்	2	70	65	H	L	H	M	H	H	M	H	L	H	M	H	-	-	-
CLO-4 :	பல்வேறு வடிவங்களைக் கொண்ட பேச்சுக்கலையை அறிவதன்வழி, சிறந்த மேடைப் பேச்சாளராக உருவாகும் தகுதியைப் பெறுதல்	2	70	70	H	M	H	L	H	M	M	H	H	L	H	H	-	-	-
CLO-5 :	தமிழைக் கணினி வழி, இணையம் வழி கொண்டுசேர்க்கும் உலகளாவிய செயல்பாடுகளை அறிந்துகொள்ளுதல்	2	80	70	H	M	H	H	M	H	L	M	H	L	H	H	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	தமிழில் அகராதிகள்	நேர்காணல் அறிமுகம்	விமர்சனம் – அறிமுகம்	பேச்சுக்கலை	கணினித்தமிழ்
	SLO-2	ஒரு மொழி/இருமொழி அகராதி	ஆளுமைத்திறன்	விமர்சனத்தின் நோக்கம்	பேச்சின் அடிப்படைகள்	கணினி வழித் தட்டச்சு
S-2	SLO-1	பன்மொழி அகராதி	நோக்கம் – கண்டறிதல்	விமர்சன வகைகள்	தன்னம்பிக்கையும் பேச்சும்	தட்டச்சு செய்யும் மென்பொருட்கள்
	SLO-2	உயிர்/மெய் எழுத்துகள்	நேர்காணல் முறைகள்	இலக்கிய விமர்சனம்	பேச்சின் வகைகள்	எழுத்துருக்கள்

S-3	SLO-1	உயிர்மெய் எழுத்துகள்	இனிய சொற்கள் பயன்பாடு	திரை விமர்சனம்	மேடைப் பேச்சு	யூனிகோடு எழுத்துருக்கள்/பிற எழுத்துருக்கள்
	SLO-2	அகராதிக்கான அடிப்படைகள்	நேர்காணல் வகைகள்	கலை விமர்சனம்	பட்டிமன்றப் பேச்சு	குரல் வழி தட்டச்சு
S-4	SLO-1	அகராதி உருவாக்கப் பயிற்சி	நேரடியாக வினா விடை	விமர்சகர் தகுதிகள்	சொற்பொழிவு முறை	எழுத்து வழி தட்டச்சு
	SLO-2	அகராதி உருவாக்கப் பயிற்சி	அச்சு ஊடக நேர்காணல்	தேர்ந்த புலமை	பேச்சின் நுட்பங்கள்	தட்டச்சு செய்யும் பயிற்சி
S-5	SLO-1	கலைச்சொல் அறிமுகம்	காட்சி ஊடக நேர்காணல்	எழுத்துவடிவ விமர்சனம்	பேச்சாளர்களும் பேசும் முறைகளும்	தட்டச்சு செய்யும் பயிற்சி
	SLO-2	பிறமொழிச் சொற்களும் தமிழில் கலைச் சொற்களும்	கேட்பு ஊடக நேர்காணல்	காட்சி வடிவ விமர்சனம்	பேச்சு - எடுத்துரைப்பும் உடல்மொழியும்	பிழை திருத்திகள்
S-6	SLO-1	கலைச்சொல்லாக்க நெறிமுறைகள்	கள ஆய்வில் நேர்காணல்	விமர்சனம் செய்யும் பயிற்சி	நவீன தொழில்நுட்பங்களில் பேச்சு முறைகள்	தமிழில் பிழை திருத்தம் செய்யும் மென்பொருட்கள்
	SLO-2	கலைச்சொல் உருவாக்க உத்திகள்	நேர்காணல் செய்யும் பயிற்சி	விமர்சனம் செய்யும் பயிற்சி	பேச்சாளர்க்குரிய தகுதிகள்	வலைப்பூ உருவாக்கம்
S-7	SLO-1	துறைசார் சொற்கள்	நேர்காணல் செய்யும் பயிற்சி	செய்தியறிக்கை	பேச்சுப் பயிற்சி	வலைப்பூவில் எழுதும் முறைகள்
	SLO-2	புதிய கண்டுபிடிப்புகளும் கலைச்சொற்களும்	செய்தி வாசிப்பு முறைகள்	சமூக நிகழ்வை எழுதுதல்	பேச்சுப் பயிற்சி	வலைப்பூவின் பயன்கள்
S-8	SLO-1	பயன்பாட்டுச் சொற்கள்	செய்தி வாசிப்பு நுட்பங்கள்	செய்தியாளர்க்குரிய தகுதிகள்	கலந்துரையாடலின் நோக்கம்	தமிழ் இணைய நூலகங்கள்
	SLO-2	கலைச்சொல்லாக்கப் பயன்பாடுகள்	உச்சரித்தல்	உற்றுநோக்குதல்	கலந்துரையாடலின் தனித்தன்மைகள்	இணைய நூலகப் பயன்பாடுகள்
S-9	SLO-1	கலைச்சொல் உருவாக்கப் பயிற்சி	பிழையின்றி வாசித்தல்	சமநிலையில் எழுதுதல்	தம் கருத்தைத் தெளிவாக உரைத்தல்	தமிழ்த் தொடரடைவுகள்
	SLO-2	கலைச்சொல் உருவாக்கப் பயிற்சி	வாசித்தலும் உணர்வும்	செய்தியறிக்கை தயாரித்தல்	கலந்துரையாடல் பயிற்சி	தொடரடைவின் பயன்பாடுகள்

Learning Resources	**1.** அகராதியியல், பெ. மாதையன், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர், 1997. **2.** பேச்சுக்கலை, ம. திருமலை, மீனாட்சி புத்தக நிலையம், மயூராவளாகம், மதுரை, 2009. **3.** பேச்சாளராக, அ.கி.பரந்தாமனார், பாரி நிலையம், சென்னை, 1961 **4.** இணையத் தமிழ், சந்திரிகா சுப்பிரமணியன், சந்திரோதயம் பதிப்பகம், மதுரை, 2020. **5.** நேர்காணல், மின்னூலகம், தமிழ் இணையக் கல்விக் கழகம், https://www.tamilvu.org/

Learning Assessment											
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
Level 2	Apply Analyze	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
Level 3	Evaluate Create	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
1. Dr.P.P.R.Subramanian, Director, Mozhi Trust, Thiruvanmiyur, Chennai – 600 041.	*1. Dr. V. Dhanalakshmi, Associate Professor, Subramania Bharathi School of Tamil Language &Literaturel, Pondicherry University, Pondicherry*	*1. Dr.B.Jaiganesh, Associate Professor & Head, Dept. of Tamil, FSH, SRMIST, KTR*
		2. Dr. R. Ravi, Assistant Professor and Head, Dept. of Tamil, FSH, SRMIST, VDP.
		3. Mr. G. Ganesh, Assistant Professor, Dept. of Tamil, FSH, SRMIST, RMP.
		4. Dr. T.R.HebzibahbeulahSuganthi, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR.
		5. Dr.S.Saraswathy, Assistant Professor, Dept. of Tamil, FSH, SRMIST, KTR.

Course Code	ULH23AE2J	Course Name	APPLIED HINDI-II	Course Category	AE	Ability Enhancement Courses (AE)	L	T	P	O	C
							1	0	2	2	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*HINDI*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To find and analyze different types of Cinema*			
CLR-2 :	*To Discover the print Media in the present World*			
CLR-3 :	*Writing report for Employability*			
CLR-4 :	*Writing Reviews and Create Job Oriented learning*			
CLR-5 :	*To Acquire technical words for various job Prospects*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3	Program Learning Outcomes (PLO)														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	*To Understand the History and Documentary in Hindi Cinema*	*2*	*75*	*80*	*H*	*H*	*H*	*M*	*L*	*H*	*L*	*M*	*L*	*L*	*H*	*M*	-	-	-
CLO-2 :	*To Comprehend Media Studies*	*2*	*80*	*90*	*H*	*H*	*H*	*M*	*L*	*H*	*H*	*M*	*L*	*L*	*H*	*M*	-	-	-
CLO-3 :	*To Evaluate report Writing*	*2*	*75*	*95*	*H*	*H*	*M*	*L*	*H*	*H*	*M*	*H*	*M*	*M*	*H*	*H*	-	-	-
CLO-4 :	*Enhance their Writing Skills in Media Studies*	*2*	*80*	*90*	*H*	*H*	*L*	*H*	*M*	*H*	*L*	*H*	*H*	*M*	*H*	*H*	-	-	-
CLO-5 :	*To Understand and usage of technical words in Hindi*	*2*	*85*	*90*	*M*	*H*	*M*	*H*	*L*	*H*	*H*	*L*	*H*	*M*	*H*	*H*	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	*HINDI CINEMA*	*MEDIA AUR HINDI BHASHA*	*REPORTARJ LEKHAN*	*FILM REVIEW& VIGYAPAN*	*PARIBHASHIK SHABDAVALI*
	SLO-2	*CINEMA KI AVDHARNA*	*AVDHARNA*	*AVDHARNA*	*ARTH*	*ARTH*
S-2	SLO-1	*UDBHAV*	*SWARUP*	*SWARUP*	*PARIBHASHA*	*PARIBHASHA*
	SLO-2	*VIKASH*	*MAHATVA*	*UDDESHYA*	*SWARUP*	*SWARUP*
S-3	SLO-1	*DOCUMENTRI MOVE KI AVDHARNA*	*MEDIA MEN BHASHA KA PRAYOG*	*MAHATVA*	*AWADHARNA*	*PRAKAR*
	SLO-2	*COMERCIAL MOVE KI AVDHARNA*	*UTTARDAYITVA*	*REPORTARJ LEKHAN KE PRATI RUCHI JAGANA*	*FILM REVIEW KA MAHATTVA*	*AVADHARNA*
S-4	SLO-1	*PRAYOJAN*	*PRINT MEDIA*	*REPORTAJ KI BHUMIKA*	*VIGYAPAN AUR BAZAR*	*PRAYOJAN*
	SLO-2	*UDDESHYA*	*ELECTRONIC MEDIA*	*PRAYOJAN*	*VIGYAPAN AUR ROZGAR*	*UDDESHYA*
S-5	SLO-1	*MAHATVA*	*MEDIA KI JIMMEDARI*	*PRAYOG*	*PRINT VIGYAPAN*	*MAHATVA*
	SLO-2	*PRAKAR*	*SMACHAR LEKHAN*	*UTTARDAYITVA*	*VIGYAPAN KI BHASHA*	*PRAYOG*
S-6	SLO-1	*PRISHTHBHUMI*	*REPORTER KE GUN*	*RIPOTARJ LEKHAN*	*AWADHARNA*	*UDDESHYA*
	SLO-2	*KARYASHALA*	*SAHAJTA*	*PUNRIKSHAN*	*ARTH*	*TAKANIKI SHABDAVALI KA MHATVA*

S-7	**SLO-1**	*DOCUMENTRY KI VIDHI*	*NISPAKSHTA*	*LEKHAN VIDHI*	*PARIBHASHA*	*HINDI SE ANGREZI SHABD*
	SLO-2	*DOCUMENTRY AUR COMERCIAL MOVE MEN ANTAR*	*PEET PATRAKARITA*	*SAMAJIK DAYRA*	*SWARUP*	*ANGREZI SE HINDI SHABD*
S-8	**SLO-1**	*COMERCIAL KI VIDHI*	*UTTARDAYITVA*	*SAHITYA ME RIPOTARJ LEKHAN*	*VIGYAPAN KE PRAKAR*	*EK DIN EK SHABD*
	SLO-2	*MOVE VISLESHAN*	*BHASHA GYAN*	*PARIYOJNA KARYA*	*VIGYAPAN KI VISHESHTAYEN*	*SHABDON KA VISLESHAN*
S-9	**SLO-1**	*PARICHARCHA*	*PARICHARCHA*	*PARICHARCHA*	*VIGYAPAN MANG*	*PATH PRICHARCHA*
	SLO-2	*PRASHNABHYASH*	*PRASHNABHYASH*	*PRASHNABHYASH*	*VIGYAPAN KA PRABHAV*	*PRASHNABHAYASH*

Learning Resources	***Edited Book: "PRAYOJAN MULOK HINDI", SRIJONLOK PUBLICATION, 2023, New Delhi.*** 1. Film Banti Hai aur Banati Bhi hai, Lekhika – Sonal, Neolit Publication 2. https://navbharattimes.indiatimes.com/entertainment/movie-review/articlelist/2325387.cms?curpg=3 3. https://epustakalay.com/book/4858-hindi-patrakarita-by-dr-krishnbihari-mishra/ 4. https://hindisamay.com/ 5. https://rajbhasha.gov.in/hi/hindi-vocabulary

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Shri. Santosh Kumar Editor : Srijanlok Magazine Place: Vashishth Nagar, Ara – 802301	*1. Prof.(Dr.) S.Narayan Raju, Head, Department of Hindi,CUTN, Tamilnadu*	*1. Dr.S Preeti. Associate Professor & Head, SRMIST*
		2. Dr. Md.S. Islam Assistant Professor, SRMIST
		3.Dr. S. Razia Begum, Assistant Professor, SRM IST
		4, Dr.NishaMurlidharan Assistant Professor, VDP,SRM IST

Course Code	ULF23AE2J	Course Name	French for Specific purpose-II	Course Category	AE	Ability Enhancement Courses (AE)	L	T	P	O	C
							1	0	2	2	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*French*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	Strengthen the language of the students both in oral and written
CLR-2 :	Express their sentiments, emotions and opinions, reacting to information, situations
CLR-3 :	Make them learn the basic rules of French Grammar.
CLR-4 :	Develop strategies of comprehension of texts of different origin
CLR-5 :	Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	o enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French	2	75	80	H	M	H	H	M	H	H	L	M	M	H	L	-	-	-
CLO-2 :	*To strengthen the knowledge on concept, culture, civilization and translation of French*	2	80	90	M	H	L	H	H	M	H	M	L	L	H	M	-	-	-
CLO-3 :	*To develop content using the features in French language*	2	75	80	H	H	L	M	H	M	L	H	M	M	H	H	-	-	-
CLO-4 :	*To interpret the French language into other language*	2	75	90	H	L	M	H	M	H	H	M	L	H	M	L	-	-	-
CLO-5 :	*To improve the communication, intercultural elements in French language*	2	80	75	M	H	H	L	M	M	H	H	M	L	H	M	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	TOEIC	Les quantificateurs	Les prépositions de lieu	Les verbes irréguliers	La négation
	SLO-2	Qu'est-ce que c'est/	le génitif	Les activités	le futur et	l'interrogation
S-2	SLO-1	À qui est-il destiné ?	Les adjectifs	Les prépositions de temps -	le conditionnel	Les activités
	SLO-2	Les compétences évaluées	et pronoms possessifs	Les activités	les modaux	l'exclamation
S-3	SLO-1	Le nom	les pronoms	les temps et	La suggestion	Les activités
	SLO-2	Le pluriel des noms	Les pronoms personnels	Les activités	le conseil	l'emphase
S-4	SLO-1	Les indénombrables	les pronoms compléments	les aspects-	Les exemples	Les exemples
	SLO-2	Les noms composés	Les activités	Les activités	le reproche	Les activités

S-5	**SLO-1**	L'adjectif	pronoms réfléchis	Le présent simple	Les activités	l'impératif
	SLO-2	Les comparatifs	Les activités	Les activités	L'obligation	Les activités
S-6	**SLO-1**	les superlatifs	les adverbes	Le présent be+ing	la permission	la voix passive
	SLO-2	les articles définis (the)	Les activités	Les activités	l'interdiction	Les exemples
S-7	**SLO-1**	les articles indéfinis (a, an)	La place de l'adverbe dans la phrase	*Les exemples*	La capacité	les subordonnées relatives
	SLO-2	Les exemples	Les activités	Le prétérit simple - Le prétérit be+ V-ing	l'incapacité	Les activités
S-8	**SLO-1**	Les adjectifs	L'ordre des adverbes	Les exemples	les verbes à particule	Les subordonnées circonstancielles
	SLO-2	Les exemples	Les activités	- Le présent perfectbe+ing	les verbes suivis de V-ing	Les activités
S-9	**SLO-1**	pronoms possessifs (this et that)	les prépositions-	Le pastperfect simple -	d'un infinitif avec sans to	A ne pas confondre
	SLO-2	Les activités	Les exemples	Le past perfect be + ving -	Les exemples	Les activités

Learning Resources	***Theory:*** 1. **"*Réussir le noueau TOEIC*"** Détails des épreuves, méthodologie, grammaire, et vocabulaire, Studyrama. ***2.*** *https://www.fluentu.com/blog/french/french-grammar* ***3.*** *https://www.elearningfrench.com/learn-french-grammar-online-free.html* ***4.*** *https://www.lawlessfrench.com/grammar* ***5.*** *https://blog.gymglish.com/2022/12/15/basic-french-grammar*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	50%	50%	40%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	20%	20%	30%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Expert from Higher Technical Institutions**	**Internal Experts**
1. Mr. KavaskarDanasegarane Process Expert Maersk Global Service Center Pvt. Ltd	*1. Dr. C.Thirumurugan Professor, Department of French, Pondicherry University*	*1. Mr. Kumaravel K. Assistant Professor & Head, SRMIST, KTR*
2.Mr. Sharath Raam Prasad Character Designer, Animaker Company Pvt.		*2. Mrs. Abigail, Assistant Professor, SRMIST, VDP*

Course Code	UCA23G02J	Course Name	*Serverless Database Techniques*	Course Category	G	*Generic Elective Courses*	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	The purpose of learning this course is to:

		Learning
CLR-1 :	*Understand Serverless Computing*	
CLR-2 :	*Design Efficient and Scalable Applications*	
CLR-3 :	*Improve Development Agility*	
CLR-4 :	*Enhance Data Manipulation and Querying Skills*	
CLR-5 :	*Ensure Data Security and Access Control*	

Course Learning Outcomes (CLO):	At the end o this course, learners will be able to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*Understand the concepts and benefits of serverless computing and its application in database systems.*	*3*	*80*	*70*
CLO-2 :	*Design and implement serverless database applications based on given requirements.*	*3*	*85*	*75*
CLO-3 :	*Apply appropriate data modeling techniques for serverless databases.*	*3*	*75*	*70*
CLO-4 :	*Perform querying and data manipulation operations in a serverless environment.*	*3*	*85*	*80*
CLO-5 :	*Implement security measures and access control mechanisms for serverless databases.*	*3*	*85*	*75*

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
H	*H*	*M*	*H*	*M*	*M*	*M*	*M*	*L*	*M*	*L*	*M*	*L*	*L*	*L*
H	*H*	*M*	*M*	*H*	*M*	*M*	*M*	*M*	*M*	L	M	*M*	L	*L*
M	*M*	*M*	*H*	*M*	*H*	*H*	*M*	*M*	*M*	*L*	*M*	*M*	L	*L*
M	M	*H*	*H*	*M*	*M*	*M*	*H*	*M*	*M*	L	*M*	*M*	*L*	*L*
M	*M*	*M*	*M*	*H*	*H*	*H*	M	*M*	*M*	*L*	*M*	*L*	*L*	*L*

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction to Serverless Computing and Databases	Designing Serverless Database Applications	Querying and Data Manipulation in Serverless Databases	Security and Access Control in Serverless Databases	Monitoring, Troubleshooting, and Performance Optimization
	SLO-2	Understanding the concept of serverless computing and its benefits	Analyzing the requirements and considerations for serverless database application design	Querying and retrieving data from serverless databases using SQL and NoSQL techniques	Security considerations for serverless database applications	Monitoring serverless database performance and usage metrics
S-2	SLO-1	Overview of different types of serverless databases	Designing data models and schemas for serverless databases	Implementing data manipulation operations such as insert, update, and delete in a serverless environment	Implementing authentication and authorization mechanisms for serverless databases	Typtes of Troubleshooting
	SLO-2	Exploring the architectural components of serverless databases	Exploring the integration of serverless databases with other cloud services	Understanding the limitations and trade-offs of serverless querying and data manipulation	Applying encryption techniques to protect data in transit and at rest	Optimization of Serverless Database applications
S-3	SLO-1	Introduction to popular serverless database providers and their offerings	Best practices for performance optimization and scalability in serverless database applications	Exploring serverless database-specific querying languages and frameworks	Managing access control policies and roles in a serverless database environment	Implementing logging Strategies

	SLO-2	Types of Serverless Database Techniques	CRUD Opertion in SQLite	SQLite Joins	Introduction to Azure Serverless Computing	error handling strategies in serverless database applications
S-4,5	**SLO-1**	**Lab 1 : SQLite Installation, working with SQLite**	**Lab 4: Program to implement CRUD operations**	**Lab 7:Program to implement SQLite Join operations**	**Lab 10: A quick tour to Azure Serverless Computing**	**Lab 13: Run interactive queries using serverless SQL**
	SLO-2					
S-6	**SLO-1**	Introduction of SQLite	SQLite Insert Query	SQLite Inner Join, Outer Join, Cross Join	O**verview of** Serverless Computing	Scaling strategies for serverless databases based on usage patterns
	SLO-2	History	SQLite Select Query	SQLite Date and Time,	Evolution of Serverless Computing	Auto-scaling strategies
S-7	**SLO-1**	SQLite Features	SQLite Update Query	Connectivity	Characteristics of Serverless Computing	Information Protection & Encryption
	SLO-2	SQLite Advantages	SQLite Delete Query	Database Connectivity	Benefits of Serverless Computing	
S-8	**SLO-1**	SQLite Syntax	SQLite Conditions	Python and SQLite Development	Supported Programming languages for Azure fuctions	Working with Azure Serverless SQL Database
	SLO-2	SQLite Data Type	List of conditions	SQLite Driver for Python	Azure Serverles SQL Database	Implementing Azure Serverless Solutions
S-9,10	**SLO-1**	**Lab 2 : Program to execute SQLite commands**	**Lab 5: Program to implement SQLite Conditions**	**Lab 8: To create and execute a simple python program**	**Lab 11: Program to create serverless database using Azure.**	**Lab 14: Program to perform Customer Tweet Analysis**
	SLO-2					
S-11	**SLO-1**	SQLite Operators	SQLite Where ,AND , OR	SQLite Indexes	Structure, Objective	Problem Statement for Customer Tweet Analysis application
	SLO-2	SQLite Expressions	SQLite LIKE	Python SQLite Cursor object	Overview of Azure Serverles SQL Database	Design the Customer Tweet Analysis application
S-12	**SLO-1**	SQLite Create DB, SQLite Detach DB	SQLite Glob , Limit	SQLite Transactions	Difference between Azure Serverless SQLDatabase and Azure Provisioned SQL Database	Implement the Customer Tweet Analysis application
	SLO-2	SQLite Attach DB	SQLite Order By ,Group By, SQLite Having	SQLite Constraints	Benefits of Azure Serverless SQL Database	Test the Customer Tweet Analysis application
S-13	**SLO-1**	SQLite Create Table	SQLite Distinct, SQLite Union, Union All	SQLite Views, Creating and dropping views	SQL Azure Database Architecture	Problem Statement & Design for Human Resource Management
	SLO-2	SQLite Alter Table	SQLite Triggers ,After Insert , After Update, SQLite Drop Trigger	Getting Started with Python and SQLite, Connecting to SQLite	Azure SQL Services,Scaling Using Azure SQL Database, Azure Blob Storage	Implement and Test the Human Resource Management
S-14, 15	**SLO-1**	**Lab 3 : Program to create , attach and detach database**	**Lab 6: Program to implement Triggers**	**Lab 9: Program to perform SQLite Database connectivity from a python program**	**Lab 12: Program to perform basic database operations using Azure**	Lab **15: Program to develop human resource management**
	SLO-2					

Learning Resources	1. *Serverless Architectures on AWS: With examples using AWS Lambda" by Peter Sbarski* 2. *"Serverless Design Patterns and Best Practices: Build, secure, and deploy enterprise ready serverless applications with AWS" by Brian Zambrano and Ajay Nair* 3. *Python and SQLite Development by Agus Kurniawan* 4. *Mastering Azure Serverless Computing by Abhishek Mishra · 2020* 5. *"Hands-On Serverless Applications with Kotlin: Build scalable, reliable, and cost-effective applications with AWS and Kotlin" by Hardik Trivedi* 6. *"Serverless Applications with Node.js: Using AWS Lambda and Claudia.js" by Slobodan Stojanovic, Aleksandar Simovic, and Philipp Müns*

	7.	*"Mastering Azure Serverless Computing: Design and manage powerful serverless applications using Azure Functions" by Ovais Mehboob*

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	***Dr. P. Roshni Mol, SRMIST***

Course Code	UCA23S04L	Course Name	GO PROGRAMMING	Course Category	S	Skill Enhancement Courses	L	T	P	O	C
							0	0	4	2	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

ourse Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
CLR-1 :	Learn Go fundamentals and apply them in real world scenarios	1	2	3
CLR-2 :	Understand and develop your knowledge of programming fundamentals	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-3 :	Learn to handle the data with various data types.			
CLR-4 :	*Learn the importance of interfaces*			
CLR-5 :	*Learn the Concept of Server Programming*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*Understand the Programming concepts in free form environment*	*3*	*80*	*70*
CLO-2 :	*Know how to use the slices and maps*	*3*	*85*	*75*
CLO-3 :	*Understand to handle the data using pointers*	*3*	*75*	*70*
CLO-4 :	*Usage of Structs and Interfaces etc.,*	*3*	*85*	*80*
CLO-5 :	*Write basic applications in Go*	*3*	*85*	*75*

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	H	*M*	*M*	*H*	*L*	*M*	*M*	M	*M*	*M*	*L*	*H*	*M*	*L*	*L*
CLO-2 :	*H*	*M*	*M*	*M*	*L*	*M*	*M*	*H*	*M*	M	*L*	*H*	*M*	*L*	*L*
CLO-3 :	*H*	*M*	*M*	*M*	*L*	*M*	*M*	*H*	*M*	*M*	*L*	*H*	*M*	*L*	*L*
CLO-4 :	H	*M*	*M*	*M*	*L*	*M*	*M*	*H*	*M*	*M*	*L*	*H*	*M*	*L*	*L*
CLO-5 :	*M*	*M*	*M*	*M*	*L*	*M*	*M*	*H*	*M*	*H*	*L*	*H*	*M*	*L*	*L*

Duration (hour)		12	12	12	12	12
S-1	SLO-1	GO Languages -Introducation	Control statements – if	What is a function? Declaration of Function	What are Structs in GO programming?	What are Files?
S-2	SLO-1	GO Languages - Advantages	Control statements – if else	Types of Functions	Syntax for declaring structs	How do we do File operations?
S-3	SLO-1	Syntax of a GO Program	switch case	Program to find minimum and maximum using function	Methods on structs	Writing Data into a File and Reading Data from a File
S-4	SLO-1	Program to display Sample Text	Write a program to find the biggest of three numbers	Recursive Functions	Methods on non-structs	Program to demonstrate for Writing Data into a File
S-5	SLO-1	What are variables? Rules for naming a variable.	Repetitive Statements – for loop	Function to return multiple values	Program for employee pay roll with structs	Program to demonstrate for Reading Data from a File
S-6	SLO-1	Constants	Go Slices	Program to find nCr using recursive function	What are the Maps in GO?	What are interfaces in GO?

S-7	SLO-1	Write a Simple Program in GO	Program to display all Prime numbers between 1 to 100	Program to swap two numbers with a function returning two values	Syntax for creating a map	Advantages of Interface
S-8	SLO-1	Data Types	Program to display a Pattern	Go Srtructure	Program to demonstrate map	Program to demonstrate interfaces
S-9	SLO-1	Different Types of Operators	Array	Go Type Casting	Pointers	What is OOPS? How a class is created and used in GO?
S-10	SLO-1	Expressions and their types	Array Types	Program to demonstrate Slices	What are pointers and how Pointers are declared and used	Classes
S-11	SLO-1	Write a program to find area of the rectangle	Program for Two Dimensional Array- Matrix Multiplication	Program for string operations.	usage of Pointers	Program to demonstrate classes
S-12	SLO-1	Write a program to find Simple and Compound Interest	Write a program to implement Jump Statements	Program to demonstrate string operations	Program to demonstrate the usage of pointers	interfaces with pointer based Receivers

Learning Resources	1. An Introduction to Programming in Go, Caleb Doxsey 2. *Programming in Go: Creating Applications for the 21st Century by Mark Summerfield (Addison-Wesley Professional)*	3. *The Go Programming Language by Alan A. A. Donovan and Brian W. Kernighan (Addison-Wesley Professional Computing Series)*

Learning Assessment					
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**			
		CLA – 1 (20%)	**CLA – 2 (20%)**	**CLA – 3 (30%)**	**CLA – 4 (30%)#**
		Practice	**Practice**	**Practice**	**Practice**
Level 1	Remember	30%	30%	30%	10%
	Understand				
Level 2	Apply	30%	30%	30%	50%
	Analyze				
Level 3	Evaluate	40%	40%	40%	40%
	Create				
	Total	100 %	**100%**	**100%**	**100%**

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr.D.Helen*

Course Code	UCD23V05T	Course Name	Career Readiness and Professional Skills	Course Category	V	Value Addition Course	L	T	P	O	C
							2	0	0	2	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Guidance Cell	Data Book / Codes/Standards	-		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
CLR-1 :	Enable students to understand reasoning skills and mathematical concepts	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Prepare students for job interviews			
CLR-3 :	Learn structured query language (SQL) to an intermediate/advanced level			
CLR-4 :	Learn the benefits of Python as a scripting language			
CLR-5 :	Develop life-long skills students can use to seek jobs, internships and make career changes			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning		
		1	2	3
CLO-1 :	Solve the problems on reasoning	3	80	75
CLO-2 :	Face interviews confidently	3	80	75
CLO-3 :	Understand the importance and major issues of database security and the maintenance of data integrity	3	75	70
CLO-4 :	Utilise essential programming components including variables, conditional logic, loops, and functions to create simple programs	3	75	70
CLO-5 :	Assist students in choosing a career path during their course	3	75	70

	Program Learning Outcomes (PLO)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	H	M	-	-	-	M	-	H	-	H	-	H	M	-	-
CLO-2 :	-	-	M	-	M	-	-	-	L	-	H	-	-	H	H
CLO-3 :	H	M	-	M	H	-	M	-	-	-	-	M	-	H	M
CLO-4 :	H	-	M	M	-	H	-	-	-	M	-	H	-	H	M
CLO-5 :	-	M	M	-	H	-	M	-	-	-	H	-	-	H	H

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Partnership	Self-Image and Self-Presentation	SQL - Introduction to SQL	SQL – Joins	Class coding basics
	SLO-2	Partnership related solving problems	Etiquettes	SQL Statement Classes	SQL – inner joins –Join Syntax	Class coding basics – quiz session
S-2	SLO-1	Cryptarithmetic	Interview Skills - Introduction	Introduction to Databases	Introducing Python	Understanding Data Structures
	SLO-2	Cryptarithmetic – solving problems	Do's and Don'ts during Interview	SQL - Databases & RDBMS	Introducing Python Object Types	Python for Data
S-3	SLO-1	Ordering, Ranking	Mock Interview – Session 1	SQL data types - Introduction	Python - Data Types & Operators	Python Data Types
	SLO-2	Grouping	Mock Interview – Session 2	SQL data types	Python's Core Data Types	Overview of Python Data Types
S-4	SLO-1	Venn Diagrams concepts	Mock Interview – Session 3	SQL - Syntax	Introduction to Functions	Python Structures
	SLO-2	Venn Diagrams solved questions	Mock Interview – Session 4	SQL – Data Type Syntax	Why use Functions	Overview of Python Data Structures
S-5	SLO-1	Types of Paragraph	HR Round – Practice Session	SQL – Commands Introduction	Python – Functions basic	Python - Collections
	SLO-2	Paragraph Forming Questions	HR personal Interview –Mock-Session	SQL - DDL, DML Commands	Coding functions	Improving Code readability

S-6	*SLO-1*	*Types of Sentences*	*Email Etiquettes*	*SQL - Subqueries*	*Introduction to Classes*	*Collection Module*
	SLO-2	*Ordering of Sentences*	*Email Drafting – Do's and Don'ts*	*Non-correlated Subqueries*	*Why Use Classes?*	*Collection Module in Python*

Learning Resources	*1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill, 5th Edition* *2. Dr.Agarwal.R.S, Quantitative Aptitude for Competitive Examinations, S. Chand and Company Limited, 2018 Edition* *3. Edgar Thrope, Test of Reasoning for Competitive Examinations, Tata McGraw Hill, 6th Edition*	*4. Bhatnagar R P, English for Competitive Examinations, Trinity Press, 2016* *5. C. J. Date, A. Kannan, S. Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.* *6. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.*

Learning Assessment					
Level	Bloom'sLevel of Thinking	Continuous Learning Assessment (100% weightage)			
		CLA-1 (20%)	CLA-2 (20%)	CLA-3 (30%)	CLA-4 (30%)#
		Theory	Theory	Theory	Theory
Level 1	Remember	20%	10%	25%	25%
	Understand				
Level 2	Apply	50%	50%	50%	50%
	Analyze				
Level 3	Evaluate	30%	40%	25%	25%
	Create				
	Total	100 %	100 %	100 %	100 %

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Mock interviews, etc.
CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. M. Ponmurugan, Executive PMOSS, Cognizant Technology Solutions India Pvt. Limited, Chennai	*Dr. G. Saravana Prabu, Asst. Professor, Department of English, Amrita Vishwa Vidhyapeedam, Coimbatore*	*Dr. Sathish K, HOD, Department of Career Guidance Cell, FSH, SRMIST* *Ms. Deepalakshmi S, Assistant Professor, Department of Career Guidance Cell, FSH, SRMIST*

Course Code	UMI23M01L	Course Name	My India Project	Course Category	M	*Mandatory Courses*	L	T	P	O	C
							0	0	0	0	0

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department		*Computer Applications*	Data Book / Codes/Standards	*Nil*	

(Assessment Method – Fully Internal)

Assessment Tools	Marks
Review – I (Activities)	50
Review – II (Project report and Presentation)	50
Total	100

SEMESTER – V

Course Code	UCA23501J	Course Name	Python Programming	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	NIL	Co-requisite Courses	NIL	Progressive Courses	NIL
Course Offering Department	COMPUTER APPLICATIONS	Data Book / Codes/Standards	NIL		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Describe the core syntax and semantics of Python programming language.
CLR-2 :	Discover the need for working with the strings and functions.
CLR-3 :	Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
CLR-4 :	Indicate the use of regular expressions and built-in functions to navigate the file system.
CLR-5 :	Infer the Object-oriented Programming concepts in Python.

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning 1 Level of Thinking (Bloom)	Learning 2 Expected Proficiency (%)	Learning 3 Expected Attainment (%)	PLO 1 Fundamental Knowledge	PLO 2 Application of Concepts	PLO 3 Link with Related Disciplines	PLO 4 Procedural Knowledge	PLO 5 Skills in Specialization	PLO 6 Ability to Utilize Knowledge	PLO 7 Skills in Modeling	PLO 8 Analyze, Interpret Data	PLO 9 Investigative Skills	PLO 10 Problem Solving Skills	PLO 11 Communication Skills	PLO 12 Analytical Skills	PLO 13 ICT Skills	PLO 14 Professional Behavior	PLO 15 Life Long Learning
CLO-1 :	Develop, document, and debug modular python programs to solve computational problems	3	80	70	H	H	M	M	M	H	M	M	M	M	L	M	M	L	L
CLO-2 :	Select a suitable programming construct and data structure for a situation.	3	85	75	M	H	M	M	L	M	M	H	M	H	L	M	M	L	L
CLO-3 :	Use built-in strings, lists, sets, tuples and dictionary in applications.	3	75	70	M	H	M	M	L	M	M	H	M	H	L	M	M	L	L
CLO-4 :	Define classes and use them in applications	3	85	80	M	M	M	M	L	M	H	H	M	H	L	M	M	L	L
CLO-5 :	Use files for I/O operations.	3	85	75	H	M	M	M	L	M	M	H	M	H	L	M	M	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	An introduction to python programming	The Structure of Strings	Introduction to Lists, List literals	Introduction to function, Functions as Abstraction Mechanisms	Introduction to classes
	SLO-2	Structure of a Python program	The Subscript Operator	Basic list operators, Replacing an Element in a List	Functions Eliminate Redundancy, Functions Hide Complexity	Design with Classes
S-2	SLO-1	understanding Python interpreter	Program using subscript operator	Replacing an Element in a List	Functions Support General Methods with Systematic Variations	Objects and Classes, An example for class
	SLO-2	understanding Python Shell	Slicing for Substrings, Program for slicing substrings	Example program to Replace an Element in a List	Functions Support the Division of Labor	Docstrings
S-3	SLO-1	Datatypes, Example program using all data types	Testing for a Substring with the in Operator, Program using substring	List Methods for Inserting Elements	Defining a Recursive Function	Method Definitions, The init Method
	SLO-2	String literals, Escape Sequences	The Positional System for Representing Numbers	Program to List Methods for Inserting Elements	Tracing a Recursive Function	Instance Variables
S	SLO-1	Lab 1: Write a Python code to	Lab 4:Make a simple calculator	Lab 7: Program to Transpose a	Lab 10: Program using recursive	Lab 13: Program using classes and

4-6	**SLO-2**	*display system information using pywhois*		*Matrix* *Program to List Methods for Inserting Elements*	function	methods
S-7	**SLO-1**	*String Concatenation*	*Converting binary to decimal, Program to convert binary to decimal*	*List Methods for Removing Elements*	*Using Recursive Definitions to Construct Recursive Functions*	*The str Method*
	SLO-2	*Variables and the assignment statement*	*Converting decimal to binary, Program to convert decimal to binary*	*Searching a List, Sorting a List*	*Recursion in Sentence Structure*	*Accessors, Mutators*
S-8	**SLO-1**	*Example program using variables*	*Converting binary to decimal, Program to convert binary to decimal*	*Mutator Methods, Aliasing*	*Infinite Recursion, The Costs and Benefits of Recursion*	*The Lifetime of Objects*
	SLO-2	*Program Comments and Doc Strings*	*Converting decimal to binary, Program to convert decimal to binary*	*Aliasing side effects*	*Managing a Program's Namespace*	*Rules for Defining a Simple Class*
S-9	**SLO-1**	*Numerical Datatypes, Character sets*	*String Methods, Program using string method*	*Equality: Object Identity*	*Module Variables, Parameters, and Temporary Variables*	*Rational Number Arithmetic and Operator Overloading*
	SLO-2	*Arithmetic expressions, Understanding error messages*	*Octal and Hexadecimal Numbers, Text Files and Their Format*	*Structural Equivalence*	*Scope, Lifetime*	*Comparison Methods, Equality and the eq Method*
S 10-12	**SLO-1**	**Lab 2: *The Magic 8 Ball is a toy used for fortune-telling or seeking advice.***	***Lab 5: Find the Factorial of a Number*** ***Python Program to Convert Decimal to Binary, Octal and Hexadecimal***	**Lab 8: *Using a List to Find the Median of a Set of Numbers*** ***Program using sorting and searching***	**Lab 11: *Write the code for a mapping that generates a list of the absolute values of the numbers in a list named numbers.***	**Lab 14: *Python Program for Operator overloading***
	SLO-2					
S-13	**SLO-1**	*Logical operators*	*Writing Text to a File, Writing Numbers to a File*	Tuples, Creation of several tuples	*Default (Keyword) Arguments*	*Using pickle for Permanent Storage of Objects*
	SLO-2	*Definite iteration : For loop, Example program using for loop*	*Reading Text from a File, Reading Numbers from a File*	*Dictionaries, Dictionary Literals*	*Functions as First-Class Data Objects*	*Input of Objects and the try-except Statement*
S-14	**SLO-1**	*Formatting text for output,*	*Example program to read and write text and numbers*	*Adding Keys and Replacing Values*	*Mapping, Filtering, Reducing*	*Inheritance Hierarchies and Modeling*
	SLO-2	*Selection : if and if else statement, Example program using if and if else*	*Accessing Files and Directories on Disk*	*Accessing Values*	*Using lambda to Create Anonymous Functions*	*Polymorphic Methods, Abstract Classes*
S-15	**SLO-1**	*Conditional iteration :while loop*	*Manipulating Files and Directories on Disk*	*Removing Keys*	*Example program using functions*	*The Costs and Benefits of Object-Oriented Programming*
	SLO-2	*Example program using while loop*	*Example program to access and manipulate files*	*Traversing a Dictionary*	*Creating Jump Tables*	*Event-Driven Programming, Example for Event-Driven Programming*
S 16-18	**SLO-1**	**Lab 3: Check whether a number is prime or not,** ***Python Program to Generate a Random Number***	***Lab 6: Program to read and write text and numbers***	**Lab 9: *When the user enters a statement, the program responds in one of two ways: 1 With a randomly chosen hedge, such as "Please tell me more." 2 By changing some key words in the user's input string and appending this string to a randomly chosen qualifier. Thus, to "My teacher always plays favorites," the program might reply, "Why do you say that your teacher always plays favorites?"***	**Lab 12: *Write the code for a filtering that generates a list of the positive numbers in a list named numbers. You should use a lambda to create the auxiliary function.***	**Lab 15: Program using polymorphism, abstract classes**
	SLO-2					

Learning Resources	*Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705*

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Ms.N.Revathi*
		Dr. Agusthiyar. R

Course Code	UCA23502J	Course Name	COMPUTER NETWORKS	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understand the evolution of computer networks using the layered network architecture			
CLR-2 :	Understand the addressing concepts and learn networks devices			
CLR-3 :	Design computer networks using subnetting and routing concepts			
CLR-4 :	Understand the error types, framing, flow control			
CLR-5 :	Understand the various Medium Access Control techniques and also the characteristics of physical layer functionalities			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Understand the need for Network and various layers of OSI and TCP/IP reference model.	H	H	M	M	M	H	M	M	M	M	M	M	L	L	L
CLO-2 :	Explain various Data Communications media	H	H	M	M	M	H	M	M	M	M	L	M	L	L	L
CLO-3 :	Identify the different types of network topologies and Switching methods.	H	H	M	M	M	H	M	M	M	M	L	M	L	L	L
CLO-4 :	Identify the different types of network devices and their functions within a network.	H	H	M	M	M	H	M	M	M	M	L	M	L	L	L
CLO-5 :	Analyze and Interpret various Network and Transport Layer protocols.	H	H	M	M	M	H	M	M	M	M	L	M	L	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Evolution of Computer Networks	Data Link Layer	Network Layer	Transport Layer	Physical Layer - Functionalities
	SLO-2	The Internet	Functionalities	Functionalities	Functionalities	Transmission Terminology
S2	SLO-1	The Internet today	MAC Addressing	Network Addressing	Port Number	Frequency, Spectrum, And Bandwidth
	SLO-2	Computer Network Architecture	Framing	Class full Addressing	TCP	Data And Signals
S3	SLO-1	Categories of Networks (LAM,WAN,MAN)	Data Link Control	Routers and Their Functions	TCP Functionalities	Analog And Digital Transmission
	SLO-2	A Data Communications Model-Networks	Line Discipline	Routing Metrics	UDP	Transmission Impairments
S4 – S6	SLO-1 , SLO-2	**Laboratory 1:** Basic Network Commands and their functionalities	**Laboratory 4:** Construct N/W using bus topology, Star topology	**Laboratory 7:** Multi-routing connection with static router	**Laboratory 10:** Implementing a simple application using UCP	**Laboratory 13:**Analyze the Working of a DNS

S7	SLO-1	Protocols	Flow Control – Stop and Wait	Routing Table	UDP Functionalities	Analog to Digital Conversion
	SLO-2	Elements of Protocol	Flow Control – Sliding Window	Routing Algorithm Types	TCP Vs UDP	Digital to Analog Conversion
S8	SLO-1	Network Topologies	Error Control – Stop and Wait	Distance Vector Routing	Application Layer Functionalities	Noise in transmission Attenuation
	SLO-2	Transmission Modes in a Network	Error Control – Go back N	Distance Vector Routing with an Example	HTTP	Twisted Pair-Physical Description-Applications-Unshielded And Shielded Twisted Pair
S9	SLO-1	N/W Layard Architecture	Error Control –Selective Reject	Link State Routing	HTTP Messages	Coaxial Cable- Physical Description-Applications-Transmission Characteristics
	SLO-2	OSI Model Reference Model		Link State Routing Example		Optical Fiber- Physical Description Applications-Transmission Characteristics
S10-12	SLO-1	**Laboratory 2:** Introduction to CISCO Packet Tracer (CPT)	**Laboratory 5:** Construct N/W using Ring topology, Mesh topology	**Laboratory 8:** Connecting 2 LANs Using Dynamic Routing	**Laboratory 11:**Analyzing the Working of RIP	**Laboratory 14**:Implementing a simple web server
	SLO-2					
S-13	SLO-1	Functions of the Various Layers of OSI reference model	Errors in Transmission - Types	Switching in N/W	DNS	Compare the various features of Guided Transmission media
	SLO-2	TCP/IP Reference Model		Circuit-Switching	Electronic mail	Radio Waves -Applications-Transmission Characteristics
S-14	SLO-1	Functionalities of the Various layers of the TCP/IP reference model	Error Detection – Parity, Checksum	Circuit-Switching Advantages	Basic Electronic Mail Operation	Micro Waves Applications-Transmission Characteristics
	SLO-2	Comparison of the OSI and TCP/IP Reference Models	Error Detection - CRC	Packet-Switching Principles	SMTP & MIME	Infrared Waves Characteristics-Applications
S-15	SLO-1	Comparison of Layers	Error Correction -Types	Advantage of Packet Switching	SMTP Overview-Connection Setup-	Satellite Communication
	SLO-2	Comparison of the services	Hamming Code	Compare Circuit and Packet Switching	Mail Transfer	Compare Feature of Guided Vs UnGuided Transmission Media
S16-18	SLO-1	**Laboratory 3:** Build a Peer to Peer N/W using Hub and Switch. Analyze the difference between the working of a Hub and a Switch	**Laboratory 6:** Connecting two LANs using router with static Router	**Laboratory 9:** Implementing a simple application using TCP	**Laboratory 14 :**ARP simulation in CPT	**Laboratory 15:** Emulate Working of a complete N/W using CPT

Learning Resources	1.BehrouzA.Forouzan,(2010), "Data Communications and Networking", 5th Edition 2. ToddLammle,(2011), "CCNA Study Guide", Seventh Edition	3.WilliamStallings,(2010), "Data and Computer Communications", Ninth Edition 4. https://www.netacad.com/courses/packet-tracer

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										

Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	SWEETY BAKYARANI E

Course Code	UCA23503J	Course Name	OBJECT ORIENTED ANALYSIS & DESIGN	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	NIL	Co-requisite Courses	NIL	Progressive Courses	NIL
Course Offering Department	Computer Applications	Data Book / Codes/Standards	NIL		

Course Learning Rationale (CLR):	The purpose of learning this course is to,

CLR-1 :	Build high quality reusable software
CLR-2 :	Apply UML for modeling problems
CLR-3 :	Understand Software Design Patterns
CLR-4 :	Develop reliable software systems
CLR-5 :	Apply Standardized testing approaches

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Master the vocabulary, use and idioms of the UML	2	85	80
CLO-2 :	Scope of Object Oriented Software Systems	3	85	80
CLO-3 :	Understand and Apply UML	3	85	80
CLO-4 :	Design UML Architecture for a system	3	85	80
CLO-5 :	Develop Test Templates	3	85	80

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
H	H	M	M	H	M	M	M	M	L	L	M	L	L	M
H	H	M	M	H	M	M	M	M	L	L	M	L	L	M
M	M	M	M	H	H	H	M	M	L	L	M	L	L	M
M	M	M	M	H	H	H	M	M	L	L	M	L	L	M
M	M	M	M	H	H	H	M	M	L	L	M	L	L	M

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to OOAD	Basics of Structural Modeling	Behavioral Modeling	Architectural Modeling	Patterns & frameworks
	SLO-2	OO Basics	Classes, Class Diagram	Interactions, Sequencing	Component- Components and Interfaces	Patterns & Architecture
S-2	SLO-1	Importance of Modelling	Common Modeling Techniques for classes	Interactions-Links And Associations	Simple and Extended Components	Frameworks, Mechanisms
	SLO-2	Principles of Modelling	Relationships in classes	Objects Creation	Components And Classes	Modeling Design Patterns

S-3	**SLO-1**	Overview of UML	Modeling Dependencies, Inheritance	Modeling Flow Control by Time	Components And Interfaces	Modeling Architecture Patterns
	SLO-2	Where can UML be used?	Modeling Structural Relationship	Modeling Flow Control by Organization	Kinds Of Components	Black Board Architectural Patterns
S-4-6	**SLO-1**	Lab 1: Case Study: ATM System	Lab 4: Case Study-Quiz System	Lab 7: Case Study: Stock Maintenance System	Lab 10: Case Study: Exam Registration System	Lab 13: Case Study: Mark Analysis
	SLO-2					
S-7	**SLO-1**	Overview of Conceptual Model of UML	Extensibility Mechanisms in UML	Use case Diagrams	Organizing Components	Software Quality
	SLO-2	Building Blocks of UML-Things	Stereotypes, Tagged values, Constraints	Usecase, Actors	Component Diagrams	Software Testing
S-8	**SLO-1**	UML Relationships	Notes	Use Case Scenario	Modeling API using Components	Need for testing, Kinds of Error
	SLO-2	Introduction to OOAD	Standard Elements	Use Case and Collaborations	Modeling Tables, Files	Testing Standards
S-9	**SLO-1**	OO Basics	Other Adornments in UML	Organizing Usecases	Modeling Documents	Develop Test Cases
	SLO-2	Importance of Modelling	Modeling New Building Blocks	Modeling Context using usecases	Modeling Source Code using Component Diagram	Develop test plans
S-10-12	**SLO-1**	Lab:2 Case Study: Library Management System	Lab 5: Case Study: Cellular Phone	Lab 8: Case Study:Passport Registration System	Lab 11: Case Study: Order Processing System	Lab 14: Case Study: Develop test template
	SLO-2					
S-13	**SLO-1**	Principles of Modelling	Modeling Comments	Modeling Requirements using usecases	Deployment	Issues in OO Testing
	SLO-2	Architecture	Modeling new properties	Use case Diagram with relationships	Simple and Extended Nodes	Testing, Unit Testing, Integration Testing
S-14	**SLO-1**	Object Oriented Methodologies	Modelling Group of Elements using Packages	Activity Diagram	Nodes and components	Black Box Testing, White Box Testing
	SLO-2	SDLC, SDLC Phases	Interfaces, Object Diagrams	Modeling operation using Activity Diagram, State machine	Organizing Nodes , Connections in Nodes, Deployment Diagrams	Impact of Object Orientation on Testing, GUI Testing, System Testing
S-15	**SLO-1**	Object Oriented Analysis, Differentiate OOA & OOD	Objects & Links, Modelling Anonymous Objects,	Modeling the lifetime of an object	Modeling Processors, Devices, Embedded System	Object Oriented metrics
	SLO-2	Features of OOP,OOPL, Grady Booch, Rambaugh, Methodology, Jacobson	Modeling object structures	State chart Diagram, Modeling Reactive objects using state chart	Modeling Embedded System using Deployment Diagram	Testing Standards
S-16-18	**SLO-1**	Lab 3:Case Study: Student Information System	Lab 6: Illustrate object diagram for Payroll Application	Lab:9: Case Study: Placement Registration System	Lab 12: Case Study: Air Line Reservation	Lab 15: Develop Test cases and Test plan for any system
	SLO-2					

Learning Resources	1. Grady Booch, James Rumbaugh and Ivar Jacobson (2004). "The Unified Modeling Language User Guide". Addison Wesley Longman Pvt. Ltd., Singapore, 2. Craig Larman, —Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Developmentll, Third Edition, Pearson Education, 2005 **3.** Ali Bahrami – Object Oriented Systems Development – McGraw Hill International Edition – 1999

Learning Assessment											
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Mr.D.B.Shanmugam, SRMIST*

Course Code	UCA23D01J	Course Name	WINDOWS PROGRAMMING USING VB.NET	Course Category	D	Discipline Specific Elective Courses	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Understand the basic structure of VB.Net and features of IDE*			
CLR-2 :	*Understand .NET framework and can realize some of the major enhancements in the new version of VB*			
CLR-3 :	*Develop programs using primitives and constructs in VB .NET*			
CLR-4 :	*Handle controls in Forms(message Box, InputBox), Windows MDI forms and Controls (Textbox, Creating MultiLine,Word Wrap textboxes)*			
CLR-5 :	*Understand various controls in VB.NET and able to develop programs using controls*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Design/develop programs with GUI interfaces	*3*	*80*	*70*	*L*	*H*	*M*	*M*	*L*	*H*	*M*	*H*	*L*	*L*	*L*	*M*	*M*	*L*	*L*
CLO-2 :	*Assemble multiple forms, modules, and menus into working VB.NET solutions*	*3*	*85*	*75*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	M	*M*	*L*	*L*	*H*	*M*	*L*	*L*
CLO-3 :	*Develop menu based program for text manipulation*	*3*	*75*	*70*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*M*	*M*	*L*	*L*	*H*	*M*	*L*	*L*
CLO-4 :	*Implement lists and loops with VB.NET controls and iteration*	*3*	*85*	*80*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*H*	*M*	*L*	*L*	M	*M*	*L*	*L*
CLO-5 :	*Understand ADO .NET and develop database applications*	*3*	*85*	*75*	*M*	*M*	*M*	*M*	*M*	*H*	*M*	*H*	*M*	*L*	*L*	*H*	*M*	*L*	*L*

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Evolution of the .NET Framework	*Control Statements*	*Inheritance*	*Exception Handling*	*Single Document Interface(SDI)*
	SLO-2	Overview of the .Net Framework	*If Statement*	*Polymorphism& Virtual Methods*	*Default Exception Handing Mechanism*	*Multiple Document Interface (MDI)*
S-2	SLO-1	*Components of .NET Framework*	*Radio Button Control*	*Abstract classes & Abstract Methods*	*User Defined Exception Handling Mechanism*	*Implementation for SDI and MDI*
	SLO-2	*Common Language Runtime (CLR)*	*Check Box Control*	*Sealed Classes*	*Implementation for Default and User Defined Exception Handling*	*Dialog Boxes*
S-3	SLO-1	*Common Type System(CTS)*	*List Box Control, Group Box Control*	*Interfaces - Definition of an Interface*	*The Throw Statement*	*Implementation for Modal and Modeless Dialog Boxes*
	SLO-2	*Common Language Specification (CLS)*	*Checked List Box Control & Combo Box Control*	*Declaration of an Interface*	*Custom Exception*	*Built-in Dialog Boxes*
S-4 to	SLO-1	***Lab1:Understanding the IDE of***	***Lab 4: String Handling Functions,***	***Lab 7: Connecting to URL using***	***Lab 10: Application using default***	***Lab 13: Develop applications***

S-5	**SLO-2**	***Visual Studio, Changing background and foreground color using toolbox controls***	***Applications using group box, list box, checked list box, combo box***	***Link Label, Paint Brush Application, Application for Implementing the concept Abstract class and abstract methods***	***and User Defined Exception Handling Mechanism***	***using SDI and MDI***
S-6	**SLO-1**	Framework Class Library (FCL)	*Select … Case Statement*	*Usage of Interface*	*Multithreading*	*Implementation for Dialog Boxes*
	SLO-2	*Base Class Library*	*While and Do Statement*	*Implementation of an Interface*	*Usage of Threads, Thread Class*	*ToolBar&StatusBarControl*
S-7	**SLO-1**	*AJAX*	*For Statement and Methods*	*Multiple Implementation of an Interface and Interface with Inheritance*	*Start(), Abort() and Join() Methods*	*Database Connectivity – Introduction*
	SLO-2	*Windows Forms*	*Types of methods*	*Implementation of an Namespace*	*Sleep(), Suspend(),Resume() Method*	*Advantages of ADO.NET*
S-8	**SLO-1**	*ASP.Net&ADO.Net*	*Arrays, One-dimensional Array*	*Components*	*Implementation for Thread Class*	*Managed Data Providers*
	SLO-2	*Benefits of .Net, VB.NET Language*	*Multidimensional Array*	*Access Modifiers*	*Thread Priority*	*Developing a Simple ADO.NET Based Application*
S-9 to S-10	**SLO-1**	***Lab2: Computing area of rectangle, circle, square , Designing Math Calculator***	***Lab 5: Digital clock using Timer control, Design of Animation application***	***Lab 8: Application using ImageList, Loading pictures into picture box, Application using Interface, Components***	***Lab 11: Application using Thread class, Multithreading***	***Lab 14: Textpad Application using Dialog control, Toolbar Application, Notepad Editor***
	SLO-2					
S-11	**SLO-1**	*Development of Simple VB.Net Program*	*Definition of Class&Usage of Class*	*Implementation for Public Access Modifier*	*Synchronization*	*Creating of a Data Table*
	SLO-2	*Variable declaration and Initialization*	*Jagged Array*	*Implementation for Private Access Modifier*	*I/O Streams*	*Retrieving Data from Tables*
S-12	**SLO-1**	*Value Data Types &Reference Data Types*	*Constructor Overloading*	*Implementation for Protected Access Modifier*	*Binary Data Files*	*Table Updating*
	SLO-2	*Boxing& Unboxing*	*Instance Class Members*	*Implementation for Friend Access Modifier and Protected Friend Access Modifier*	*Text Files, Data Files*	*Disconnected Data Access Through Dataset Object*
S-13	**SLO-1**	*Arithmetic Operator, Label Control&& Button Control*	*Shared Class Members*	*Implementation for Polymorphism*	*FileInfo classes*	*Object Model Data set Class*
	SLO-2	*Text Box Control*	*Shared Constructors*	*Implementation for Abstract Class and Abstract Methods*	*DirectoryInfo Classes*	*SQL& OLEDB Provider*
S-14 to S-15	**SLO-1**	*Lab 3: Shopping Cart Application, Student Marksheet, Application using text box control, Label and Button control*	*Lab 6: Sorting array in ascending and descending order, Implementing Constructor, Copy Constructor and Shared Constructor*	*Lab 9: Application using Sealed Class, Polymorphism, Access Modifiers*	*Lab 12: Application for implementing Thread priority, Synchronization, and files*	*Lab 15: Employee Database design with coding, Retrieving data using Grid control, Marksheet preparation using ADO.Net*
	SLO-2					

Learning Resources	1. *Muthu.C (2008), "Visual Basic.Net", 2nd Ed, Vijay Nicole Imprints Pvt., Ltd,* 2. *Jeffrey R.Shaprio (2002), "Visual Basic .NET The Complete Reference", Mac Graw Hill*	3. *Michael Halvorson (2010), "Visual Basic 2010 Step by Step", Microsoft Press.* 4. *Harold Davis (2002), "Visual Basic.NET Programming", Sybex.*	

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Dr. E. Srimathi, Assistant Professor, Department of BCA, SRM IST, Ramapuram Campus.

Course Code	UCA23D02J	Course Name	DATA ANAYLSIS USING R	Course Category	D	Discipline Specific Elective Courses	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	*Learn in-depth concepts, methods and applications of R programming*
CLR-2 :	*Learn how to start looking at data from the perspective of the data scientist*
CLR-3 :	*Experimenting with different data pre-processing techniques for knowledge discovery*
CLR-4 :	Learn about data pre-processing and Exploratory Data Analysis
CLR-5 :	*Use R software for data import and export, data exploration and visualization, and for data analysis tasks*

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Understand the fundamental concepts and applications of R Language	2	85	80
CLO-2 :	Analyze the basic principles of Controls statements , functions and arrays	3	85	80
CLO-3 :	Learn various data structures and their functions	3	85	80
CLO-4 :	Understand about data pre-processing and Exploratory Data Analysis	3	85	80
CLO-5 :	Apply data visualization techniques for various dataset	3	85	80

Learning	Program Learning Outcomes (PLO)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	H	M	M	M	M	H	M	M	M	M	L	H	L	M	L
CLO-2 :	H	M	M	M	M	H	M	H	M	M	L	M	L	M	L
CLO-3 :	M	M	M	M	M	H	M	H	M	M	L	H	L	M	L
CLO-4 :	M	M	M	M	M	H	M	H	M	M	L	H	L	M	L
CLO-5 :	M	M	M	M	M	H	H	H	M	M	L	M	L	M	L

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction to R Programming	Control statements IF, IF…ELSE	R-Function	Importing Files: CSV,xls,text files	Overview of Data Visualization in R
	SLO-2	Essentials of the R Language	SWITCH	Creating Function, Calling function, passing Arguments	Loading and handling Dataset in R	Data Visualization Packages

S-2	SLO-1	Getting Started with R: Installation of R & R Studio	Looping statements: FOR	Built in functions: mean(), paste(),	Getting and Setting the Working Directory – getwd(),setwd()	Interactive Graphics
	SLO-2	R Packages	WHILE, REPEAT	sum(), min(), max(), seq()	tandard Deviation, Skewness ,Kurtosis, Bivariate Quantitative Analysis – Crosstabs , Covariance , Correlation, Data Manipulation in R	Working with Graphs: Creating and saving graphs, Customizing symbols, lines, colors, and axes Annotating with text and titles Controlling a graph's dimensions, Combining multiple graphs into one
S-3	SLO-1	Installing Packages	Control Statement: break statement, next statement	user-defined function	List Management Data Transformation	Plotting, Scatter plot,Line Plot
	SLO-2	Loading Libraries	Working with String and Date	Working with R Date & Math Functions	Merging Data Frames Outlier Detection Combining multiple vector	R – Bar Charts & Box Plot: Bar Chart Labels, Title and Colors.
S-4-5	SLO-1 SLO-2	**Lab 1: Implementation to install R & R Studio and install & load packages**	**Lab 5:Implementation of Control Statements & Looping Statements in R**	**Lab 7:Implementation of R Function**	**Lab :9 Implemataion of Data Manipulation in R**	**Lab 13: Implementation of data visualization in R**
S-6	SLO-1	Working with R Environement Setup	R Data Structure	Working with string functions	Introduction to Data Preprocessing in R	- R –Pie Charts: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart
	SLO-2	R Script	R Vectors – Sequence vector, rep function, vector access,	Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower()	Steps for Data Pre-processing in R	R Histograms – Density Plot,
S-7	SLO-1	Basic Syntax	R List - Creating a List, List, Add/Delete Element List, Size of List, Merging Lists, Accessing element in the List	Data Aggergation	Handling Missing Values: Is.na(),is.nan	Kernel density plots, Violin plots, Heat maps
	SLO-2	Variables in R	R Matrices: Creating Matrixes, Accessing Elements of a Matrix,	Data Summarization	na.omit, na.exclude, na.pass, na.fail	Regression Analysis - Simple Linear Regression
S-8	SLO-1	Variable Assignment	Matrix Computations: Addition, subtraction, Multiplication and Division	Apply Family: apply(),lapply(),sapply()	Exploratory Data Analysis ,Types of EDA	Multiple Regression
	SLO-2	Data types and R Objects	R Arrays: Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculation Across Array Elements	tapply(), mapply()	Descriptive Statistics : min(), max(), range(), mean(),	Logistic Regression
S-9,10	SLO-1 SLO-2	**Lab:2 Implementation of data types in R**	**Lab 6: Implementation of Vector & List**	**Lab 7: Implementation of R Function**	**Lab :10 Implementation of R Program to handle missing values for real-time dataset**	**Lab 14: Implementation of various charts for catogoricial data**

S-11	SLO-1	Working with files: Read and writing into different types of files	Data Frames –Create Data Frame, Data Frame Access	split() Function, by()	median(), quartile ()	Poisson Regression
	SLO-2	Comments in R	Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame	Working with Tables	Measures ofCentralTendency:Mean,Median,Mode	Visualizing bivariate and multivariate relationships
S -12	SLO-1	Saving in R data ,Loading R data objects ,Writing to files	Expand Data Frame: Add Column, Add Row - Joining columns and rows	Matrix/Array-Like Operations on Tables	Measures of Dispersion	Understanding correlograms
	SLO-2	Data sorting , Data aggregation	Data frame rbind() and cbind()	Extracting a Sub table, Table-Related Function	Standard Deviation, ,Bivariate Quantitative Analysis	Using mosaic and association plots
S-13	SLO-1	R Operators: Arithmetic operators, Assignment operators	Merging Data frames merge() – Melting and Casting data melt(), cast().	Data Murging in R	Skewness ,Kurtosis	Identification of missing data
	SLO-2	Comparison operators, Logical operators,Miscellaneous operators	R Factors –creating factors, generating factor levels	Working with dplyr packages	Crosstabs, Covariance , Correlation,	Visualization of missing data patterns
S-14,15	SLO-1 SLO-2	**Lab: 3 Implementation of operators in R**	**Lab 6: Working with Data frames & Factor**	**Lab 8: Implementation of Data murgingoperationg for real-time data set.**	**Lab :12 Implementation of Descriptive Statistics**	**Lab:15: Implementation of Data Visualization for missing data petterns**

Learning Resources	1. Roger D. Peng," R Programming for Data Science ", 2012 2. Norman Matloff,"The Art of R Programming- A Tour of Statistical Software Design", 2011	1. Robert I. Kabacoff, "R in Action Data Analysis and Graphics with R", Manning Publications, 2011. 2. Tony Fischetti Data Analysis with R,Packt Publishing; 2nd edition,2018

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
Level 2	Apply Analyze	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%

Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Dr.D.Helen

Course Code	UCA23D03J	Course Name	WEB DEVELOPMENT USING ANGULAR JS AND MONGODB	Course Category	D	Discipline Specific Elective Courses	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	HTML	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	Create single page applications and understand the functional behavior of dynamic web pages			
CLR-2 :	Understand presentation components that look like HTML elements			
CLR-3 :	Build corner to corner interactive components in dynamic web pages			
CLR-4 :	Understand MVC framework/architecture of web programming/client-server architecture			
CLR-5 :	Build synchronized objects across view and model components			
CLR-6 :	Understanding JSON in DBs, helps building applications for large scale data storage			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	Make use of expressions, do data binding with external components	3	90	90	H	L	H	M	H	-	-	-	M	-	-	-	M	M	H
CLO-2 :	Distinguish the role of MVC in creating dynamic web applications	3	90	90	H	M	H	M	H	-	-	-	H	-	-	-	M	M	H
CLO-3 :	Understand the role of reusability and data encapsulation in the form of objects	3	85	85	-	M	M	M	H	-	-	-	M	-	-	-	M	M	H
CLO-4 :	Distinguish RDBMS and schema design of MongoDB	4	90	90	H	M	H	M	H	-	-	-	M	-	-	-	M	M	H
CLO-5 :	Perform query operations using MongoDB	3	90	90	H	M	M	M	H	-	-	-	M	-	-	-	M	M	H
CLO-6 :	Understand and build logical relationships between documents using MongoDB	4	85	85	H	H	H	H	H	-	-	-	H	-	-	-	M	M	H

Duration (Hour)	15	15	15	15	15

S-1	**SLO-1**	Introduction about HTML Need of Scripting Language	Function Definition, Function Parameters	Image Optimization	Lightweight injection token for libraries	ii)Query an array of nested documents iv)Geospatial Queries Query Operation Examples
	SLO-2	Difference between client and server side scripting	Calling a Function Return Statements	Hydration	Angular Tools , Development workflow	Update Operation: updateOne(), updateMany()
S-2	**SLO-1**	Script tag in HTML Java Script declaration	Nested Functions	Testing –Code Coverage, Testing Services, Basics Testing Components,	CLI Builders	replaceOne(), findAndModify() Update operation :Examples
	SLO-2	Output printing – document. Write, innerHTML	Example program -Simple calculator	Test Pipes, Testing Utility	Language Service	Delete Operation: deleteMany(), deleteOne()
S-3	**SLO-1**	window .alert, console.log Java script statements	Web stacks introduction, Difference between php and java script	Internationalization	Dev Tools	iii)findOneAndDelete() Delete operation Examples
	SLO-2	Comments and Variables	LAMP and LEMP MEAN, MERN	Example Angular Applications	Schematics	Operation on Mongodb Data: projection
S 4-5	**SLO-1**	Laboratory 1 – Java Script Input and Output	Laboratory 4 - Functions	Laboratory 7 – Create an interface	Laboratory 10 - creating database	Laboratory 13 – Working with Update and Delete operations
	SLO-2					
S-6	**SLO-1**	Java script Operators -Logical, Bitwise, Arithmetic and Assignment operators	Introduction About Angular	Animation – Transition and Triggers, Complex Sequence	Introduction about database, Schema	Limiting Records Sorting Records
	SLO-2	Java Script Datatypes – numeric, Java Script Datatypes – non numeric	Getting Started	Reusable Animations, Route Transition Animations	DBMS and RDBMS	Single Field, Compound, Multikey
S-7	**SLO-1**	Conditional statements If else statements Switch statements	Understanding Angular, Overview, Component,Template,	Service workers & PWA	MongoDB Datatypes: i)Integer ii)Boolean iii)Double iv)String v)Arrays vi)Object vii)Null viii)Regular expression ix)Timestamp x)Date xi)Object ID	Geospatial,text Index, Hashed Index
	SLO-2	Iteration statements	Directives ,Dependency Injection	Web Workers	Installing MongoDB in Windows, Linux and Mac Operating Systems	Properties of Index i)Unique Indexes ii)Partial Indexes
S-8	**SLO-1**	Loop Controls – for loop	Developer Guides, overview, standalone, change detection,	Server side rendering	Installing and Working with MongoDB interfaces: i)Mongo Shell, ii)Mongo Compass Introduction to entities of MongoDB: i)Databases i)Collections and iii)Documents	iii)Sparse Indexes iv)TTL Indexes
	SLO-2	While loop, Do while Loop, For each loop	Routing and navigation	Pre rendering	Database: i)createDatabase()method with example ii)dropDatabase() method with example	Aggregation in Mongodb: i)aggregate() method Aggregate expressions: i) $sum ii) $avg iii) $min iv) $max v) $push vi) $addToSet vii) $first viii) $last
S	**SLO-1**	Laboratory 2 – Java Script Operators	Laboratory 5 – Hello World, Create Home	Laboratory 8- Animation	Laboratory 11- Data base	Laboratory 14- Perform Various

9-10	**SLO-2**	and Conditions	Component		Collection	Aggregation Method
S-11	**SLO-1**	Arrays Introduction and declaring	Forms , Reactive Forms	Angular Libraries	Collections: i)createCollection() method with example ii)dropCollection() method with example	MongoDB Backup: Export/Import data backup using shell i)mongodump ii)mongorestore
	SLO-2	Accessing arrays	Building dynamic forms	Feature Preview	Document with different types of values i)Document with Scalar Values	MongoDB Backup: Export/Import data backup using Mongo Compass
S-12	**SLO-1**	Array Properties : index	es-build based builds	Best Practices-Security, Accessibility	ii) Document with Documents as values	Monitoring Deployment using Mongodb: i)mongostat, mongotop
	SLO-2	Input length, prototype	ESM default imports vs. namespace imports	Keeping up to date	iii)Document with Array as values	iii)serverStatus, dbStats, collStats
S-13	**SLO-1**	Array Methods :concat, every, forEach, Array Methods :indexOf, join, lasIndexOf, toString	HTTP Client	property binding best practices	CRUD operation :Insert Operation i)insertOne() and ii)insertMany() with examples	expressions iii) Perform Mongodb data Export and Import using shell as well as mongo compass.
	SLO-2	Array Methods : reduce, reverse, slice, some, sort	Hydration	Lazy loading features modules	Perform Query Operation for the following situations i)Query on nested documents ii)Query an array	iv)Working with mongo deployment commands
S 14-15	**SLO-1**	Laboratory 3 - Looping Statements	Laboratory 6 - Create Housing Location Component	Laboratory 9 –Angular form , Integrate Angular forms ,Build template driven forms	Laboratory 12 – Perform CRUD operations	Laboratory 15: i)Creating different types of indexes
	SLO-2					

Learning Resources	1. **JavaScript, 1st Edition, Kindle Edition by Shyam Seshadri (Author) ,O'Reilly** 2. **Angular: Up and Running: Learning Angular, Step by Step 1st Edition, Kindle Edition by Shyam Seshadri (Author) ,O'Reilly**	1. https://angular.io/docs 2. URL: https://docs.mongodb.com/manual/tutorial/ 3. https://www.javascript.com/

Learning Assessment										
Bloom's Level of Thinking	Continous Learning Assessment(50% Weightage)								Final Examination (50% weightage)	
	CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice

Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. Navarathinamani P, Co-Founder/COO Datayaan Solutions Pvt. Ltd. Chennai	*Dr. Neelanarayanan,, Professor, School of Computer Science and Engineering, VIT Chennai*	*Dr. Umarani*

Course Code	UCA23G03J	Course Name	Basics of Android	Course Category	G	Generic Elective Courses	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	*NIL*	Co-requisite Courses	*NIL*	Progressive Courses	*NIL*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*NIL*	

Course Learning Rationale (CLR):	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Develop Mobile applications			
CLR-2 :	Design UI for activities of mobile applications			
CLR-3 :	Get familiarized with broadcast receivers and Internet services			
CLR-4 :	Work with SQLite Database and content providers			
CLR-5 :	Work on interactive activities that comprises an application			
CLR-6 :	Test application (using emulator) and export the application to a mobile phone			

Course Learning Outcomes (CLO):		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Develop android app that include date, time, toast,	3	80	70	L	H	M	H	L	M	L	L	M	M	M	H	L	L	L
CLO-2 :	Develop mobile app involving interactive components (UI)	3	85	75	H	H	L	M	L	M	L	L	M	L	M	H	L	L	L
CLO-3 :	Create activity that makes use of images, sound files	3	75	70	M	H	M	H	L	M	L	L	M	L	M	H	L	L	L
CLO-4 :	Able to create a contact list that simulates mobile phones (SQlite)	3	85	80	M	H	M	H	L	M	L	L	M	L	M	H	L	L	L
CLO-5 :	Use of spinners, progress bar to simulate loading files with respect to size of file, time and speed of network.	3	85	75	H	H	M	M	L	M	L	L	M	L	M	H	L	L	L
CLO-6 :	Export the activities to the mobile phone and cheer up the work of his own	3	80	70	L	H	M	H	L	M	L	L	M	L	M	H	L	L	L

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction to Android	Layouts and its Types	Gallery and ImageView	Location-Based Services	Eclipse for Android Development
	SLO-2	Android versions	Linear, Scrollview	ImageSwitcher, Grid View	Displaying Maps	Workspaces
S-2	SLO-1	Android open stack	Absolute,Table	Using Menus with View	Creating the Project	Package Explore
	SLO-2	Features	Relative,Frame	Displaying Menus – Options menu	Obtaining Maps API Key	Using Projects from Other Workspaces
S-3	SLO-1	Mobile Application development	Resize and reposition	Context menu	Displaying the Map	Editors
	SLO-2	Mobile Application trends	Screen orientation	Helper methods for menus	Displaying the Zoom Control	Perspectives
S-4,5	SLO-1	Lab1: Simple Mobile App development	Lab4: Demonstrate different layout and views	Lab7: Displaying Pictures an Menus with View	Lab10: Program to display map and location.	Lab13: Demonstration of Eclipse Platform.
	SLO-2					

S-6	**SLO-1**	Eclipse, SDK, AVD	Checkbox	Develop a digital clock	Getting the Location That Was Touched	Code Completion
	SLO-2	Demonstrations Android application	ToggleButton, RadioButton	SMS Messaging	Developing Android Services	Refactoring
S-7	**SLO-1**	Anatomy of Android applications	RadioGroup	Sending SMS Messages Programmatically	Creating Your Own Service	Debugging
	SLO-2	Life cycle of Android	ProgressBar	Getting Feedback After Sending the Message	Performing Long-Running Tasks in a Service	Setting Breakpoint and exceptions
S-8	**SLO-1**	Implicit Intent	AutocompleteText	Receiving SMS	Performing Repeated Tasks in a Service	User defined content providers
	SLO-2	Explicit Intents	Picker View	Broadcasting and service	Executing Asynchronous Tasks on Separate Threads Using Intent Service	Managing data using SQLite
S-9,10	**SLO-1**	Lab2: Applying Styles and Themes to Activity	Lab5: Displaying the Time and Date Picker in a Dialog Window	Lab8: Demonstrating Message services.	Lab11: Program for Creating Your Own Service.	Lab14: Program to demonstrate SQLite application.
	SLO-2					
S-11	**SLO-1**	Understanding Activities	Time and Date Picker View	Caveats and Warnings	Binding Activities to Services	Connecting SQLite
	SLO-2					
S-12	**SLO-1**	Understanding the Components of a Screen	Listviews – list view	Networking	Publishing Android Applications	Data persistence
	SLO-2	Understanding the Components of a Screen	Spinner view	Downloading Binary Data	Preparing for Publishing	Types of Data persistence
S-13	**SLO-1**	Creating the User Interface Programmatically	Web view	Downloading Text File	Versioning	Shared User preferences
	SLO-2	Basic Views	Customizing the ListView	Accessing Web Services	Digitally Signing Your Android Applications	Need of Persistence
S-14,15	**SLO-1**	Lab3: Designing Your User Interface Using View	Lab6: Demonstrate the List view and Spinner View	Lab9: Mobile app for Sending an EMail	Lab12: Publish Android applications.	Lab15: Mobile App development using Persistence
	SLO-2					

Learning Resources	1. Wei-Meng Lee (2012), "Beginning Android Application Development", Wrox Publications (Programmer to Programmer) 2. EdBurnette (2010), "Hello Android: Introducing Google's Mobile Development Platform", The Pragmatic Publishers, Third Edition 3. Jerome DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%

	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr. Agusthiyar R*

Course Code	UCA23S05L	Course Name	Lua Programming	Course Category	S	Skill Enhancement Course	L	T	P	O	C
							0	0	2	2	1

Pre-requisite Courses	*NIL*	Co-requisite Courses	*NIL*	Progressive Courses	*NIL*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards			

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	Learn the basics of working with Lua
CLR-2 :	Learn String Manipulation using Lua
CLR-3 :	Learn to work with decision control and looping statements
CLR-4 :	Learn object-oriented programming concept in Lua
CLR-5 :	Learn and use the concept of arrays

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Understand the basics of programming the Lua language	*3*	*80*	*70*
CLO-2 :	Understand how to use tables, the data structure that makes Lua so powerful	*3*	*85*	*75*
CLO-3 :	Apply Inheritance	*3*	*75*	*70*
CLO-4 :	*Perform String Manipulation*	*3*	*85*	*80*
CLO-5 :	*Use Lua Libraries*	*3*	*85*	*75*

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
H	*H*	M	*M*	*M*	*M*	*M*	*M*	*M*	*L*	*M*	*H*	*M*	*L*	*L*
H	*H*	*M*	*M*	*M*	*M*	*M*	*M*	*H*	*L*	*L*	*M*	*M*	*L*	*L*
M	M	*M*	*M*	*M*	*H*	*H*	*M*	*M*	*H*	*L*	*M*	*M*	*L*	*L*
M	M	*M*	*M*	*M*	*H*	*H*	*M*	*M*	*H*	*L*	*M*	*M*	*L*	*L*
M	*M*	*M*	M	M	*H*	*H*	M	*M*	*H*	*L*	M	M	*L*	*L*

Duration (hour)		06	06	06	06	06
S-1	SLO-1	Introduction To Lua Programming	Functions	While Loops, Infinite Loops	Arrays	Inheritance
	SLO-2	Writing First Lua Program	Defining a Function, Calling a Function, Function Arguments, Any No of Arguments, Returning a value, Returning Multiple values	Breaking a Loop	Array constructors, Array are one based, Sparse array, The size of an array, Multidimensional array	Single and Multiple Inheritance
S-2	SLO-1	Basic Syntax	Define a function using variable no of arguments to sum all the argument passed.	Write a program to reverse a number	Write a program to add two matrix	Write a program to implement single and multiple inheritance
	SLO-2	Token, Comments, Identifiers, Keywords, Whitespaces				
S-3	SLO-1	Variables	Operators	Repeat until loop, for loop	Iterating	math
	SLO-2	Basic Data Types	Arithmetic operators, Relational Operators, Logical Operators, Misc Operators, Operator Precedence	Nested Loop	Understanding pairs, Understanding ipairs, Closures, Iterative functions	Trigonometry, Changing Numbers, Comparing Numbers, Randomness
S-4	SLO-1	Developing Simple Programs	Write a program to perform simple arithmetic operations	Write a program to generate multiplication table	Write a program to illustrate the concept Iterators	Write a program to work with math library

	SLO-2					
S-5	**SLO-1**	String Types - String Literals/, String Length, Concatenate Strings, String Coercion, Escape Characters, Console input	Control Structures	Creating Tables, Storing Values	Objects	File IO
	SLO-2	Scope – Scope access, Global Access, Shadowing	If, elseif, else, Nesting if statements	Table Constructors, Tables are references	Classes, The : operator, Tables inside of objects	Opening a File, Reading Data, Writing Data, Closing a File
S-6	**SLO-1**	Write a program to perform various string manipulations	Write a Program that takes user input. If typed 'Hi" display "Welcome", If typed "Bye", Display "Good Bye"	Write a program to work with tables	Write a program using class and objects	Write a program to create a file
	SLO-2					

Learning Resources	1. *"Lua Programming, A Beginners Guide, 2019 Edition, The Definitive Lua Programming Guide, Lua Publishing* **2.** *Lua Quick Start Guide by Gabor Szauer,2018, Packt Publishing*

Learning Assessment

Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**			
		CLA – 1 (20%)	**CLA – 2 (20%)**	**CLA – 3 (30%)**	**CLA – 4 (30%)#**
		Practice	**Practice**	**Practice**	**Practice**
Level 1	Remember	30%	30%	30%	10%
	Understand				
Level 2	Apply	30%	30%	30%	50%
	Analyze				
Level 3	Evaluate	40%	40%	40%	40%
	Create				
	Total	100 %	**100%**	**100%**	**100%**

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Mr.D.B.SHANMUGAM,Assistant Professor, SRM IST, Ramapuram Campus,*

Course Code	UCA23P02L	Course Name	INTERNSHIP - II	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	0	0	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	Demonstrate skills learnt in the real time environment.	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLR-2 :	Explore the different industries that are using IT																		
CLR-3 :	Enhance the skills in the system aspects																		
CLR-4 :	Understanding the professional connections with the knowledge learnt																		
CLR-5 :	Applying the skills in problem solving																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	To get an insight of an industry and organization/company	3	80	70	M	M	M	M	M	M	M	M	M	M	L	H	M	H	H
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	M	M	M	L	M	L	M	M	M	L	H	L	H	H
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	M	M	M	L	M	L	M	M	M	L	H	L	H	H
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	M	M	M	L	M	L	M	M	M	L	H	L	H	H
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	M	M	M	M	L	M	L	M	M	M	L	H	L	H	H

Students can choose a company of their own interest for internship for a period of minimum four weeks to learn about the application of IT in real time environment. In the first week of July, all the students have to give a presentation about their observations made by them in internship. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

Learning Assessment				
Project Work / Internship	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Internship Report	Viva-Voce
	20%	30 %	30 %	20 %

SEMESTER-VI

Course Code	*UCA23601J*	Course Name	SOFTWARE ENGINEERING AND TESTING	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning
CLR-1 :	*Familiarize the software life cycle models and software development process*	
CLR-2 :	*Understand the various techniques for requirements, planning and Testing*	
CLR-3 :	*Examine the basic methodologies for software design, development, testing*	
CLR-4 :	*Manage user expectations and software development team*	
CLR-5 :	*Acquire the latest industry knowledge like agile for development*	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*Identify the process of project life cycle model and process*	2	85	80
CLO-2 :	*Analyze and specify software requirements through a productive working Relationship Customers.*	3	85	80
CLO-3 :	*Design the system based on Functional Oriented and Object Oriented Approach for Software Design.*	3	85	80
CLO-4 :	*Develop the correct and robust code for the software products*	3	85	80
CLO-5 :	*Perform by applying the test plan and various testing techniques*	3	85	80

Program Learning Outcomes (PLO)

	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	H	H	M	M	H	M	M	M	M	L	L	M	L	M	M
CLO-2 :	H	H	M	M	H	M	M	M	M	L	L	M	L	M	M
CLO-3 :	M	M	M	M	H	H	H	M	M	L	L	M	L	M	M
CLO-4 :	M	M	M	M	M	H	H	M	M	L	L	H	L	M	M
CLO-5 :	M	M	M	M	M	H	H	M	M	L	L	H	L	M	M

Duration (hour)		18	18	18	18	18
S-1	SLO-1	The Evolving Role of Software	Computer-Based Systems	Principles of Testing	Integration testing	Performance Testing
	SLO-2	Software Engineering Definition	The System Engineering Hierarchy – System Modeling	Introduction-Testing Definition	Top down Integration testing	Factors of Governing
S-2	SLO-1	Software Characteristics	System Simulation	Phases of software	Bottom up Integration testing	Regression testing
	SLO-2	Software Applications and A Crisis	Comparison of various software Development	Error, Fault, Bug-Failure of the system –Comparison of the terms	Bi-Directional Integration	Types of regression testing
S-3	SLO-1	Software Myths	Business Process Engineering: An Overview	Types of testing-	System Integration	Software testing strategy

	SLO-2	Types Of Myths, *Software Engineering : Layered Technology*	Requirements Engineering process, *Software requirements specification*	Quality assurance, *Quality Control*	System Acceptance Testing, *Functional testing*	Best practice in regression testing, *Methodology for Performance Testing*
S 4-6	SLO-1 SLO-2	Lab :Problem Statement Preparation	Lab : Software Requirement Specification Document Preparation	Lab : Preparation of DFD of any Project	Lab : Test Case Design	Lab : Manual Testing – Usage of Text
S-7	SLO-1	*Software Process*	*Characteristics of Good Requirements*	*Testing verification and validation*	*Non Functional testing*	*Tools for Performance Testing*
	SLO-2	*Software Process Models*	*Types of Requirements*	*White Box Testing*	*Functional Vs Non Functional Testing*	*Challenges for Performance Testing*
S-8	SLO-1	*Linear Sequential Model*	*Requirements Elicitation*	*Techniques of White Box Testing*	*System Testing*	*Performing Initial Test, Understanding the Criteria*
	SLO-2	*Advantages And Disadvantages*	*Requirements Analysis and Negotiation*	*Black box testing*	*Design and Architectural Verification*	*Classifying Test Cases.*
S-9	SLO-1	*Prototyping Model*	*Requirement Documentation*	*Techniques of Black box testing*	*Deployment Testing*	*Resetting the Test Cases, Concluding the Results of Regression Testing*
	SLO-2	*Advantages And Disadvantages, Rapid Application Development Model*	*Requirement Specification and Analysis, Software Requirement Specification and System Requirement Specifications*	*Static Testing, DYNAMIC Testing*	*Beta Testing, Certification, Standards*	
S 10-12	SLO-1 SLO-2	*Lab :Problem Statement Preparation*	*Lab: Drawing E-R Diagram for any project*	*Lab : Preparation of DFD of any Project*	*Lab : Manual Testing – Calculator*	*Lab : Manual Testing – Sorting*
S-13	SLO-1	Evolutionary Process Models	Characteristics of Good SRS Document	Challenges in white box testing	Testing for Compliance	Configuration testing
	SLO-2	Incremental Model	Requirement Management	Black Box Testing	Scalability Testing	compatibility testing
S-14	SLO-1	Advantages and Disadvantages	Software Prototyping	Techniques of Black Box Testing	Reliability testing	Test plan with debugging
	SLO-2	Spiral Model, WIN WIN Model	Selecting the prototyping approach	Structural testing	Stress testing	Levels of testing
S-15	SLO-1	Concurrent Development Model	Specification Principles, Representation	Static testing	Acceptance Testing	Testing tools
	SLO-2	Component Based Development, Comparison of Process models	Specification Review, Characteristics of Good E-R Diagrams, SRS Document	Verification & Validation Techniques, Cyclomatic complexity, Control flow graph	Acceptance Criteria, Selecting Test Cases, Executing Tests	Key Issues in Software maintenance
S 16-18	SLO-1 SLO-2	Lab : Software Requirement Specification Document Preparation	Lab: Drawing E-R Diagram for any project	Lab : Test Case Design	Lab : Manual Testing – Mark sheet	Lab : Manual Testing – Login Form

Learning Resources	1. *Roger S. Pressman, (2001), "Software Engineering ", Fifth edition, McGraw-Hill Higher Education - A Division of The McGraw-Hill Companies.* 2. *Srinivasan Desikan and Gopalasamy Ramesh, "Software Testing for Principles and Practices", Pearson Education.*	3. *William E. Perry (2006), "Effective Methods of Software Testing", 3rd Ed, Wiley India.* 4. *Renu Rajani, Pradeep Oak (2007), "Software* Testing", TMH

Learning Assessment						
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**				**Final Examination (50% weightage)**
		CLA – 1 (10%)	**CLA – 2 (10%)**	**CLA – 3 (20%)**	**CLA – 4 (10%)#**	

		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	*Dr.S.Gopinathan, Professor, University of Madras, Chennai*	*Mr .J. Venkata Subramanian, SRMIST*
		Mrs. M. R. Sudha, SRMIST

Course Code	UCA23602T	Course Name	WIRELESS COMMUNICATION AND MOBILE COMPUTING	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Computer Networks	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning
CLR-1 :	Understand the concept of Wireless and Mobile Communication	
CLR-2 :	Learn the protocols followed in Wireless Communication	
CLR-3 :	Understand the effectiveness of Mobile Nodes and IP	
CLR-4 :	Identify the various types of Ad-hoc Networks	
CLR-5 :	Study about latest protocols and applications of wireless and mobile standards	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO)														
					1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	Understand the concept of Wireless Communication, Spread Spectrum	2	85	80	H	H	M	H	M	M	M	M	M	L	L	M	M	L	M
CLO-2 :	Learn the concepts of Multiplexing, Medium Access Control	3	85	80	H	H	M	H	M	M	M	M	M	L	L	M	M	L	M
CLO-3 :	Able to understand the Mobile Communications and Standards	3	85	80	M	H	M	M	H	H	M	M	M	L	L	M	M	L	M
CLO-4 :	Grasp the Social Awareness of Telecommunication Systems	3	85	80	M	H	M	M	H	H	M	M	M	L	L	M	M	L	M
CLO-5 :	Defend the need for Wireless Communication in providing solution to technical problems	3	85	80	M	H	M	M	H	H	M	M	M	L	L	M	M	L	M

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Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Networks	Wireless LAN	Wireless ATM	Mobile Computing Introduction	Mobile Telecommunication System
	SLO-2	Wireless Networks	IEEE 802.11 Architecture	Mobile Network Layer		
S-2	SLO-1	Transmissions	Protocol Architecture	Handover Location Management	Wireless Networking and Mobile Computing	Global System for Mobile Communication
	SLO-2	Wireless Transmission	MAC Management			
S-3	SLO-1	Applications of Wireless Transmission	Hyper LAN	Access Point Control Protocol	Mobile Computing Applications	General Packet Radio Service
	SLO-2		Protocol Architecture	Mobile IP		
S-4	SLO-1	Frequency	Channel Access Control Sub layer	DHCP	Characteristics of Mobile Computing	Universal Mobile Telecommunication System
	SLO-2	Radio Transmission	Medium Access Control Sub layer		Advancements	
S-5	SLO-1	Signal Propagation	Bluetooth	Types of Handover	Structure of Mobile Computing	Commercial Mobile Operating Systems
	SLO-2	Multiplexing		Handover scenarios		
S-6	SLO-1	Space Division Multiplexing	Bluetooth Physical layer	Forward and Backward Handover	Mobile Ad-hoc Networks	Software Development Kit
	SLO-2	Frequency Division Multiplexing	MAC layer	Computer Tomography		IOS
S-7	SLO-1	Time Division Multiplexing	Networking Security	Mobile Quality Service	Needs and Importance of Mobile Ad-hoc Networks	Android Operating System
	SLO-2	Classical Aloha, Slotted Aloha	Link Management	APCP Objective type Test		
S-8	SLO-1	CSMA, Demand Assigned Multiple Access	WATM Services	IP Packet Delivery	Ad-hoc Concepts	Blackberry, Windows OS
	SLO-2	Code Division Multiplexing	Reference Model	Agent advertisement		
S-9	SLO-1	Modulations	Telecommunication System	Discovery	Ad-hoc Characteristics	M-Commerce
	SLO-2	Spectrum			Applications	
S-10	SLO-1	Spread Spectrum	Satellite System	Tunneling & Encapsulation,	**Design Issues**	Structure Pros & Cons
					Routing	
S-11	SLO-1	PRMA	Broadcasting System	Reverse Tunneling,	Traditional Routing Protocols	Mobile Payment System
	SLO-2	Medium Access Control			Popular Routing Protocols	
S-12	SLO-1	Multiple Access with Collision Avoidance	Handover Reference Model	Optimization,	Vehicular Ad-hoc Networks	Security Issues
			Handover Requirements	DSDV, DSR	Mobile Ad-hoc Networks	

Learning Resources	1. William Stallings, '' Wireless communication and networks', Pearson education 2. Jochen H. Schller, "Mobile Communications", Pearson Education, New Delhi, 2007, 2nd Edition. 3. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd. 2005 4. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of MobileComputing", Springer 2003	5. NPTEL & MOOC courses titled Mobile Computing 6.https://www.smartzworld.com/notes/mobile-computing-pdf-notes-mc-notes-pdf/ 7.https://www.vidyarthiplus.com/vp/Thread-IT6601-Mobile-Computing-Lecture-Notes-All-Uni 8.https://nptel.ac.in/courses/106106147/

Learning Assessment												
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice

Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	J.Venkata Subramanian, Assistant Professor, Dept. of CA, SRMIST

Course Code	*USA23603T*	Course Name	Research Methodology	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Understand Research principles while developing software.
CLR-2 :	Gain extensive knowledge about the Research concepts, methods and the process models.
CLR-3 :	Obtain adequate knowledge about Research process models and software.
CLR-4 :	Identify the research methods involved in various area.
CLR-5 :	Define the hypothesis value, research reporting structure.

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: Level of Thinking (Bloom)	Learning: Expected Proficiency (%)	Learning: Expected Attainment (%)	PLO 1 Fundamental Knowledge	PLO 2 Application of Concepts	PLO 3 Link with Related Disciplines	PLO 4 Procedural Knowledge	PLO 5 Skills in Specialization	PLO 6 Ability to Utilize Knowledge	PLO 7 Skills in Modeling	PLO 8 Analyze, Interpret Data	PLO 9 Investigative Skills	PLO 10 Problem Solving Skills	PLO 11 Communication Skills	PLO 12 Analytical Skills	PLO 13 ICT Skills	PLO 14 Professional Behavior	PLO 15 Life Long Learning
CLO-1 :	To understand the Research and Evaluation techniques.	2	85	80	H	H	M	H	M	M	L	M	M	L	L	H	L	M	M
CLO-2 :	To plan and manage hypothesis value at each stage of the Research.	3	85	80	H	H	M	H	M	M	L	M	M	L	L	H	L	M	M
CLO-3 :	To learn about the Research Type and find the correct methods to the	3	85	80	H	H	M	H	M	M	L	M	M	L	L	H	L	M	M
CLO-4 :	To develop Research skill.	3	85	80	H	H	M	H	M	M	L	M	M	L	L	H	L	M	M
CLO-5 :	To develop skills to manage the various phases involved in Research.	3	85	80	H	H	M	H	M	M	L	M	M	L	L	H	L	M	M

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Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Research Methods	Introduction to literature review	Introduction to Research Design	Introduction to Design of Sample Survey	Introduction to Data Collection & Analysis Primary & secondary data
	SLO-2					
S-2	SLO-1	Definition of research	Methods to collect the meaningful data	Identify the research problem	Introduction to Census	Validity and Reliability of data collection Procedures
	SLO-2					
S-3	SLO-1	Role of Research	Data Cleaning	Select a Research problem	Introduction to Sample enumerations	data preparation and exploratory data analysis
	SLO-2					
S-4	SLO-1	objectives of research	Reviewing the data	Defining a Research problem	Difference between Census V/s	Introduction to parametric and

	SLO-2				Sample enumerations	nonparametric tests
S-5	SLO-1	Applications of research	Process the data	Introduction to need of research problem design	Introduction to objectives in Research sampling	Introduction to correlation and regression analysis
	SLO-2					
S-6	SLO-1	Research in Computer Science & Applications	Analysis the Data	Apply the Research design with the simple data set	Introduction to principles of sampling	Introduction to ANOVA Using MS Word - Test formatting, Math Type, MS Equation editor
	SLO-2					
S-7	SLO-1	Steps involved in research	Conceptualization of a research problem	Introduction to Good Design	Introduction to Types of Sampling in Research methods	Introduction to INFLIBNET, e-journals, e-library and Scopus, Mathematical reviews
	SLO-2					
S-8	SLO-1	Aim and Scope of research in Computer filed	Formulation of a research problem	Feature of Good Research design	Sampling Errors	Introduction to Data Communication and networks
	SLO-2					
S-9	SLO-1	Types of Research	Identifying the variables	Introductions to different Research design	Non-sampling errors	Introduction to LAN, WAN,GAN, Internet
	SLO-2					
S-10	SLO-1	Research Process in the Computer Field	Assigning the initial value to the variables	different research designs - exploratory	Determination of the sample size	Website, Webpage, E-mail
	SLO-2					
S-11	SLO-1	Introduce the basic software to develop a Research	constructing hypothesis	different research designs - descriptive	Designing Questionnaires	Search Engines, Scientific search engines
	SLO-2					
S-12	SLO-1	Research Process	Types of hypotheses.	different research designs - experimental	Design the interview	Prepare a PDF and Latex files
	SLO-2					

Learning Resources	Krishna Swamy K.N., Siva Kumar A.I., Mathirajan M., "Management Research Methodology (2006), Pearson Education, New Delhi.	Kothari C.R., "Research Methodology, Methods and Techniques, Second edition, (2008), New Age International Publication.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	50%	-	50%	-	50%	-	50%	-	50%	-
	Analyze										
Level 3	Evaluate	20%	-	20%	-	20%	-	20%	-	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Dr. V.Raja SRM IST, Vadapalani

Course Code	UCA23D04J	Course Name	Introduction to Animation	Course Category	D	Discipline Specific Elective Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	NIL	Co-requisite Courses	NIL	Progressive Courses	NIL
Course Offering Department	Computer Applications	Data Book / Codes/Standards		NIL	

Course Learning Rationale (CLR):		Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To acquire the knowledge on basic principles of animation			
CLR-2 :	To learn the art of story telling			
CLR-3 :	To up skill digital character based animation and titles for short films, videos			
CLR-4 :	To learn 2D animation, motion graphics and GIF stickers			
CLR-5 :	Understand key principles and process to translate sequential images into animation			
CLR-6 :	To understand basic knowledge on Rendering			

Course Learning Outcomes (CLO):		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Understand the design principles to animation production	2	75	70	H	H	M	M	L	M	M	M	M	L	M	H	M	L	L
CLO-2 :	Identify the 12 principles of animation and apply them	2	80	70	H	H	M	M	L	L	M	M	M	L	H	M	L	L	L
CLO-3 :	Assess and commend the trends in current animation	2	70	60	M	H	L	L	H	H	M	M	M	L	M	M	M	L	L
CLO-4 :	Demonstrate progress in basic drawing and animation	2	70	65	H	M	L	M	M	H	M	M	M	M	H	M	M	L	L
CLO-5 :	Create traditional and computer generated 2D animation, motion graphics and GIF stickers	2	75	70	H	H	M	M	H	M	M	M	L	L	M	L	M	L	L
CLO-6 :	Create digital animation ad knowledge of rendering	2	80	65	M	M	H	M	H	L	M	L	M	M	H	M	L	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Animation - Introduction	Applications	Modifier	Ball animation - gradients	Animal Walk Cycle
	SLO-2	Concept	Outcomes	Bend	Using key frames	Drawing Cycle sheet
S-2	SLO-1	Research	Cell Animation	Smooth	Stretch and squash	Drawing animal
	SLO-2	Preparation	Introduction	Special features	Timing and motion	Dividing body parts - symbols
S-3	SLO-1	Narrative Drawing	Walk Cycles	Bend Tool	tween	Creating key frames
	SLO-2	Techniques and approach	Drawing		Shadow layer	Different types of walk cycle
S-4-6	SLO-1	**Lab: Types of animation**	**Lab: 3D software interface**	**Lab:Frame by frame animation of 10-20 sec**	**Lab: Ball animation**	**Lab: Animal walk cycle**
	SLO-2					
S-7	SLO-1	Story	3D animation	UV Map	Creating symbols	Lip synchronization
	SLO-2	Design		Effects	Drawing simple character	Knowing alphabets
S-8	SLO-1	Design as concept	Standard and Extended primitives	Effects tool	Using pen tool or shape tool	Knowing movements
	SLO-2	Art of Story telling	Standard Tool	Modelling	Divide body parts to symbols	Creating mouth shapes
S-9	SLO-1	Storyboard as narratives	Adjusting Segment, Logo	Logo	Creating symbols	Movement of the lips

	SLO-2	Storyboard as composition	Architecture, tilting	Modeling tool	Type of symbols	Creating expression, emotion
S-10-12	**SLO-1**	**Lab: Principles of Animation**	**Lab:Drawing tools, pen tools create drawing in the frames.**	**Lab: Frame by frame animation in color (20 sec)**	**Lab: Character drawing & creating symbols**	**Lab: Lip Synchronizing character mouth shape & dialogue**
	SLO-2					
S-13	**SLO-1**	Character and movement	Creating object	Special Effects	Human walk cycle	Short animation film
	SLO-2	Character Development	Creating tool	Bomb and Particles	Drawing cycle sheet for walk	Storyboard creation
S-14	**SLO-1**	Sound	Material Editor	Special tool	Creating keyframes and tween	Background in layers
	SLO-2	Technique	Applying on objects	Video tool	Normal walk cycle	Creating characters
S-15	**SLO-1**	The Animator	Giving effects	Lighting tool	jump, run	Creating props, scenes
	SLO-2	Roles	Editing tool	Camera tool	Tiptoe, crawl	Background music & dialogue
S-16-18	**SLO-1**	**Lab: Principles of Animation**	**Lab: draw flipbook with animation principles**	**Lab: Creating simple animation with shape, classic & motion tweening.**	**Lab: Human walk cycle**	**Lab: Create a short animation film**
	SLO-2					

Learning Resources	**1.** ***Frank Thomas and Odie Johnson, The Illusion of Life: Disney Animation, Disney Editions; Rev Sub edition, 2014*** **2.** ***The Animator's Survival Kit by Richard Williams, Revised Edition, Faber & Faber, 2011*** **3.** ***Wells, P. (2006) The Fundamentals of Animation. Switzerland: AVA Publishing*** **4.** ***Autodesk 3ds Max 2013 Essentials, DariushDerakhshani, 2013, First Edition, John Wiley and Sons, USA*** **5.** ***Adobe Creative Team, 2012 Adobe After Effects CS6 Classroom in a Book Adobe.*** **6.** ***Cartoon Animation with Preston Blair, Revised Edition!: Learn techniques for drawing and animating cartoon characters, Preston Blair, Walter Foster Publishing, 03-Nov-2020***

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	20%	20%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	10%	10%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Mrs J Shyamala Devi, Assistant Professor, SRMIST, Ramapuram*

Course Code	UCA23D05J	Course Name	INTRODUCTION TO COMPUTER VISION	Course Category	D	*Discipline Specific Elective Courses*	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Inculcate the fundamentals of computer vision
CLR-2 :	To teach the functions of a Computer vision techniques involved in training the Computer vision models on different problems
CLR-3 :	Build intelligent and automated real-world Computer vision applications
CLR-4 :	To teach the participants choosing the right set of frameworks involved in building critical Computer Vision.
CLR-5 :	Introduction to Text classification, Image classification, Image detection, Object recognition, and Object detection techniques.
CLR-6 :	Apply real-world business problems

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Understanding the fundamental concepts of Computer vision	2	85	80	H	H	M	M	M	H	M	L	M	M	M	L	M	L	L
CLO-2 :	Gain hands-on solid skills, knowledge and expertise of real-world situations	3	85	80	H	H	M	M	M	M	L	L	M	M	M	M	M	L	L
CLO-3 :	Expertise in Data gathering, Data collection, Model training, and model evaluation with domain-specific components.	3	85	80	H	H	M	M	M	M	M	L	M	M	H	L	M	L	L
CLO-4 :	Applying all the computer vision techniques to real -world industry problems.	3	85	80	H	H	M	M	M	H	M	M	L	M	M	M	M	L	L
CLO-5 :	Applying the right computer vision techniques for the problem statement at hand.	3	85	80	H	H	M	M	M	H	M	M	L	M	M	M	M	L	L
CLO-6 :	Design and develop the "end-to-end" computer vision solution for a given problem statement either in a group or individually.	3	85	80	H	H	M	M	M	H	M	M	M	M	M	M	M	L	L

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Duration (hour)		18	18	18	18	18
S-1	SLO-1	Computer Vision - Introduction	Computer Vision Workflow Steps	Computer Vision Techniques an Overview	Image Classification Models	Computer Vision in Real World Applications
	SLO-2	Computer Vision Overview	Business Problem Identification	Image Processing	ImageNet	Computer Vision in Healthcare
S-2	SLO-1	Computer Vision defined from academic perspective	Success Criteria Definition	Image Processing Techniques	CIFAR	Computer Vision in Retail

	SLO-2	Computer Vision defined from Industry perspective	Right Computer Vision Techniques	Image Restoration, Linear Filtering , Independent Component Analysis , Pixelation	MNIST	Computer Vision in Energy
S-3	SLO-1	Signal Processing for Computer Vision	Collect Training Data	Template Matching, Image Generation Technique, Filtering Techniques in Image Processing	Object Detection Models	Computer Vision in Oil & Gas
	SLO-2	Pattern recognition of Computer Vision	Label Train and Test Datasets	Linear Filter, Non Linear Filter, Box Filter, Gaussian Filter	Fast R-CNN	Computer Vision in Automobile
S- 4-6	SLO-1	Lab 1-Install OpenCV Displaying images OpenCV	Lab 4: Text in Images	Lab 7: Image Edge Detection OpenCV	Lab 10: Image Filtering Blurring OpenCV Image Filtering Blurring Gaussian Blur OpenCV	Lab 13: Image Filtering bilateral OpenCV
S-7	SLO-1	Challenges of Computer Vision	Train the computer vision model	Median Filter	Faster R-CNN	Computer Vision in day to day life
	SLO-2	Computer Vision Data Requirements	Evaluate the computer vision model	Feature detection and matching	Computer Vision Hands On Lab Work - Build, Test and Deploy ML Models (Consumer 1)	Computer vision in security systems
S-8	SLO-1	How much data is needed	Test the model	Harris Corner Detector, SIFT (scale invariant feature transform), SURF (speeded-up robust features), FAST (features from accelerated segment test	Challenges	Surveillance
	SLO-2	Is your data good enough?	Deploy the model	BRIEF (Binary Robust Independent Elementary Features), Harris Corner Detector SIFT (scale invariant feature transform) SURF (speeded-up robust features) FAST (features from accelerated segment test)	High level decisions	Fingerprint recognition and biometrics
S-9	SLO-1	Data Structure	Iterate the steps process	Problems that Computer Vision can Solve	Choosing the hardware components (GPU, TPU)	Medical Imaging
	SLO-2	Data Format	Computer vision architecture	Text Classification	Building a CV Software system	Object Recognition
S-10-12	SLO-1	Lab2: Reading &Writing images OpenCV	Lab 5- Color Space OpenCV Thresholding OpenCV	Lab 8: Image Scaling & Rotation using OpenCV	Lab 11: Image Filtering Blurring Median Blur OpenCV Morphological Operations Erosion OpenCV	Lab 14: Morphological Operations Opening OpenCV
S-13	SLO-1	Data Type	Data Ingestion	Image Detection	Benefits	Medical Image Analysis
	SLO-2	Training Data	Data Pre-processing	Image Segmentation	Challenges	Content-Based Image Retrieval
S-14	SLO-1	Validation Data	Multiprocessing	Image Classification	High level decisions	Video Data Processing

	SLO-2	Test Data	Transfer Learning/Model Processing	Object Detection	Customer Image Segmentation	Virtual Reality and Augmented Reality
S-15	SLO-1	Image Processing Techniques,	Data Transformation	Object Recognition	Edge Detection Techniques	Computer vision applications in Construction
	SLO-2	Filtering Techniques in Image Processing Linear Filter, Non-Linear Filter	Popular Computer Vision frameworks:OpenCV, TensorFlow,Matlab	Object Classification	Canny Edge Detection	Computer Vision applications in Agriculture
S-16-18	SLO-1 **SLO-2**	Lab 3-Draw a Rectangle Draw a Circle	Lab 6: Finding Contours	Lab 9: Image Translation OpenCV Image Filtering OpenCV	Lab 12: Morphological Operations Dilation OpenCV	Lab 15: Morphological Operations Closing OpenCV

Learning Resources	1. R. Jain, R. Kasturi, and B. G. Schunck, Machine Vision, McGraw-Hill, Inc. 1995. 2. Digital Image Processing and Analysis: Application with MATLAB and CVIPtools, 3rd Edition, SE Umbaugh, Taylor&Francis/CRC Press, 2018	3. Computer Vision: Algorithms and Applications by Richard Szeliski. Available for free online. 4. Computer Vision: A Modern Approach (Second Edition) by David Forsyth and Jean Ponce. Available for free online. 5. Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani, and Jerome Friedman. Available for free online (Warning: Direct PDF link). 6. Multiple View Geometry in Computer Vision (Second Edition) by Richard Hartley and Andrew Zisserman. Available for free online through the UM Library (Login required).

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	15%	20%	15%	20%	15%	20%	15%	20%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	15%	10%	15%	10%	15%	10%	15%	10%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	**Dr.S.Meenakshi, SRM IST, RMP**
		Dr.T.PapithaChristobel, SRM IST, RMP

Course Code	*UCA23D06J*	Course Name	**PROGRAMMING USING C#**	Course Category	D	***Discipline Elective* Course**	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	To cover the fundamental concepts of the C# language
CLR-2 :	To learn various C# libraries
CLR-3 :	To understand the basis of web programming
CLR-4 :	To understand the basis of Windows Programming
CLR-5 :	To understand .NET Controls and ActiceX Data Objects
CLR-6 :	To enable the learner to become an application developer using this language

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Understand the basics of C# and .NET framework	2	85	80	H	L	H	M	M	M	L	M	L	L	H	M	L	L	L
CLO-2 :	Develop applications using object-oriented aspects of C#	3	85	80	H	H	M	M	M	M	L	M	L	L	H	M	M	L	L
CLO-3 :	Design Windows applications	3	85	80	H	H	M	M	M	M	L	M	L	M	H	M	M	L	L
CLO-4 :	Create Database applications using ActiveX Data Objects	3	85	80	H	H	H	M	M	M	M	M	L	L	M	M	M	L	L
CLO-5 :	Develop Web based applications	3	85	80	H	H	H	M	M	M	M	M	L	M	M	L	M	L	L
CLO-6 :	Develop Web based applications with Database Interaction	3	85	80	H	H	H	M	M	M	M	M	L	M	M	M	M	L	L

Duration (hour)		**18**	**18**	**18**	**18**	**18**
S-1	SLO-1	*Introducing C# - Understanding .NET Framework*	*Class Fundamentals*	*Delegates – Declaration, Methods*	*Programming with Basic Windows Form Controls: Button Control, Label and Link Label Control*	*ADO.Net framework*
	SLO-2	*Origin and Benefits*	*Principles, Defining Class*	*Delegate Instantiation, Invocation*	*Textbox Control, Radiobutton and Checkbox Controls*	*Architecture of .Net Framework*
S-2	SLO-1	*Overview of C#*	*Creating Objects*	*Multicast Delegates*	*RichtextboxContro, Listbox and CheckedListbox Controls*	*ADO.NET managed providers*
	SLO-2	*Simple C# Program*	*Accessing Objects*	*Implementing Multicast delegates*	*Simple windows*	*Types of Providers*
S-3	SLO-1	*Literals, Variables and Data Types*	*Constructors*	*Console I/O Operations – Console Input, Output*	*ListView Controls, Advanced Windows Form Features*	*Data set – Object Model*

	SLO-2	*Declaration and Initialization of variables*	*Example using Constructors*	*Formatted Output, Numeric Formatting, Standard Numeric Format, Custom Numeric Format*	*Menus and Toolbars*	*DataTable Collection*
S-4-S 6	**SLO - 1**	***Lab 1: Initialization and Declaration, Data types***	***Lab 4: Classes, Constructors***	***Lab 7: Delegates***	***Lab 10: Create Windows Applications***	***Lab 13:Develop Web Applications Using Object Model***
S-7	SLO-1	*Operators and Expressions*	*Indexers and Properties*	Event Handling	*SDI and MDI Applications*	*Data source controls*
	SLO-2	*Evaluation of Expressions*	*Implementation of an indexer and property*	*Application of event with Delegates*	*Building MDI Applications*	*SQL DataSource, AccessDataSource*
S-8	SLO-1	*Program Control Statements: Branching*	*Inheritance*	*Errors and Exception Handling*	*Validation Controls*	*Working with Grid view*
	SLO-2	*If, If else, Elseif*	*Implementation of inheritance*	*Using try, Catch*	*Types of Validation Controls*	*Bind Data Using SQlConnection and SQL Adapter*
S -9	SLO-1	*Program Control Statements: Looping*	Abstract Class, Sealed Class	*Exception Hierarchy*	*Navigation Controls*	*DataList*
	SLO-2	*While, Do While, For*	Case Study	*Implementing Exception Hierarchy*	*Types of Navigation Controls*	*Templates and Events in Datalist*
S-10 - S-12	**SLO-1**	***Lab 2:Control Statements***	***Lab 5: Inheritance***	***Lab 8: Exception Handling***	***Lab 11: Develop Web Applications using Validation and Navigation Controls***	***Lab 14: Develop Web Application Using DataSource Control***
S-13	SLO-1	*Methods in C#*	Interface	Custom Exception	*Data Controls*	*Formview*
	SLO-2	*Case Study Using Methods*	*Sample Programs*	*Throwing our own Exceptions*	*Program using Data Controls*	*Displaying Data with Formview Control*
S-14	SLO-1	*Arrays : Array Class, Array List*	*Operator Overloading*	*Multithreading in C#*	*Creating Web Applications*	*Repeater Control*
	SLO-2	*One Dimensional array, Two Dimensional array, Jagged Arrays*	*Overloadable Operators, Defining*	Creating and Starting Thread	*Case Study*	*Templates and Events in Repeater*
S-15	SLO-1	*Arrays : Array Class, Array List*	*Operator Overloading – Unary Operators, Binary Operators*	*Scheduling a Thread*	*Deployment*	*Designing Web Application*
	SLO-2	*One Dimensional array, Two Dimensional array, Jagged Arrays*	*Operator Overloading –Binary Operators*	*Synchronizing Threads*	*Steps to Deployment*	*Steps to Design Web Applications*

S-16-S-18	**SLO-1**	***Lab 3:Arrays***	***Lab 6: Interface, Operator Overloading***	***Lab 9: Custom Exception, Thread***	***Lab 12: Develop Web Applications using Data Controls***	***Lab 15: Develop Web Application Using Form View and Repeater Control***

Learning Resources	1. E. Balagurusamy, "Programming in C#-A Primer" – Fourth Edition, Mc Graw Hill Education. Kogent(2010), "ASP.NET 4.0 Black Book – Platinum Edition", DreamtechPress,New Delhi 2.	1. Paul Deitel, Harvey Deitel – C# 2010 For Programmers, Deitel Developer Series – Pearson Education – 2011 2. Andrew Troelsen – C# and the .NET Platform – A1 Press – 2003

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Dr.L.Selvam

Course Code	UCA23G04J	Course Name	INTRODUCTION TO MACHINE LEARNING	Course Category	G	Generic Elective Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning
CLR-1 :	Gain knowledge on the Machine learning concepts	1
CLR-2 :	Gain theoretical Knowledge on setting hypothesis for pattern recognition.	
CLR-3 :	Applying suitable machine learning techniques for data handling and to gain knowledge from it.	
CLR-4 :	Evaluate the performance of algorithms and to provide solution for various real world applications	
CLR-5 :	To Solve Real World Problems	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Understand the basic concepts in Machine learning	2	80	70
CLO-2 :	Characteristics of Machine Learning techniques that enable to solve real world problems	2	75	75
CLO-3 :	Characteristics of machine learning strategies	2	85	70
CLO-4 :	Implement various supervised learning methods to appropriate problems	2	80	80
CLO-5 :	Integrate and Identify more than one techniques to enhance the performance of learning	2	75	75

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
H	H	H	M	M	L	M	L	M	M	M	M	L	L	L
H	H	H	M	M	L	M	L	M	M	M	M	L	L	L
H	H	H	M	M	L	M	L	M	M	M	M	L	L	L
M	M	H	H	H	L	M	L	M	M	M	M	L	L	L
M	M	H	H	H	L	M	L	M	M	M	M	L	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to Machine Learning	Introduction to Machine Learning Techniques	Clustering and regression	Introduction Classification and Regression	Introduction to Unsupervised learning
	SLO-2					
S-2	SLO-1	Define Learning	Supervised Learning	linear regression	K-Nearest Neighbor algorithm	Introduction to clustering
	SLO-2					
S-3	SLO-1	Applications of Machine Learning	Unsupervised Learning	logistic regression	Linear Regression	Types of Clustering
	SLO-2					
S 4-6	SLO - 1	LAB : Install Python and import the necessary files	LAB : Sample Programs for Supervised Learning & Unsupervised	LAB : Sample programs for Clustering and Regression	LAB : Sample Program for KNN & Linear Regression	Sample Program for Clustering

	SLO - 2		Learning			
S-7	SLO-1 SLO-2	processes involved in Machine Learning	Reinforcement Learning	Bayesian decision theory	Logistic Regression	Hierarchical Clustering
S-8	SLO-1 SLO-2	Introduction to datasets	Real life examples of Machine Learning	classifiers	Introduction to Support Vector Machine (SVM)	Agglomerative Clustering
S-9	SLO-1 SLO-2	How to import the dataset	Difference between the Learning Types	discriminant functions	Properties of SVM	Divisive clustering
S 10-12	SLO-1 SLO-2	LAB : Sample program to import the dataset	LAB : Sample Programs for Reinforcement Learning	LAB: Sample programs using Classifiers	LAB : Sample Program using Logistic Regression and SVM	Sample Programs for different types of Clustering
S-13	SLO-1 SLO-2	Feature sets	Machine perception	univariate networks.	Introduction to Evaluation Measures in ML	Partial Clustering
S-14	SLO-1 SLO-2	Introduction to Dataset division	feature extraction	multivariate Network	SSE, MME, R2, confusion matrix, precision	K-means clustering
S15	SLO-1 SLO-2	test, train and validation sets, cross validation	classification	Bayesian belief networks.	Recall, F-Score, ROC-Curve	Difference between Partial and K-means Clustering
S 16-18	SLO-1 SLO-2	LAB : Sample program to train and Validation of dataset	LAB : Sample Programs for Feature Extraction	LAB : Sample Programs for Bayesian Networks	LAB : Sample Program using the Evaluation Measures	Sample Programs for Partial Clustering and K-means Clustering

Learning Resources	*1. EthemAlpaydin, "Introduction to Machine Learning", MIT Press, Prentice Hall of India, 3rd Edition2014.* 2. MehryarMohri, Afshin Rostamizadeh, Ameet Talwalkar " Foundations of Machine Learning", MIT Press,2012. 3. Tom Mitchell, "Machine Learning", McGraw Hill, 3rdEdition, 1997. *4.* MACHINE LEARNING - An Algorithmic Perspective, Second Edition, Stephen Marsland, 2015.	5. CharuC.Aggarwal,"DataClassificationAlgorithmsandApplications",CRCPress,2014. 6. Charu C. Aggarwal, "DATA CLUSTERING Algorithms and Applications", CRC Press, 2014. 7. Kevin P. Murphy "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012 8. Jiawei Han and Micheline Kambers and JianPei, "Data Mining Concepts andTechniques",3rd edition, Morgan Kaufman Publications, 2012.

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%

	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Dr.V.Raja , SRM IST

Course Code	UCA23P04L	Course Name	MINI PROJECT	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	4	2	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards	*Nil*		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Demonstrate skills learnt in the real time environment.			
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	M	M	L	L	M	H	M	M	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	L	M	L	M	M	M	M	L	M	H	M	M	L
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	L	M	M	L	M	H	L	M	M
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	L	L	M	L	M	M	M	L	L

Students can choose problems of their own interest to develop software package using the programming languages/tools available. There will be two reviews conducted during the project period for all the students .At the end of the project, every student shall submit a structured project report and will take a Viva Voce examination.

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Learning Assessment				
Mini Project Work	**Continuous Learning Assessment (50% weightage)**		**Final Evaluation (50% weightage)**	
	Review – 1	**Review – 2**	**Project Report**	**Viva-Voce**
	20%	**30 %**	**30 %**	**20 %**

SEMESTER – VII

Course Code	UCA23701J	Course Name	CLOUD COMPUTING	Course Category	C	Discipline Specific Core Course	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards	*Nil*		

Course Learning Rationale (CLR):	The purpose of learning this course is to,

	Learning
CLR-1 :	Understand the evolution of parallel and distributed computing
CLR-2 :	Understand the architecture of cloud
CLR-3 :	Understand the need for virtualization
CLR-4 :	The concepts behind scheduling and load balancing that is happening across Heterogeneous resources in the environment
CLR-5 :	Justify the need for improved hardware and software infrastructures (servers, protocols, security algorithms)
CLR-6 :	Know the commercial functioning of cloud computing

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 Expected Attainment (%)
CLO-1 :	Defend the need for cloud computing to run an online business	3	85	75
CLO-2 :	Understand and figure out the necessities of middleware technologies	3	75	70
CLO-3 :	Practically create a virtual environment (lab purpose using vmware)	3	75	70
CLO-4 :	Implement crypto algorithms that may be used in the computing environment	3	85	80
CLO-5 :	Use few libraries from the cloud sim to create Cloudlets, cloudletlist, scheduling modules	3	85	75

Program Learning Outcomes (PLO)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	L	H	L	H	L	M	L	M	L	L	M	H	L	L	L
CLO-2 :	H	H	L	M	L	M	L	M	M	L	M	H	M	L	L
CLO-3 :	M	H	M	H	L	M	M	M	M	L	L	H	M	L	L
CLO-4 :	M	H	M	H	L	M	L	M	M	L	M	H	L	L	L
CLO-5 :	M	H	M	H	L	M	L	L	M	L	L	H	L	L	L

Duration(Hour)		18	18	18	18	18
S-1	SLO-1	Evolution and History of cloud computing	Cloud Infrastructure	Platform as a Service	Data in Cloud	Cloud Computing–Simulation
	SLO-2	Introduction to Cloud Computing	Architectural Design of Computer and storage Clouds	Evolution of PaaS	Data as a Service	Cloud Computing :Simulation Tools
S-2	SLO-1	Cloud Types	Layered Cloud Architectural Development	Introduction to Paas	DaaS: Architecture	Simulation Tools :CloudSim, Cloud Analyst
	SLO-2	Basics types of Models	Cloud enabling technologies	Paas Service Provider	DaaS: Advantages	Simulation Tools: Green Cloud, EMUSIM
S-3	SLO-1	Layers and types of Cloud	Data center technologies	Platform as a Service :Acquia Cloud	DaaS: Disadvantage	Simulation Tools: Ground Sim, MR-CloudSim
	SLO-2	Features of Cloud Computing	Web technologies	Platform as a Service :Amazon AWS	Database as a service	Cloud based Web Applications &Service Testing Tools
S-4-6	SLO-1	Laboratory1:Createavirtualmachine	Laboratory 4:Create a drop box using Google AP	Laboratory 7:Encryption and Decryption ofText	Laboratory 10:Laboratory8:SimpleExperimentsinCloudSim	Laboratory 13: Create a Warehouse Applicationin Sales force.Com
	SLO-2					
S-7	SLO-1	Cloud Computing Stack	Multitenant technologies	Platform as a Service: APP42PaaS	Cloud Based data storage	Cloud based Web Applications & Service Testing Tools
	SLO-2	Advantages of Cloud computing	Service technologies	Platform as a Service: Google AppEngine	Advantage and limitations	Cloud Based Mobile &Multimedia Application Testing Tools
S-8	SLO-1	Components of Cloud computing	Hardware and Infrastructure	PaaS Application Framework	Cloud Storage Interoperability	Cloud Applications and New Opportunity
	SLO-2	Limitations of Cloud computing	Client net work	PaaS Operator Verbs	Cloud Security	Design approach with case studies
S-9	SLO-1	Cloud Computing service providers	Security Networks	Paas Developer Verbs	Introduction	Design methodology for IaaS Service model
	SLO-2	Types of service provider	Services	Advantages and challenges of PaaS	Security Risks and Best Practice	Google API
S 10-12	SLO-1	Laboratory 2:Installation of Platforms	Laboratory 5:TransferDatausingGoogleAPPs	Laboratory 8: Simple Experimentsin Cloud Sim	Laboratory 11: Simple Experiments in Cloud Sim	Laboratory 14: Create a Warehouse Application in Sales force Communing Apexprog Lang
	SLO-2					
S-13	SLO-1	**Virtualization**	**Accessing the Cloud**	**Software as a Service**	**Security Cloud**	**AWS EC2 instance**
	SLO-2	History of virtualization	Platforms	Evolution of SaaS	SecurityriskandBestPractic	Migration

					es	
S-14	SLO-1	Introduction to virtualization	Web Applications	Basis of SaaS	SecurityCloud:CIAConcept	Specific Cloud Services Models
	SLO-2	Types of Virtual Machines	Web APIs	Advantages of SaaS	TypesofSecurityAttacks	Introduction
S-15	SLO-1	Advantages of virtualization	Web browsers	Brief Introductory part of software as a service	Security Policy Implementation	Resource allocation in cloud computing
	SLO-2	Components of virtualization	Cloud storage	Saas: Unification Technologies	Security Policy Implementation: Policy Types	Introduction
S 16-18	SLO-1	Laboratory 3: Deploying existing Apps	Laboratory 6: upload and download using Google APPs	Laboratory 9: Simple Experiments in Cloud Sim	Laboratory 12:Simple Experiments in Cloud Sim	Laboratory 15:Implimentation of SOAP Web Services
	SLO-2					

Learning Resources	1. Dr.AnandNayyar, (2019), "Handbook of Cloud Computing", BPB 2. Buyya R., Broberg J., Goscinski A., "Cloud Computing: Principles and Paradigm", John Wiley& Sons, 2011. 3. Arshdeep Bahga and Vijay Madisetti,"Cloud Computing – A Hands on Approach", Universities Press (India) Pvt Ltd. 2014. 4. A.Srinivasan and J.Suresh, "Cloud Computing – A Practical Approach for Learning and Implementation", Pearson India Publications 2014.

LearningAssessment											
Bloom's LevelofThinking		ContinousLearningAssessment(50%Weightage)								FinalExamination(50%weightage)	
		CLA–1(10%)		CLA–2(10%)		CLA–3 (20%)		CLA–4(10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100%		100%		100%		100%		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	1.Dr.S.Jayachandran 2.Dr. AGUSTHIYAR R

Course Code	UCA23D07J	Course Name	*Web development using Node JS and MongoDB*	Course Category	D	Discipline Specific Elective Course	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	*NIL*	Co-requisite Courses	*NIL*	Progressive Courses	*NIL*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*NIL*	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Full Stack Development using Node.js
CLR-2 :	Design social media websites,music players and mini games via scripting
CLR-3 :	Building own modules
CLR-4 :	Understanding Node Package Manager
CLR-5 :	Interface with Mongo DB
CLR-6 :	Master NoSQL database

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: 1 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 Expected Attainment (%)
CLO-1 :	Install Node.js	2	80	70
CLO-2 :	Create basic web applications using Node.js	3	85	75
CLO-3 :	Build HTTP server using core modules	3	75	70
CLO-4 :	Use stream IO to efficiently serve the web page	3	85	80
CLO-5 :	Create Modules to organize server	3	85	75
CLO-6 :	Quering and performing CRUD on Mongo DB	3	80	70

Program Learning Outcomes (PLO)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	H	H	H	M	L	L	L	M	M	M	M	L	L	L	L
CLO-2 :	H	H	H	M	L	M	L	M	M	L	M	M	L	L	L
CLO-3 :	H	H	H	M	M	L	L	L	M	L	M	L	M	L	L
CLO-4 :	H	H	H	M	M	L	L	M	M	M	M	L	L	L	L
CLO-5 :	H	H	H	L	M	L	L	M	L	L	M	M	M	L	L
CLO-6 :	H	H	H	M	M	M	L	M	L	M	M	M	M	L	L

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Need of Scripting Language	Array Methods :indexOf, join, lasIndexOf, toString	Add HTTP header	Streams – Reading a Stream	Document with different types of values i)*Document with Scalar Values*
	SLO-2	Difference between client and server side scripting	Array Methods : reduce, reverse, slice, some, sort	Example programs	Stream – Writing to a stream	ii)*Document with Documents as values*
S-2	SLO-1	Script tag in HTML	Function Definition	Read the Query String	Piping the Stream	iii)*Document with Array as values*

	SLO-2	Java Script declaration	Function Parameters	Split the Query String	Chaining the Streams	CRUD operation :Insert Operation i)*insertOne() and ii)insertMany()* with examples
S-3	SLO-1	Output printing – document. Write, innerHTML, window .alert, console.log	Calling a Function, Return Statements	Node.js URL Module, Node.js – NPM Package	Node.js as a File Server, Create Files, Reading Files	Perform Query Operation for the following situations *i)Query on nested documents* *ii)Query an array*
	SLO-2	Java script statements, Comments and Variables	Nested Functions, Example Programs	Node.js File Server, Downloading and Using a Package	Delete Files, Update and rename files	*ii)Query an array of nested documents* *iv)Geospatial Queries* *Query Operation Examples,* Update Operation: *updateOne(), updateMany()*
S-4-6	SLO-1 SLO-2	Lab 1 – Java Script Input and Output	Lab 4 – Functions	Lab 7 –Query String	Lab 10 – Streams and Files	*Lab :Working with CURD operations* Insert and Query
S-7	SLO-1	Java script Operators -Logical, Bitwise, Arithmetic and Assignment operators	Web stacks introduction LAMP, LEMP, MEAN, MERN	Callback – Blocking code example Callback – Non- Blocking code example	Creating a Upload Form Parse the uploaded files	Delete Operation: deleteMany(), deleteOne() iii)findOneAndDelete() Delete operation Examples
	SLO-2	Java Script Datatypes - numeric	Difference between php and java script	Event Driven Programming	Save the files	Operation on Mongodb Data: projection
S-8	SLO-1	Java Script Datatypes – non numeric	Node introduction and evolution	Working of node Application	Display the uploaded files	Limiting Records Sorting Records
	SLO-2	Conditional statements	Installing node.js and npm in windows	Node Even emitter class	Nodemailer Modules	Indexes in Mongodb, default _id index
S-9	SLO-1	If else statements	Installing node.js and npm in Linux	add Listener(), on(), once()	Sending a email	Creating and Index createIndex method
	SLO-2	Switch statements, Iteration statements	Built in modules in node.js – http, https, Built in modules in node.js – querystring, readline	removeListener(), removeAllListeners() setMaxListemers(), listeners()	Multiple Receivers, Sending HTML	Single Field, Compound, Multikey, Geospatial,text Index, Hashed Index
S-10-12	SLO-1 SLO-2	Lab 2 – Java Script Operators and Conditions	Lab 5 – Installing Node.js	Lab 8 – Event Driver classes	Lab 11 – Sending Mail	*Lab :Working with CRUD operations* Update and Delete
S-13	SLO-1	Loop Controls – for loop	Include modules	Creating Buffers, writing to buffers	Mongodb Datatypes: i)Integer ii)Boolean iii)Double iv)String v)Arrays vi)Object vii)Null viii)Regular expression ix)Timestamp x)Date xi)Object ID	Properties of Index i)Unique Indexes ii)Partial Indexes
	SLO-2	While loop	Writing first sample application	Reading from Buffers	Installing Mongo DB in Windows, Linux and Mac Operating Systems	iii)Sparse Indexes iv)TTL Indexes

S 14	SLO-1	Do while Loop	Creating own modules	Converting Buffer to JSON	Installing and Working with MongoDB interfaces: i)Mongo Shell, ii)Mongo Compass	Aggregation in Mongodb: i)aggregate() method Aggregate expressions: i) $sum ii) $avg iii) $min iv) $max
	SLO-2	For each loop	Including your own module	Concatenate Buffer	Introduction to entities of MongoDB: i)Databases i)Collections and iii)Documents	v) $push vi) $addToSet vii) $first viii) $last
S-15	SLO-1	Arrays Introduction and declaring	Node.js – REPL Terminal – Read, Eval	Compare, Copy Buffer	Database: i)*createDatabase()*method with example	*Mongodb Backup: Export/Import data backup using shell* i)mongodump ii)mongorestore
	SLO-2	Accessing arrays	Node.js – REPL Terminal – Print, Loop	Slice Buffer and Buffer Length	ii)*dropDatabase()* method with example	*Mongodb Backup:* *Export/Import data backup using Mongo Compass*
S 16-18	SLO-1 SLO-2	Lab 3:Looping Statements	Lab 6 - Running sample application using node.js	Lab 9 - Buffers	Lab 12 – Working with MongoDB – create,drop,working with Collections	Lab: i)Creating different types of indexes ii)Aggregate data using different Aggregate expressions iii)Perform Mongodb data *Export* and *Import* using shell as well as mongo compass. iv)Working with mongo deployment commands

Learning Resources	1. Dayley, C., Dayley, B., Dayley, B. (2017). Node.js, MongoDB and Angular Web Development: The Definitive Guide to Using the MEAN Stack to Build Web Applications. United Kingdom: Pearson Education. 2. MongoDB Complete Guide: Develop Strong Understanding of Administering MongoDB, CRUD Operations, MongoDB Commands, MongoDB Compass, MongoDB Server, MongoDB Replication and MongoDB Sharding (English Edition. (2021). India: BPB Publications. **Online Official Documentation** 1. NodeJS v13.10.1 Docs: https://nodejs.org/latest-v13.x/api/documentation.html 2 . MongoDB: https://docs.mongodb.com/manual/tutorial/getting-started/

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember Understand	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%

Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Mrs. S Sindhu, SRM IST*
		Dr N Vijayalakshmi, SRM IST
		Mrs. S Suriya, SRM IST

Course Code	UCA23D08J	Course Name	*Cyber Security*	Course Category	*D*	*Discipline Specific Elective Courses*	L	T	P	O	C
							3	0	3	2	4

Pre-requisite Courses	*Operating Systems*	Co-requisite Courses	*NIL*	Progressive Courses	*NIL*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*NIL*	

Course Learning Rationale (CLR):		Learning	Program Learning Outcomes (PLO)

		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	Learn overview of cyber crimes and cyber security	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLR-2 :	Understand different methods of cyber attacks																		
CLR-3 :	Learn using tools used in cyber crime.																		
CLR-4 :	Understand cyber laws for organizations																		
CLR-5 :	Know use of forensics in cyber crime investigations																		
CLR-6 :	Know cyber safety and avoid victimization.																		
Course Learning Outcomes (CLO):																			
CLO-1 :	Understand the fundamentals of keeping information safe online, recognizing illegal online activities, and the laws that govern them.	3	80	70	L	H	H	M	M	M	L	H	M	M	L	M	L	L	L
CLO-2 :	Identify different kinds of cyber attacks and learn about the tools used to carry out these attacks.	3	85	75	M	M	H	H	H	L	L	M	M	M	L	M	M	L	L
CLO-3 :	Use different tools to gather information from various sources for cybersecurity purposes.	3	75	70	M	M	H	H	H	L	L	M	M	L	L	M	M	L	L
CLO-4 :	Utilize techniques to identify and detect unauthorized access or intrusion attempts in a system.	3	85	80	L	L	H	H	H	M	L	M	L	M	L	M	M	L	L
CLO-5 :	Implement measures and techniques to prevent unauthorized access or intrusion into a system.	3	75	70	H	H	H	M	M	L	L	M	M	L	L	M	M	L	L
CLO-6 :	Apply cyber safety for organizations.	3	85	80	L	H	H	H	M	M	L	M	M	L	M	M	M	L	L

Duration (hour)		18	18	18	18	18
S-1	**SLO-1**	Cyber Security - Introduction	Reconnaissance	Scanning Methodology	Intrusion Detection	Cyber Attacks
	SLO-2	History of Internet	Harvester	Techniques	Introduction	Types and effects
S-2	**SLO-1**	Impact of Internet	Whois	Ping Swear	Host Based Intrusion Detection	Online auctions
	SLO-2	CIA Triad	Netcraft	Techniques		Online shopping
S-3	**SLO-1**	Cybercrime - History	Host	Nmap Commands	Network Based Intrusion detection	Online games
	SLO-2	Reasons for Cybercrime	Extracting Information - DNS	Switches		online gambling
S-4,5,6	**SLO-1**	Lab: Substitution & transposition techniques Ceaser Cipher	Lab: Diffie-Hellman Key Exchange algorithm	Lab: chkrootkit security audit tool	Lab: Installing SNORT either Lnux/windows	Lab: Content Matching
	SLO-2					

S-7	**SLO-1**	Classification of cyber crimes	Extracting Information from EMail Servers	SYN Scan	Distributed or Hybrid Intrusion Detection	Spyware
	SLO-2	Cybercriminals		Types - TCP, UDP Scan		Scrumware
S-8	**SLO-1**	Need for Cyber Security	Social Reconnaissance	Connect Scan	Exchange format	Internet addiction
	SLO-2	Cyber laws	Scanning	Half-open Scan	Honeypots	Theft of identity
S-9	**SLO-1**	The Indian IT Act	Port Scanning	Stealth	SNORT Types	Stolen software
	SLO-2	Punishment for cyber crimes	Pros and Cons	XMAS Scan	Modes in SNORT	Scams
S-10,11,12	**SLO-1**	Lab: Rail fence row and column transformation	Lab: ImplementBrute force Attack	Lab: Implement SCAN methods	Lab: Intrusion Detection System to detect attacks	Lab: Real time network traffic analysis
	SLO-2					
S-13	**SLO-1**	Attacks and Countermeasures	Network Scanning	NULL SCAN	Firewalls	Criminal Hackers
	SLO-2	Malicious attacks	Types of network scanning	IDLE SCAN	Intrusion Prevention systems	Plagiarism
S-14	**SLO-1**	Types of malicious attacks	Vulnerability Scanning	FIN SCAN	Firewall characteristics	Phishing
	SLO-2	Common attack vectors	Pros and Cons	Comparision of scans	Types of firewalls	Cyber bullying
S-15	**SLO-1**	Web application attack	Types - Vulnerability Scanning	Banner Grabbing	Firewall Location	Cyber Safety
	SLO-2	Countermeasures	OWASP Top 10 vulnerabilities	OS finger printing	Configurations	Tips to stay protected
S-16,17,18	**SLO-1**	ImplementDictionary Attack	Lab: program to hide text data in image file (Steganography)	Lab: Sniff ARP traffic	Lab: OS finger printing	Lab: Data packet logging
	SLO-2					
Learning Resources		1. Cyber Security- Understanding CyberCrimes, Computer Forensics and Legal Perspectives by Nina Godbole and SunitBelpure, Publication Wiley 2. Cyber Security - A practitioner's guideBy David Sutton , BCS, The Chartered Institute for IT Publication Date: 10 Jul 2017 ISBN-13: 9781780173405 3. Computer Security Principles and Practice,William Stallings, Lawrie Brown, Third Edition, Pearson Education, 2015 4. Penetration Testing: A Hands-On Introduction to Hacking, Georgia Weidman, No Starch Press, 2014 5. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy", Elsevier, 2011 6. Kimberly Graves, "CEH Official Certified Ethical hacker Review Guide", Wiley Publishers, 2007					

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	20%	20%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	10%	10%
	Create										

	Total	**100%**	**100%**	**100%**	**100%**	**100%**

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Mrs. J. Shyamala Devi, MCA,ME, Asst. Prof. – BCA

Course Code	UCA23G05J	Course Name	Data Visualization and Exploring Models	Course Category	G	*Generic Elective Courses*	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards			

Course Learning Rationale (CLR):

CLR-1 :	Understanding the concept of statistical analysis and R
CLR-2 :	Gaining knowledge about various libraries in Python for visualization
CLR-3 :	The detailed concept of Dataset
CLR-4 :	Understand the Exploratory Data analysis
CLR-5 :	Various Processes for Analyzing Data
CLR-6 :	Implementation of Theoretical knowledge by using algorithms

Course Learning Outcomes (CLO):

Learning				Program Learning Outcomes (PLO)														
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 : Identify the key components of statistical analysis and R	3	80	70	H	H	M	H	L	L	L	M	L	L	M	L	M	L	L
CLO-2 : List out the process of visualization in python	3	85	75	H	H	H	M	M	L	M	L	M	M	L	L	M	L	L
CLO-3 : Understanding the in depth concept of Dataset	3	75	70	H	H	M	H	M	L	M	L	M	M	L	L	M	M	L
CLO-4 : Understand Exploratory Data analysis	3	85	80	H	H	H	M	M	M	M	L	M	M	L	L	M	L	L
CLO-5 : List out the phases involved in data analysis	3	85	75	H	H	M	M	M	M	M	L	M	H	M	M	M	L	L
CLO-6 : Apply algorithms for dataset	3	80	70	H	H	M	M	H	L	M	L	H	H	L	M	M	H	H

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction to Statistics	Introduction to Data Visualization in Python	Introduction to Dataset	Interpreting a heatmap	Statistical data elaboration
	SLO-2	Difference between inferential statistics and descriptive statistics	Matplotlin and Seaborn	Initial exploration of the dataset	Visualizing a variable relationship	
S-2	SLO-1	Drawing Inferences from Data	Lie Chart	Functions for initial Exploration	ExploratoryDataAnalysis (EDA)	1-D,2-D,N-D Statistical analysis
	SLO-2	Random Variables	Bar Chart	Counting Categorical value		
S-3	SLO-1	Normal Probability Distribution	Histograms	Data validation	Definition, Motivation, Stepsindataexploration	Extreme Value Analysis Clustering based Data
	SLO-2	Sampling	Scatter plots	Detecting data types		

S-4-5	**SLO-1**	**Lab 1:Exporting dataset into R**	**Lab 4: Creating a dashboard with Plotly**	**Lab 7: Import the dataset, categorize, and implement agg() with visualization**	**Lab 10: Find the shape of your dataset using EDA**	**Lab 13: Implementing genetic algorithm**
	SLO-2					
S-6	**SLO-1**	Sample Statistics	Heat Maps	Validating continents and range	The basic data types Data Type Portability	Distance Based and Density Based outlier analysis Outlier Detection in Categorical
	SLO-2	Sampling Distributions.	Adding error bars to a chart	Data Summarization		
S-7	**SLO-1**	Introduction to R	Adding error bars to a plot	.groupby() and .agg()	Introduction to Missing Data	Feature selection algorithms: filter methods
	SLO-2	Overview and About R	Creating box plots	Named aggregation	Traditional methods for dealing with missing data	wrapper methods and embedded methods
S-8	**SLO-1**	R and R studio Installation	Quantitative scatter plot	Visualising Categorical summaries	Maximum Likelihood Estimation	Principal Component Analysis(PCA)
	SLO-2	Introduction to data frames in R	Encoding time by color	Addressing Missing Data	Introduction to Bayesian Estimation	Kernel PCA
S-9-10	**SLO-1**	**Lab 2: Visualizing Carbon dioxide levels**	**Lab 5: Implementation of multiple graphs**	**Lab 8: Variation of the gold price with time data**	**Lab 11: Bayesian Estimation**	Lab 14: **Locating outliers in Dataset**
	SLO-2					
S-11	**SLO-1**	Modifying and Manipulating Data frames in R	Waffle chart	Converting and analyzing missing data	Multiple Imputation-Imputation Phase,	Canonical Correlation Analysis
	SLO-2	Introduction to visualization with R	Word cloud	Importing Date time data	Analysis and Pooling Phase	
S-12	**SLO-1**	Introduction to ggplot 2	Seaborn and Regression plot	Visualizing relationships over time	Practical Issues in Multiple Imputation	Factor Analysis
	SLO-2	Aggregates in R	Data visualization interfaces with Dash	Correlation		
S-13	**SLO-1**	Joining tables in R	Styling the header	Interpreting a heatmap	Models for Missing Notation Random Data	Multi-dimensional scaling
	SLO-2	Mean and mode in R	Styling the Charts	Visualizing a variable relationship		
S-14-15	**SLO-1**	**Lab 3: Implementation of Mean, Mode average for the dataset uploaded.**	**Lab 6: Interactive Charts for Stock Market**	**Lab 9: Implement Missing data functions**	**Lab 12: Replace the missing data with mean**	**Lab 15: Implementation of PCA**
	SLO-2					

Learning Resources	1. Core Python Programming - Second Edition, R. Nageswara Rao, Dreamtech Press. 2. R Graphics Essentials for Great Data Visualization by AlboukadelKassambara ***3.*** Charu C. Aggarwal," Data Mining The Textbook, Springer, 2015. ***4.*** Craig K. Enders, "Applied Missing Data Analysis", The Guilford Press, 2010.

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	20%	20%

	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	10%	10%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

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Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Mrs. S. Suriya* *Dr. Agusthiyar R*

Course Code	UCA23G06T	Course Name	Basics of IOS	Course Category	G	*Generic Elective Courses*	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning
CLR-1 :	To acquire the basic concept of IOS	1
CLR-2 :	Understand the IOS design patterns	2
CLR-3 :	To gain knowledge in IOS frameworks	3
CLR-4 :	To build applications using SWIFT	
CLR-5 :	To impart knowledge of IOS app publishing process	

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To gain knowledge to develop IOS apps	3	80	70
CLO-2 :	Understand the basic concept of Swift programming language and also gain knowledge in Xcode	3	85	75
CLO-3 :	To understand the IOS Framework	3	75	70
CLO-4 :	To gain knowledge on MapKit framework and IOS design patterns	3	85	80
CLO-5 :	Ability to work with IOS development tools	3	85	75

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1	L	H	M	H	L	M	M	M	L	L	M	H	M	L	L
CLO-2	H	H	L	M	L	M	M	L	M	L	M	H	M	L	L
CLO-3	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4	M	H	M	H	L	M	M	L	M	M	M	H	M	L	L
CLO-5	H	H	M	M	M	M	M	L	M	M	M	H	M	L	L

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to IOS Development	Swift Programming Language	Introduction to Xcode	Table views and collection views	Push notifications and in-app messaging
	SLO-2		Introduction to Swift		Table view cells	User notification framework
S-2	SLO-1	Overview of IOS development	Main Advantages and Disadvantages of Swift	Creating the initial user interface	table view data sources	Push notification services
	SLO-2				collection views	
S-3	SLO-1	Understanding IOS architecture	Syntax and basic concepts	interface Builder	collection view cells –collection view data sources	In-app messaging
	SLO-2		The println() function Variables, Constants, Data types		Layouts and scrolling	

S-4	SLO-1	IOS Framework	Conditional Statements & Operators	X code editor	Networking and web services	Personalization and targeting
	SLO-2				Introduction to networking	Debugging and testing techniques
S-5	SLO-1	IOS software stack	Comparison operators Arithmetic operators Logical operators	Debugging and testing	URLSession framework	
S-6	SLO-1	core OS layer	Functions and closures	Debugging tools	RESTful web services RESTful Architecture JSON Authentication	Xcode debugger:
	SLO-2		Functions with parameters			Logging and console output Unit testing: Integration testing
S-7	SLO-1	Core Service layer	Functions with returned values	Simulator		
	SLO-2		Optional Unwrapping Forced optional unwrapping			
S-8	SLO-1	IOS development tools SWIFT XCODE Cocoa Tourch Firebase	Loops, For loops, While loops For in loops	Source control	Core data and persistence	App distribution and monetization
	SLO-2					
S9	SLO-1		Objects & classes Methods, Properties	Deployment	SON and XML parsing	App review guidelines
	SLO-2		Methods with parameters Methods with return values			
S10	SLO-1	Setting up development environment	Structs Creating a struct,Accessing a struct	Version control	Authentication and security	In-app purchases:
	SLO-2		Inheritance,Creating a subclass, Method overriding			
S11	SLO-1	Creating a new IOS project	Memory management	Navigation and tab bar controllers	Location and maps integration	Advertising and sponsorships Advertising Networks In-App Advertising Native advertising Sponsorship UserData
	SLO-2		Automatic Reference counting Strong and Weak References Retain Cycles	Navigation controllers UIWindow - UILabel - UIButton - UISegmentedController - UITextField - UISlider - UISwitch - UIActivityIndicatorView - UIProgressView - UIPageControl - UIStepper	MapKit framework Map Display Location Services	
S12	SLO-1	Running the IOS app	Error handling- Error handling patterns,Errorcodes,Error Logging	tab bar controllers	Geo coding and reverse geocoding	Subscription models
	SLO-2					

Learning Resources	1.Learning IOS Development: A Hands-on Guide to the Fundamentals of IOS Programming" by Maurice Sharp and Jordan Morgan: 2. "iOS Programming: The Big Nerd Ranch Guide" by Joe Conway and Aaron Hillegass	3.iOS Development with Swift" by Craig Grummitt

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember Understand	30%	-	30%	-	30%	-	30%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	40%	-	50%	-
Level 3	Evaluate Create	30 %	-	30%	-	30%	-	30 %	-	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

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Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr. S. Lakshmi*

Course Code	UCA23P03L	Course Name	INTERNSHIP - III	Course Category	*IAPC*	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	0	0	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	Demonstrate skills learnt in the real time environment.			
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To get an insight of an industry and organization/company	3	80	70
CLO-2 :	To gain valuable skills and knowledge	3	85	75

	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	L	H	L	H	L	L	L	L	L	L	M	M	M	H	M
CLO-2 :	M	H	L	M	L	M	L	L	M	L	L	M	M	H	M

CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	L	L	M	L	L	M	M	H	M
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	L	L	M	L	L	M	M	H	M
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	L	L	M	L	L	M	M	M	M

Students can choose a company of their own interest for internship for a period of minimum four weeks to learn about the application of IT in real time environment. In the first week of July, all the students have to give a presentation about their observations made by them in internship. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

Learning Assessment				
Project Work / Internship	**Continuous Learning Assessment (50% weightage)**		**Final Evaluation (50% weightage)**	
	Review – 1	**Review – 2**	**Internship Report**	**Viva-Voce**
	20%	**30 %**	**30 %**	**20 %**

Course Code	UCA23P05L	Course Name	*Project Phase-I*	Course Category	*IAPC*	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	0	C
							0	0	8	2	4

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning
CLR-1 :	Demonstrate skills learnt in the real time environment.	
CLR-2 :	Explore the different industries that are using IT	
CLR-3 :	Enhance the skills in the system aspects	
CLR-4 :	Understanding the professional connections with the knowledge learnt	
CLR-5 :	Applying the skills in problem solving	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70
CLO-2 :	To gain valuable skills and knowledge	3	85	75
CLO-3 :	To make professional connections and enhance networking	3	75	70
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75

	Program Learning Outcomes (PLO)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
CLO-3 :	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

Students can choose problems of their own interest to develop software package using the programming languages/tools available. There will be two reviews conducted during the project period for all the students .At the end of the project, every student shall submit a structured project report and will take a Viva Voce examination.

Learning Assessment				
Project Phase-I	**Continuous Learning Assessment (50% weightage)**		**Final Evaluation (50% weightage)**	
	Review – 1	**Review – 2**	**Project Report**	**Viva-Voce**
	20%	**30 %**	**30 %**	**20 %**

SEMESTER – VIII

Course Code	UCA23801J	Course Name	Big Data Analytics	Course Category	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards			

Course Learning Rationale (CLR):	
CLR-1 :	Understand the Big Data Platform and its Use cases
CLR-2 :	Provide an overview of Apache Hadoop
CLR-3 :	Provide HDFS Concepts and Interfacing with HDFS
CLR-4 :	Understand Map Reduce Jobs
CLR-5 :	Provide hands on Hodoop Eco System
CLR-6 :	Apply analytics on Structured, Unstructured Data

Course Learning Outcomes (CLO):		Learning 1 Level of Thinking (Bloom)	Learning 2 Expected Proficiency (%)	Learning 3 Expected Attainment (%)
CLO-1 :	Identify Big Data and its Business Implications.	3	80	70
CLO-2 :	List the components of Hadoop and Hadoop Eco-System	3	85	75
CLO-3 :	Access and Process Data on Distributed File System	3	75	70
CLO-4 :	Understand the YARN Infrastructure	3	85	80
CLO-5 :	Manage Job Execution in Hadoop Environment	3	85	75
CLO-6 :	Develop Big Data Solutions using Hadoop Eco System	3	80	70

Program Learning Outcomes (PLO)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related Disciplines	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize Knowledge	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	H	H	M	M	M	L	L	L	M	M	M	L	M	L	L
CLO-2 :	H	H	H	M	M	L	M	L	M	M	M	L	M	L	L
CLO-3 :	H	H	M	H	M	L	M	L	M	M	M	L	M	L	L
CLO-4 :	H	H	H	M	M	L	M	L	M	M	M	L	M	L	L
CLO-5 :	H	H	M	M	M	L	M	L	M	H	M	M	M	L	L
CLO-6 :	H	H	M	M	M	L	L	L	M	H	M	M	M	L	L

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction of Big Data	Big Data Hadoop	Big Data HDFS	How does MapReduce Work?	Introduction to PIG
	SLO-2	Big Data Tools Overview	Overview of Hadoop	Overview of Eco System	**Business benefits of MapReduce**	Execution Modes of Pig,
S-2	SLO-1	Hadoop	**Apache Hadoop overview**	HDFS	Business Challenges of MapReduce	Comparison of Pig with Databases
	SLO-2	Apache Strom	**Business Benefits of Apache Hadoop**	YARN	**MapReduce Architecture**	Grunt
S-3	SLO-1	Hadoop	Need of Apache Hadoop	Map Reduce	MapReduce Example	Pig Latin
	SLO-2	Apache Strom	**Components of Hadoop**	Spark	**Implementation of MapReduce**	User Defined Function
S-4&	SLO-1	Lab 1: Normalizing data	Lab 4: Creating Modules	Lab 7: Set up Hadoop cluster	Lab 10: Import data from MS Excel	Lab 13: Implement partitioner in

S-5	**SLO-2**			configuration	into HDFS	Hadoop
S-6	**SLO-1**	Big Data Technologies Overview	Processing Layer (MapReduce)	Pig	Job Scheduling Optimizations, MR Task Distribution Optimization	Data Processing Operators
	SLO-2	Data Management	**Storage Layer (HDFS)**	Hive	Networking & I/O Optimizations	Hive Shell
S-7	**SLO-1**	Data Mining	Hadoop YARN	HBase	Iterative Processing	Hive Services
	SLO-2	In-Memory Analytics	**Apache Spark overview**	Mahout	Join Operations	Hive Meta store
S-8	**SLO-1**	Predictive Analytics	Benefits of Apache Spark	Zookepper	Data Access	Comparision with Traditional Database
	SLO-2	Text Mining	**Need of Apache Spark**	Oozie	Load Balancing	HiveQL
S- 9& S-10	**SLO-1**	Lab 2: Formatting data	Lab 5: Install and configure Hadoop, set working directory and various processes	Lab 8: Implement HDFS and explore its characteristics	Lab 11: Import data from MySQL into HDFS	Lab 14: Implement nested MapReduce
	SLO-2					
S-11	**SLO-1**	Big Data Analytics	Components of Apache Spark	Basic File System	Data Flow Optimization	Tables
	SLO-2	Text Analytics	**Spark Core Engine**	Operations in File system	Short Job Optimization	Querying Data
S-12	**SLO-1**	Information extraction	**Spark SQL**	Data Flow	Controlling Map Reduce Excecution	User Defined Function
	SLO-2	Text Summarization	**Spark Streaming**	Data Ingest	Input Format	HBasic
S-13	**SLO-1**	Question Answering,Role of Bigdata	**MLib , GraphX,** Hadoop 2.X versus Hadoop 3.X	Flume and Scoop, Hadoop archives, Hadoop I/O: Compression	Reader , Writer, Combiner, Partitioners	Concepts in HBase, Hbase Versus RDBMS
	SLO-2	Working with Semi-structured Data, UnStructured Data	Processing data with Hadoop and Interacting with Hadoop Eco System	Serialization, Avro and File-Based Data structures	Developing simple MapReduce Application.	Hive Services, Data types in Hive, Built in function in Hive, Big SQL
S-14 &S-15	**SLO-1**	Lab 3: Importing Modules	Lab 6: Implement basic commands in Hadoop to manipulate big data.	.Lab 9: Explore the properties of YARN	Lab 12: Implement reducer in Hadoop	Lab 15: Create a scenario based on real time domain
	SLO-2					

Learning Resources	1. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012. 2. SeemaAcharya, SubhashiniChellappan, Big Data and Analytics, Wiley Publications, 2nd Edition, 2014, DT Editorial Services, Big Data, Dream Tech Press, 2nd Edition, 2015. 3. Black Book Big Data, Dream tech publications, 1st Edition, 2017.

Learning Assessment											
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	20%	20%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%

	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	10%	10%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr.N.Vijayalakshmi, SRMIST*

Course Code	UCA23D09J	Course Name	Blockchain Technology	Course Category	D	Discipline Specific Elective Course	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	*NIL*	Co-requisite Courses	*NIL*	Progressive Courses	
Course Offering Department		*Computer Applications*	Data Book / Codes/Standards		

Course Learning Rationale (CLR):	This course offers learners to	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	State core blockchain concepts, the benefits, and the limitations of blockchain technologies.			
CLR-2 :	Acquire knowledge about cryptography and cryptocurrency fundamentals			
CLR-3 :	Obtain knowledge on Consensus mechanism algorithm.			
CLR-4 :	Acquire knowledge about open-source blockchain platform			
CLR-5 :	Determine real world challenges that blockchain technologies may assist in solving			
CLR-6 :	Make decisions about the use (or not) of blockchain technology in systems, and support decisions with relevant arguments.			

Course Learning Outcomes (CLO):	The Learners will be able to	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Contentedly discuss and describe the history, types and applications of Blockchain	3	80	70	H	M	M	L	H	H	L	L	L	L	L	L	H	M	M
CLO-2 :	Gains familiarity with cryptography and Consensus algorithms.	3	85	75	M	H	H	M	H	H	M	L	L	L	L	M	H	L	M
CLO-3 :	Apply the tools for understanding the background of crypto currencies	3	75	70	M	H	H	H	H	H	M	M	L	L	L	L	H	L	M
CLO-4 :	Identify in different open-source blockchain platform	3	85	80	M	H	H	M	H	H	H	H	M	M	L	M	H	L	M
CLO-5 :	Identify major research challenges and technical gaps existing between theory and practice in cryptocurrency domain	3	85	75	M	H	H	H	H	H	M	M	M	M	L	M	H	L	M
CLO-6 :	Understanding of latest advances and its applications in Block Chain Technology.	3	80	70	M	H	H	H	H	H	H	M	M	M	L	M	H	H	H

Duration Hours		15	15	15	15	15
S1	SLO1	Distributed DBMS	Cryptocurrency Fundamentals	Operation of Bitcoin Blockchain	Ethereum	Blockchain Implementation Challenges
	SLO2	Limitations of Distributed DBMS	Bitcoin	Blockchain Architecture	Ethereum Network	Zero Knowledge proofs

S2	SLO1	Introduction to Block chain	Digital Keys and Addresses	Block, Hash, Distributer P2P	Ethereum Virtual Machine (EVM)	protocols in Block chain
	SLO2	History, Definition	Transactions, Mining	Structure of Blockchain	Components of Ethereum	Succinct non interactive argument for Knowledge (SNARK)
S3	SLO1	Physical Ledger vs Digital LedgeR	Bitcoin Networks and PaymentsWallets	**Database vs. Blockchain Architecture**	Wallets for Ethereum	pairing on Elliptic curves
	SLO2	Distributed Ledger	Alternative Coins,	How does Blockchain Architecture works	Solidity	Zcash
S4,5	SLO1	**Lab1:** Create a Public Ledger vs. Private Ledger with the various attributes like Access, Network Actors, Native token, Security, Speed and examples.	Lab 4: -Bitcoin Wallet Creation and Transactions	Lab7: -Building a Distributed Peer-to-Peer Network	Lab 10: -Ethereum Network Setup	Lab13: Understanding Zcash , a privacy-focused cryptocurrency
S6	SLO1	Digital Money to Distributed Ledgers	Name coin, Zcash	Consensus mechanism	Smart Contracts	Attacks on Blockchains
	SLO2	Design Primitives: Protocols, Security, Consensus	Bitcoin limitations	Proof of Work (PoW)	some attacks on smart contracts	Sybil attacks
S7	SLO1	Blockchain Categories: Public	Cryptography Fundamentals	Proof of Stake (PoS)	Ethereum and Smart Contracts	selfish mining
	SLO2	Private	overview of Hashing	Byzantine Fault Tolerance(BFT)	The Turing Completeness of Smart Contract Languages	51% attacks
S8	SLO1	Consortium	cryptographic algorithm	Proof of Authority (PoA)	verification challenges	
	SLO2	Blockchain Categories Use Cases	SHA 256,signature schemes	Proof of Elapsed Time (PoET)	comparing Bitcoin scripting vs. Ethereum Smart	Sharding based consensus algorithms

S9,10	SLO1	**Lab2: -**Peer-to-Peer Network Simulation	**Lab 5: -Bitcoin Mining Simulation**	Lab 8: Consensus Mechanism Simulation	Lab 11: Solidity Smart Contract Development	Lab 14: Case Study about the different attacks
S11	SLO1	Blockchain Network and Nodes	encryption schemes and elliptic curve cryptography	consensus protocols	Contracts	Introduction to Web3
	SLO2	Peer-to-Peer Network	Introduction to Hyperledger	Permissioned Block chains	Decentralized Applications (DApps)	Contract Deployment
S12	SLO1	Decentralized networks and technology (serverless)	Hyperledger framework	Design goals	Any two example Decentralized Applications (DApps)	POST Requests
	SLO2	Features of Blockchain	Hyperledger as a Protocol	Consensus protocols for Permissioned Block chains.		
S13	SLO1	Applications of Blockchain technology	Hyperledger Fabric	Block chain network creation	Blockchain oracles	Development Frameworks
	SLO2		Digital Security Technology			
S14, 15	SLO1	**Lab3: Explore available tools for blockchain technology**	**Lab6:** implementation of Cryptographic hash functions used in password verification.	**Lab9: Building Blockchain**	lab 12: Explore any one Decentralized Applications (DApps)	Lab 15: Simple application using web3

Learning Resources	**1.** Melanie Swan, "Block Chain: Blueprint for a New Economy", O"Reilly, first edition – 2015. **2.** Daniel Drescher, "Block Chain Basics", Apress; 1st edition, 2017 **3.** Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained", 2nd Edition, Packt Publishing Ltd, March 2018. **4.** Mark Gates, "Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money", Wise Fox Publishing and Mark Gates 2017. Reference Books: 1. Ritesh Modi, "Solidity Programming Essentials: A Beginner"s Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing. Websites: 1. https://developer.ibm.com/patterns/create-and-deploy-block chain-network-usingfabric-sdk-java/ 2. https://docs.docker.com/get-started/https:/console.ng.bluemix.net/docs/services/block%2520chain/index.html

Learning Assessment						
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**				**Final Examination (50% weightage)**
		CLA – 1 (10%)	**CLA – 2 (10%)**	**CLA – 3 (20%)**	**CLA – 4 (10%)#**	

		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Dr.P.Chanthini, SRMIST, KTR Campus

Course Code	UCA23D10J	Course Name	Internet of Things	Course Category	D	Discipline Specific Elective Course	L	T	P	O	C
							3	0	2	2	4

Pre-requisite Courses	NIL	Co-requisite Courses	NIL	Progressive Courses	NIL
Course Offering Department	Computer Applications	Data Book / Codes/Standards			

Course Learning Rationale (CLR):

CLR-1 :	Demonstrate the design, communication model and enabling technologies for IoT.
CLR-2 :	Explore the system management and domain for various applications of IoT
CLR-3 :	Categorize the various protocols that are used for developing IoT applications.
CLR-4 :	Deploy an IoT application and connect to the cloud.
CLR-5 :	Develop IoT application for real time scenario
CLR-6 :	*Create innovate device for organizations and society*

Course Learning Outcomes (CLO):

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Apply the knowledge/understanding of mathematics, science, to the solution of complex problems applicable to the discipline	3	80	70	L	H	L	H	L	M	M	L	L	L	M	H	M	L	L
CLO-2 :	Design, implement, and evaluate a computer-based system, process, component, or program to meet desired solutions that meet the specified needs with suitable concern for the public health and safety, and the cultural, societal, and environmental considerations.	3	85	75	H	H	L	M	L	M	M	L	M	L	M	H	M	L	L
CLO-3 :	Create, select, and apply applicable techniques, resources, and modern engineering and IT tools to complex engineering activities with an understanding of the limitations.	3	75	70	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	Function successfully as an individual, and as a member or leader in assorted teams, and in multidisciplinary settings.	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	Prove knowledge and understanding of the engineering and management principles and apply the same to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	3	85	75	H	H	M	M	L	M	M	L	M	L	M	H	M	L	L
CLO-6 :	*Design and develop creative devices for the society.*	3	80	70	L	H	M	H	L	M	M	L	L	L	M	H	M	L	L

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction, Types, Applications, Merits	Communication Models in IoT	IoT Platforms Design Methodology	IoT Platforms	Introduction about RESTful API

	SLO-2	Definition& Characteristics of IoT	Device to Device Model	Purpose & Requirements, process model specification, domain model specification	IoT Logical Design with Python	Designing a RESTful Web API
S-2	SLO-1	Physical design of IoT , Things in IoT	Device to Cloud Model	Information model specifications, service specifications, Iot level specifications	Python Data types and Data Structures	Amazon Web Services
	SLO-2	IoT protocols	Device to Gateway Model	Functional view specifications, operational view specifications.	Control Flow statements	Amazon Web Services for IoT
S-3	SLO-1	logical Design of IoT	M2M	Device & component Integration, Application development	Classes and Python Packages for IoT	Creating a ID in Amazon
	SLO-2	IoT Functional Blocks	Differences between IoT and M2M	IoT System for Weather Monitoring	JSON, XML	Implementation of EC2
S 4-5	SLO-1	**Lab 1: Explain working of Raspberry Pi.**	**Lab 4:Demonstrate a smart object API gateway service reference implementation in IoT toolkit**	**Lab 7:Explain application framework and embedded software agents for IoT toolkit.**	**Lab 10:Reading Data from Internet using sensor**	**Lab 13: Smart Irrigation System**
	SLO-2					
S-6	SLO-1	IoT Levels and Deployment Templates	M2M in IoT	Purpose & Requirements, process model specification, domain model specification	HTTP Lib, URL Lib	Implementation of Autoscaling
	SLO-2	Levels 0, Levels 1	Architecture of M2M	Information model specifications, service specifications, Iot level specifications	SMTP Lib	Implementation of S3
S-7	SLO-1	Levels 2, Levels 3	Software-DefinedNetworking (SDN) SDN	Functional view specifications, operational view specifications.	Introduction to IoT Physical Devices	Implementation of RDS
	SLO-2	Level 4, Level 5	Architecture of SDN	Device & component Integration, Application development	Basic Building Blocks of IoT device	DynamoDB
S-8	SLO-1	IoT Deployment Challenges	Network Function Virtualization(NFV)	IoT System for Agriculture	Example Device: Raspberry Pi	Implementation of DynamoDB
	SLO-2	Domain Specific IoT	Architecture of NFV	Functional view specifications, operational view specifications.	About the board	Kinesis
S 9-10	SLO-1	**Lab 2: Controlling LED with Raspberry Pi**	**Lab 5: Write and explain working of an HTTP- to-CoAP semantic mapping proxy in IoT toolkit.**	**Lab 8 : Arduino with ESP8266 explanation**	**Lab 11: Home Automation**	**Lab 14: Health care system**
	SLO-2					

S-11	SLO-1	Home, Cities	NFV for IOT	Introduction to Cloud Storage Models	Raspberry Pi Interfaces &SPI Serial	Implementation of Kinesis
	SLO-2	Environment, Energy systems	IoT System Management	Stages of IoT Architecture	Introduction to Arduino	Case studies – Environment
S - 12	SLO-1	Industry	Advantages and Disadvantages of IoT system management	Sensors/Actuators	IoT hardware	IoT systems for weather Reporting Bot
	SLO-2	Agriculture	Need for IoT Systems Management	Devices , Gateway and Cloud	Microprocessors & Microcontrollers	Renewable Energy Systems
S-13	SLO-1	Health and Lifestyle	NETCONF ,YANG and NETOPEER	IoT Security and Interoperability	Resistive Sensors, Capacitive Sensors	Forest Fire Detection&Smart grid
	SLO-2	IoT components	IoT Systems and Device Management with NETCONF-YANG	Risks and Attacks&Tools for Security	Inductive Sensors, Electromagnetic Sensors	Case studies - IoT system for Energy
S 14-15	SLO-1	**Lab 3: Interfacing Light Sensor with Raspberry pi**	**Lab 6: Describe gateway as a service deployment in Iot toolkit**	**Lab 9: Weather Monitoring System**	**Lab 12: Remote Surveillance system**	**Lab 15:Air Pollution Monitoring System**
	SLO-2					
	SLO-2					

Learning Resources	1. *ArshdeepBahga and Vijay Madisetti, "Internet of Things - A Hands-on Approach", Universities Press, 2015.* 2. *Dieter Uckelmann et.al, "Architecting the Internet of Things", Springer, 2011.* 3. *CunoPfister, "Getting Started with the Internet of Things", O'Reilly, 2011.* 4. *Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014.* 5. *HonboZhou , "The Internet of Things in the Cloud: A Middleware Perspective ", CRC Press , 2012.*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	20%	20%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	10%	10%
	Create										

	Total	100 %	100 %	100 %	100 %	100 %

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*MrsM.Divya , SRMIST*

Course Code	UCA23D11T	Course Name	E-Commerce	Course Category	D	Discipline Specific Elective Courses	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To acquire the basic concept of E-Commerce			
CLR-2 :	Understand business of internet			
CLR-3 :	To impart knowledge on electronic payment systems			
CLR-4 :	To build various security and challenges in ECommerce			
CLR-5 :	To gain knowledge on consumer aspects in E-Commerce			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Understand the basic concept of E- Commerce and its applications	3	80	70
CLO-2 :	To gain the knowledge on EDI	3	85	75
CLO-3 :	Analyze security and the web	3	75	70
CLO-4 :	To gain knowledge on consumer aspects in E-Commerce	3	85	80
CLO-5 :	To gain knowledge on consumer aspects in E-Commerce	3	85	75

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
L	H	M	H	L	L	L	M	L	L	M	H	M	L	L
H	H	L	M	L	M	M	L	M	L	M	H	M	L	L
M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
M	H	M	H	L	M	M	M	M	L	M	H	M	L	L
H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to E- Commerce	Consumer oriented E- Commerce	EDI Implementation, MIME, and Value-Added Networks	**Security:** Internet security standards	Management Policies
	SLO-2	Definition& Classification of E-Commerce	Consumer oriented E- Commerce applications	Standardization and EDI	Network security and firewalls	Business Procedure
S-2	SLO-1	Framework of electronic commerce	Mercantile Process Models	EDI Software Implementation	client server network security	Public Laws
	SLO-2	Anatomy of E-Commerce Applications	Mercantile Models from the consumer's Perspective	EDI Envelope for Message Transport	secure electronic payment protocols	Payment Systems
S-3	SLO-1	E- Business models	Mercantile Models from the Merchant's Perspective	Value-Added Networks	cryptography and authentication	**Business concept in E-Commerce:** Digital Commerce Marketing
	SLO-2	E-Commerce based activities	Electronic business models	Internet-Based EDI	emerging client server security threats	Advertising strategies and tools
S-4	SLO-1	Goals of E-Commerce	B2B, B2C, C2C, C2B	Customization and Internal Commerce	security issues	Internet Marketing Technologies
	SLO-2	Technical Components of E-Commerce	B2B, B2C, C2C, C2B	Supply Chain Management	Firewalls and network security	Social Marketing
S-5	SLO-1	Functions	Electronic Payment Systems	Technology for Online-Business	encryption techniques	Mobile Marketing
	SLO-2	Advantages, and disadvantages of E-Commerce	Types of Electronic Payment Systems	Middleware	***Encryption Tools and Techniques***	Location based Marketing
S-6	SLO-1	Scope of E-Commerce	Digital Token -Based Electronic Payment Systems	Domain names	data and message security	Ethical, Social, in E-Commerce
	SLO-2	Electronic Commerce Applications	Smart cards and Electronic Payment Systems	**7. Choose the Perfect Domain Name for Ecommerce**	**Threats to message security**	Political Issues in E-Commerce
S-7	SLO-1	Network infrastructure	Credit **c**ard Based Electronic Payment System	work flow atomization and coordination	encrypted documents and electronic mail	The Means of Distribution
	SLO-2	Market forces Influencing the I-way	Risk and Electronic Payment System	customization		A model for Message Handling
S-8	SLO-1	Role of Internet	Designing Electronic Payment System	internal commerce	hypertext publishing	security and the web
	SLO-2	The Internet Terminology	Web-site Design	Contents: Text	MIME baiscs	B2C Models of E-commerce Business model of any e-commerce website
S9	SLO-1	E- commerce and World Wide Web	Web sites as market place	Contents: Integrating	S/MIME	Web security

	SLO-2	Globalization of the Academic Internet	E –commerce, pure online vs. brick and click business	E-business applications	MOSS	website security
S10	SLO-1	Components of the I way	click business	Component of Internet	MIME	The new age of Information based marketing
	SLO-2	Network Access Equipment	Electronic data interchange	Information technology structure	elated Facilities for EDI over the Internet.	Advertising on the internet
S11	SLO-1	Network Access Equipment-	EDI Applications in business EDI: Legal, Security, and Privacy Issues	Development of Intranet	Securing Channels of Communication	Case Study: Identify Key components
	SLO-2	Public Polic Issues shaping the I-way	EDI and Electronic Commerce	Extranet and their Difference	Protecting Networks	strategy
S12	SLO-1	Internet Terminology	Internal Information System	Assessing requirement for an online business designing	Protecting Servers	B2B
	SLO-2	An overview of Internet Applications	Work-Flow Automation and Coordination	Developing and deploying the system	ProtectingClients	B2C Models of E-commerce Business model of any e-commerce website

Learning Resources	1. Ravi Kalakota and Andrew B Whinston, (1999), "Frontiers of Electronic Commerce", Pearson Education Asia, (Unit I, II& III) 2. Marilyn Greenstein and Todd M Feinman, (2000), "Electronic commerce: Security, Risk Management and Control" Tata McGraw-Hill. (Unit IV & V)	3. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014. 4. K.Bajaj& D Nag , “E-Commerce”, Tata McGraw Hill – 1999.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	-	30%	-	30%	-	30%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	40%	-	50%	-
Level 3	Evaluate Create	30 %	-	30%	-	30%	-	30 %	-	20%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	*Dr.T.S.Suganya BCA Dept. SRM ISTRamapuram.*

Course Code	UCA23D12T	Course Name	Artificial Intelligence	Course Category	D	Discipline Specific Elective Course	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Discover problems that are agreeable to solution by AI methods.
CLR-2 :	Study the basics of designing intelligent agents that can solve general purpose problems
CLR-3 :	Discover appropriate AI methods to solve a given problem
CLR-4 :	Perform intellectual task as decision making, problem solving, perception, understanding
CLR-5 :	Formalize a given problem using different AI methods
CLR-6 :	Provides adaptive learning

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	PLO 1 Fundamental Knowledge	PLO 2 Application of Concepts	PLO 3 Link with Related Disciplines	PLO 4 Procedural Knowledge	PLO 5 Skills in Specialization	PLO 6 Ability to Utilize Knowledge	PLO 7 Skills in Modeling	PLO 8 Analyze, Interpret Data	PLO 9 Investigative Skills	PLO 10 Problem Solving Skills	PLO 11 Communication Skills	PLO 12 Analytical Skills	PLO 13 ICT Skills	PLO 14 Professional Behavior	PLO 15 Life Long Learning
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLO-1 :	Demonstrate fundamental understanding of the history of artificial intelligence and its foundations	2	85	80	H	L	M	L	M	L	L	M	M	M	H	L	H	M	M
CLO-2 :	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	3	85	80	L	H	M	L	M	L	L	M	M	H	H	L	M	M	M
CLO-3 :	Identify systems with Artificial Intelligence.	3	85	80	L	L	H	L	M	L	L	M	M	M	H	L	H	M	M
CLO-4 :	Ability to understand Artificial Intelligence techniques, such as search algorithms,	3	85	80	L	H	M	L	M	L	L	H	M	M	H	L	M	M	L
CLO-5 :	Ability to learn Artificial Intelligence techniques for problem solving.	3	85	80	L	L	M	L	H	L	L	M	H	M	H	L	M	M	L
CLO-6 :	Ability to learn the current Artificial Intelligence techniques.	3	85	80	L	L	H	L	M	L	L	M	H	M	H	L	M	L	L

Duration (hour)	12	12	12	12	12

S-1	**SLO-1**	Introduction to Artificial Intelligence	Logical Reasoning-Introduction	Planning: designing programs to search for data or solutions to problems	Uncertain Knowledge and reasoning	Learning
	SLO-2	History of AI- Overview of AI	Knowledge Representation	Forward search and backward search	Quantifying uncertainty	Learning agents
S-2	**SLO-1**	Applications of AI- Ai Techniques	Logical Agents: Knowledge based Agents	state-space search	Probability Theory: Uncertain Knowledge	Classification of learning
	SLO-2	Types of AI: General vs Narrow	The Wumpus World & Logic	Represent the current state and goal state	Axioms of probability	Learning elements
S-3	**SLO-1**	Problem Solving with AI- AI models	Propositional logic	Problems to solve: Water Jug Problem	Bayes Theorem	Inductive Learning methods
	SLO-2	Data Acquisition and Learning Aspects in AI	Propositional logic: Syntax & Syntax grammar	State representation: Initial, operator, goal state	Bayes' Rules& uses	Learning decision tree
S-4	**SLO-1**	Problem-Solving Process	Inference	Train travel problem	probabilistic Reasoning	Attribute based representation
	SLO-2	Formulating Problems	Implication by inference Types of reasoning	State representation: Initial, operator, goal state	Uncertainty: Causes of uncertainty:	Choosing an attribute
S-5	**SLO-1**	Problem Types and Characteristics	First-Order logic	partial-order planning	Probability	Decision tree learning
	SLO-2	Problem Analysis and Representation	Syntax of First-Order logic	Basic representation Operator representation	Probability of occurrence\	Ensemble learning
S-6	**SLO-1**	Agents- Examples of Agents	Basic elements of First order logic Reducing first-order inference	planning graphs	Conditional probability	Explanation based learning
	SLO-2	Types of agents	Quantifiers in First-order logic	Planning graph of feeding	Probability occurrence for the problem	Information gain
S-7	**SLO-1**	General Search algorithm Uniformed Search Methods	Inference in first order logic and Generalized rules for FOL	Uses of planning graph	Bayesian networks	Explanation based learning
	SLO-2	Heuristic Search Techniques	FOL inference rules for quantifier	Planning graph example	Types of Bayesian Network	Statistical Learning methods
S-8	**SLO-1**	BFS, Uniform Cost Search	Forward chaining	Graph plan algorithm	Building model op Bayesian Network	Learning with hidden variable
	SLO-2	Depth First search, Depth Limited search (DLS)	Properties of forward chaining	Using planning graphs for heuristics	Directed Acyclic Graph	Naïve Bayes
S-9	**SLO-1**	Iterative Deepening search algorithm	Fast conversion of forward chaining	planning and acting in the real world	Conditional probability	Instance base learning
	SLO-2	Iterative Deepening search for DFS	Properties of forward chaining Examples for forward chaining	Basic Planning	Bayesian Network Graph	Neural Networks
S-10	**SLO-1**	Informed Search-Introduction	Backward Chaining	Real world: JOB shop scheduling	Inferences in Bayesian networks	Reinforcement Learning
	SLO-2	General tree search: Evaluation function	Properties of Backward chaining Examples for Backward chaining	Critical path method	Components of Bayesian Network	Elements of reinforce learning

S-11	**SLO-1**	General graph search: Evaluation function	Unification	Forward march	Temporal models	Reinforcement learning problem
	SLO-2	Generate and Test BFS	Conditions for Unification & Unification algorithm	Backward march	Inference in temporal models	Agent environment interface
S-12	**SLO-1**	Generate and Test A* & AO* algorithm	Resolution for inference rule	Limited resources	Hidden Markov models	Steps for Reinforcement learning
	SLO-2	CSP	Steps for Resolution	Hierarchical Planning	HMM components	Problem solving methods for RL

Learning Resources	**3.** Russel.SandNorvig.P, (2003), "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education

Learning Assessment

Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%) #**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Valliyappan, Full Stack Developer, Lentra Technologies, Chennai	Dr.S.Gopinathan, Professor, University of Madras, Chennai	Mrs. PM Kavitha Dr. Agusthiyar R Dr.S Jayachandran

Course Code	UCA23G07T	Course Name	Data Wrangling	Course Category	G	Generic Elective Course	L	T	P	O	C
							4	0	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	This course offers learners to	Learning	Program Learning Outcomes (PLO)

		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	Clean and format data to eliminate duplicates and errors in your datasets	Level of Thinking	Expected Proficiency	Expected Attainment	Fundamental	Application of	Problem Solving skills	Link with related	Procedural Knowledge	Skills in Specialization	Ability to Utilize	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills	Analytical Skills	Communication Skills	Professional Behavior	Lifelong learning
CLR-2 :	Learn when to standardize data and when to test and script data cleanup																		
CLR-3 :	Scrape websites and APIs to find a bounty of useful information																		
CLR-4 :	Explore and analyze datasets with new Python libraries and techniques																		
CLR-5 :	Use Python solutions to automate your entire data-wrangling process																		
Course Learning Outcomes (CLO):	The Learnerss will be able to																		
CLO-1 :	Acquire the Fundamentals of Data Wrangling using Python Data Structures and Libraries	2	85	80	H	M	M	L	H	H	L	L	L	L	L	L	H	M	M
CLO-2 :	Acquire data and demonstrate the knowledge of Web Scraping	3	85	80	M	H	H	M	H	H	M	M	L	L	L	M	H	L	M
CLO-3 :	Clean data, impute missing values and detect Outliers	3	85	80	M	H	H	H	H	H	M	H	L	L	L	L	M	L	M
CLO-4 :	Perform Data Wrangling and Visualization	3	85	80	M	H	H	M	H	H	H	H	M	M	L	H	H	L	M
CLO-5 :	Perform Aggregation and Groupby operation	3	85	80	M	H	H	H	H	H	M	H	M	M	L	H	H	L	M

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Data Wrangling	Acquiring & Storing Data	What is Data Cleaning?	Data Wrangling - Join	What is Grouping?
	SLO-2	What is the role of data wrangling?	Readability, Cleanliness, and Longevity of the Data	Data Cleaning Process	Hierarchical Indexing	Mechanics of Group By Operation
S-2	SLO-1	Why data wrangling?	Where to find Data?	Benefits of Data Cleaning	Reordering and Sorting Levels	Iterating Over Groups

	SLO-2	Data Wrangling Challenges	Govwenment Data, NGO Data, Education Data, Medical and ScienfiticData,CrowdSourced data and APIs	Example Use Case for Data Cleaning	Summary Statistics by Level	Selecting a Column or Subset of Columns
S-3	**SLO-1**	Tools for Data Wrangling	Data Investigation-Case Studies	Components of Quality Data	Indexing with a DataFrame's columns	Grouping with Dicts and Series
	SLO-2	Data Wrangling Tasks	Relational Databases-MySQL and PostgreSQL	Subsetting the DataFrame	Data Wrangling - Combining	Grouping with Functions
S-4	**SLO-1**	Data Sources - EMR, PO	Non-Relational Databases - NoSQL	The unique function	Combining and Merging Datasets	Ex: sum(), min()
	SLO-2	File fformats: JSON, XML, EXCEL, CSV, HTML,audio files.	Reading data from different sources	Conditional Selection and Boolean Filtering	Database-Style DataFrame Joins	Grouping by Index Levels
S-5	**SLO-1**	Handle machine-readable data formats with Python	Data Loading into Pandas DataFrame	Handling Missing Data	Merging on Index	What is Data Aggregation?
	SLO-2	Working with Excel Files	Fundamentals of Regular Expressions RegEx	Filtering Out Missing Data	Concatenating Along an Axis	Column-Wise and Multiple Function Application
S-6	**SLO-1**	Parsing Excel Files	Reading and Writing data in text format	Filling in missing data	Pandas concat function with arguments	Returning Aggregated Data Without Row Indexes
	SLO-2	Python Data Structures - Sets	Reading text files in pieces	Data Transformation	Combining Data with Overlap	Apply: General split-apply-combine
S-7	**SLO-1**	Tuples and Strings	Writing data to text format	Removing Duplicates	Pandas Merge Functions with Arguments	Suppressing the Group Keys
	SLO-2	Iterators	Working with delimited format	Transforming Data using a function or mapping	DataWrangling-Reshaping and Pivoting	Quantile and Bucket Analysis
S-8	**SLO-1**	Lambda Expressions	JSON data	Replacing values	Reshaping with Hierarchical Indexing	Example: Filling Missing Values with Group-Specific Values
	SLO-2	Introduction to Numpy. Pandas, Matplotlib	XML and HTML : Web scraping	Renaming Axis Indexes	stack and unstack	Example: Random Sampling and Permutation
S-9	**SLO-1**	Numpy Basics	Introduction to Beautiful Soup 4 library	Discretization and Binning	Plotting and Visualization	Example: Group Weighted Average and Correlation
	SLO-2	Pandas DataFrames	Inspect data source	Detecting and Filtering Outliers	matplotlib API Primer	Example: Group-Wise Linear Regression
S-10	**SLO-1**	Statistics and Visualization with NumPy and Pandas	Scrape HTML content from a Page	Permutation and Random Sampling	Figures and Subplots	What is Pivot Tables?

	SLO-2	Descriptive Statistics using Numpy and Pandas	Parse HTML Code with Beautiful Soup	Computing Indicator/Dummy Variables	Colors, Markers, and Line Styles	Summary of pivot_table methods in Python
S-11	**SLO-1**	Random Variables	Reading data from XML	String Manipulation, String methods	Saving Plots to File	What is Cross Tabulation?
	SLO-2	Probability Distribution	Reading data from an API	Regular Expressions	Plotting with pandas and seaborn	CrossTab function in python
S-12	**SLO-1**	Discreteand Continuous Distribution	Reading microsoft excel files	Vectorized Strings	Types of Plots in matplotlib	Handling Categorical data in Python
	SLO-2	Introduction to Matplotlib Through a Scatter Plot	Interacting with Web API's	Concat, merge, join data tables	Facet Grids and Categorical Data	Techniques for Method Chaining

Learning Resources	**1. Data Wrangling with Python, by Kazil and Jarmul (ISBN: 1491948817)**

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	*Mrs.M.Ramla, Assistant Profesor, SRM IST*

Course Code	UCA23P06L	Course Name	Project Phase-II	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	12	2	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	Demonstrate skills learnt in the real time environment.	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

Students can choose problems of their own interest to develop software package using the programming languages/tools available. There will be two reviews conducted during the project period for all the students .At the end of the project, every student shall submit a structured project report and will take a Viva Voce examination.

Learning Assessment				
Project Phase-II	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %

COURSES FOR EARNING ADDITIONAL CREDITS

Course Code	UCD23P01L	Course Name	Internship Report– I	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	8	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Demonstrate skills learnt in the real time environment.			
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

Students can choose a company of their own interest for internship for a period of minimum TEN weeks (Part-time) to learn about the application of their related field in real time environment. All students have to give a presentation about their observations made by them in internship as per the schedule given. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

Learning Assessment				
Internship	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %

Course Code	UCD23P02L	Course Name	Project Work – I	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	8	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Demonstrate skills learnt in the real time environment.			
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

Students can choose problems of their own interest to develop software package using the programming languages/tools available. There will be two reviews conducted during the project period for all the students .At the end of the project, every student shall submit a structured project report and will take a Viva Voce examination.

Learning Assessment				
	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
Internship	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %

Course Code	UCD23P03L	Course Name	Apprenticeship – I	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	8	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Demonstrate skills learnt in the real time environment.			
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

Students can choose a company of their own interest for *Apprenticeship* for a period of minimum TEN weeks (Part-time) to learn about the application of their related field in real time environment. All students have to give a presentation about their observations made by them in internship as per the schedule given. At the end of the internship period, every student shall submit a structured internship report within 15 days from the date of the completion of the internship period.

Learning Assessment				
	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
Internship	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %

Course Code	UCD23P04L	Course Name	Internship Report– II	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	8	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	Demonstrate skills learnt in the real time environment.	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

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Learning Assessment				
Internship	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %

Course Code	UCD23P05L	Course Name	Project Work – II	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	8	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Demonstrate skills learnt in the real time environment.			
CLR-2 :	Explore the different industries that are using IT			
CLR-3 :	Enhance the skills in the system aspects			
CLR-4 :	Understanding the professional connections with the knowledge learnt			
CLR-5 :	Applying the skills in problem solving			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-4 :	To get experience in a field to allow the student to make a career transition	3	85	80	M	H	M	H	L	M	M	L	M	L	M	H	M	L	L
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	H	H	M	H	L	M	M	M	M	L	M	M	M	L	L

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Learning Assessment				
Internship	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %

Course Code	UCD23P06L	Course Name	Apprenticeship – II	Course Category	IAPC	Internship/Apprenticeship / Project/ Community Outreach	L	T	P	O	C
							0	0	8	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

CLR-1 :	Demonstrate skills learnt in the real time environment.
CLR-2 :	Explore the different industries that are using IT
CLR-3 :	Enhance the skills in the system aspects
CLR-4 :	Understanding the professional connections with the knowledge learnt
CLR-5 :	Applying the skills in problem solving

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Disciplinary Knowledge	2 Critical Thinking	3 Problem Solving	4 Analytical Reasoning	5 Research Skills	6 Team Work	7 Scientific Reasoning	8 Reflective Thinking	9 Self-Directed Learning	10 Multicultural Competence	11 Ethical Reasoning	12 Community Engagement	13 ICT Skills	14 Leadership Skills	15 Life Long Learning
CLO-1 :	To get an inside view of an industry and organization/company	3	80	70	L	H	M	H	L	M	L	L	L	L	L	H	M	L	L
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	H	M	L	M	L	L	M	L	L	H	M	L	L
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Learning Assessment				
Internship	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %