ACADEMIC CURRICULA

UNDERGRADUATE DEGREE PROGRAMME

Bachelor of Computer Applications in

Data Science

Three Years /

Bachelor of Computer Applications (Honours) in

Data Science

Four Years

Learning Outcomes Based Curriculum Framework (LOCF)

Choice Based Flexible Credit System

Academic Year
2023-2024

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Kancheepuram District 603203, Tamil Nadu, India

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SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Kattankulathur, Kancheepuram 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 Information Technology*
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 Data Science 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 Data Science.*
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 Data Science

1. Discipline Specific Core Courses (C) (20 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P	O	
UDS23101J	*Programming Using Java*	*3*	*0*	*3*	*2*	*4*
UDS23102J	*Fundamentals of Data Science*	*3*	*0*	*3*	*2*	*4*
UDS23103T	*Role of Mathematics in AI*	*4*	*0*	*0*	*2*	*4*
UDS23201J	*Introduction to Computing With Distributed Data Processing*	*3*	*0*	*3*	*2*	*4*
UDS23202J	*Fundamentals of Data Structures and Algorithms*	*3*	*0*	*3*	*2*	*4*
UDS23203T	*Role of Statistics in AI*	*4*	*0*	*0*	*2*	*4*
UDS23301J	*Data Engineering for Enterprise*	*3*	*0*	*3*	*2*	*4*
UDS23302J	*Data Base Management System*	*3*	*0*	*3*	*2*	*4*
UDS23303T	*Machine Learning*	*4*	*0*	*0*	*2*	*4*
UDS23401J	*Deep Learning*	*3*	*0*	*3*	*2*	*4*
UDS23402J	*Advanced Computing With Python and GCP*	*3*	*0*	*3*	*2*	*4*
UDS23403T	*Fundamentals of Natural Language Processing*	*4*	*0*	*0*	*2*	*4*
UDS23501J	*Deep Learning with Keras and Tensorflow*	*3*	*0*	*3*	*2*	*4*
UDS23502J	*Big Data Analytics with Applications*	*3*	*0*	*3*	*2*	*4*
UDS23503J	*Intelligent Automation*	*3*	*0*	*3*	*2*	*4*
UDS23601J	*Introduction to Computer Vision*	*3*	*0*	*3*	*2*	*4*
UDS23602J	*Advanced Analytics and Data Visualization for Enterprise*	*3*	*0*	*3*	*2*	*4*
USA23603T	*Research Methodology*	*4*	*0*	*0*	*2*	*4*
UDS23701J	*Data Science for Business Analytics*	*3*	*0*	*3*	*2*	*4*
UDS23801J	*AI and Intelligent Automation for Enterprise*	*3*	*0*	*2*	*2*	*4*
Total Learning Credits		**80**				

2. Discipline Specific Elective Courses (D) (5 Courses)						
Course Code	Course Title	Hours/ Week				C
		L	T	P	O	
UDS23D01J	*Data Warehousing and Data Mining*	*3*	*0*	*2*	*2*	*4*
UDS23D02J	*Introduction to Cloud Computing*					
UDS23D03J	*Machine Learning for Enterprise*	*3*	*0*	*2*	*2*	*4*
UDS23D04J	*Blockchain Technology*					
UDS23D05J	*Digital Transformation*	*3*	*0*	*3*	*2*	*4*
UDS23D06J	*Real World Computer Vision Applications*					
UDS23D07J	*Technology Leadership and Innovation Management*	*3*	*0*	*2*	*2*	*4*
UDS23D08J	*Social Media and Text Analytics*					
UDS23D09T	*Statistical Analysis and Business Applications*	*4*	*0*	*0*	*2*	*4*
UDS23D10T	*Applications of Edge IoT and ML*					
Total Learning Credits						**20**

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*
UDS23S03L	*Web Programming*	*0*	*0*	*2*	*2*	*1*
UDS23S04L	*Go Programming*	*0*	*0*	*4*	*2*	*2*
UDS23S05L	*Lua Programming*	*0*	*0*	*2*	*2*	*1*
Total Learning Credits						**7**

3. Generic Elective Courses (G)						
(9 Courses)						
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					
ULT23G02J	Tamil-II	2	0	2	2	3
ULH23G02J	Hindi-II					
ULF23G02J	French-II					
UDS23G01J	Data Wrangling	3	0	2	2	4
UDS23G02J	Office Automation with Advanced Excel	3	0	2	2	4
UDS23G03J	No-Code Applications	3	0	2	2	4
UDS23G04J	Introduction to Animation	3	0	2	2	4
UDS23G05J	Digital Marketing	3	0	2	2	4
UDS23G06J	Introduction to Internet of Things	3	0	2	2	4
UDS23G07T	Basics of Cyber Security	4	0	0	2	4
	Total Learning Credits					**34**

5. Ability Enhancement Courses (AE) (4 Courses)						
Course Code	**Course Title**	**Hours/Week**				
		L	**T**	**P**	**O**	**C**
ULE23AE2T	Business 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**				
		L	**T**	**P**	**O**	**C**
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**				
		L	**T**	**P**	**O**	**C**
UDS23P01L	Internship – I	0	0	0	0	1
UDS23P02L	Internship – II	0	0	0	0	1
UDS23P03L	Internship – III	0	0	0	0	2
UDS23P04L	Mini Project	0	0	4	2	2
UDS23P05L	Project Phase-I	0	0	8	2	4
UDS23P06L	Project Phase-II	0	0	12	2	6
	Total Learning Credits					**16**

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

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)	AE-1(4) (Business 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)	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**	**30**
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	**Course**	**Hours/ Week**				
Code	**Title**	**L**	**T**	**P**	**O**	**C**
ULT23G01J	*Tamil-I*	*2*	*0*	*2*	*2*	*3*
ULH23G01J	*Hindi-I*					
ULF23G01J	*French-I*					
ULE23AE2T	*Business English*	*4*	*0*	*0*	*2*	*4*
UDS23101J	*Programming Using Java*	*3*	*0*	*3*	*2*	*4*
UDS23102J	*Fundamentals of Data Science*	*3*	*0*	*3*	*2*	*4*
UDS23103T	*Role of Mathematics in AI*	*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	**Course**	**Hours/ Week**				
Code	**Title**	**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*
UDS23201J	*Introduction to Computing With Distributed Data Processing*	*3*	*0*	*3*	*2*	*4*
UDS23202J	*Fundamentals of Data Structures and Algorithms*	*3*	*0*	*3*	*2*	*4*
UDS23203T	*Role of Statistics in AI*	*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 Code	**Course Title**	**Hours/ Week**				
		L	**T**	**P**	**O**	**C**
UDS23301J	*Data Engineering for Enterprise*	*3*	*0*	*3*	*2*	*4*
UDS23302J	*Data Base Management System*	*3*	*0*	*3*	*2*	*4*
UDS23303T	*Machine Learning*	*4*	*0*	*0*	*2*	*4*
ULT23AE1J	*Applied Tamil - I*	*1*	*0*	*2*	*2*	*2*
ULH23AE1J	*Applied Hindi – I*					
ULF23AE1J	*French for Specific Purpose-I*					
UDS23G01J	*Data Wrangling*	*3*	*0*	*2*	*2*	*4*
UDS23S03L	*Web Programming*	*0*	*0*	*2*	*2*	*1*
UDS23P01L	*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 Code	**Course Title**	**Hours/ Week**				
		L	**T**	**P**	**O**	**C**
UDS23401J	*Deep Learning*	*3*	*0*	*3*	*2*	*4*
UDS23402J	*Advanced Computing With Python and GCP*	*3*	*0*	*3*	*2*	*4*
UDS23403T	*Fundamentals of Natural Language Processing*	*4*	*0*	*0*	*2*	*4*
ULT23AE2J	*Applied Tamil – II*	*1*	*0*	*2*	*2*	*2*
ULH23AE2J	*Applied Hindi - II*					
ULF23AE2J	*French for Specific Purpose-II*					
UDS23G02J	*Office Automation with Advanced Excel*	*3*	*0*	*2*	*2*	*4*
UDS23S04L	*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**
UDS23501J	*Deep Learning with Keras and Tensorflow*	*3*	*0*	*3*	*2*	*4*
UDS23502J	*Big Data Analytics with Applications*	*3*	*0*	*3*	*2*	*4*
UDS23503J	*Intelligent Automation*	*3*	*0*	*3*	*2*	*4*
UDS23D01J	*Data Warehousing and Data Mining*	*3*	*0*	*2*	*2*	*4*
UDS23D02J	*Introduction to Cloud Computing*					
UDS23G03J	*No-Code Applications*	*3*	*0*	*2*	*2*	*4*
UDS23S05L	*Lua Programming*	*0*	*0*	*2*	*2*	*1*
UDS23P02L	*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**
UDS23601J	*Introduction to Computer Vision*	*3*	*0*	*3*	*2*	*4*
UDS23602J	*Advanced Analytics and Data Visualization for Enterprise*	*3*	*0*	*3*	*2*	*4*
USA23603T	*Research Methodology*	*4*	*0*	*0*	*2*	*4*
UDS23D03J	*Machine Learning for Enterprise*	*3*	*0*	*2*	*2*	*4*
UDS23D04J	*Blockchain Technology*					
UDS23G04J	*Introduction to Animation*	*3*	*0*	*2*	*2*	*4*
UDS23P04L	*Mini Project*	*0*	*0*	*4*	*2*	*2*
Total Learning Credits		**16**	**0**	**14**	**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**
UDS23701J	*Data Science for Business Analytics*	*3*	*0*	*3*	*2*	*4*
UDS23D05J	*Digital Transformation*	*3*	*0*	*3*	*2*	*4*
UDS23D06J	*Real World Computer Vision Applications*					
UDS23G05J	*Digital Marketing*	*3*	*0*	*2*	*2*	*4*
UDS23G06J	*Introduction to Internet of Things*	*3*	*0*	*2*	*2*	*4*
UDS23P03L	*Internship – III*	*0*	*0*	*0*	*0*	*2*
UDS23P05L	*Project Phase-I*	*0*	*0*	*8*	*2*	*4*
Total Learning Credits		**12**	**0**	**18**	**10**	**22**
Total number of Hours / Week						**30**

Semester – VIII						
Course Code	**Course Title**	**Hours/ Week**				
		L	**T**	**P**	**O**	**C**
UDS23801J	*AI and Intelligent Automation for Enterprise*	*3*	*0*	*2*	*2*	*4*
UDS23D07J	*Technology Leadership and Innovation Management*	*3*	*0*	*2*	*2*	*4*
UDS23D08J	*Social Media and Text Analytics*					
UDS23D09T	Statistical Analysis and Business Applications	*4*	*0*	*0*	*2*	*4*
UDS23D10T	Applications of Edge IoT and ML					
UDS23G07T	*Basics of Cyber Security*	*4*	*0*	*0*	*2*	*4*
UDS23P06L	*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
UDS23101J	*Programming Using Java*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23102J	*Fundamentals of Data Science*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UDS23103T	*Role of Mathematics in AI*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23201J	*Introduction to Computing With Distributed Data Processing*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23202J	*Fundamentals of Data Structures and Algorithms*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23203T	*Role of Statistics in AI*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23301J	*Data Engineering for Enterprise*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23302J	*Data Base Management System*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23303T	*Machine Learning*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23401J	*Deep Learning*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23402J	*Advanced Computing With Python and GCP*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23403T	*Fundamentals of Natural Language Processing*	*H*	*H*	*H*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*L*	*L*	*L*
UDS23501J	*Deep Learning with Keras and Tensorflow*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23502J	*Big Data Analytics with Applications*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23503J	*Intelligent Automation*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23601J	*Introduction to Computer Vision*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23602J	*Advanced Analytics and Data Visualization for Enterprise*	*H*	*H*	*M*	*M*	*H*	*M*	*L*	*L*	*L*	*H*	*L*	*M*	*M*	*M*	*M*
USA23603T	*Research Methodology*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23701J	*Data Science for Business Analytics*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23801J	*AI and Intelligent Automation for Enterprise*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*H*
UDS23D01J	*Data Warehousing and Data Mining*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23D02J	*Introduction to Cloud Computing*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*H*
UDS23D03J	*Machine Learning for Enterprise*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*H*
UDS23D04J	*Blockchain Technology*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*H*
UDS23D05J	*Digital Transformation*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23D06J	*Real World Computer Vision Applications*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
UDS23D07J	*Technology Leadership and Innovation Management*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UDS23D08J	*Social Media and Text Analytics*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*
UDS23D09T	*Statistical Analysis and Business Applications*	*H*	*H*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UDS23D10T	*Applications of Edge IoT and ML*	*H*	*H*	*M*	*M*	*M*	*L*	*M*	*M*	*L*	*M*	*L*	*H*	*M*	*M*	*L*
ULT23G01J	*Tamil-I*	*H*	*M*	*M*	*M*	*M*	*L*	*M*	*L*	*M*	*M*	*L*	*H*	*H*	*H*	*H*
ULH23G01J	*Hindi-I*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
ULF23G01J	*French-I*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
ULT23G02J	*Tamil-II*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
ULH23G02J	*Hindi-II*	*H*	*H*	*M*	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*M*	*H*	*M*	*L*	*M*
ULF23G02J	*French-II*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*
UDS23G01J	*Data Wrangling*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
UDS23G02J	*Office Automation with Advanced Excel*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
UDS23G03J	*No-Code Applications I*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*
UDS23G04J	*Introduction to Animation*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
UDS23G05J	*Digital Marketing*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*M*	*H*	*H*
UDS23G06J	*Introduction to Internet of Things*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*H*	*L*	*M*	*L*	*M*	*M*	*M*	*L*
UDS23G07T	*Basics of Cyber Security*	*H*	*H*	*H*	*L*	*M*	*M*	*H*	*H*	*L*	*H*	*M*	*L*	*M*	*L*	*H*
UCD23S01L	*Quantitative Aptitude and Logical Reasoning*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UCD23S02T	*Verbal Ability and Skill Development*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*H*	*L*	*M*	*L*	*M*	*M*	*M*	*L*
UDS23S03L	*Web Programming*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23S04L	*Go Programming*	*H*	*H*	*M*	*H*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*M*	*M*	*M*
UDS23S05L	*Lua Programming*	*H*	*M*	*M*	*M*	*M*	*H*	*M*	*H*	*L*	*M*	*L*	*M*	*M*	*M*	*L*
ULE23AE2T	*Business English*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*M*	*H*	*H*
ULT23AE1J	*Applied Tamil – I*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*

ULH23AE1J	*Applied Hindi – I*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
ULF23AE1J	*French for specific purpose-I*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
ULT23AE2J	*Applied Tamil – II*	*H*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*	*M*	*H*	*H*
ULH23AE2J	*Applied Hindi - II*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*
ULF23AE2J	*French for specific purpose-II*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*M*	*H*	*H*	*H*	*M*	*H*	*H*
UES23AE1T	*Environmental Studies*	*H*	*H*	*M*	*M*	*M*	*L*	*M*	*M*	*L*	*M*	*L*	*H*	*M*	*M*	*L*
UCD23V01T	*Universal Human Values*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UEN23V01L	*Communication Skills*	*H*	*H*	*H*	*H*	*M*	*L*	*L*	*L*	*M*	*L*	*M*	*H*	*L*	*H*	*L*
UCD23V02T	*Industry Oriented Employability Skills for Science*	*H*	*H*	*M*	*H*	*M*	*L*	*M*	*M*	*L*	*L*	*M*	*H*	*M*	*L*	*M*
UCD23V05T	*Career Readiness and Professional Skills*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*
UDS23P01L	*Internship – I*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UDS23P02L	*Internship – II*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UDS23P03L	*Internship – III*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*
UDS23P04L	*Mini Project*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UDS23P05L	*Project Phase-I*	*H*	*H*	*M*	*H*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*H*	*M*	*M*	*M*
UDS23P06L	*Project Phase-II*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*M*	*M*	*M*	*L*	*H*	*H*	*M*	*M*
UNS23M01L	*NSS*	*H*	*H*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UNC23M01L	*NCC*	*H*	*H*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UNO23M01L	*NSO*	*H*	*H*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UYG23M01L	*YOGA*	*H*	*H*	*M*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*M*	*M*	*M*
UMI23M01L	*My India Project*	*H*	*H*	*M*	*M*	*M*	*L*	*L*	*L*	*M*	*M*	*M*	*M*	*M*	*M*	*M*
	Program Average	*H*	*H*	*M*	*M*	*M*	*H*	*M*	*M*	*L*	*M*	*M*	*H*	*L*	*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
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	மரபிலிருந்து மாற்றம் பெற்ற புதுக்கவிதை மரபின் சிந்தனைகளை அறியச் செய்தல்			
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	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills, Communication Skills	Analytical Skills	Ethical Practices1	Professional Behavior	Lifelong learning
CLO-1 :	புதுக்கவிதை உருவாக்கித் தந்த புதிய சிந்தனைக் களங்களை அறிந்துகொள்ளுதல்	2	75	60	H	-	H	-	H	H	-	M	H	-	H	H	-	-	-
CLO-2 :	நவீன கவிதைகள் வழி மாற்றம் பெற்று வரும் மானுட விழுமியங்களைத் தெரிந்துகொள்ளுதல்	2	80	70	H	-	H	-	H	H	-	H	M	-	H	H	-	-	-
CLO-3 :	தமிழ்ச்சமூகத்தின் இடைக்கால வாழ்வியல் முறைகளை உணர்ந்துகொள்ளுதல்	2	70	65	H	-	H	-	H	H	-	H	M	-	H	H	-	-	-
CLO-4 :	நவீன இலக்கிய வரலாறு வழி தமிழ்க் கல்வி வரலாறு, சமூக வரலாறு பெற்ற வளர்ச்சி நிலைகளைத் தெரிந்துகொள்ளுதல்	2	70	70	H	-	H	-	H	H	-	H	H	-	H	H	-	-	-
CLO-5 :	மொழியின் நுட்பங்களை அறிந்து மொழி ஆளுமையோடு செயல்பட அறிந்துகொள்ளுதல்	2	80	70	H	-	H	-	H	H	-	H	H	-	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	பழனிபாரதியின் 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	முல்லைக்காடு, தொகுப்பும் பதிப்பும் - தமிழ்த்துறை ஆசிரியர்கள், எஸ்.ஆர்.எம். அறிவியல் மற்றும் தொழில்நுட்பக் கல்விநிறுவனம், காட்டாங்குளத்தூர், 603203, 2023 வல்லிக்கண்ணன், புதுக்கவிதை தோற்றமும் வளர்ச்சியும், ஆழி பதிப்பகம், சென்னை, 2018 கா. சிவத்தம்பி, தமிழில் சிறுகதை தோற்றமும் வளர்ச்சியும், என்.சி.பி.எச்., சென்னை, 2013 தமிழ் இணையக் கல்விக்கழகம் - http://www.tamilvu.org/ மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம் - https://www.projectmadurai.org/

	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.Hebzibah beulah Suganthi, 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	Program Learning Outcomes (PLO)

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:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		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	Ethical Practices1	Professional Behavior	Lifelong learning
CLO-1 :	To Understand the Philosophy of life and living through Stories	2	75	60	H	H	H	M	H	H	H	H	H	M	H	H	-	-	-
CLO-2 :	To Examine Travelogue writing and Sketch	2	80	70	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-
CLO-3 :	To Identify Irony and essay based writing	2	70	65	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-
CLO-4 :	Evaluate the various social issues depicted in the prose	2	70	70	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-
CLO-5 :	To Understand the basic and fundamental principal of Translation	2	80	70	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	KAHANI	REKHACHITRA & YATRAVITRANT	NIBANDH	NATAK	ANUVAD& PARIBHASHIK SHABDAVALI
	SLO-2	AVDHARNA	VDHARNA	IBANDH KI AVDHARNA	AVDHARNA	RTH
S-2	SLO-1	SWARUP	WAROOP	WARUP	IATAK KA SWARUP	ARIBHASHA
	SLO-2	PARIBHASHA	HUMIKA	ARIBHASHA	PARIBHASHA	WARUP
S-3	SLO-1	KAHANI KE TATVA	IAHATVA	IAHATVA	TATWA	RAKAR
	SLO-2	KAHANI KA MAHATVA	IDDESHYA	IDDESHYA	PRAKAR	IAHATVA
S-4	SLO-1	PARIKSHA- PREMCHAND	ISHA- EKHACHITRA	UTAJ- NIBANDH AJARI PRASHAD DIVEDI	JDDESHYA	IDDESHYA
	SLO-2	KAHANI KA PARICHAY	EKHIKA PARICHAY	EKHIKA PARICHAY	RANGMANCH KA PARICHAY	NUVAD KA PRAYOJAN

S-5	SLO-1	VISLESHAN	ATH KA VISHLESHAN	ATH KA MAHATVA	NATAK KA MAHATVA	NUVAD KA PRAYOG
	SLO-2	EMANDARI KA MAHATVA	URU SHISHYA KA AMBANDH	IPRIT PARISHTHITIYON ME JEEVAN KI SH	PRAYOJAN	HROT BHASHA KA GYAN
S-6	SLO-1	HONHARI KA PARICHAY	GURU KE PRATI SMARPAN BHAVANA	MANAV KI AKANKSHAYEN	ANDHER NAGRI-(NATAK) BHARTENDU HARISHCHAND	LAKSHYA BHASHA KA GYAN
	SLO-2	UDDESHYA	PATH KA MAHATVA	SHANGHARSHIL JEEVAN	LEKHAK PARICHAY	ANUVAD KA DAYITVA
S-7	SLO-1	MALBE KA MALIK- MOHAN RAKESH	HELE PAR HIMALAY (YATRAVITRANT)	SANGHARSH KA PARINAM	NATAK KA VISLESHAN	ANUVAD KA ABHYASH
	SLO-2	LEKHAK PARICHAY	LEKHAK PARICHAY	BHOLARAM KA JEEV-(VYANGYA) HARISHANKAR PARSHAI	NATAK ABHINAY	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	TATKALIN PARISHTHITI KA VARNAN	YATRA KA YATHARTH CHITRAN	MAHATVA	SHISHYA KI AGYANTA	ANUVAD PRIYOJNA KARYA
S-9	SLO-1	APNI MITTI SE LAGAV	PATH KA VISLESHAN	LEKHAK PARICHAY	GURU SHISHYA SAMBANDH	PUNRIKSHAN
	SLO-2	RAJNITIK VIDWESH KA PARINAM	HIMALAY KA VARNANA	PATH KA VIHLESHAN	HASHYA VYANGY SE AVAGAT KARANA	VIVIDH PRAYOG
S-10	SLO-1	PROPKAR KI BHAVANA	HIMALAY KA LOK JEEVAN	MADHYAVARGI PARIVAR KI STHITI	DURDRISHTIHIN	PARIBHASHIK SHABDAVALI
	SLO-2	KAHANI PATH	LOK SAMASYA	SARKARI TANTRA KA KHOKHLA RUP	MAHATTAKANKSHI KA DUSHPARINAM	ATI MAHTVAPURN SHABD
S-11	SLO-1	KAHANI KA VISHLESHAN	UDDESHYA	PAURANIK KATHA KA CHITRAN	GURU KI AVAGYA KA DUSHPARINAM	TAKANIKI SHABDAVALI KA MHATVA
	SLO-2	PRASHO KI CHARCHA	PRASHNA ABHYASH	SANVEDANSHIL BHAVANA	TATKALIN SAMAJIK VYAVASTHA KI CHARCHA	HINDI SE ANGREZI SHABD
S-12	SLO-1	PRASHN ABHYASH	PATH PRICHARCHA	PARICHARCHA	PARICHARCHA	ANGREZI SE HINDI SHABD
	SLO-2	KAHANI KA UDDESHYA	MAHATVAPURN BIBDUON KI CHARCHA	PRASHANA ABHYASH	PRASHNABHYASH	SHABDAVALI KI AVSHYAKTA

Learning Resources	***Edited Book: ""SAMANYA HINDI", SRIJONLOK PUBLICATION, 2023, New Delhi.***

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	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*
Alumni	***Student***	*2. Dr. Md.S. Islam Assistant Professor, SRMIST*
Ananya Singh, Trainee Associate (Finance Operations) Cargill Business Services India, Building 9,2nd and 3rd Floor, Cessna Business Park, Kaverappa Layout, Kadubeesanahalli, India, Bengaluru, Karnataka	*Maimunah sheik, Reg: RA2131001010006 Dept: of Biotechnology*	*3.Dr. S. Razia Begum, Assistant Professor, SRM IST*
		4, Dr.Nisha Murlidharan 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	Program Learning Outcomes (PLO)

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	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	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 acquire knowledge about French language	2	75	60	H	M	H	H	M	H	H	H	H	M	H	H	-	-	-
CLO-2 :	To strengthen the knowledge on concept, culture, civilization and translation of French	2	80	70	M	H	M	H	H	M	H	M	L	H	H	M	-	-	-
CLO-3 :	To develop content using the features in French language	2	85	75	H	H	H	M	H	L	H	H	M	H	H	H	-	-	-
CLO-4 :	To interpret the French language into other language	2	70	80	H	H	M	H	M	H	H	M	H	H	M	H	-	-	-
CLO-5 :	To improve the communication, intercultural elements in French language	2	80	70	M	H	H	M	M	M	H	H	M	H	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 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:*** "**La Nouvelle Génération-AI"** Méthode de français, Marie-Noëlle COCTON, P.DAUDA, L.GIACHINO, C.BARACCO, Les éditions Didier, Paris, 2018. ***Cahier d'activités avec deux discs compacts.***

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. Kavaskar Danasegarane *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. Abigalai Assistant Professor, SRMIST, VDP*

Course Code	ULE23AE2T	Course Name	*BUSINESS 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	*English*		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 :	Understand the critical component for success in the workplace and Organize regular speaking practice sessions where students can engage in conversations and discussions related to business scenarios.			
CLR-2 :	Provide students with a collection of audio recordings or online resources that cover various business-related topics. These exercises should include comprehension questions and activities to improve listening skills, such as identifying main ideas, specific details, and understanding different accents.			
CLR-3 :	Practice drafting and editing and Focus on developing skills in organization, clarity, coherence, and the appropriate use of business language and conventions.			
CLR-4 :	Prepare clear,precise, readable written document			
CLR-5 :	Learn to design documents to make information easily accessible			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	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 :	*Conversant with the basic forms and formats of Writing*	2	85	80	H	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-2 :	*Techniques of Business Writing*	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-3 :	*To become a skilled writer*	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-4 :	*To Prepare precise business documents*	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-5 :	*Improve the Reading skills*	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H

Duration (hour)		12	12	12	12	12
S-1	*SLO-1*	*Introduction to Listening Skills as an important unit in communication*	*Introduction to Communication*	*Introduciton to Writing Business Letters*	*Introduction to Report Writing*	*Importance of Business Meetings*
	SLO-2	*Listening Process*	*Internal Communication*	*Importance of writing skills*	*Features of Good Report*	*Types of Business Meetings*
S-2	*SLO-1*	*Listening is not the same as Hearing*	*Stake Holders in Internal Communication*	*Difference between Personal and Business Letters*	*Purpose of Report Writing*	*Conducting Meetings*
	SLO-2	*Time Spent Communicating*	*Channels and methods to use different Channels*	*Structure & Format*	*Differentiate between Business Report and Engineering report*	*Common Mistakes made at Meetings*
S-3	*SLO-1*	*Purpose of Listening*	*Internal Tele-Conversation*	*Types of Business Letters*	*Steps in Report Writing*	Students will be able to identify and correct common mistakes in sentence structure, grammar, and punctuation.

	SLO-2	*Principles of Listening*	*Self-Introduction*	*Writing E-Mails*	*Structure of a Report*	*Employment Communication*
S-4	*SLO-1*	*Classification of Listening and the purpose*	*Seeking and Giving Information*	*Principles of E-mail*	*Types of Reports*	Students will be able to write a well-structured and professional resume that highlights their skills and experiences.
	SLO-2	*Informational Listening and the art of listening*	*Giving Messages*	*E-mail Etiquette*	*Format of Reports*	Students will be able to create an appealing and professional design for their resumes, including proper formatting and layout.
S-5	*SLO-1*	*Critical Listening*	*Expression of Gratification*	*Overcoming problems in E-mail Communication*	*Oral Communication Skills*	*Reason for a Cover Letter to Apply for a Job*
	SLO-2	*Therapeutic or Empathetic Listening*				
S-6	*SLO-1*	*Other Listening Types*	*External Communication*	*Writing Memos, What is a Memo?*	*Oral Business Presentation*	*Format of Cover Letter*
	SLO-2	*Barriers to Effective Listening Process*	*Stake Holders*	*Principles of Precis Writing and purpose*	*Purpose, Audience, Locale*	*Types of Cover Letter*
S-7	*SLO-1*	*Categorization of Barriers to Communication*	*Channels of External Communication*	*Approaches to memo writing*	*Steps in Making a Presentation*	*Group Discussion*
	SLO-2	*How to resolve the barriers for communication?*	*Cross Organizational Video-Teleconferencing*	*Format of a Memo*	*Research and Planning*	*Understand the Nature of Discussion*
S-8	*SLO-1*	*Reading Skills*	*Briefing the Organization*	*Circulars*	*Structure and Style*	*Difference between Debate and Discussion*
	SLO-2	*Effective Reading Strategies - 1 to 5*	*Description of Product*	*Guidelines for writing Circulars*	*Preparation and Presentation*	*Ways to form and present the arguments*
S-9	*SLO-1*	*Effective Reading Strategies - 6 to 10*	*Description of Process*	*Format of Circulars*	*Delivering a Presentation*	*Ways to Defend*
	SLO-2	*Purpose of Reading*	*Description of Services*	*Notices- Purpose*	*Making the Self Presentable*	*Emotional Intelligence: Understanding*
S-10	*SLO-1*	*Types of Reading*	*Holding Meetings over Skype*	*Format of Notices*	*Dressing Sense*	*Understanding Individual Nature*
	SLO-2	*Techniques for Effective Reading*	*Communication Network: Scope*	*Important Points to Note in a Notice*	*Clear Voice - Dos and Dont's*	*Zohari Window Model*
S-11	*SLO-1*	*Improving Comprehension*	*Types of Communication Network*	*Writing Component: Preparing Emails*	*Planning &Analyzing*	*Encouraging Fellow Participants*
	SLO-2	*Reading Component- A Story of bankruptcy*	*Formal Communication Network*	*Preparing Memo and circulation of the same*	*Structuring*	*Making Communication More Friendly*
S-12	*SLO-1*	*Reading Component- A Story of bankruptcy*	*Informal Communication Network*	*Preparing Circular*	*Managing Body Language*	*Knapp's Relationship Escalation Model*
	SLO-2	*Reading Component- A Story of bankruptcy*	*Conducting a Elevator Pitch Round*	*Preparing Notices and the purpose*	*Managing Emotions*	*Convincing Others by using rhetorics*

Learning Resources	*1. Business English (English, Paperback, Delhi University)* *2. Business English: A Complete Guide for All Business and Professional Communications Paperback – by PREM P.BHALLA .*	*4. Speak Business English Like an American: (Book & Audio CD) Paperback –, 2014, by Amy Gillett (Author)*

	3. Business English (English, Paperback, Geffner Andrea B.)	*5. Practical English Usage, 4th edition: International Edition (without online access): English Paperback – 2017 by Michael Swan* *6. Essential Business Words: ebook by Josef Essberger*

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	30%	-	30%	-	30%	-	30%	-	30%	-
	Analyze										
Level 3	Evaluate	40%	-	40%	-	40%	-	40%	-	40%	-
	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**
Krishna Raj ***Sutherland*** ***Krishna.Raj1@sutherlandglobal.com***	***Dr. J Mangayarkarasi*** ***Associate Professor and Head, Dept. of English Ethiraj College 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 V.Vennila, Assistant Professor, Department of English, FSH, SRMIST***

Course Code	UDS23101J	Course Name	Programming Using 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 and Applications	Data Book / Codes/Standards		Nil	

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

CLR-1 :	TounderstandtheprinciplesandconceptsofObjectOrientedProgramming
CLR-2 :	TolearnhowtoextendJavaclasseswithinheritanceanddynamicbinding.
CLR-3 :	TolearnhowtoproducerobustprogramsinJavausingExceptionHandling
CLR-4 :	Toachieveparallelismusingthreadingconcepts
CLR-5 :	ToDevelopthebasicsofGraphicalUserInterfaceProgramming

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Use an integrated development environment to write, compile, run, and test simple object-Oriented Java programs.	1	85	80
CLO-2 :	Implement Javaprograms using classes, objects and also focused on garbage collection.	2	85	80
CLO-3 :	*Apply Exception handling and Parallelism in java applications*	2	85	80
CLO-4 :	Identifyandfixdefectsandcommonsecurityissuesincode.	3	85	80
CLO-5 :	Togain knowledge in Applets, Event handling using AWT controls.	3	85	80

Learning	Program Learning Outcomes (PLO)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Lifelong learning
M	-	-	-	M	-	-	-	M	-	-	M	-	-	-
M	H	H	H	H	-	-	-	M	-	-	M	-	-	-
-	M	H	H	H	-	-	M	M	-	-	-	-	-	-
-	M	M	H	M	-	-	-	M	-	-	M	-	-	-
-	M	H	H	H	-	-	-	M	H	H	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	*SLO-1*	Origin of Java	Class fundamentals	Inheritance Basics	Introduction to java Thread model	Introduction to Event Handling
	SLO-2	Impact of java over internet	Defining a Class	Understanding Types of Inheritance: Single, Multilevel, HierarchicalInheritance	Creating a Thread by Extending Thread Class	Understanding Action Event & Item Event
S-2	*SLO-1*	Java's magic:ByteCode , JVM	CreatingObjects	How does java support multiple inheritance?	Creating a Thread by implementing Runnable Interface.	Key Event & Mouse Event
	SLO-2	JavaBuzzwords - Simple, Object Oriented, Robust, Multi threaded, Architecture-Neutral, Interpreted and highperformance, Distributed, Dynamic	Assigning object Reference Variables	Using Superkeyword	Thread Class	Text Event, Window Event, Component Event
S-3	*SLO-1*	Evolution of Java - Introduction to Object Oriented Concepts of Java	Introduction to method, Accessing class members -	What is Method Overriding? - Understanding Dynamic Method dispatch	Creating multiple threads - Assigning Thread priorities	Introduction to Event Listener Interfaces - Working with Action Listener &, Adjustment Listener
	SLO-2	Encapsulation,Polymorphism, Inheritance	Constructors, Characteristics of Constructors - Types of constructors - this Keyword	Introduction to Abstract Keyword - Working with Abstract class and Method & Using final with inheritance,	Applying Synchronization - Inter-thread communication	Working with Container Listener, Item Listener, Component Listener - Workingwith Key Listener & Mouse Listener
S 4-6	*SLO-1* *SLO-2*	**Laboratory1: Learning to work with Java IDE and Writing Simple Conversion Programs**	**Laboratory 4: Classes andObjects**	**Laboratory 7: Inheritance, Method Overriding, Abstract classes and methods**	**Laboratory10: Multi-threading**	**Laboratory13: EventHandling**
S-7	*SLO-1*	Introduction to Lexical Issues of Java	Java Destructor- Garbage Collection	Introduction to Package	Introduction to Legacy Classes	Introduction AWT Controls
	SLO-2	White spaces, Identifiers, Literals Comments, Separators ,Keywords	Finalize( ) Method	Creatinga Package	Working with Vectorclass	Working with Laboratory

S-8	***SLO-1***	Introduction to Datatypes of Java - Byte, short, int, long, float, double, chars, Boolean	Overloading methods	Understanding Access Protection	Examples using Vectorclass	Working with Buttons controls
	SLO-2	What is variable?,Declaring a variable, dynamic initialization of variables - Scope and life time of variables	Overloading constructors - Using objects as parameters - Argument Passing -	Importing packages - Introduction to Interfaces - Defining an interface	Understanding Stack class - Examples using Stack class	Working with Check Boxes - Working with Checkbox Group controls
S-9	***SLO-1***	Introduction to Operators	Returning Objects	Implementing Interfaces	Introduction to Legacy Interfaces - Understanding Enumeration Interface	Working with Choice controls - Working with Lists controls
	SLO-2	Working with Arithmetic, Relational, Logical, Bit wise, Conditional, Assignment operators	Recursion	How Interfaces are extended?	Examples using Enumeration interface	Working with Text Fieldcontrols
S 10-12	***SLO-1***					
	SLO-2	**Laboratory 2: Operators**	**Laboratory 4: Overloading Methods and Constructors, finalize() method**	**Laboratory8: Packages and Interfaces**	**Laboratory11: Legacy Classes and Interfaces**	**Laboratory 14: AWT Controls**
S-13	***SLO-1***	What is Array?, Initialization of Arrays	Introducing Access Control	What is Exception?	Introduction to Utility classes, Working with String Tokenizer	Introduction to Layout Manager
	SLO-2	Understanding Types of Arrays	Understanding Static variables and methods	Understanding Exception Types	Working with Date class, Working with Calendar	Understanding Flow Layout
S-14	***SLO-1***	Introduction to Control Statements - Working with Selection Statements-All forms of if & Switch	Understanding Final variables And methods	Introduction to Exception Handling - Working with try and catch	Working with Gregorian Calendar, Working with Random Class	Understanding Border Layout
	SLO-2	Introduction to Iterative Statements	Working with NestedClass - Understanding Inner Class	Using multiple catch clauses	Working with Scanner Class Examples using utility classes	Understanding Grid Layout
S-15	***SLO-1***	Workingwithwhile,do-while, for, for eachstatements	IntroductiontoStringClass and String Buffer Class - Working with String Handling Methods	WorkingwithFinally,Throw and throws	Introduction to Applets- Applet Life Cycle	Introductiontol /OStreams

	SLO-2	Introduction to Jump Statements - Workingwithbreak, continue and return Statements	Command Line arguments	Understanding Built-in Exceptions - CreatinguserdefinedExceptions	Creating and Executing Applets - Applets Tags in HTML - Graphics Class	Byte Streams classes - Character Streams classes - Examplesusing Byte and Character
S 16-18	***SLO-1***	**Laboratory 3: Arrays, Control Statements**	**Laboratory 6: String Class, Command Line Arguments**	**Laboratory9: Exception Handling**	**Laboratory 12: Utility Classes and Simple Applet Programs**	**Laboratory15: Layout Managers, Byte and Character Streams**
	SLO-2					
Learning Resources		1. HerbertSchildt,(2007),"Java:TheCompleteReference",TwelfthEdition,TataMcGrawpublication **2.** ArnoldandJ.Goslin,(2000),"TheJavaProgrammingLanguage",FourthEdition,AddisionWesley			1. E. Balagurusamy, "Programming with Java", TataMc-Graw Hill, 5th Edition.	

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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr. S Uma Shankari SRMIST, RMP***

Course Code	UDS23102J	Course Name	Fundamentals of Data Science	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:
CLR-1 :	Understand the basics of Data Science
CLR-2 :	Learning the fundamentals of data types
CLR-3 :	Exploring essential skills required as mathematical and statistical analysis
CLR-4 :	Appreciate the applications and implications of Data Science using Python
CLR-5 :	Machine learning with python

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 :	Describe the significance of data science and understand the process	3	80	70
CLO-2 :	Understand different types of data description for data science process	3	85	75
CLO-3 :	Gain knowledge on relationships between data	3	75	70
CLO-4 :	Use the Python Libraries for Data Wrangling	3	85	80
CLO-5 :	Apply visualization Libraries in Python to interpret and explore data	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	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills, Communication	Analytical Skills	Ethical Practices	Professional Behavior	Lifelong learning
H	H	M	M	M	M	M	M	H	H	M	M	M	H	H
H	H	H	H	H	-	M	-	H	H	M	M	M	H	H
H	H	M	H	H	-	M	-	H	H	M	M	M	H	H
H	H	H	M	M	M	M	-	H	M	M	M	M	H	H
H	M	M	M	M	M	M	-	H	H	M	M	M	H	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration (hour)		18	18	18	18	18
S-1	**SLO-1**	Unit I: Introduction	Unit 3: Data Science Methodologies	Unit VI: Describing Relationships	Unit VIII: Numpy and pandas packages	Unit X: Scientific Computing with Python (Scipy)
	SLO-2	Define data science	Introduction to Data Science Methodologies	Correlation	Numpy ndarray	Getting Started with SciPy
S-2	**SLO-1**	Benefits and challenges	Business Understanding	Scatter plot	Vectorization operation	SciPy Constants , Optimizers
	SLO-2	Data analytics vs Data mining	Problem Statement Formulation	Correlation co efficient for quantitative data	Array indexing and slicing - Array transposing and swapping	SciPy Sparse Data , Graphs
S-3	**SLO-1**	Facets of data - Data science process overview	Analytic Understanding - Understanding Data Requirements	Computation formula - Regression and multiple regression line	Mathematical and statistical functions in numpy	SciPy Spatial Data Processing - SciPy Spatial Matlab Arrays SciPy Interpolation
	SLO-2	Defining research goals - Retrieving data	Data Collection - Data Understanding	Least square regression line - Standard error estimation	Creation of data frame - Accessing rows and columns in data frame	Data Manipulation with Pandas - Getting Started with Data Manipulation with Pandas
S-4-6	**SLO-1**	**Lab 1: Write an Python script to print a statement**	**Lab 5: Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.**	**Lab 9: Find the correlation matrix.**	**Lab 11: Install, Import Scikit Learn and Explore Iris Dataset with Pandas for ML Modelling**	**Lab 17: Plot the histogram, bar chart and pie chart on sample data.**
	SLO-2					
S-7	**SLO-1**	Data preparation - EDA	Modelling Data	Unit VII:Data structure and oops	Indexing, selection and filtering	Reading Data from a Excel file
	SLO-2	Build the model - Findings a model	Modelling Evaluation	Python programming procedure	Arithmetic operations in data frame	Reading Data from a .csv file
S-8	**SLO-1**	Data mining	Unit IV: Data Science mathematical preliminaries	Statements - Expressions	Function application and mapping	Reading Data from a .txt file
	SLO-2	Data warehousing	Statistical inference - Population and samples	Flow of control	Unit IX :Python libraries for Data wrangling	Unit XII: Data Visualization
S-9	**SLO-1**	Basic statistical description of data	Descriptive statistics - Correlation	Functions	Basics of numpy arrays - Aggregations Computation on arrays	Importing matplot lib - Getting started with Data Visualization
	SLO-2	Unit II: Data Science Defined	Regression	Numerical data types - Sequence	Comparison, marks and Boolean logic - Fancy indexing, structural array	Getting started with Data Visualization Library Matplotlib - Density and contour plot
S-10-12	**SLO-1**	**Lab 2: PerformAnalysis on Simple Dataset for DataScience and Business Intelligence Applications**	**Lab 6: Install Python and apply all basic python functions Lab 7: Install and perform a Numerical Array Processing using NumPy**	**Lab 10: Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.**	**Lab 12: Install, Import Matplotlib. Explore all the Data Visualization Graphs. Lab 13: Find the outliers using plot.**	**Lab 18: Install, Import Matplotlib. Explore all the Data Visualization Graphs. Lab 19: Python program for line chart**
	SLO-2					
S-13	**SLO-1**	Evolution of data science	Probability - Unit V: Describing data	Strings, tuples	Data manipulation with pandas	Visualizing errors
	SLO-2	Data Science Roles - Data Science Pipeline	Types of data - Types of variables	List, Dictionaries	Data selection - Data indexing	Three-dimensional plotting

S-14	**SLO-1**	Application of data science in various fields - Data Security Issues - Big data and data science hype	Describing data with tables and graphs	Class, Constructors - Object creation	Operations on data - Missing data	Bar graph using matplotlib - Pie Graph using matplolib
	SLO-2	Data Science Vs business - Real world examples of role of data science	Describing data with averages	Inheritance	Hierarchical indexing - Combining dataset	Columnusing matplolib - Box Plot using matplolib
S-15	**SLO-1**	Role of Data engineers - Data science impact on business	Normal distribution - standard score - Import pandas	Overloading - Text file - binary file	Aggregation - Group, Pivot table	Histogram using matplolib - LineplotsUsing Matplotlib - Sub Plots Using Matplotlib
	SLO-2	Data science vs AI vs ML vs Deeplearning - Three Features for Data Science and Business Intelligence	Python for data science - Python Conditional Statements	Reading CSV file, writing CSV file - Read and writing Excel File	Getting Started with Numpy - Creating Numpy Arrays	Scatter Plot Using Matplotlib - Plot Customizations, Saving Plots
S-16-18	**SLO-1** **SLO-2**	**Lab 3: Write a python program for swapping two numbers Lab 4: Write an Python script to find subset of dataset by using subset (), aggregate () functions on iris dataset.**	**Lab 8:Write an Python script to find basic descriptive statistics using summary, str, quartile function on mtcars& cars datasets**	**Lab 11: Install and perform a simple Exploratory Data Analysis using Pandas Lab 12: Install, Import Pandas Learn and Explore a Sample Dataset with it**	**Lab 16: . Find the data distributions using box and scatter plot.**	**Lab20 : Python program for customizing plot**

Learning Resources	1.David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (Unit I) 2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.	1.Jojo Moolayil, "Smarter Decisions : The Intersection of IoT and Data Science", PACKT, 2016. 2. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015. 3. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013

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, 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*	*Ms.N.Indumathi SRMIST,RMP*

Course Code	UDS23103T	Course Name	Role of Mathematics in AI	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)

CLR-1 :	To apply the basic concepts and theorems of matrices.
CLR-2 :	To learn the basic concepts of differentiation, basic concepts of integration and to apply Bernoulli's formula.
CLR-3 :	To learn the concepts of connectives, validity of arguments and normal forms.
CLR-4 :	Apply Logic, truth table in computer science.
CLR-5 :	To Understand the concept of Graphs, isomorphism of graph, Eulerian graph and Hamiltonian graph.

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 Scientific Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO – 1	14 PSO - 2	15 PSO – 3
CLO-1 :	Gaining knowledge in basic concepts of matrix method.	3	85	80	L	M	L	-	M	-	-	-	-	-	H	-	-	-	-
CLO-2 :	Understanding the concepts of differentiation and to solve the problems of Radius of curvature.	3	80	75	M	H	M	-	L	-	-	-	-L	-	L	-	-	-	-
CLO-3 :	Understanding the concepts of integration and to evaluate Bernoulli's formula.	3	85	80	L	H	-	H	L	-	-	-	M	M	-	-	-	-	-
CLO-4 :	Logical knowledge through the Statements, connectives, arguments, validity of arguments and Normal forms using truth tables	3	85	80	M	H	M	H	M	-	-	-	-	-	H	-	-	-	-
CLO-5 :	Understand the concepts of Graphs terminology Sub graphs, Acyclic, Euler path, Hamiltonian Path	3	85	80	M	L	-	M	L	-	-	-	M	M	H	-	-	-	-

		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 Differentiation	Logic	Graphs and Their Representation-	Trees
	SLO-2	Examples of types of matrix.	Solving basic problems	Basic explanation	Basic Graph terminology	Basic Definitions
S-2	SLO-1	Symmetric matrix	Minima of functions of single variable	Statements- simple compound	Simple Problems	Basic properties of Trees
	SLO-2	Skew symmetric matrix	Maxima of functions of single variable	Symbolic representation	Drawings of Graphs	properties of Trees
S-3	SLO-1	Hermitian matrix	Minima and maxima of functions of single variable	Connectives explanation.	Special Families of Graphs	Labeled Trees
	SLO-2	Skew Hermitian matrix	Problems based on Minima and maxima of functions of single variable	conjunction, disjunction, negation	Simple Problems	Labeled Trees
S 4	SLO-1	Orthogonal matrix	Problems using maxima and minima	Simple problems	Incidence graphs	Problems based on the concepts
	SLO-2	Unitary matrix	Problems using maxima and minima	Problems using Truth Tables	Simple Problems	Undirected Trees

S-5	**SLO-1**	Eigen values of a matrix	Introduction to curvature	Tautology, contradiction	Adjacency Matrices	Simple Problems
	SLO-2	Eigen values of a matrix	Radius of curvature (Cartesian co-ordinate)	Problems using Truth tables	Problems using	Binary trees
S 6	**SLO-1**	Eigen vectors of a matrix	Problems based on radius of curvature	logical equivalence,	vertex degrees matrices	Rooted Trees and Branches
	SLO-2	Eigen vectors of a matrix	Problems based on radius of curvature	Simple truth table problems	Isomorphism of Graphs	Rooted Trees and Branches
S-7	**SLO-1**	Eigen values and eigen vectors of a matrix	Introduction to integration	Tautological implications	Simple Problems	Spanning Trees
	SLO-2	Eigen values and eigen vectors of a matrix	Basic problems on integration	Simple problems	Sub graphs	Simple problems
S -8	**SLO-1**	Eigen values and eigen vectors of a matrix	Integration of polynomial functions	Arguments- validity of arguments	Acyclic Graphs- Simple Problems	Spanning Trees
	SLO-2	Eigen values and eigen vectors of a matrix	Problems based on Integration of polynomial functions	Simple problems	Digraphs	Simple problems
S -9	**SLO-1**	Cayley Hamilton theorem	Integration by the method of substitution	Normal forms –	Problems using Graphs	Minimal Spanning Trees
	SLO-2	Problems of order 2 based on Cayley Hamilton theorem	Problems based on Integration by the method of substitution	Minterms and maxterms	Paths, cycles and connectivity	Simple Problems
S-10	**SLO-1**	Problems of order 3 based on Cayley Hamilton theorem	Integration of rational and irrational functions	Maxterms with examples	Euler path and circuits	Problems based on Minimal Spanning Trees
	SLO-2	Problems of order 3 based on Cayley Hamilton theorem	Integration of the type $\int \frac{P(x)}{Q(x)}dx$	Problems using Truth tables	Eulerian cycles	Kruskal's Algorithm
S-11	SLO-1	Cramer's rule	Integration by the method of partial fraction	Principal disjunctive normal form -	Euler path and Circuits	Rooted Tree
	SLO-2	Problems order 2 based on Cramer's rule.	Integration of the form $\int \frac{dx}{ax^2+bx+c}$	Problems using Truth tables	Hamiltonian Path and Circuits.	binary Tree and Simple Problems
S-12	SLO-1	Problems of order 3 based on Cramer's rule.	Bernoull's formula for Integral by parts.	Principal conjunctive normal form	Problems using Hamiltonian Path	Expression of Trees
	SLO-2	Problems of order 3 based on Cramer's rule.	Problems based on Bernoull's formula for Integral by parts.	Problems using Truth tables	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***. Discrete Mathematiucs by V, Sundaresan, K. S. Ganapathy Subramanian, K.Ganesan, A. R. Publications, 1996. 3. *Dr. A. Singaravelu, Allied Mathematics, 7th edition, A. R. Publications, 2015*

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	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)	***1. Dr. L.Sivakami, SRMIST***
2. Dr. M. Vasantha, ICMR, Chennai (Industrial Expert)	***2. Dr. S.Lakshmi Priya, 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:
CLR-1 :	Demonstrate various principles involved in solving mathematical concepts
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:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
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 Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
M	H	M	M	M	H	L	M	M	H	M	M	L	L	M
M	H	M	M	M	H	L	M	M	H	M	M	L	L	M
M	H	M	M	M	H	L	M	M	H	M	M	L	L	M
M	M	M	M	M	M	L	M	M	M	H	M	L	H	H
M	M	M	M	M	M	L	M	M	M	H	M	L	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 Chart*	*Inequalities*	*Spotting Error*	*Basics of Written Communication*
	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, PlaceMentor: 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, FSH, SRMIST*
		Ms. Deepalakshmi S, Assistant Professor, Department of Career Guidance, 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:
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,
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			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
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLO-1 :	Evaluate the significance of value inputs in formal education and start applying them in their life and profession	3	80	70	M	M	M	H	M	M	M	M	L	L	M	L	M	H	H
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	M	M	M	H	M	M	M	M	L	L	M	L	M	H	H
CLO-3 :	Analyze the value of harmonious relationship based on trust and respect in their life and profession	3	85	70	M	M	M	H	M	M	M	M	L	L	M	L	M	H	H
CLO-4 :	Examine the role of a human being in ensuring harmony in society and nature.	3	85	80	M	M	M	H	M	M	M	M	L	L	M	L	M	H	H
CLO-5 :	Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.	3	85	75	M	M	M	H	M	M	M	M	L	L	M	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	Definitiveness of (Ethical) Human Conduct

					among the Four Orders of Nature	
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'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: 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, 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:*

		Learning		
CLR-1 :	சங்க இலக்கியங்கள் வழி தொன்மை அக, புற வாழ்வியலை அறியச் செய்தல்	1	2	3
CLR-2 :	தமிழ்ச்சமூகத்தின் அறவியல் குறித்து தெரியச் செய்தல்	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
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:*			
CLO-1 :	பண்டைத் தமிழ்ச் சமூகத்தின் அக, புற வாழ்வியல் இன்றைய சமூக மேம்பாட்டிற்கு வழிகாட்டி நிற்பதை அறிந்துகொள்ளுதல்	*2*	*75*	*60*
CLO-2 :	தமிழ்ச் சமூகம் அறத்தை வலியுறுத்திய சமூகம் என்பதன் வழி மானுட அறத்தைத் தெரிந்துகொள்ளுதல்	*2*	*80*	*70*
CLO-3 :	பக்தி இலக்கியம் மூலம் இறைத் தந்துவங்களை அறிந்து மானுட ஒற்றுமை மேம்பாட்டை அறிந்துகொள்ளுதல்	*2*	*70*	*65*
CLO-4 :	தொல் தமிழ்ச்சமூகம் இலக்கியம், அரசியல், அறம், பக்தி ஆகியவற்றில் தழைத்தோங்கியதைத் தெரிந்துகொள்ளுதல்	*2*	*70*	*70*
CLO-5 :	வாழ்வியலின் நெறிகளைச் சொல்லும் கதைகளைப் படைக்கும் திறனோடு மொழி ஆளுமையையும் அறிந்துகொள்ளுதல்	*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	-	*H*	-	*H*	*H*	-	*M*	*H*	-	*H*	*H*	-	-	-
H	-	*H*	-	*H*	*H*	-	*H*	*H*	-	*H*	*M*	-	-	-
H	-	*H*	-	*H*	*H*	-	*M*	*H*	-	*H*	*H*	-	-	-
H	-	*H*	-	*H*	*H*	-	*H*	*H*	-	*H*	*H*	-	-	-
H	-	*H*	-	*H*	*H*	-	*H*	*H*	-	*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/ உள்ளடக்கம்	அறமும் வாழ்வியலும்	பல்லவர் கால இலக்கியங்கள்	சங்ககால மக்களின் வாழ்வியல்	தமிழ்ச் சிறுகதையும் தமிழ்ச் சமூக 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 எட்டுத்தொகையும்	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	வைகலும் - பாடல் (39)	வைணவ சமயம்	பதினெண் கீழ்க்கணக்கு நூல்கள்	மூடநம்பிக்கைகளின் சிக்கல்கள்

		தன்மையும் இயற்கையும்				
	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	ஐம்பெருங்காப்பியங்களின் 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 பாடல்கள்)	சமயத் தத்துவங்களும் வாழ்வியல் விழுமியங்களும்	கற்பனைத்திறன் – வளர்த்தல்
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	கொன்றை, தொகுப்பும் பதிப்பும் - தமிழ்த்துறை ஆசிரியர்கள், தமிழ்த்துறை, எஸ்.ஆர்.எம். அறிவியல் மற்றும் தொழில்நுட்பக் கல்விநிறுவனம், காட்டாங்குளத்தூர், 603203, 2023 தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை, 2017 மு. அருணாசலம், தமிழ் இலக்கிய வரலாறு, நூற்றாண்டு முறை (9ஆம் நூ. முதல் 16 வரை), தி பார்க்கர், சென்னை, 2005 தமிழ் இணையக் கல்விக்கழகம் - http://www.tamilvu.org/ மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம் - https://www.projectmadurai.org/

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	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 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.Hebzibah beulah Suganthi, 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	Program Learning Outcomes (PLO)

		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	They get to learn Ancient ,Medieval, and Modern poetry	Level of Thinking	Expected Proficiency (%)	Expected Attainment (%)	Fundamental	Application of Concepts	Link with Related	Procedural Knowledge	Skills in Specialization	Ability to Utilize	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLR-2 :	To understand the Significance of poems of great poets like Kabir,Tulsidas,Bihari and Dhananand																		
CLR-3 :	To Enhance and Enrich their knowledge 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:																		
CLO-1 :	To provide a brief Introduction of Hindi poetry(Bhaktikal,Reetikal and Aadhunikkal)	2	75	60	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-
CLO-2 :	To Discuss the origin and development of various forms of poetry in Hindi	2	80	70	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-
CLO-3 :	Focus on Evaluating the social changes through poetry	2	70	65	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-
CLO-4 :	To Examine Trans creation in advertisement	2	70	70	H	H	H	H	H	H	H	H	H	M	H	H	-	-	-
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	80	70	H	H	H	H	H	H	H	H	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.*

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	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***
Alumni	***Student***	***2. Dr. Md.S. Islam Assistant Professor, SRMIST***
Ananya Singh, Trainee Associate (Finance Operations) Cargill Business Services India Building 9,2nd and 3rd Floor, Cessna Business Park, Kaverappa Layout, Kadubeesanahalli, India, Bengaluru, Karnataka	***Maimunah sheik Reg: RA2131001010006 Dept: of Biotechnology***	***3.Dr. S. Razia Begum, Assistant Professor, SRM IST***
		4, Dr.Nisha Murlidharan Assistant Professor, VDP,SRM IST

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:

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		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To acquire knowledge about French language	2	75	60
CLO-2 :	To strengthen the knowledge on concept, culture, civilization and translation of French	2	80	70
CLO-3 :	To develop content using the features in French language	2	70	65
CLO-4 :	To interpret the French language into other language	2	70	70
CLO-5 :	To improve the communication, intercultural elements in French language	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	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	H	H	M	H	H	-	-	-
M	H	M	H	H	M	H	M	L	H	H	M	-	-	-
H	H	H	M	H	L	H	H	M	H	H	H	-	-	-
H	H	M	H	M	H	H	M	H	H	M	H	-	-	-
M	H	H	M	M	M	H	H	M	H	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. **''La 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.***

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. Kavaskar Danasegarane ***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. Abigalai 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 teach the importance of environment*
CLR-2 :	*To impart the knowledge about ecosystem*
CLR-3 :	*To teach about Biodiversity*
CLR-4 :	*To create awareness about environmental pollution*
CLR-5 :	*To understand about Environment Protection*

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	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills	Analytical Skills	Communication Skills	Professional Behavior	Lifelong learning
CLO-1 : *To gain knowledge on the importance of natural resources and energy*	2	75	60	H	H	H	-	-	-	M	-	-	-	-	-	-	-	M
CLO-2 : *To understand the structure and function of an ecosystem*	2	80	70	-	H	-	H	-	-	M	-	-	-	-	-	L	-	M
CLO-3 : *To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence*	2	70	65	H	-	-		-	-	M	-	-	-	M	-	-	-	M
CLO-4 : *To understand the causes of types of pollution and disaster management*	2	70	70	H	-	H	H	H	-	M	-	-	-	-	-	L	-	M
CLO-5 : *To observe and discover the surrounding environment through field work*	2	80	70	-	H	-	H	-	-	M	-	-	-	-	-	-	-	M

Duration (hour)		9	9	9	9	9
S-1	SLO-1	*Environmental Studies- Concept*	*Concept of an ecosystem*	*Biodiversity at Global, National And Local Levels*	*Causes, Effects and Control Measures of Nuclear hazards*	*Need for equitable utilization*
	SLO-2	*Scope and Importance of Environmental Studies*	*Ecosystem degradation and Resource utilization*	*India as a Mega Diversity Nation*		*Equity – Disparity*
S-2	SLO-1	*Need for public awareness.*	*Structure and Functions of an ecosystem*	*Threats to biodiversity: habitat loss, poaching of wildlife*	*Solid Waste Management*	*Urban – rural equity issues*

	SLO-2	*Institutions in Environment*	*Producers, consumers and decomposers*	*man-wildlife conflicts*	*Causes, Effects and Control Measures of Urban and Industrial Waste*	*The need for Gender Equity*
S-3	**SLO-1**	*People in Environment*	*Energy flow in the ecosystem*	*Endangered species of India*	*Role of Individuals In Pollution Prevention*	*Preserving resources for future generations*
	SLO-2	*Awareness about Environmental Studies*	*The water cycle , The Carbon cycle , The Oxygen cycle , The Nitrogen cycle , The energy cycle and, Integration of cycles in nature*	*Endemic species of India*		*The rights of animals*
S-4	**SLO-1**	*Introduction to natural resources- Associated Problems*	*Ecological succession*	*Environmental Pollution- Definition*	*Disaster management- Nature Floods, Earthquakes*	*The ethical basis of environment education and awareness*
	SLO-2	*Renewable and Nonrenewable resources*	*Food chains, Food webs and Ecological pyramids*			
S-5	**SLO-1**	*Forest resources*	*Ecosystem, Introduction, Types, Characteristic features, Structure and functions*	*Causes, Effects and Control Measures of Air Pollution*	*Cyclones Landslides*	*The conservation ethic and traditional value systems of India*
	SLO-2	*Water Resources*	*Forest ecosystem*			
S-6	**SLO-1**	*Mineral Resources*	*Grassland ecosystem*	*Causes, Effects and Control Measures of Water Pollution*	*Social Issues and the Environment From Unsustainable to Sustainable Development*	*Wasteland Reclamation*
	SLO-2	*Food Resources*	*Desert ecosystem*			
S-7	**SLO-1**	*Energy Resources*	*Aquatic ecosystems (ponds, lakes, streams)*	*Causes, Effects and Control Measures of Soil Pollution*	*WaterConservation*	*Climate change & Global warming*
	SLO-2	*Land Resources*	*Aquatic ecosystems (rivers, estuaries, oceans)*			
S-8	**SLO-1**	*Renewable and non-renewable resources- Wind*	*Value Of Biodiversity*	*Causes, Effects and Control Measures of Marine pollution*	*Rain Water Harvesting Watershed*	*Acid rain & Ozone layer depletion*
	SLO-2	*Renewable and non-renewable resources- geothermal*	*Consumptive Value And Productive Value*			
S-9	**SLO-1**	*Renewable and non-renewable resources- Solar*	*Social Value and Ethical Value*	*Causes, Effects and Control Measures of Noise Pollution*	*Environmental Ethics: Issues and Possible Solutions*	*Nuclear Accidents and Nuclear Holocaust*
	SLO-2	*Renewable and non-renewable resources- Biomass*	*Aesthetic Value and Option Value*	*Causes, Effects and Control Measures of Thermal Pollution*	*Resource consumption patterns*	

Learning Resources	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.	Dr.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											
	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 Industry	Experts from Academic	Internal Experts
1. Mr. Suresh S, Program Head, Hello FM	*1. Dr. G Balasubramania Raja, Prof & Head, Manonmaniam Sundranar University* *Mail- gbs_raja@yahoo.com*	*1. Dr. Rajesh R, Head, SRM IST*

Course Code	UDS23201J	Course Name	Introduction to Computing with Distributed Data Processing	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
CLR-1 :	Understand the concept to advanced computing in recent times			
CLR-2 :	Learn the basics of cloud computing and cloud database			
CLR-3 :	Understand the concept of MongoDB			
CLR-4 :	Identify the concept to of Apachy Spark			
CLR-5 :	Impart the knowledge of distributed data processing with Scala			
Course Learning Outcomes (CLO):		Level of Thinking	Expected Proficiency	Expected Attainment
CLO-1 :	Learn the basics of Traditional Computing, distributed file processing	3	80	70
CLO-2 :	Classify different types of Distributed file system, distributed databases	3	85	75
CLO-3 :	Recognize Cloud computing and Architecture	3	75	70
CLO-4 :	Understanding about RMI, RPC, MongoDB, openMP and ScalaProgramming	3	85	80
CLO-5 :	Grasp the concept to of Google CloudPlatform	3	85	75

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental	Application of	Problem Solving	Link with related	Procedural	Skills in	Ability to Utilize	Skills in Modelling	Analyze, Interpret	Investigative Skills	ICT Skills	Analytical Skills	Communication	Professional	Lifelong learning
H	H	M	-	-	H	-	-	H	H	-	-	M	H	H
H	H	H	H	H	H	M	-	H	H	-	M	M	H	H
H	H	M	H	H	-	M	-	H	H	-	M-	M	H	H
H	H	H	H	H	-	-	M	H	M	-	H	M	H	H
H	M	M	M	M	M	M	-	H	H	-	M	M	H	H

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to Distributed Systems	Distributed database Management System	Query Processing	SQL to MongoDB Mapping	Distributed Algorithms
	SLO-2	Characterization of Distributed Systems	Functions of distributed data base system	Query Processing Problem	How to optimize query performance	Introduction to distributed computing models
S-2	SLO-1	DS issues and Goals, Types of distributed systems	Distributed databases - Homogeneous and Heterogeneous databases	Layers of Query Processing	Benefits of MongoDB query	Asynchronous message passing model
	SLO-2	Distributed File system	Distributed Data storage	Query Processing in Centralized Systems	MongoDB projection and Embedding	Time and message complexity
S-3	SLO-1	Design and implementation of distributed file systems	Why Distributed storage is important?	Parsing	Distributed operating systems	clock synchronization
	SLO-2	Features of DFS	Distributed cloud storage - Features of distributed cloud storage	Translation	**Shell commands to manage HDFS**	Message Ordering and Group communication
S-4-6	SLO-1	**Lab 1: Write a program to implement Remote Method Invocation**	**Lab 4: Virtualization in CloudbyusingKVMandVMware**	**Lab 8 : Creation of Queries in MongoDB**	**Lab 11: Example programs-Hadoop Streaming**	**Lab 14: Writing spark applications**
	SLO-2					
S-7	SLO-1	File Models	Distributed Transactions	Optimization	Different types of distributed operating systems	**Simple programs using Scala**
	SLO-2	File accessing models	How distributed transactions work	Code generation	Features of distributed operating system	Termination Detection Algorithm and Reasoning with Knowledge
S-8	SLO-1	File caching schemes	Essential properties of distributed transactions (ACID)	Example Query Processing in Distributed Systems	Examples of distributed OS	OpenMP programming
	SLO-2	File Replication	Commit protocols - Distributed one phase commit Distributed two phase commit	Mapping global query to local Optimization of Distributed	Advantages and Disadvantages of distributed OS	Getting Started with Memory Programming
S-9	SLO-1	Network file System	Objectives of Concurrency control in Distributed Databases Concurrency Control anomalies	Queries	Design and implementation of distributed operating system	Fundamentals of Shared Memory Programming
	SLO-2	Andrew file System	Methods of concurrency control Serializability and recoverability	Centralized Query Optimization	Hadoop Distributed system	BasicOpenMPConecpts
S-10-12	SLO-1	**Lab 2:Write a Program to implement Remote Procedure Call**	**Lab 5:Mongodb Atlas – Installation** Lab 6.b: MongoDB CRUD operations	**Lab 9. Write a program to sort a single field in Mongodb**	Lab 12 : **Writing a Hadoop MapReduce program in python**	Lab15: **Write a MPI Program to senddata acrossall processes** Perform a Simple Vector Addition usingOpenMPProgramming

	SLO-2					
S-13	**SLO-1**	Working andArchitectureofCluster Computing and GridComputing	Distributed Serializability, Enhanced lock based and timestamp based protocols	Data localization	Introduction to HDFS and its features	Parallel Directive
	SLO-2	Architecture of CloudComputing	Hetrogeneous distributed databases	Fragmented query ordering	Apache Hadoop HDFS architecture	DataScopingRules
S-14	**SLO-1**	TypesofCloudApplication Development Infrastructure-as-a-service	Cloud based databases Why use a cloud- database	Update Document in Mongodb	Cluster in Hadoop-MapReduce	BasicOpenMPConstructs
	SLO-2	Platform-as-a-service, Benefits of Software-as-a-service	Types of cloud-based database Advantages of cloud based databases	Bulk write operations in MongoDB	Import /Export Data between HDFS and RDBMS Apache Spark	OpenMPDirectives, OpenMPCalls Parallelizingan ExistingCode with OpenMP
S-15	**SLO-1**	What is DDMS	Replication in MongoDB Indexing in MongoDB	Delete documents in MongoDB	Kafka Stream	MessagePassinginterface (MPI) parallelprogramming - IntroductiontoMessage PassingInteface
	SLO-2	Advantages and Disadvantages of DDBS	Distributed Query Optimization Algorithm	HDFS Commands-Hadoop	-Apache Spark : spark SQL-spark RDD-MLlib, MLflow, structured streaming.	MesssgePassingModel
S-16-18	**SLO-1** / **SLO-2**	**Lab 3: Case study: PaaS (FaceBook,GoogleAppEngine)**	**Lab 7: Data modeling in MongoDB**	**Lab 10 : Hadoop installation – Setting up a Single Node**	**Lab 13: Create an Application using ApacheSpark. (Ex.: Similarity word count during searching)**	**Lab16: Create a Simple Virtual Machine on Google ComputeService**

Learning Resources	**1. AndrewS.Tanenbaum, MaartenVanSteen,"DistributedSystems–Principles andParadigms",SecondEdition,Pearson,2006.** **2. Buyya R.,BrobergJ., GoscinskiA.,"CloudComputing:PrinciplesandParadigm", JohnWiley&Sons,2011.**

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, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

ExpertsfromIndustry	ExpertsfromHigherTechnicalInstitutions	InternalExperts
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor,* *Department of Computer Science, University of Madras, Chennai*	*Dr.S.Lakshmi, FSH, KTR*

Course Code	UDS23202J	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-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications	DataBook/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:	Utilize the different datatypes; Utilize searching and sorting algorithms			
CLR-2	Utilize linkedlist 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 searchin graphs for real-time application development			

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

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to theory of datastructures	Introduction to stack	Tree Traversals –In order, preorder	Introduction to sorting	GraphTerminology
	SLO-2	Data representation	Representation of stack through array	TreeTraversals - Post order	Differenttypesofsorting	Representation of graph–Arrays
S-2	SLO-1	Abstract Data type	Representation of stackthroughlinked list	BinarySearchTree	Bubble sort	Representation of graph– Linked list
	SLO-2	Classification of data types	Operation son stack	ThreadedBinary SearchTree	Example	Graph Traversal –BFS
S-3	SLO-1	Asymptotic Notation	Disadvantages of Stack, Polish Notations	Binary SearchTree:Construction	Insertion Sort - Example	Example
	SLO-2	Algorithm Analysis – **Recursion -** Example	Applications –Evaluation of Expression - Infix to Postfix expression – Towers of Hanoi,Recursion	BinarySearchTree:Insertion - Binary SearchTree:Searching - Binary SearchTree:Searching	Quicksort -Example	Graph Traversal–DFS – Example - TopologicalSorting
S 4-6	SLO-1	**Lab1: Recursion**	**Lab 4: stack and its applications**	**Lab7:TreeTraversals**	**Lab10: Implementation of Bubble and Insertion sort**	**Lab13:Implementation of shortest path algorithm**
	SLO-2					
S-7	SLO-1	Introduction to Data structures	Queue	Applications of trees	Selection sort	Shortest Path Algorithm-Introduction
	SLO-2	Data Structures and its uses	Representation of Queue using Arrays And Linked list	Applications of BST	Example	Shortest Path Algorithm:Dijkstra
S-8	SLO-1	Linear and Non Linear Data Structures	Operationson Queue	Expression trees	Merge sort	Applications of Graph
	SLO-2	Operationson data structure	Circular Queue	Example	Example	Minimum spanning tree
S-9	SLO-1	Array types	Double ended Queue	AVLTree	Radix sort	Prims
	SLO-2	Array operations - Applications of arrays - Dynamic memory allocation	Priority Queue- Reversing a Queue using another queue - Applications of Queue	AVLTreeRotations - Applications of AVL tree	Heap Sort Example Comparison of sorts	Example
S 10 - 12	SLO-1	**Lab2:Arrays**	**Lab 5:Queue implementation using array and pointers**	**Lab 8: Implementation of BST Heap Data Structure**	**Lab11:ImplementationofQuicksortandmergesort Introduction to searching**	**Lab14: Implementationofminimumspanningtree**
	SLO-2					
S-13	SLO-1	Introductiontolists	Introductiontononlineardata Structures	MinimumHeapConstruction	Linearsearch	Kruskals -Example
	SLO-2	Linkedlist operations	TreeADTandTerminologies	Example	Binary search	Algorithm Design And Analysis

S-14	SLO-1	Types of Linked Lists	Tree Terminologies	Minimum Heap Deletion Construction	Comparison of different search	Greedy Algorithms
	SLO-2	Linkedlist vs.Arrays - Application of linkedlist	Tree Representation - Tree Types and Operations	Maximum Heap Construction	Define Hashing - Hashfunctions	Example
S-15	SLO-1	Performance Analysis and Measurement of algorithm	BinaryTreeRepresentation	MaximumHeapDeletionConstruction	Hashing:Collision avoidance Hashing: Separate chaining	Divide And Conquer - Example
	SLO-2	Efficiency of algorithm - Time complexity and space complexity	Propertiesofbinary tree	ApplicationsofHeapsandAVLtrees	Openaddressing AdvantagesofHashing	Backtracking - Example
S 16 - 18	SLO-1	**Lab3:LinkedList**	**Lab 6: Implementation of binary tree using Arrays**	**Lab9: Heap Implementation**	**Lab12:ImplementationofGraphusingArray**	**Lab15: To implement binary search using divide and conquer strategy**
	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

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

Course Designer		
ExpertsfromIndustry	**ExpertsfromHigherTechnicalInstitutions**	**InternalExperts**
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr.S.Arunarani, Assistant Professor, SRMIST, KTR Campus***

Course Code	UDS23203T	Course Name	Role of Statistics in AI	Course Category	C	Discipline Specific Core Courses	L	T	P	0	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; t, F and χ^2 table is needed	

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

Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	To provide foundations in Statistics			
CLR-2:	To provide a strong foundations of organizing the data, diagrammatic and graphical presentation.			
CLR-3 :	To apply Statistical techniques in AI			
CLR-4 :	To provide the application of correlation and regression in AI.			
CLR-5 :	To analyze the sample data in order to estimate or predict characteristics of the larger population from which the sample is drawn.			
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 understand the statistical modeling and its limitations, and have skill in description, interpretation and exploratory analysis of data by graphical and other means;	3	85	80
CLO-2 :	To calculate and apply measures of central tendency - grouped and ungrouped data cases.	3	80	75
CLO-3 :	To understand and apply measures of dispersion - grouped and ungrouped data cases.	3	85	80
CLO-4 :	Find the relationship between two or more variables using correlation and regression.	3	85	80
CLO-5 :	Perform Test of Hypothesis for small sample. Learn non-parametric test such as the Chi-Square test for Independence and Goodness of Fit, Perform the Analysis of Variance - One way Classifications.	3	85	80

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge Sustainability	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills, Communication	Analytical Skills	Ethical Practices	Professional Behavior	Lifelong learning
CLO-1 :	L	-	-	-	M	L	-	-	-	-	-	-	-	-	-
CLO-2 :	L	-	-	-	-	H	-	-	-	-	-	-	-	-	M
CLO-3 :	H	-	-	-	-	M	-	-	-	-	-	-	-	-	M
CLO-4 :	H	-	-	-	-	M	-	-	-	-	-	-	-	-	M
CLO-5 :	M	-	-	-	H	M	-	-	-	-	-	-	-	-	-

		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	Nature and scope of statistical methods **Definition of statistics** **Numerical Data**	Measures of Central tendency i. **Definition** ii. **Functions of average**	Measures of Dispersion,	Correlation Analysis: Correlation - Definition and uses **Types of correlation**	**Random experiment, types of events with examples**

			iii. **Characteristics of a typical average**			
	SLO-2	**Nature of statistics**	**Arithmetic mean Individual series**	Range –Individual, Discrete series and Continuous series	**Methods for Finding Correlation Coefficient,** Properties of correlation coefficient	**Definition of probability, addition and multiplication law**
S-2	**SLO-1**	**Importance of statistics**	Arithmetic mean Discrete series	Quartile Deviation - Individual and Discrete series	Karl Pearson's Correlation Co-efficient	**Problems based on addition and multiplication law**
	SLO-2	**Functions of statistics**	Arithmetic mean Continuous series	Quartile Deviation - Individual and Discrete series	Karl Pearson's Correlation Co-efficient	**Conditional probability - formula**
S-3	**SLO-1**	Limitations	Arithmetic mean Continuous series	Quartile Deviation - Continuous series	**Spearman's Rank Correlation Coefficientwith non-repeated Ranks**	Problems on conditional probability
	SLO-2	**Distrust of Statistics**	Arithmetic mean Cumulative series	Quartile Deviation - Continuous series	**Spearman's Rank Correlation Coefficientwith non-repeated Ranks**	Definition of Baye's theorem
S 4	**SLO-1**	Classification i. **Meanings** ii. **Objects** iii. **Rules of classification**	Arithmetic mean Meritsand Demerits	Mean Deviation about Mean – Individual Series	**Spearman's Rank Correlation Coefficientwith repeated Ranks**	Problems on Baye's theroem
	SLO-2	Classification i. **Types of classification** ii. **Characteristics of good classification**	Median Individual series	Mean Deviation about Mean – Discrete series	**Spearman's Rank Correlation Coefficientwith repeated Ranks**	Definition of probability distribution and its Type
S-5	**SLO-1**	Tabulation: i. **Parts of Tabulation** ii. **Rules of Tabulation**	Median Discrete series	Mean Deviation about Mean – Continuous series	Spearman's Rank Correlation Co-efficient	Testing of Hypotheses -Testing Procedures Definition of test statistic t and its uses
	SLO-2	**Types of tables Objective of Tabulation**	Median Continuous series	Mean Deviation about Median – Individual series	**Problems on finding the best pair of judgements**	**t-test Small Sample tests**
S-6	**SLO-1**	**Components of Good Table Rules of construction of the table.**	Median Continuous series	Mean Deviation about Median – Discrete series	**Bivariate Distribution**	**t-test - Test for Single Mean**
	SLO-2	**Difference between classification and tabulation.**	Median Merits and Demerits	Mean Deviation about Median– Continuous series	**Bivariate Distribution**	**t-test -Test for two Sample Means**

S -7	**SLO-1**	Diagrammatic representation of various types of statistical data : **Bar Diagram**	Mode Individual series	Standard Deviation – Individual and Discrete Series	**Regression Analysis: Regression - Definition and Uses**	**t-test** **- t Test Statistic, when sample standard deviations are not known, but Population Standard Deviations are known**
	SLO-2	**Types of Bar diagram**	Mode Discrete series	Standard Deviation – Individual and Discrete Series	**Regression Coefficients**	**t-test** **- t Test Statistic, when sample standard deviations are not known, but Population Standard Deviations are known**
S -8	**SLO-1**	**One dimensional Diagrams**	Mode Continuous Series	Standard Deviation-Continuous Series	**Regression Equations**	Chi-Square distribution **- Definition and its Uses**
	SLO-2	**Two dimensional Diagrams**	Mode Continuous Series	Standard Deviation-Continuous Series	**Types of Regression Equations**	**Chi-Square test** **- Testing Procedure**
S-9	**SLO-1**	**Pie chart**	Mode Continuous series	Coefficient of Variation	**Regression Equation of X on Y and Regression Equation of Y on X**	**Chi-Square test** **- Problems**
	SLO-2	**Histogram**	Mode Meritsand Demerits	Coefficient of Variation	**Regression Equation of X on Y and Regression Equation of Y on X**	**F-test** **- Test Statistic of F-test**
S-10	SLO-1	Frequency Polygon	**Empirical Relation**	Graphical solution of Dispersion Lorenz curve	**Regression Equation of X on Y and Regression Equation of Y on X**	**Uses and testing Procedures**
	SLO-2	**Frequency Curve**	**Empirical Relation**	Graphical solution of Dispersion Lorenz curve	**Regression Equation of X on Y and Regression Equation of Y on X**	Testing the equality of variance using F distribution
S-11	SLO-1	Less than O gives	Graphical solution of Median	Skewness Bowley's coefficient of Skewness	**Relationship between Correlation and Regression Coefficients**	**Problems based on F-test**
	SLO-2	More than O gives	Graphical solution of Median	Skewness Bowley's coefficient of Skewness	**Problems on the Relationship between the Coefficients**	**Analysis of Variance – Definition and Uses**
S-12	SLO-1	**Lorenz Curve**	Graphical solution of Mode	Concept of Kurtosis	**Finding the corrected Correlation Coefficient values by correcting the wrongly entered inputs**	**Analysis of Variance – testing procedure**
	SLO-2	**Lorenz Curve**	Graphical solution of Mode	Concept of Kurtosis	**Finding the corrected Correlation Coefficient values by correcting the wrongly entered inputs**	**ANOVA - One Way Classification**

Learning Resources	***Theory:*** ***1.*** Pillai, R.S.N, Bagavathi, V. (2009),Statistics,Theory and Practice,7th Edition,S.ChandLtd,NewDelhi. ***2.*** Gupta, S.P. (2012), Statistical Methods, 4th Edition, Sultan Chand & Sons, New Delhi. ***3.*** Khan and Khanum, (2008), Fundamentals of Bio Statistics, 3rd Edition, Ukaaz Publications, Hyderabad. ***4.*** Ken Black, (2013), Business Statistics for Contemporary Decision Making, 7th Edition, John Wiley Publications

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	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***
Dr. V. Prakash, Dr. Ambedhkar Government Arts College, Chennai	***Ms. Madhumitha J, Ass. Prof., FSH, SRM IST***
Dr. M. Vasantha, ICMR, Chennai	***Dr. S. Lakshmi Priya, Ass. Prof., FSH, SRM IST***

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			Program Learning Outcomes (PLO)														
CLR-1:	Critically evaluate basic mathematical concepts related to mixtures and alligations, Numbers, time and work	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2:	Use their logical thinking and analytical abilities to solve reasoning problems	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills	Analytical Skills	CommunicationSkills	Professional Behavior	Lifelong learning
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:																		
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	M	M	M	M	L	M	M	H	M	H	M	M	M
CLO-2:	Establish a student's interest and awareness in seating arrangements, mathematical operations, logical reasoning	3	80	75	M	H	M	M	M	M	L	M	M	H	M	H	M	M	M
CLO-3:	Acquire soft skills that will help for applying jobs	3	85	70	M	M	M	M	M	H	L	M	M	M	H	M	M	M	H
CLO-4:	Demonstrate various principles involved in aptitude problems	3	85	80	M	M	M	M	M	M	L	H	M	H	M	H	M	M	M
CLO-5:	Ability to solve problems on reasoning and to interpret english language	3	85	75	M	H	M	M	M	H	L	M	M	M	H	M	M	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

	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-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, FSH, SRMIST***
		Dr. Muthu Deepa M, Assistant Professor, Department of Career Guidance, FSH, SRMIST

Course Code	UEN23V01L	Course Name	Communication Skills	Course Category	V	Value Addition Course	L	T	P	0	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 :	Extend and expand the integrity in an individual which shall never allow him/her to compromise upon a noble way of living
CLR-2 :	Enable the students to overcome the fear of speaking a foreign language and enable them to think through a foreign language.
CLR-3 :	Make them communicate an unbiassed way of thinking in a better manner
CLR-4 :	Develop strategies of comprehension of texts based on different culture and life styles
CLR-5 :	Strengthen spoken and written skills of the student in English

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 of becoming better beings through the tools of Language and Literature	2	75	60
CLO-2 :	To acquire a strong knowledge on concept, culture, civilization through English Literature	2	80	70
CLO-3 :	To develop own content and to be able to translate using the features in English Language	2	70	65
CLO-4 :	To interpret the contents in the texts presented in English Language	2	70	70
CLO-5 :	To present an improved and healthier communication and intercultural elements acquired through English Literature	2	80	70

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge Sustainability	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills	Analytical Skills	Communication Skills	Professional Behavior	Lifelong learning
CLO-1 :	H	H	H	H	-	-	-	H	H	H	H	H	-	-	-
CLO-2 :	H	H	H	-	-	-	-	H	H	H	H	H	-	-	-
CLO-3 :	H	H	H	-	H	H	-	-	H	H	H	H	-	-	-
CLO-4 :	H	H	H	-	H	-	-	-	-	-	H	H	-	-	-
CLO-5 :	H	H	-	H	-	H	-	H	H	H	H	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	**Introduction to Listening Skills.** Exploring Effective Ways of Listening. Barriers of Listening. Active and Passive Listening.	**Introduction to Reading Skills.** Discussion of techniques of reading like Skimming and Scanning, Intensive reading and extensive reading.	**Introduction to Speaking Skills.** Explaining the importance of phonetics and vocabulary in order to improve the speaking skills.	**Introduction to Writing Skills-** The Importance of writing skills and explaining the difference between formal and informal writing.	**Introduction to appreciation of texts.** Introducing the students to what it means to appreciate texts.
	SLO- 2	Students are given activities to speak on any of their favourite topic and listen. Checking the listening skills of the peer members will enable both the speaking students and listening students understand the barriers of listening and understand how effective listening can be implemented.	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: **Persuasive writing**- letter of recommendation, testomials, **descriptive writing**- an article about any specific scientific process or working model of any technology, travelogue, **narrative writing-** personal memoir writing, short story or novel, poetry writing, and **expository writing**- objective writing for the purpose of imparting knowledge and facts- cook books and scientific reports. The instructor and the students can choose any one writing style to learn deeply about it and master the specific style through the practice of writing according to the context.	Encouraging the students to share a few of their favourite lines from any sources they have read. This can be translated in to Tamil as sharing a few lines from paditthadhil piditthadhu. They can share a few favourite text lines that they have preserved in their collection.
S-2	SLO-1	Introduction to Digital language lab/ usage of mobile applications like 6 Minute English from BBC Learning English - help in the listening skills by providing an interactive environment to the students	Learners are enabled to record their speech and listen to it in order to correct their problematic areas while reading like decoding, poor comprehension, and speed.One will know himself where he/ she has gone wrong Fluency and Pronunciation has to be evaluated	The right enunciation of certain words to be taught through phonetic representation and decoding the phonetic symbols by learning to use the dictionary. The instructor can give a demo of some model words through pronunciation according to phonetics.	Introduction to letter writing. Types of letters- Formal and Informal letters with examples. Instructing how to write a formal letter- business mail. Guiding how to write an informal letter- personal and subjective letter to family and friends. Learning E-mail etiquette.	Explaining why appreciating texts creates a good reader.
	SLO- 2	Equipping the listening skill of the learners by making them enagage with the listening exercises played in language lab or with mobile applications. Listening to	After repetitive practices of reading select paragraphs from web resources, their standard will be measured.	The students will observe and repeat and learn the phonetic pronunciation of words by practicing continuously.	Asking the students to write a formal letter and informal letter and check for e-mail etiquettes in writing. This will enable the students to learn how to write letters.	Enabling the students to reflect in the classroom about any of their favourite books/ articles or magazines.

		English songs and/or news bulletins may be done as an introductory level of listening. This kind of warming-up activity in listening will let the students move towards active listening from passive listening.				
S-3 – S-4	**SLO-1**	Introducing google podcasts. The course instructor has to guide the students to listen to any of the episodes from "7 Good minutes" by Clyde Lee Dennis	The speed, fluency, pronunciation, comprehension of the words in the paragraph are given utmost importance and the students are asked to identify the meanings of the words in the given passage.	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. Reading and recitation of the text of the first letter-Enjoy within limits, says Mr. Mathrubootham
	SLO- 2	The students are given 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.This task enables the instructor and learners to cross check the ability of identifying and grasping the speaker's words and the improvement levels of the same ability with the same task performed actively, multiple times with different speakers of the English Language.	The instructor has to teach proper pause at right points by giving hints and tricks to follow where the pauses are to be followed. For example pauses can be explained to be given at places where the following occurs 1. Comma 2. Shift of ideas 3. Usage of conjunctions and prepositions 4. Additional Information about the subjects. 5. Causes and consequences 6. Survey research and inference	Identifying common errors in concord, preposition, direct speech and indirect speech.	Encouraging the students to write a review of any book or a movie or an interview or a debate. Alternatively students can be shown any specific clipping from any movie and they can be asked to write an interpretation of the clipping that was shown.	Appreciating the text by talking about the personality of the characters represented. Identifying the peculiar usage of Tamil language phrases and incorporating Tamil accent while pronouncing English words.
S-5	**SLO-1**	Imitating the speakers by listenng to them and attempting to learn the pronunciation of the words uttered in the audio.	Students can be made into two groups the one which reads and the other which identifies the flaws in reading. Example : wrong	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.

		Instructor can attempt first and the students can follow.	pronunication, incorrect accent, word meanings etc.			
	SLO- 2	Repetetive 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.	A variety of writing tasks can be given to the students through which the meachnaics of writing can be assessed and evaluated.	Appreciating the text by talking about Mathrubootham's humour 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. 1. Your body language may shape who you are -by Amy Cuddy. 2. The power of introverts- by Susan Cain 3. How great leaders inspire action- by Simon Sinek	The instructor can teach how to identify the key arguments in a passage by identifying the 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. This can be done through yes or no quiz that enables the students to identify correct or incorrect usages of sentences with respect to the topics discussed in the previous classes regarding 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	1. Introducing to the audios of TED TALK British Speakers. Listening to the native speakers of English Language through TED TALKS. 2. Inside the mind of a master procrastinator- by Tim Urban 3. How to speak so that people want to listen- by Julian Treasure 4. Do schools kill creativity?- by Sir Ken Robinson	The students should be 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.	Appreciating the text by understanding 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. The learners will be enabled to understand, recognize and imitate the exact accent and pronunciation.	Guiding the act of reading through scanning and skimming by model reading of the passages by the instructor.	The students are given assignments to work on collocation and create a speech for two minutes that involves usage of collocations.	Teaching effective writing by learning to avoid 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.	The students can perform the scanning and skimming activities in reading after observing the instructor and understanding how it is done.	The learners are introduced to idioms and phrases for quick choice of learning how to speak in short time and how to speak easily and effectively.	Practicing effective writing by learning to avoid common errors in tenses, direct and indirect speech and syntax structure.	Appreciating the text by understanding 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. Students are introduced to the usage and application of the android app and instruct them to install in their mobile phones.	Enabling loud reading of the students. Identifying the benefits of slow mind reading and loud reading.	A speaking task to check the usage of collocations, idioms and phrases, vocabulary and phonetic pronunciation is to be given to the students and enable them improve their speaking skills.	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	To enable them imitate the different sounds and accents and make them repeat it after listening to any of the videos from the library based on individual interest. The instructor can select the following video from wood pecker app: The Withered Arm by Thomas Hardy- A Bitesized Audiobook. Aim for time frames from 00.00 to 02.00.	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. A random set of words are given to the students through which the student has to create an imaginative connection between the random words and build a story. This improves creative writing skill and also emhances the ability to impart coherence in writing.	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 are made into groups for checking the comprehension skills. This can be done after guiding how to analyse the text of a passage.	Automating vocabulary through engaging the students in various activity games like solving crossword puzzle and playing scattergories. The instructor can get the instructions of playing different games that improve vocabulary from the following websites and instruct the same to the learners. https://www.fluentu.com/blog/english/learn-english-puzzle/ https://swellgarfo.com/scattergories/	Introduction to blog writing and steps to become an effective blog writer. Introducing some of the blog writers who have developed a great fan following for their writing and content. Studying the blogs of some famous bloggers and explore their techniques of effective writing.	Appreciating the importance of bringing in the Indianized way of speaking the English Language in order to depict the character called Mathrubootham.

	SLO- 2	Complete practicing of speaking back limited short time frames by simultaneously looking at the transcript at each time frame and listening to the respective audio. Listening to the words in the audio video visual clip with the transcript should follow speaking activity of the student.	Brainstorming the comprehension skills among the student groups by questioning the key points in the passage. This will help them check their level of comprehension if they are able to answer the questions from the passages correctly.	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. This will improve their writing skill over a period of time.	Appreciating the text for portraying and bringing in the conversation with the relatable characters of both formal and informal everyday life experiences and contexts of relevance.
S 11 - S 12	**SLO-1**	*Interested students can complete listening and reflecting the complete audio listening practice and speaking.*	The students should be guided where there can be a possibility of misunderstanding a question that leads to incorrect answers, and should be taught to identify the answers properly by cross-checking the hint words that match the question and answers.	**Spur of the moment speech.:** 1. Giving a speaking task to the students to speak on any random topic to check their usage of vocabulary, pronunciation, fluency, idioms and phrases, collocations and error free speech. 2. Pictionary game practice. Speaking/ giving interpretation about the picture shown.	Selecting any news article and learning the writing style in it. The instructor can guide to improve report writing.	Encouraging the students to 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 similar to the activity that was begun before developing the listening skills. A comparison can be done as a constructive feedback to the learners about the improvement of their listening skills before and after engaging with the activities of listening.	Passages for reading comprehension are to be given for practice that tests their reading skills. A record of the improvement of the reading skills before and after engaging in activities like decoding, skimming and scanning, loud reading,can be shown to the students. Through this language competency of the students will be evaluated and learnt.	**Prepared speech :** Giving a speaking task to the students to speak on their own choice after giving some time for preparation to check their innovation and creativity in using vocabulary, pronunciation, fluency, idioms and phrases, collocations and error free speech.	Students are given chances to write reports on various topics. This will enhance their ability to understand facts and improve their writing style.	Enabling the students to share their appreciation of any of their favourite lines form the books they have read.

LearningResources	***Theory:*** 1. Horizon- English Text Book – Compiled and Edited by the faculty of English Departement, FSH, SRMIST, 2020 ***English Grammar in Use by Raymond Murphy****Raymond Murphy, Intermediate English Grammar, Cambridge University Press, 2007* 2. *R.P. Bhatnagar, English for Competitive Examinations, Trinity Press, 3rd Edition,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 – 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	UNS23M01L UNC23M01L UNO23M01L UYG23M01L	Course Name	*NSS* *NCC* *NSO* *YOGA*	Course Category	M	Mandatory Course	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	UDS23301J	Course Name	Data Engineering for Enterprise	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 and Applications	Data Book / Codes / Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning
CLR-1 :	To introduce the participants to the fundamental concepts of bigdata, its tools and technologies, their working and frameworks	
CLR-2 :	To introduce the participants to the fundamental concepts of internet of things, a system of interconnected computers, digital machines, devices etc.	
CLR-3 :	To enumerate all the business challenges involved in the data engineering process.	
CLR-4 :	To work with the Data mapping, Data Integration, Data Validation, Governance, Quality systems, with their tools and technologies.	
CLR-5 :	The Primary Objective of this unit is to work with various structured, unstructured, semi-structured, sensor and machine datasets and process with the right tools, technologies, and libraries available.	

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 Problem Solving skills	4 Link with related Discipline	5 Procedural Knowledge	6 Skills in Specialization	7 Ability to Utilize Knowledge	8 Skills in Modelling	9 Analyze, Interpret data	10 Investigative Skills	11 ICT Skills	12 Analytical Skills	13 Communication Skills	14 Professional Behavior	15 Lifelong learning
CLO-1 :	Have a firm understanding of Big data from academic an industry perspective. They will have a solid understanding of big data principle, tools, techniques and frameworks.	2	85	80	L	-	-	-	M	-	-	-	M	-	-	M	-	-	-
CLO-2 :	Have a firm understanding of defining the role Big data and IoT plays in building scalable AI Products.	3	85	80	L	H	H	H	H	-	-	-	M	-	-	M	-	-	-
CLO-3 :	Have solid hands-on skills, knowledge and expertise in Data gathering, Data collection, Data Mapping, Data Conversion, Data Quality, Data Validation with domain-specific components	3	85	80	L	M	H	H	H	-	-	M	M	-	-	-	-	-	-
CLO-4 :	Have solid hands-on skills, knowledge and expertise in Collecting data from different enterprise systems and process them efficiently	3	85	80	-	M	M	H	M	-	-	-	M	-	-	M	-	-	-
CLO-5 :	Able to reading, process, and write data from Big Data and IIoT platforms using the right tools and techniques involved	3	85	80	-	M	H	H	H	-	-	-	M	H	-	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Data Engineering Introduction	ERD Model	Big Data Tools	Data Preparation with Python	Working with Unstructured Data
	SLO-2	What is Data Engineering?	MDM Model	Hadoop	What is Data Preparation?	Data Profiling
S-2	SLO-1	Why Data Engineering is important?	Star Scheme	Apache Strom	Data Preparation Requirements	Data Profiling Benefits
	SLO-2	Data Engineering Driving Factors	Extended Star Schema	MongoDB	Steps in Data Preparation	Group or Individual Project
S-3	SLO-1	Data Engineering Building Blocks Data Engineering Advancement	Snowflake Data Types, Structured, Unstructured, Semi-Structured	Cloudera	Data Discovery Data Profiling	Information Modeling and Data Virtualization
	SLO-2	Data Engineering Skills and Expertise Data Analytics vs Data Engineering	Machine Data, Sensor Data Image, Video, Voice	Introduction to Hadoop Hadoop Storage HDFS (Hadoop Distributed File System)	Data Cleansing Data Transformation	Business Processes Master Data/Reference Data Transaction Data/Measures/KPIs
S-4 to S-6	SLO-1	**Lab 1 :** **Setup a Simple Data Engineering Development Infrastructure in My SQL Opensource**	**Lab 4 :** **Validate data in the below data loaded tables** ● **Customer Table** ● **Product Table**	**Lab 7:** **Write a Select query with the following conditions using python**	**Lab 10 :** **Perform Data Transformation with the some logic using python**	**Lab 13:** **Perform data validation with some logic using python** ● **Validate for Incorrect Product UOM's**
	SLO-2	**Should be able to create table, load data and query data.**	• **Sales Order Tables Check if the CustomerID, ProductID and Sales OrderID are unique and not null.** • **Check if the Data type of Customer Names, Product Names are CHAR**	• **Use LEFT JOIN to merge above result with the Sales order table on ProductID** • **Use RIGHT JOIN to merge the result of first conditions with the Sales order table on ProductID**	● **Add the First name and the Last Name as Full Name** ● **Change the Customers Full Name with Upper Case to Proper Case**	● **Write validation results in a File in G Drive**
S-7	SLO-1	Data Analytics Overview	Data Source	Hadoop Architecture	Data Enrichment	Data Subsets
	SLO-2	Data Analysis vs Data Analytics	Data Target	Hadoop MapReduce	Data Governance	Information Modelling
S-8	SLO-1	Data Analytics Advancement	Datastore	Introduction to Apache Hive and Hbase	Data Quality	Data Access Path
	SLO-2	Role of Data Engineering in Data Analysis	Data Mapping	Big Data Processing with Apache Spark	Data Validation	Virtual Data Provisioning

S-9	**SLO-1**	Data Engineering vs Data Warehousing Data Warehousing Overview	Data Conversion	Data Collection with Python	Data Consistency	Group or Individual Project
	SLO-2	Data Warehousing Building Blocks Data Warehousing Challenges	Data Transformation Data Flow Data Pipeline	What is Data Identification? Identifying the Required Data and Data Sources, Data Format	Data Completeness Data Accuracy Examples of Data Integration	Unit 10: Data Governance and Data Quality Data Sources - Mapping, Integration, Validation, Governance and Quality, Data Stakeholders, Data Subject Areas
S-10 to S-12	**SLO-1** **SLO-2**	**Lab 2 :** **Create following tables with appropriate columns** ● **A Customer Table** ● **A Product Table** ● **A Sales Order Table** **Note: Check DeepSphere.AI GitHub for table structure and sample data**	**Lab 5 :** **Validate data in the below data loaded tables** ✓ **Check if the Customer Email has a format: name@email.com** ✓ **Check if there are any null values** ✓ **Check if there are any duplicate values**	**Lab 8:** **Perform Update operation with the below logic using python** ● **Update Unit Price = $40 where Product = 'Coolers'** ● **Update Quantity = 5 Customer = 'Alfred'**	**Lab 11:** **Perform Data Transformation with the some logic using python** ● **CHANGE the Sales Order Date Format as DDMMYYYY** ● **Sort the product in the higher order of Revenue**	**Lab 14:** **Using two different files and merge the Files and then load into table using Python In Colab and use appropriate python libraries**
S-13	**SLO-1**	Data Warehousing limitations Data Warehousing Industry Needs and Market Demand	Data Frequency, Real-Time Data, Batch Data, and Data Streaming	Data Structure	Importance of Data Integration	Data Owners
	SLO-2	Compare Data Engineering Technologies, Skills, and Expertise with Data Warehousing	Data Provisioning	Data Frequency	Business Challenges of Data Integration	Data Change Processes
S-14	**SLO-1**	Difference between Data Engineering and Data Warehousing	Data Architecture	What is Data Collection?	Key General Tools/Technologies	Data Systems
	SLO-2	Data Engineering Architecture Data Engineering Building Blocks	ETL (Extract, Transform, and Load)	Source and Target Systems	Data Cleansing and Data Blending	Data Validation
S-15	**SLO-1**	Database and No SQL database	Introduction to Big Data, What is Big Data?	Examples of Data Collection Business Challenges of Data Collection	Understanding different Data Formats, Data Mapping and Data Conversion	Data Quality Standards, Data Acceptance Criteria
	SLO-2	Data Model	Big Data Business Applications Big Data Architecture	Business Benefits of Data Collection Key General Tools/Technologies	Data Integration, Working with Structured Data	Data Access Controls Group or Individual Project
S-16 to S-18	**SLO-1**	**Lab 3:** **Load Data into the following tables from CSV file, TEXT File and Google G Drive** ● **Customer Table**	**Lab 6:** **Write a Select query with the following conditions using python** ● **Use INNER JOIN to merge the Customer**	**Lab 9:** **Perform Update operation with the below logic using python** ● **Calculate Revenue as = Unit Price * Quantity**	**Lab 12:** **Perform data validation with some logic using python** ● **Validate for Customer Full Name without Double Spaces**	**Lab 15:** **Using Data from Two different Files merge the Files, remove duplicate rows and replace NULL values with #### and then load into table using Python In**

	SLO-2	● **Product Table** ● **Sales Order Tables**	**table with the Product table on CustomerID**	● **Calculate 10% discount where Product = 'Toothpaste'**	● **Validate for Sales Order Data with incorrect date correct (Should be MMYYDD)**	**Colab and use appropriate python libraries**

Learning Resources	**1.** Data Science and Engineering at Enterprise Scale by Jerome Nilmeier Released April 2019 Publisher(s): O'Reilly Media, Inc	**2.** Enterprise Big Data Engineering, Analytics, and Management, Martin Atzmueller (University of Kassel, Germany), Samia Oussena (University of West London, UK) and Thomas Roth-Berghofer (University of West London, UK)

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, 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***	**Dr.K.Sutha, SRMIST, Ramapuram**

Course Code	UDS23302J	Course Name	Data Base Management System	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	Program Learning Outcomes (PLO)

		1	2	3
CLR-1:	*To understand the fundamentals of Database Management Systems and the applications*			
CLR-2:	*To design ER-models to represent simple database application scenarios*			
CLR-3:	*To gain knowledge about relational database model and language*			
CLR-4:	*To develop queries using Structure Query Language (SQL) and PL/SQL*			
CLR-5:	*To improve the database design by normalization.*			
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking	Expected	Expected
CLO-1:	*Acquire the knowledge on DBMS concepts, Architecture and applications*	1	85	80
CLO-2:	*Acquire the skills to model an applications data requirements using tools like ER diagram*	2	85	80
CLO-3:	*Apply the knowledge to create, store and retrieve data using query language*	2	85	80
CLO-4:	*Ability to conceptualize data using Structure Query Language (SQL) and PL/SQL*	3	85	80
CLO-5:	*Implement the knowledge to improve database design using various normalization and optimize queries*	3	85	80

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental	Application of	Problem Solving	Link with related	Procedural	Skills in	Ability to Utilize	Skills in Modeling	Analyze, Interpret	Investigative	ICT Skills,	Analytical Skills	Ethical Practices	Professional Behavior	Lifelong learning
L	-	-	-	M	-	-	-	-	-	-	-	-	-	-
M	-	M	H	H	-	-	-	-	-	-	-	-	-	-
H	M	M	M	H	-	-	M	-	H	-	-	-	-	-
H	M	M	H	H	-	-	-	M	M	-	M	-	-	-
-	M	H	H	M	-	-	M	-		-	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to Database Management System	Importance of Database Design	SQL Queries	Introduction to Normalizations	Concurrency control
	SLO-2	Characteristics of database System	Schemas, and Instances	Examples using SQL queries	Anomalies in DBMS	Concurrent Execution in DBMS
S-2	SLO-1	Advantages of DBMS over File Processing System	Three level Architecture of Database design	Nested Queries	Non loss decomposition and functional dependencies	Problems with concurrent execution
	SLO-2	Applications of DBMS	Data Models	Joins	Uses of normal forms in DBMS	Concurrency control protocols
S-3	SLO-1	Purpose of Database System Database Designing Process and View of Data	Types of data models Hieratical Model	Types of joins Division	Types of normal forms, First Normal Form	Lock based concurrency control protocols, Time stamp-based concurrency control protocols
	SLO-2	Components of DBMS Database Environment	Network Model. Relational model, Object Base Data Model	Relational comparison operators, SQL Aggregate functions	Second Normal Form, Third Normal Form	Validation based concurrency control protocols, Recovery and atomicity in DBMS
S-4 to S-6	SLO-1 SLO-2	**Lab 1: Design a Database and create required tables**	**Lab 4:SQL Data Manipulation Language commands using employee database**	**Lab 7: SQL using Joins**	**Lab 10: PL/SQL Functions and Procedures**	**Lab 13: PL/SQL Trigger**
S-7	SLO-1	Functions of DBMS	Entity - Relationship Model	Subqueries	BCNF	Failure classifications
	SLO-2	Database Users, Data Independence, Physical and Logical data independence	ER Diagram concepts: Entity, Attributes and Relationship	Views	Fourth Normal Form, Fifth Normal Form	Failure with loss of non-volatile storage
S-8	SLO-1	Database System Architecture	Weak Entity Sets, Strong Entity Set, Attributes-types of attributes	Introduction to PL/SQL PL/SQL: variable declaration	Inference Rules preservation, Advantages of functional dependencies	Multiple Granularity, Log based Recovery
	SLO-2	Role of Database Administrator, Types of DBMS Architecture	Relationship and Relationship Set, Constraints, Keys	Characteristics of PL/SQL Advantages and disadvantages of PL/SQL	Decomposition using FD – dependency	Recovery with concurrent transactions, Transaction Logs

S-9	SLO-1	1-tier, 2-tier and 3-tier, Introduction to relational databases and Relational Model	Mapping cardinality, Removing redundant attributes in entity sets	Control Structures, Types of control structures	Decomposition into BCNF, Decomposition into 3NF	Backup techniques Remote Backup systems
	SLO-2	Terminologies used in relational model	Reduction in relational schema	PL/SQL Procedure, Passing parameters in procedure	Properties of Decompositions, Lossless-Join Decomposition-Dependency	Advance Recovery systems
S-10 to S-12	SLO-1 SLO-2	**Lab 2: SQL Data Definition Language using student database**	**Lab 5: SQL Data Control commands**	**Lab 8: SQL using aggregate functions and set operations**	**Lab 11: Case study submission for normalization**	**Lab 14: Case study submission for recovery**
S-13	SLO-1	SQL Fundamentals	Generalization	PL/SQL Function	Transaction management: ACID properties	Recovery with Concurrent Transactions
	SLO-2	Basic structure of SQL queries	Aggregation and Specialization	PL/SQL Recursive function	Transaction State	Buffer Management
S-14	SLO-1	Database languages. DDL, DML.DCL and TCL, Key constraints and it types	Relational Algebra-Fundamental Operators and syntax, relational algebra queries	PL/SQL Cursors, Types of cursors	Implementation of Atomicity and Durability	Indexing in databases
	SLO-2	Specifying Foreign Key Constraints in SQL	Pitfalls in Relational database Functional dependency	Triggers, Examples of Triggers in SQL	Concurrent Executions, serializability	Types of indexing, Structure of B-Tree
S-15	SLO-1	Integrity Constraints Over Relations	Trivial and non-trivial FD Multivalued dependency	Accessing Databases from Applications	Recoverability, Implementation of Isolation	Properties of B-Tree, Hashing
	SLO-2	Types of integrity constraints	Transitive dependency	Embedded SQL	Testing for serializability	Static and dynamic hashing
S-16 & S-18	SLO-1 **SLO-2**	**Lab 3: Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables**	**Lab 6: Case study submission for ER Diagram**	**Lab 9: PL/SQL Conditional and Iterative Statements**	**Lab 12: PL/SQL cursor**	**Lab 15: Case study submission for database backups**

Learning Resources	Abraham Silberscatz, "Database System Concept", 6th Edition, McGraw Hill.	References: 1. Ramez Elmasri, Shamkant B. Navathe, (2011), "Fundamentals of Database Systems", Sixth Edition, Pearson Education 2. James R. Groff and Paul N. Weinberg, "The complete Reference SQL". 3rd Edition

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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	

Course Code	UDS23303T	Course Name	MACHINE LEARNING	Course Category	C	Discipline Specific Core 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,	Learning
CLR-1:	Understand the basic theory underlying Machine Learning	
CLR-2:	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.	
CLR-3:	Understand the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning	
CLR-4:	Understand a range of machine learning algorithms along with their strengths and weaknesses	
CLR-5:	Learn the basics of Demystifying Artificial Intelligent and machine learning	

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	1 Fundamental Knowledge	2 Application of Concepts	3 Problem Solving skills	4 Link with related Discipline	5 Procedural Knowledge	6 Skills in Specialization	7 Ability to Utilize Knowledge	8 Skills in Modelling	9 Analyze, Interpret data	10 Investigative Skills	11 ICT Skills	12 Analytical Skills	13 Communication Skills	14 Professional Behavior	15 Lifelong learning
CLO-1:	To understand various key paradigms for machine learning approaches	2	85	80	H	M	-	-	-		-	-	-	-	-	-	-	-	-
CLO-2:	Implement and analyse existing learning algorithms, including well-studied methods for classification, regression, structured prediction, clustering, and representation learning	3	85	80	L	M	M	H	H	H	H	H		M	M	M	-	-	-
CLO-3:	Understand a very broad collection of Machine Learning algorithms and problems	3	85	80	L	H	M	H	H	H	H	H	L	M	H	M	-	-	-
CLO-4:	Grasp the ML implementation framework	3	85	80	L	H	M	H	M	M	H	H	L	M	M	M	-	-	-
CLO-5:	Develop skills of using recent machine learning software for solving practical problems.	3	85	80	L	M	H	L	M	M	M		H	M	H	-	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Unit 1 – Introduction to Machine Learning	Unit 2 - Data and It's Processing	Unit 3 - Supervised Learning	Unit 4- Unsupervised Learning: Introduction	Unit 5- Artificial Intelligence, Machine Learning, Deep Learning and Beyond
	SLO-2	What is Machine Learning?	Introduction to Data in Machine Learning	How Supervised Learning Works?	Supervised vs. Unsupervised Machine Learning	Machine Learning and Deep Learning are Subfields of AI
S-2	SLO-1	How does Machine Learning work	How to get datasets for Machine Learning	Steps Involved in Supervised Learning	Advantages of Unsupervised Learning	Difference Between Machine Learning and Deep Learning
	SLO-2	Features of Machine Learning	Types of data in datasets	Types of supervised Machine Learning Algorithm	Disadvantages of Unsupervised Learning	Capabilities of AI and Machine Learning
S-3	SLO-1	Need for Machine Learning	Need of Dataset	Advantages of Supervised Learning	Clustering in Machine Learning	Machine Learning Tools
	SLO-2	Classification of Machine Learning	Popular sources for Machine Learning datasets	Disadvantages of Supervised Learning	Why Clustering?	Tensorflow
S-4	SLO-1	History of Machine Learning	How do we split data in Machine Learning?	Getting started with Classification - Types of Classification	Clustering Method	PyTorch
	SLO-2	Types of Machine Learning	Advantages of using data in Machine Learning	Types of Classification Algorithms	Applications of Clustering in different fields	Amazon Machine Learning (AML)
S-5	SLO-1	Machine Learning Approaches	Disadvantages of using data in Machine Learning	Classification model Evaluations	Types of Clustering Methods	Apache Spark MLlib
	SLO-2	Machine Learning Techniques	Issues of using data in Machine Learning	How does Classification work?	Different Types of Clustering Algorithm	Google ML kit for Mobile
S-6	SLO-1	Goals of Machine Learning	Understanding Data Processing	Applications of Classification Algorithm	K means Clustering	Oryx2
	SLO-2	Applications of Machine Learning	Why do we need Data Pre-processing?	process of building a Classification Model	Mean-shift Algorithm	Shogun
S-7	SLO-1	Business Challenges of Machine Learning	Different data Pre-processing techniques for machine learning.	Logistic Regression in Machine Learning	DBSCAN Algorithm	How Companies Use AI and Machine Learning
	SLO-2	Business Benefits of Machine Learning	Advantages of Data Processing in Machine Learning	K-Nearest Neighbour (KNN) Algorithm	Agglomerative Hierarchical Algorithm	How Machine Learning Will Transform Your Industry

S-8	**SLO-1**	Machine learning Life Cycle	Overview of Data Cleaning	Support Vector Machine Algorithm	Association Rule Learning	How Does Google Use Machine Learning?
	SLO-2	Machine Learning and Artificial Intelligence- Introduction	Steps involved in Data Cleaning	Naïve Bayes Classifier Algorithm	Types of Association Rule Learning	How Does Facebook Use Machine Learning?
S-9	**SLO-1**	Difference between Artificial intelligence and Machine learning	Advantages of Data Cleaning in Machine Learning:	What is Regression Analysis?	How does Association Rule Learning work?	Targeted Advertising using Machine Learning
	SLO-2	Demystifying Machine Learning	Disadvantages of Data Cleaning in Machine Learning	Types of Regression Techniques	Apriori Algorithm	Top Machine Learning Applications by Industry
S-10	**SLO-1**	Agents in Artificial Intelligence	Data Cleansing tools	Classification vs Regression in Machine Learning		Retail or eCommerce Machine Learning Use Cases
	SLO-2	Types of Agents	Challenges and Problems in Data Cleaning	Comparison between Classification and Regression	F-P Growth Algorithm	Cybersecurity Machine Learning Use Cases
S-11	**SLO-1**	Uses of Agents	Handling Imbalanced Data in Machine Learning	Linear Regression in Machine Learning	Applications of Association Rule Learning	Real-world machine learning use cases
	SLO-2	How Machine Learning and Artificial Intelligence Will Impact Global Industries	Feature Scaling	Simple Linear Regression in Machine Learning	Overfitting and Underfitting in Machine Learning	Machine Learning in Image Recognition
S-12	**SLO-1**	Difference Between Business Intelligence and Machine Learning	What is Feature Scaling?	Multiple Linear Regression	Reinforcement learning	Machine Learning in Self-Driving Cars
	SLO-2	How Artificial Intelligence (AI) and Machine Learning (ML) Transforming Endpoint Security?	Generate Test Datasets for Machine learning	Polynomial Regression	Difference between Reinforcement learning and Supervised learning	Machine learning in the future

Learning Resources	1. **Machine Learning for Absolute Beginners: A Plain English Introduction (Third Edition).Oliver Theobald, Scatterplot Press 2017.** 2. **Machine Learning, Tom Mitchell, McGraw Hill, 1997**	3. **Essential Machine Learning and Pragmatic AI, By Noah Gift, December 2018** 4. **Machine Learning Yearning by Andrew Ng, deeplearning.ai, 2018** 5. **https://www.geeksforgeeks.org/difference-between-machine-learning-and-deep-learning/**

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%	-	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, 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***	***Dr. R. Renuga Devi, SRM IST, RMP***

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 :	தமிழின்எழுத்து, சொல்வளர்ச்சிவரலாற்றைஅறியச்செய்தல்	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	மொழியைப்பிழையின்றிஎழுதும்ஆற்றலைஅடையச்செய்தல்			
CLR-3 :	வாய்மொழிவழக்காறுகளின்நுட்பங்களைத்தெரியச்செய்தல்			
CLR-4 :	கடிதம்எழுதும்முறை, கட்டுரைவரையும்முறைஅறியச்செய்தல்			
CLR-5 :	படைப்பாற்றல்திறனைவளரச்செய்தல்			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	சொற்களைச்சரியானபொருண்மையில்பயன்படுத்தும்திறன்பெறுதல்	2	75	60
CLO-2 :	மொழியைப்பிழையின்றிஎழுதுவதன்வழிமொழிஆளுமைபெறுதல்	2	80	70
CLO-3 :	வாய்மொழிமரபின்கூறுகள்வழி,மக்களின்வாழ்வியல்விழுமியங்களைஅறிந்துகொள்ளுதல்	2	70	65
CLO-4 :	அலுவலகப்பயன்பாடு, திறன்மேம்பாடுஆகியவற்றைநுட்பமாகத்தெரிந்துகொள்ளுதல்	2	70	70
CLO-5 :	கவிதை, கதைபடைக்கும்ஆற்றலைஅறிந்துகொள்ளுதல்	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 Subjects	Procedural Knowledge	Skills in Specialization	Ability to Utilize Resources	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	L	H	M	H	H	L	M	H	M	L	H	-	-	-
H	M	H	L	M	H	L	H	M	L	H	H	-	-	-
H	L	H	M	H	H	M	H	L	H	M	H	-	-	-
H	M	H	L	H	M	M	H	H	L	H	H	-	-	-
H	M	H	H	M	H	L	M	H	L	H	H	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	தமிழின்தொன்மை	மெய்யெழுத்துகளின்வகைகள்	வாய்மொழிமரபு, எழுத்துமரபு	தொடர்அமைப்பு	காலந்தோறும்கவிதை
	SLO-2	தமிழின்சிறப்புகள்	மூவினம்	வாய்மொழிமரபில்அனுபவம்	எளியதொடர்	கவிதைவடிவம்
S-2	SLO-1	கருத்து – பரிமாற்றம்	ஒற்றுஇடுதல்	வாழ்வியல்தத்துவம்	நெடுந்தொடர்	மரபுக்கவிதை
	SLO-2	பயன்பாட்டுத்தமிழ்	வல்லினம்மிகும்இடங்கள்	பழமொழிகள்	பத்திஎழுதுதல்	வசனகவிதை
S-3	SLO-1	காலந்தோறும்தமிழ்	வல்லினம்மிகாஇடங்கள்	பழமொழியும்மனிதவாழ்வியலும்	ஒருபொருளைமையமாகக்கொண்டுஎழுதுதல்	புதுக்கவிதை/ புதியவடிவக்கவிதைகள்

	SLO -2	எழுத்துகள் - அறிமுகம்	எழுத்துப்பிழைநீக்கம்	பழமொழியின்வடிவம்	காலந்தோறும்கடிதங்கள்	கவிதைக்களங்கள்
S-4	SLO -1	தமிழ்எழுத்துவரலாறு	பிழைநீக்கிஎழுதுதலின்அவசியம்	வட்டாரமொழி	தமிழில்கடிதஇலக்கியம்	கவிதைஉள்ளடக்கம்
	SLO -2	எழுத்துகளின்வரிவடிவம்	பிழைகளும்மொழிச்சிக்கல்களும்	வட்டாரமொழியில்சொலவடை	கடிதவகைகள்	கவிதைஎழுதும்முறை
S-5	SLO -1	எழுத்துகளின்பிறப்பு	எதிர்ச்சொல்வரலாறு	பழமொழியும்சொலவடையும்	கடிதம்எழுதும்முறை	தன்னுணர்ச்சிக்கவிதை
	SLO -2	உயிர்எழுத்துப்பிறப்பு	எதிர்ச்சொல்லின்உருவாக்கம்	பேச்சுநடையும்சொலவடையும்	அலுவல்கடிதம்	இயற்கை/ சமூகம் - கவிதை
S-6	SLO -1	மெய்யெழுத்துப்பிறப்பு	இணைச்சொல்லும்எதிர்ச்சொல்லும்	மரபுத்தொடர்	வாழ்த்து/ பாராட்டுக் / நட்புக்கடிதம்	காலந்தோறும்கதைகள்
	SLO -2	மொழிமுதல்எழுத்துகள்	தமிழில்எதிர்ச்சொற்கள்	பழமொழிமரபுத்தொடர்வேறுபாடு	கட்டுரைவகைகள்	கதைகளில்கற்பனையும் உண்மையும்
S-7	SLO -1	மொழிஇறுதிஎழுத்துகள்	ஒரெழுத்துஒருமொழி – அறிமுகம்	தமிழில்மரபுத்தொடர்	கட்டுரைஎழுதும்முறை	வாய்மொழிக்கதை
	SLO -2	எழுத்துவேறுபாடும்பொருளும்	ஒரெழுத்துஒருமொழியும் பொருளும்	விடுகதை	கட்டுரைக்களங்கள்	ஒருபக்கக்கதை
S-8	SLO -1	ணகர - னகர - நகரவேறுபாடு	சொற்களின்தன்மைகள்	நுண்ணறிவுவெளிப்படுதல்	போட்டிக்கட்டுரை	சிறுகதை
	SLO -2	லகர – ளகர - ழகரவேறுபாடு	ஒருசொல்பலபொருள்	கதைமரபில்நாட்டுப்புறக்கதைகள்	அனுபவக்கட்டுரை	கதைஎழுதும்முறை
S-9	SLO -1	சொல்லும்பொருளும்	ஒருபொருள்பலசொல்	தமிழில்நாட்டுப்புறக்கதைகள்	பயணக்கட்டுரை	சமூகஉணர்வின்வெளிப்பாடு
	SLO -2	காலந்தோறும்சொற்கள்	சொல்உருவாக்கத்தின்பயன்கள்	நாட்டுப்புறக்கதைகளும்சமூகவரலாறும்	இதழியல்கட்டுரைகள்	நிகழ்வைக்கதைவழியேவெளியிடல்

Learning Resources	1.	நல்லதமிழ்எழுதவேண்டுமா?, அ. கி. பரந்தாமனார், பாரிநிலையம், 2010.
	2.	நாட்டுப்புறஇயல்ஆய்வு, சு. சக்திவேல், மணிவாசகர்பதிப்பகம், சென்னை, 2006.
	3.	படைப்புக்கலை, மு. சுதந்திரமுத்து, அறிவுப்பதிப்பகம், சென்னை, 2008.
	4.	கதையியல், க. பூரணச்சந்திரன், அடையாளம்பதிப்பகம், சென்னை, 2012.
	5.	**இணையவழித்தரவுகள் :** https://tamilheritage.org/

	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.Hebzibah beulah Suganthi, 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.*** Prayojan mulak Hindi, Dr. Sontakke ***5.*** https://rajbhasha.gov.in/hi/ol_clause

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	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.Nisha Murlidharan 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:*

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

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	Procedural Knowledge	Skills in Specialization	Ability to Utilize	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										
	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 (5%)#**			
		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. Kavaskar Danasegarane **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	UDS23G01J	Course Name	Data Wrangling	Course Category	G	Generic 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	Nil	

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

		1	2	3
CLR-1 :	Clean and format data to eliminate duplicates and errors in your datasets	Level of Thinking	Expected Proficiency (%)	Expected Attainment
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
CLO-2 :	Acquire data and demonstrate the knowledge of Web Scraping	3	85	80
CLO-3 :	Clean data, impute missing values and detect Outliers	3	85	80
CLO-4 :	Perform Data Wrangling and Visualization	3	85	80
CLO-5 :	Perform Aggregation and Groupby operation	3	85	80

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	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
CLO-1 :	H	M	M	L	H	H	L	L	L	L	L	L	H	M	M
CLO-2 :	M	H	H	M	H	H	M	M	L	L	L	M	H	L	M
CLO-3 :	M	H	H	H	H	H	M	H	L	L	L	L	M	L	M
CLO-4 :	M	H	H	M	H	H	H	H	M	M	L	H	H	L	M
CLO-5 :	M	H	H	H	H	H	M	H	M	M	L	H	H	L	M

Duration (hour)		15	15	15	15	15
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? Data Wrangling Challenges	Where to find Data? Govwenment Data, NGO Data, Education Data, Medical and Scienfitic Data,CrowdSourced data and APIs	Benefits of Data Cleaning	Reordering and Sorting Levels	Iterating Over Groups
	SLO-2	Tools for Data Wrangling Data Wrangling Tasks	Data Investigation-Case Studies Relational Databases-MySQL and PostgreSQL	Example Use Case for Data Cleaning	Summary Statistics by Level Indexing with a DataFrame's columns	Selecting a Column or Subset of Columns
S-3	SLO-1	Data Sources - EMR, PO	Non-Relational Databases - NoSQL	Components of Quality Data Subsetting the DataFrame	Data Wrangling – Combining Combining and Merging Datasets	Grouping with Dicts and Series Grouping with Functions
	SLO-2	File fformats: JSON, XML, EXCEL, CSV, HTML,audio files	Reading data from different sources	The unique function, Conditional Selection and Boolean Filtering	Database-Style DataFrame Joins	Ex: sum(), min(),Grouping by Index Levels
S-4 & S-5	SLO-1	Lab1: Install python, Setting up Ipython and Jupyter Notebook	Lab 4: Download a dataset and perform visual exploration of data	Lab 7: Explore different data cleaning Tools	Lab 10: Implement Combine and merge of data in Pandas Object	Lab 13: Perform Groupby Operations using Pandas
	SLO-2					
S-6	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-7	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	Reading text files in pieces Writing data to text format	Data Transformation		

		Structures - Sets			Combining Data with Overlap, Pandas Merge Functions with Arguments	Apply: General split-apply-combine, Suppressing the Group Keys
S-8	**SLO-1**	Tuples and Strings, Iterators	Working with delimited format, JSON data	Removing Duplicates, Transforming Data using a function or mapping	DataWrangling-Reshaping and Pivoting	Quantile and Bucket Analysis Example: Filling Missing Values with Group-Specific Values
	SLO-2	Lambda Expressions, Introduction to Numpy. Pandas, Matplotlib	XML and HTML : Web scraping	Replacing values, Renaming Axis Indexes	Reshaping with Hierarchical Indexing, stack and unstack	Example: Random Sampling and Permutation
S-9 & 10	**SLO-1**	**Lab 2: Using Python libraries to parse excel file.**	**Lab 5: Use RegEx for text format files**	**Lab 8: Outlier Detection Using a Simple Statistical Test**	**Lab 11: Implement Reshaping and Pivoting using Pandas Object**	**Lab 14: Perform Aggregation Operation on dataframe**
	SLO-2					
S-11	**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-12	**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, Random Variables	Parse HTML Code with Beautiful Soup	Computing Indicator/Dummy Variables	Colors, Markers, and Line Styles	Summary of pivot_table methods in Python
S-13	**SLO-1**	Probability Distribution, Discreteand Continuous Distribution	Reading data from XML, Reading data from an API	String Manipulation, String methods, Regular Expressions	Saving Plots to File, Plotting with pandas and seaborn	What is Cross Tabulation?, CrossTab function in python
	SLO-2	Introduction to Matplotlib Through a Scatter Plot	Reading microsoft excel files, Interacting with Web API's	Vectorized Strings, Concat, merge, join data tables	Types of Plots in matplotlib, Facet Grids and Categorical Data	Handling Categorical data in Python, Techniques for Method Chaining
S-14 & S-15	**SLO-1**	**Lab 3: Using NumPy & Pandas to Calculate Basic Descriptive Statistics on the DataFrame**	**Lab 6: Build a Web Scrapper using Python**	**Lab 9: Read any tabular dataset and perform data cleaning**	**Lab 12: Use matplotlib to perform data visualization**	**Lab 15: Perform Cross Tab analysis in Python**
	SLO-2					
	SLO-2					

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

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, 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	UDS23S03L	Course Name	Web Programming	Course Category	S	Skill Enhancement Elective	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	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 :	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:	Level of Thinking	Expected	Expected	Fundamental	Application of	Problem Solving	Link with related	Procedural	Skills in	Ability to Utilize	Skills in Modelling	Analyze, Interpret	Investigative Skills	ICT Skills	Analytical Skills	Communication	Professional	Lifelong learning
CLO-1 :	Design and implement dynamic websites with good aesthetic sense of designing	3	90	90	L	M	L	-	-	M	-	-	M	-	-	-	M	M	-
CLO-2 :	Create web pages using HTML and Cascading Styles sheets	3	85	85	M	M	M	L	L	M	-	-	M	-	-	-	M	M	-
CLO-3 :	Analyze a web page and identify its elements and attributes	3	85	85	H	M	M	H	H	M	-	-	M	-	-	-	M	M	-
CLO-4 :	Manage web site content using Session and Cookies	3	85	85	H	M	H	H	H	M	-	-	M	-	-	-	M	M	-
CLO-5 :	Build web applications using PHP	3	90	90	H	M	H	H	H	M	-	-	M	-	-	-	M	M	-

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 Faithe Wempen, 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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr.J.Jebamalar Tamilselvi, SMIST, RPM***
		Dr V Saravanan, SRMIST, RPM

Course Code	*UDS23P01L*	Course Name	INTERNSHIP - I	Course Category	*IAP C*	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)

		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:	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
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLO-1 :	To get an insight of an industry and organization/company	3	80	70	L	H	-	H	L	-	-	-	L	L	-	H	-	H	H
CLO-2 :	To gain valuable skills and knowledge	3	85	75	M	H	L	M	L	-	-	-	M	L	-	H	-	H	H
CLO-3 :	To make professional connections and enhance networking	3	75	70	M	H	M	H	L	-	-	-	M	L	-	H	-	H	H
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	-	H	-	H	H
CLO-5 :	To get an inside view of an industry and organization/company	3	85	75	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 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				
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	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	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills	Analytical Skills	CommunicationSkills	Professional Behavior	Lifelong learning
M	M	M	M	M	H	L	M	H	M	M	H	M	M	M
M	M	M	M	M	H	L	M	M	M	H	L	M	M	H
H	M	M	M	M	H	L	M	M	M	M	M	M	M	H
M	M	H	M	M	H	L	M	M	M	M	M	M	M	H
M	M	H	M	M	H	L	M	M	M	M	M	M	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	1. ***Greg Perry, Dean Miller, C Programming Absolute Beginne, Que Publishing, 3rd Edition*** 2. ***Cay S. Horstmann, Core Java Fundamentals, Volume 1, 11th Edition, Prentice Hall, 2018*** 3. ***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, FSH, SRMIST***
		Dr. Muthu Deepa M, Assistant Professor, Department of Career Guidance, FSH, SRMIST

SEMESTER-IV

CourseCode	UDS23401J	CourseName	DEEP LEARNING	CourseCategory	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisiteCourses	Nil	Co-requisiteCourses	Nil	ProgressiveCourses	Nil
CourseOfferingDepartment	ComputerApplications	DataBook/ Codes/Standards	Nil		

CourseLearningRationale(CLR):	Thepurposeoflearningthiscourseisto,	Learning	ProgramLearningOutcomes(PLO)

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning			Program Learning Outcomes (PLO)														
CLR-1:	Demonstrate various principles involved in solving mathematical concepts related to permutation and combination and probability and interpret data	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2:	Learn the basic mechanics of grammar and develop resume-building practice and presentation skills in students	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Problem Solving skills	Link with related Discipline	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modelling	Analyze, Interpret data	Investigative Skills	ICT Skills	Analytical Skills	CommunicationSkills	Professional Behavior	Lifelong learning
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:*																		
CLO-1:	Understand the concepts of permutation and combinations, probability and approach questions in a simpler and innovative method	3	80	70	M	M	M	M	M	H	L	M	H	M	M	H	M	M	M
CLO-2:	Understand the different parts of speech and use them in sentences appropriately and also the importance of resume preparation	3	85	75	M	M	M	M	M	H	L	M	M	M	H	L	M	M	H
CLO-3:	Understand the importance of object oriented features	3	85	80	H	M	M	M	M	H	L	M	M	M	M	M	M	M	H
CLO-4:	Face interviews confidently	3	85	80	M	M	H	M	M	H	L	M	M	M	M	M	M	M	H
CLO-5:	Develop their domain skills	3	85	80	M	M	H	M	M	H	L	M	M	M	M	M	M	M	H

Duration (hour)		18	18	18	18	18
S-1	SLO-1	**Unit 1: Deep LearningBasics**	**Unit 2: Deep Learning Workflow**	**Unit 3: Deep Learning Models Prediction and frameworks**	**Unit 4: Convolutional Neural neworks**	**Unit 5: hardware support for Deep learning**
	SLO2	WhatisDeepLearning?	AddingAnotherinput, Addingmorelayers	ModelAccuracy	MotivationforNeural Networks	Challenges
S2	SLO-1	DeepLearningdefinedfrom Academicperspective	Error measurement in neural networks	TuneHyperparameters	BiologicalNeuralNetworks	Highleveldecisions
	SLO-2	DeepLearningdefinedfrom Industryperspective	Gradient descent	DeployModel	Neurons	Choosingthehardware components(GPU,TPU)
S-3	SLO-1	Deeplearningandmachine Learning,Deeplearning vs Data Science	Loss functions, Learning rates	MonitorPredictions, Manageyourmodels	Connectionsand weights, Propagation functions	BuildingaDeeplearningHardw aresystem
	SLO-2	How a business uses deepl earning, How deep learning works?	Advanced deep learning Concepts, Steps in Deep learning in Implementation	Components of a deeplearning solution, DataGeneration	Different layers of CNN, Max pooing, Average Pooling	Benefits, Challenges, Highleveldecisions
S-4 toS-6	SLO-1	**Lab1: Build a simple artificial Neural Networks with 1layer, with 1 neuron, and the input shape equal to 1, feed some data, use the equaltion y = 5x-3, so where x = -2, y=-4 and train the network**	**Lab4: Build a network with atleast 3 hiddenlayers that achieves better than 92% accuracy on validation and test data. You may need to train for more than 10 epochs to achieve this result**	**Lab7: Build a network for classification using the built-in MNIST dataset and Use the sigmoid activation functionUse the categorical cross entropy loss function.**	**Lab10: Build a Recommendation system using Deep Learning techniques**	**Lab13: Using Generative Adversarial networks perform Imagegeneration**
	SLO-2					
S-7	SLO-1	What are deep learning promises and challenges?	DataCollection	DataCollection	Hidden layers	Choosing the software components
	SLO-2	DeepLearningArchitecture	PublicDatasets	Training	Dropouts	ChoosingtheOS
S-8	SLO-1	DeepLearningLibraries	ExistingDatabases	Evaluation	Fully connected layer	AddingPackages
	SLO-2	DeepLearningTechnologies	WebScraping	TaskOrchestration	Final softmax layer	**Deep LearningHands On Lab Work - Build, Test and Deploy ML Models (Consumer1)**
S-9	SLO-1	Deep Learning Implementation Framework The core of deeplearning	Crowdsourcelabelling, DataPreparation	Prediction, Infrastructure	Different CNN architectures	CustomerChurn, Whoisgoingto churn?
	SLO-2	ANN Roleofdeepneuralnetworks	CleaningData, FeatureScaling	Authentication, Interaction	Lenet, m Alexnet, VGG-16	Whenthechurnwilloccur, Why(reason)isthechurn occurring

S-10 To S-12	**SLO-1**	**Lab2: Using Tensorflow Build a network with a single hidden layer**	**Lab 5: Build a network for classification using the builtin MNIST dataset**	Lab 8: **Working Data Collection, Evaluation**	Lab11:**Working on Deep Learning DataStructures**	Lab 14: **Deep Learning HandsOn Lab Work - Build, Test andDeployMLModels**
	SLO-2					
S-13	**SLO-1**	What is ANN?	Handling categorical data & text	Monitoring	VGG-19	Problemstatement
	SLO-2	Perceptron	ModelEngineering	Building your deep learning Architecture	Inception -V3	Problemtype
S-14	**SLO-1**	Single Layer Perceptron-1	TestTrainSplit	What is a deep learning Frame work?	Building a own architecture	Dataengineering
	SLO-2	Single Layer Perceptron-2	Handling Imbalanced Data	Features of a good deep learning framework	Image datasets	Datapipeline, Modelselection
S-15	**SLO-1**	Multi Layer Perceptron-1, Multi Layer Perceptron-2	ModelTraining, Model Validation	Popular deep learning frame works	Preprocessing, Data augmentation	Model engineering, Mode loutcome, analysis,and optimization
	SLO-2	Activation Functions-1, Activation Functions-2	Model Test, Model Outcome	Tensorflow, Keras, Pytorch	Image data generator	Model pipeline, Data Visuzlization and User Interface
S-16 to S-18	**SLO-1**	**Lab3: Using Tensor flow build 3 networks, each with atleast 10 hidden layers**	**Lab6: Build a network for classification using the builtin MNIST dataset and Use the sigmoid activation function**	**Lab9: Conduct an experiment onObject detection using Convolution Neural Network**	**Lab12: Customize a CNN model for Bird classification**	**Lab15: Implement Transfer learning to retrain models that have been trained on the Image Net dataset in order to perform classification on the CIFAR dataset.**
	SLO-2					

Learning Resources	DeepLearningfromScratch,bySethWeidman,ReleasedSeptember2019,Publisher(s):O'ReillyMedia,Inc.	Deep Learning: A Practical Approach, PB Paperback – 1 January 2018 by RajivChopra IntroductiontoDeepLearning, BookbyEugeneCharniak

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

CourseDesigners		
ExpertsfromIndustry	ExpertsfromHigherTechnicalInstitutions	InternalExperts
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	*Dr. M. Pandiyan, Asst. Prof. SRMIST,KTR Campus*

Course Code	UDS23402J	Course Name	Advanced Computing With Python and GCP	CourseCategory	C	Discipline Specific Core Courses	L	T	P	O	C
							3	0	3	2	4

Pre-requisiteCourses	Nil	Co-requisiteCourses	Nil	ProgressiveCourses	Nil
CourseOfferingDepartment	ComputerApplications		DataBook/ Codes/Standards	Nil	

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			
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:*	Level of Thinking	Expected Proficiency (%)	Expected Attainment (%)
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	3	85	80

	Program Learning Outcomes (PLO)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental	Application of Concepts	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
CLO-1 :	M	M	M	M	M	H	L	M	H	M	M	H	M	M	M
CLO-2 :	M	M	M	M	M	H	L	M	M	M	H	L	M	M	H
CLO-3 :	H	M	M	M	M	H	L	M	M	M	M	M	M	M	H
CLO-4 :	M	M	H	M	M	H	L	M	M	M	M	M	M	M	H
CLO-5 :	M	M	H	M	M	H	L	M	M	M	M	M	M	M	H

Duration (hour)		18	18	18	18	18
S-1	SLO-1	**Unit 1: Working and Architecture of Cluster Computing Grid Computing And Cloud Computing**	**Unit 3: Cloud Computing Building Blocks**	Examples of In-memory Computing	Working of Dynamic Load Balancing	Projects, networks, and subnet works
	SLO-2	Clustercomputingoverview	SoftwareBuildingBlocks Application Workloads, VirtualWorkloads, PaaS, Identity Management, Virtualization	Real Time Computing Overview	Applications of Dynamic Load Balancing	Routes and fire wall rules
S-2	SLO-1	Cluster Load Balancing, High Availability Clusters, High Performance Clusters	HardwareBuildingBlocks Compute Servers, Storage Servers, Hyper Converged Servers. Physical networks	Business Benefits Real Time Computing Overview	**Unit 10: Parallel Meshing and Remeshing,** Meshing Overview, Mesh Topology and Parallel Meshing Overview	VPC Networking, Common network designs, Virtual Machines
	SLO-2	WorkingandArchitectureofClustercomputing, Grid computing overview, Computational Grid Computing, Data Grid Computing,	**Unit 4: High Performance Computing**	Business Challenges RealTime Computing Overview	Business Benefits, Challenges & Applications of Parallel Meshing, Partitioning and parallel meshing technique	**Unit 14: Google Cloud Platform Compute, Kubernetes, AppEngine**
S-3	SLO-1	Collaborative Grid Computing, Manuscript Grid Computing, Working and Architecture of Grid computing, Cloud computing overview	High Performance Computers, High Performance Components	Working of Real Time Computing, Examples of Real Time Computing Computing	Remeshing Overview, Business Benefits, Business Challenges, Applications of Remeshing	GCP Compute Engine overview, Advantages, Business Benefits, Applications of Compute Engine
	SLO-2	Cloud computing overview	Compute,Network,Storage, Importance of High-Performance Computers	**Unit 7: Open MP programming,** OpenMP programming Overview	**Unit 11: Networking and Storage Options for Advanced Computing**	Google Compute Engine features MachineTypes,PersistentDisks, LocalSSD
S-4 & S-6	SLO-1	**Lab 1: Create a Google Compute Engine virtual machine and understand zones, regions, and machine types.**	**Lab 4: Access files in Cloud Storage with the Spring Resource abstraction**	**Lab7: Set up and write simple programs on Apache Spark and Jupyter Notebooks on Cloud Data**	**Lab10: Calculate multiplicative inverse of five symmetric matrices ofsize 2000x2000.**	**Lab13: Use gcloud to create two custom VPC networks with subnets, firewall rules, and VM instances, then test the networks' ability to allow traffic from the public internet.**
	SLO-2					
S-7	SLO-1	Private Cloud, Public Cloud, Hybrid Cloud and Multi cloud	Business Benefits of High-Performance Computing	Business Challenges of OpenMP Programming	Networking Options for Advanced Computing Overview	Introduction to Containers and Kubernetes
	SLO-2	WorkingofCloudcomputing	Business Challenges of High-PerformanceComputing	Parallel programming overview	Business Benefits, Business Challenges of Networking	Containers and ContainerImages

S-8	**SLO -1**	ArchitectureofCloudcomputing	What can you do with HighPerformanceComputing? High Performance Computing in the cloud	OpenMP parallel region,Worksharing	Storage Options for Advanced Computing Overview, Business Benefits Business Challenges for Advanced Computing	Introduction to Kubernetes, Introduction to Google Kubernetes Engine
	SLO -2	Difference between Cluster vs Grid computing, Cluster vs Cloud computing and Grid vs Cloud computing	**Unit 5: High Performance Computing Building Blocks**	OpenMP data environment, tasking, CreatingParallelism	**Unit 12: Google Cloud Platform Core Infrastructure And Services**	KubernetesArchitecture, Google Cloud App Engineenvironments
S-9	**SLO -1**	**Unit 2: Role of Cloud Computing in An AI Implementation**	High Performance Computing Building Blocks Overview	Unit 8: Message Passing interface (MPI) parallel programming	Google Cloud Platform Core Infrastructure and Services, Introduction to Google Cloud, Getting Started with Google Cloud	Unit15:Handson Python Lab on GCP
	SLO-2	Merging AI and cloud computing, Machine learning cloud services, IoTcloud	Why Is High-Performance Computing Important?, Business Benefits of High-Performance Computing	Message Passing interface(MPI) parallel programming, Business Benefits of MPI Programming	The Google Cloud resource hierarchy, Identity and Access Management (IAM)	HelloWorld, Add Two Numbers
S-10 & S-12	**SLO -1**	**Lab 2:Creating and Manage IAM Roles on Google Cloud**	**Lab 5: Analyze Clinical Data using BigQuery and AI Platform Notebooks**	**Lab 8: Connect to computing resources hostedon Google Cloud Platform via the web**	**Lab11: Create Kubernetes Cluster in Google Cloud Kubernetes engine**	**Lab 14: Perform basic networking tasks on Google Cloud, including Compute Engine in stances**
	SLO-2					
S-13	**SLO -1**	Business Intelligence	Components of High-Performance Computing Solutions	Business Challenges of MPI Programming	Interacting with Google Cloud,Virtual Machines in the Cloud	Square Root of a Number
	SLO-2	AIasaServiceoncloud	Compute, Network, Storage	Types of Parallel Computing Models	Storage, Containers, Applications in the Cloud	AreaofaCircle
S-14	**SLO -1**	Infrastructure as a Service and AI	Unit 6: In memory and Real Time Computing	ErrorHandling	Unit 13: Advanced Computing in Google Cloud Platform	QuadraticEquation
	SLO-2	Platform as a Service and AI	Inmemory Computing Overview, Business Benefits In-memory Computing Overview	Running MP IPrograms	Interacting with Google Cloud	SwapTwoVariables
S-15	**SLO -1**	Software as a Service and AI	Working of In-memory Computing	Unit 9:Dynamic Load Balancing, Dynamic Load Balancing Overview	Using the Google Cloud, Working with GCP Cloud Console and Cloud Shell	Mutiply Two Numbers, DivideTwoNumbers
	SLO-2	Cloud technologies for AI applications, Containers, Kubernetes	BusinessBenefitsofOpenMP Programming	Business Benefits of Dynamic Load Balancing, Business Challenges of Dynamic Load Balancing	VirtualNetworks, Virtual Private Cloud	GeneraterandomNumbers between0and100, Convert Kms to metre
	SLO -1	**Lab 3: Create Our First VPC in Google Cloud**	**Lab6: Analyze production performance with Cloud Profiler**	**Lab9: Build a Fraud Detection modelon Cloud AI Platform with**	**Lab12: Creating a Network Storage Solution Using Google**	**Lab15: Createas to ragebucket**

S-16 & S-18	**SLO-2**			**TensorFlow Enterprise and BigQuery**	**Cloud File store**	**and then use it to store some files, retrieve files, and implement version control.**

LearningResources	1. Google Cloud Platform for Developers: Build Highly ScalableCloud Solutions with the Power of Google Cloud Platform, BookbySteven Porterand TedHunter 2. Introduction to Computation and Programming Using Python,Bookby John Guttag	3. PythonforGoogleAppEngine,ByMassimilianoPippi 4. PythonProgramming:UsingProblemSolvingApproach,BookbyReemaThareja

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

CourseDesigners

ExpertsfromIndustry	ExpertsfromHigherTechnicalInstitutions	InternalExperts
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr.R.Jayashree,SRMIST***
		Mrs.S.Chandrakala,SRMIST

Course Code	UDS23403T	Course Name	Fundamentals of Natural Language Processing	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 Application	Data Book / Codes/Standards	Nil		

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

		Learning: Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understand the working principles and their functions in a business scenario.	1	2	3
CLR-2 :	To build intelligent and automated real-world natural language processing applications			
CLR-3 :	Understand the various layers of Natural Language processing			
CLR-4 :	Identify the implementation framework natural language processing solutions			
CLR-5 :	Apply Natural language processing models to business 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 Academic and Industry perspectives of NLP	2	85	80
CLO-2 :	Gain hands-on solid skills, knowledge and expertise of real-world situations	3	85	80
CLO-3 :	Able to understand the basics knowledge and expertise in Data gathering, Data collection	3	85	80
CLO-4 :	Hands-on skills and knowledge to apply all the required processes on texts	3	85	80
CLO-5 :	knowledge and expertise in setting up a data platform for building enterprise	3	85	80

Program Learning Outcomes (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 :	H	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-2 :	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-3 :	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-4 :	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-5 :	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Natural Language Processing Defined - Academic and Industry Perspective	Natural Language Processing Architecture	Topic Modelling	DeBERTa	Adding Packages
	SLO-2	What is Natural Language Processing?	Components of machine learning solution	Text Classification	Natural Language Processing Data Requirements	Natural Language Processing Data Requirements
S-2	SLO-1	Natural Language Processing defined from Academic and Industry perspective	Data Generation	Keyword Classification	How much data is needed	Patient Remittance with discharge summaries
	SLO-2	Functions of a Natural Language Processing system	Data Collection	Lemmatization	Is your data good enough?	Who is going to get readmitted?
S-3	SLO-1	Natural Language Processing in business	Feature Engg pipeline	Stemming	Data Structure	When will they get readmitted
	SLO-2	Artificial Intelligence and Natural Language Processing	Training	Part of speech tagging	Data Format	Why will they get readmitted
S-4	SLO-1	Natural Language Processing promises and challenges	Evaluation	Coreference resolution	Data Type	Problem statement
	SLO-2	Natural Language Processing Architecture,	Task Orchestration	What Problem Natural Language Processing Solves	Source System	Problem type
S-5	SLO-1	Libraries, Technologies and Framework	Prediction	Machine Translation	Target system	Data engineering
	SLO-2	Components of Natural Language Processing	Infrastructure	Named Entity Recognition	Training Data	Data pipeline
S-6	SLO-1	Phases of Natural Language	Authentication	Text/Classification	Validation Data	Model selection
	SLO-2	Natural Language Processing in Real World Applications	Interaction	Text Summarization	Test Data	Model engineering
S-7	SLO-1	NLP in healthcare	Monitoring	Topic Modelling	Natural Language Processing Data Requirements	Model Outcome
	SLO-2	NLP in Retail	Building your NLP Architecture	Keyword Extraction	Building a NLP Hardware system	Model Analysis
S-8	SLO-1	NLP in Energy	Natural Language Processing Implementation Framework	Information Retrieval	Benefits	Model Optimization
	SLO-2	Automobile	What is a NLP framework?		Challenges	Model pipeline
S-9	SLO-1	NLP in Oil & Gas	Features of a good NLP framework	Automatic Image annotation	High level decisions	Data visualization
	SLO-2	Natural Language Processing Workflow	Popular NLP frameworks	Natural Language Processing Models	Choosing the hardware components (GPU, TPU)	Introduction to Data visualization
S-10	SLO-1	Text pre-processing	NLTK, Gensim	BERT , GPT2	Building a NLP Software system	User interface

	SLO-2	Exploratory Data Analysis	SpaCy, CoreNLP	XLNet	Benefits	Data exploration
S-11	**SLO-1**	Text pre-processing	: Natural Language Processing - Techniques an Overview	Electra	Challenges	Visualizing n-grams
	SLO-2	Text Representation & Feature Engineering	Pattern Recognition	Text to Text Transfer Transformer	High level decisions	Qualitative comparisons
S-12	**SLO-1**	Pattern Mining	Named Entity Recognition	RoBERTa	Choosing the software components	NLP dashboards
	SLO-2	Evaluation and Deployment	Text Summarization	ALBERTA	Choosing the OS	NLP: Text Data Visualization

Learning Resources	1. James A. Natural language Understanding 2e, Pearson Education, 1994 2. Bharati A., Sangal R., Chaitanya V. Natural language processing: a Paninian perspective, PHI, 2000	3. Siddiqui T., Tiwary U. S. Natural language processing and Information retrieval, OUP,2008 4. https://www.nltk.org/book/

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	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 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***	***Mr. M. Murali Anand, SRM IST***

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:

		Learning		
CLR-1 :	அகராதி, கலைச்சொல்குறித்ததுட்பங்களைஅறியச்செய்தல்	1	2	3
CLR-2 :	நேர்காணல்செய்யும்திறனும்செய்திவாசிப்புமுறைகளையும்தெரியச்செய்தல்	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-3 :	விமர்சனத்தின்தன்மைகளும்செய்தியறிக்கைதயாரிக்கும்முறையையும்அறியச்செய்தல்			
CLR-4 :	பேச்சுக்கலையின்தனித்துவங்களைப்புரியச்செய்தல்			
CLR-5 :	கணினித்தமிழின்பல்வேறுநுட்பங்களைத்தெரியச்செய்தல்			

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 :	அகராதித்துறை, கலைச்சொல்லாக்கத்துறையைத்தெரிந்துகொள்ளுதல்	2	75	60
CLO-2 :	ஊடகங்களில்மொழிஆளுமையோடுசெயல்படும்திறன்பெறுதல்	2	80	70
CLO-3 :	கலை, இலக்கியவிமர்சனமுறைகளையும், செய்தியறிக்கைதயாரிக்கும்நுட்பங்களையும்தெரிந்துகொள்ளுதல்	2	70	65
CLO-4 :	பல்வேறுவடிவங்களைக்கொண்டபேச்சுக்கலையைஅறிவதன்வழி,சிறந்தமேடைப்பேச்சாளராகஉருவாகும்தகுதியைப்பெறுதல்	2	70	70
CLO-5 :	தமிழைக்கணினிவழி, இணையம்வழிகொண்டுசேர்க்கும்உலகளாவியசெயல்பாடுகளைஅறிந்துகொள்ளுதல்	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
CLO-1 :	H	L	H	M	H	H	L	M	H	M	L	H	-	-	-
CLO-2 :	H	M	H	L	M	H	L	H	M	L	H	H	-	-	-
CLO-3 :	H	L	H	M	H	H	M	H	L	H	M	H	-	-	-
CLO-4 :	H	M	H	L	H	M	M	H	H	L	H	H	-	-	-
CLO-5 :	H	M	H	H	M	H	L	M	H	L	H	H	-	-	-

Duration (hour)	9	9	9	9	9
SLO-1	தமிழில்அகராதிகள்	நேர்காணல்அறிமுகம்	விமர்சனம் – அறிமுகம்	பேச்சுக்கலை	கணினித்தமிழ்

S-1	SLO-2	ஒருமொழி/ இருமொழிஅகராதி	ஆளுமைத்திறன்	விமர்சனத்தின்நோக்கம்	பேச்சின்அடிப்படைகள்	கணினிவழித்தட்டச்சு
S-2	SLO-1	பன்மொழிஅகராதி	நோக்கம் – கண்டறிதல்	விமர்சனவகைகள்	தன்னம்பிக்கையும்பேச்சும்	தட்டச்சுசெய்யும்மென்பொருட்கள்
	SLO-2	உயிர்/ மெய்எழுத்துகள்	நேர்காணல்முறைகள்	இலக்கியவிமர்சனம்	பேச்சின்வகைகள்	எழுத்துருக்கள்
S-3	SLO-1	உயிர்மெய்எழுத்துகள்	இனியசொற்கள்பயன்பாடு	திரைவிமர்சனம்	மேடைப்பேச்சு	யூனிகோடுஎழுத்துருக்கள்/ பிறஎழுத்துருக்கள்
	SLO-2	அகராதிக்கானஅடிப்படைகள்	நேர்காணல்வகைகள்	கலைவிமர்சனம்	பட்டிமன்றப்பேச்சு	குரல்வழிதட்டச்சு
S-4	SLO-1	அகராதிஉருவாக்கப்பயிற்சி	நேரடியாகவினாவிடை	விமர்சகர்தகுதிகள்	சொற்பொழிவுமுறை	எழுத்துவழிதட்டச்சு
	SLO-2	அகராதிஉருவாக்கப்பயிற்சி	அச்சுஊடகநேர்காணல்	தேர்ந்தபுலமை	பேச்சின்நுட்பங்கள்	தட்டச்சுசெய்யும்பயிற்சி
S-5	SLO-1	கலைச்சொல்அறிமுகம்	காட்சிஊடகநேர்காணல்	எழுத்துவடிவவிமர்சனம்	பேச்சாளர்களும்பேசும்முறைகளும்	தட்டச்சுசெய்யும்பயிற்சி
	SLO-2	பிறமொழிச்சொற்களும்தமிழில்கலைச்சொற்களும்	கேட்புஊடகநேர்காணல்	காட்சிவடிவவிமர்சனம்	பேச்சு - எடுத்துரைப்பும்உடல்மொழியும்	பிழைதிருத்திகள்
S-6	SLO-1	கலைச்சொல்லாக்கநெறிமுறைகள்	களஆய்வில்நேர்காணல்	விமர்சனம்செய்யும்பயிற்சி	நவீனதொழில்நுட்பங்களில்பேச்சுமுறைகள்	தமிழில்பிழைதிருத்தம்செய்யும்மென்பொருட்கள்
	SLO-2	கலைச்சொல்உருவாக்கஉத்திகள்	நேர்காணல்செய்யும்பயிற்சி	விமர்சனம்செய்யும்பயிற்சி	பேச்சாளர்க்குரியதகுதிகள்	வலைப்பூஉருவாக்கம்
S-7	SLO-1	துறைசார்சொற்கள்	நேர்காணல்செய்யும்பயிற்சி	செய்தியறிக்கை	பேச்சுப்பயிற்சி	வலைப்பூவில்எழுதும்முறைகள்
	SLO-2	புதியகண்டுபிடிப்புகளும்கலைச்சொற்களும்	செய்திவாசிப்புமுறைகள்	சமூகநிகழ்வைஎழுதுதல்	பேச்சுப்பயிற்சி	வலைப்பூவின்பயன்கள்
S-8	SLO-1	பயன்பாட்டுச்சொற்கள்	செய்திவாசிப்புபுட்பங்கள்	செய்தியாளர்க்குரியதகுதிகள்	கலந்துரையாடலின்நோக்கம்	தமிழ்இணையநூலகங்கள்
	SLO-2	கலைச்சொல்லாக்கப்பயன்பாடுகள்	உச்சரித்தல்	உற்றுநோக்குதல்	கலந்துரையாடலின்தனித்தன்மைகள்	இணையநூலகப்பயன்பாடுகள்
S-9	SLO-1	கலைச்சொல்உருவாக்கப்பயிற்சி	பிழையின்றிவாசித்தல்	சமநிலையில்எழுதுதல்	தம்கருத்தைத்தெளிவாகஉரைத்தல்	தமிழ்த்தொடரடைவுகள்
	SLO-2	கலைச்சொல்உருவாக்கப்பயிற்சி	வாசித்தலும்உணர்வும்	செய்தியறிக்கைதயாரித்தல்	கலந்துரையாடல்பயிற்சி	தொடரடைவின்பயன்பாடுகள்

Learning Resources	**1.** அகராதியியல், பெ. மாதையன், தமிழ்ப்பல்கலைக்கழகம், தஞ்சாவூர், 1997. **2.** பேச்சுக்கலை, ம. திருமலை, மீனாட்சிபுத்தகநிலையம், மயூராவளாகம், மதுரை, 2009. **3.** பேச்சாளராக, அ.கி.பரந்தாமனார், பாரிநிலையம், சென்னை, 1961 **4.** **இணையத்தமிழ், சந்திரிகாசுப்பிரமணியன், சந்திரோதயம்பதிப்பகம், மதுரை, 2020.** **5.** **நேர்காணல், மின்னூலகம், தமிழ்இணையக்கல்விக்கழகம்,** https://www.tamilvu.org/

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- *Mini Project* s, 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.Hebzibah beulah Suganthi, 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:*

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 Level of Thinking	2 Expected Proficiency	3 Expected Attainment
CLO-1 :	*To Understand the History and Documentary in Hindi Cinema*	2	75	80
CLO-2 :	*To Comprehend Media Studies*	2	80	90
CLO-3 :	*To Evaluate report Writing*	2	75	95
CLO-4 :	*Enhance their Writing Skills in Media Studies*	2	80	90
CLO-5 :	*To Understand and usage of technical words in Hindi*	2	85	90

Learning — Program Learning Outcomes (PLO)

1 Fundamental	2 Application of	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 PSO -1	14 PSO -2	15 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**	*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

	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.Nisha Murlidharan 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:*	Learning

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 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 Expected Attainment (%)
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
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 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 PSO -1	14 PSO -2	15 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)		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 perfect be+ing	les verbes suivis de V-ing	Les activités
S-9	**SLO-1**	pronoms possessifs (this et that)	les prépositions-	Le past perfect 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											
	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 (5%)#**			
		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. Kavaskar Danasegarane 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	UDS23G02J	Course Name	Office Automation with Advanced Excel	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		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1:	Understand the Basic of Microsoft Word Documents			
CLR-2:	Understand the concepts of Formatting and Editing Documents			
CLR-3:	Understand the concepts of Formatting and Editing Spreadsheets			
CLR-4:	Design a presentation with transitions and animations			
CLR-5:	Understand the various types of charts and actions			

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:	Acquire the basics of Microsoft Word Documents	2	85	80	L	-	-	-	-	-	-	-	M	-	-	-	-	-	M
CLO-2:	Acquire the knowledge of formatting and editing documents	3	85	80	M	-	H	-	-	L	-	-	M	-	-	-	L	-	M
CLO-3:	Design slide design, layout and animation options	3	85	80	H	-	H	H	H	-	-	M	M	-	-	M	-	L	M
CLO-4:	Understand the various types of slide transitions and designs	3	85	80	-	-	H	H		-	L	-	M	-	M	-	L	L	M
CLO-5:	Understand the various types of tables and design	3	85	80	M	-	H	H	H	-	-	-	M	H	-	-	-	-	M

Duration (hour)		15	15	15	15	15
S-1	SLO -1	Introduction to MS Office, Working with Documents	Spread sheet addressing - Rows, Columns & Cells	SUMIF, SUMIFS, Printing,	Table Design	Protecting part of a worksheet
	SLO -2	Opening & Saving files, Editing text documents	Referring Cells& Selecting Cells, Entering Data, Find & Replace	Page Setup, Header & Footer	Table Properties	Setting data validation rules
S-2	SLO -1	Formatting page & setting, Converting files to different formats	Format Cells & Fill Option,	Introduction to Functions,	Query Wizard,	Filtering a database Auto Filter
	SLO -2	Importing & Exporting documents, Using Tool bars, Ruler & Icons, Formatting Documents	Conditional Formatting	Text Functions	Query Design	Subtotals: Display Subtotal at a single level
S-3	SLO -1	Setting Font styles, Fontselection, Type face Setting Paragraph style, Bullets &Numbering	Introduction to Charts, Column Chart & Bar Chart, Line Chart & Pie Chart	Date & Time Functions,	Form Design,	Pivot table: Format a Pivot table Report,
	SLO -2			Logical Functions – IF, AND, OR, Not, Text Function, Logicial Function,	Form Wizard & Navigation, SQL view, Data Import	Create a graph using Pivot data, Slicer
S-4, 5	SLO -1	**Lab 1: Creating, Opening and Basic Formatting in a Word Document**	**Lab 4: Create an Employee Salary Slip Table using Table Setting and Border Options**	**Lab: 7 Data Validation & Consolidate**	**Lab10: Sorting a database**	**Lab 13: Charts for My data**
S-6	SLO -1	Thesaurus, Proofing Document & Printing Setting Page style, Layout settings	Doughnut Chart & Scatter Chart, Conditional Formatting	Pivot Table, Pivot Charts Consolidate	Data Export, Introduction of Advanced Excel	Conditional formatting Using Cells ,Merging Workgroups
	SLO -2			Introduction to MsAccess	Working with formulas in excel	Tracking changes
S-7	SLO -1	Border & Shading, Header & footer	Formatting cells in conditional formatting,	Steps to create a blank database,	functions of excel	Formatting charts
	SLO -2	Setting Footnotes & Endnotes, Inserting page break, Column break and Line break	Tables	Table Creation	IF function Nested IF,	Chart Templates

S-8	**SLO -1**	Creating sections & frames, Anchoring &Wrapping	Auto fill, Filters, CountIF, Count IFS 4	Data types, Primary Key & Indexes	IF with AND OR NOT	Adding titles and values in charts
	SLO -2	Creating Tables, Table settings, Borders, Alignments			Look Up Functions V-Lookup	
S-9, 10	**SLO -1**	**Lab 2: Modifying Font, Text Alignment, Paragraph Indentation and Bullets and Numbering in a Word Document**	**Lab 5 : Prepare a Payslip for an Employee with Basic Formulas**, **Chart Types**	**Lab 8 :Create a database with MsAccess**	**Lab 11: Usage of conditional Statements**	**Lab 14: Change the style of Spark lines**
	SLO -2					
S-11	**SLO -1**	Insertion, deletion, Working with Shapes	Get External Data, Advanced Filter	Inserting Data,	Data Validation Methods of data validation	Spark lines
	SLO -2	Working with Hyperlink, Working with Column		Macro ,	Protecting a worksheet by Password	
S-12	**SLO -1**	WordArt, Working Pictures	Text to columns & Remove Duplicates, Inserting a Hyperlink	Built In Functions	Simple Sort, Multilevel sort	Customize Spark lines
	SLO -2	Picture Alignment, Inserting Page number		Parameterize Query	Number, Text or Date Filter	Creating a Macro
S-13	**SLO -1**	Inserting Data Time, Merging, Splitting	Inserting Clip Art, Inserting Smart Art , Inserting shapes	Action Query,	What if Analysis tools:	Recording a macro
	SLO -2	Sorting, and Formula, Introduction to Spreadsheet, Opening & Saving Spreadsheet, Menus & toolbars, Basic Functions	Sort & Filter, Name Manager, What If Analysis, Vlookup & Hlookup functions, Data Validation	Duplicaye Query Wizard, Report Design, Report Wizard	Links between different Workshe Working with charts:ets Creating Hyperlinks	Running a macro using menu command, Writing a macro, Assigning a macro to a button
S-14 ,15	**SLO -1**	**Lab 3: Inserting Header and Footer to the document &Creating Page Breaks**	**Lab 6 : Working with Functions & Pivot Table, Pivot Charts**	**Lab 9 :Create a table with sample design and report generation**	**Lab 12: Creating charts using chart tools**	**Lab:15: Functions Description**
	SLO -2					

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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	*Dr. S. Sivakumar, Department of Computer Applications, SRMIST*

Course Code	UDS23S04L	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		

Course 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
CLR-2 :	Understand and develop your knowledge of programming fundamentals	
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	Procedural Knowledge	Skills in Specialization	Ability to Utilize	Skills in Modelinn	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
H	*M*	*M*	*H*	*L*	*M*	*M*	M	*M*	*M*	*L*	*H*	*M*	*L*	*L*
H	*M*	*M*	*M*	*L*	*M*	*M*	*H*	*M*	M	*L*	*H*	*M*	*L*	*L*
H	*M*	*M*	*M*	*L*	*M*	*M*	*H*	*M*	*M*	*L*	*H*	*M*	*L*	*L*
H	*M*	*M*	*M*	*L*	*M*	*M*	*H*	*M*	*M*	*L*	*H*	*M*	*L*	*L*
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
CLR-1 :	Enable students to understand reasoning skills and mathematical concepts	1
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:	Level of Thinking	Expected	Expected Attainment (%)
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 programmes.	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	Application of	Link with Related	Procedural	Skills in	Ability to Utilize	Skills in Modeling	Analyze, Interpret	Investigative Skills	Problem Solving	Communication	Analytical Skills	ICT Skills	Professional	Life Long Learning
CLO-1 :	M	M	M	M	M	M	L	M	M	H	M	H	M	M	H
CLO-2 :	M	M	H	M	M	M	L	L	M	M	M	M	M	H	H
CLO-3 :	M	M	H	H	M	M	L	M	M	M	M	M	M	M	H
CLO-4 :	M	M	H	H	M	M	L	M	M	M	M	M	M	M	H
CLO-5 :	M	M	H	H	M	M	L	M	M	M	M	M	M	M	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'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, FSH, SRMIST***
		Ms. Deepalakshmi S, Assistant Professor, Department of Career Guidance, 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	*UDS23501J*	Course Name	*Deep Learning with Keras and Tensorflow*	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,
CLR-1 :	To make the participants comfortable with the fundamentals of some of the advanced deep learning concepts, their working principles, and their functions in a business scenario.
CLR-2 :	To make the participants comfortable with the fundamentals of different deep learning approaches, and ways to implement them using the suitable libraries and deep learning models.
CLR-3 :	To make the participants understand the methods of teaching machines in performing cognitive works just as humans do using neural networks.
CLR-4 :	To build intelligent and automated real-world deep learning applications and use cases spanning healthcare, retail, and energy verticals by intelligently Analyzing different datasets collected from diverse data sources.
CLR-5 :	To provide the participants with a sound understanding of a basic neural network including the concepts of neurons, weight, bias etc along with the mathematical concepts used in calculating the error function, enhancing model performance etc.

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
CLO-1 :	Have a strong control over the fundamental concepts of advanced deep learning including ability to have a strong foundational grasp the advanced mathematical concepts.	2	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-2 :	Have a strong control over the fundamental concepts of all the deep learning approaches, techniques for selecting the right features and the models involved in predictive analytics.	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-3 :	Use all the their cognitive skills and knowledge in applying the right set of deep learning techniques for the problem in hand	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-4 :	Gain hands-on solid skills, knowledge and expertise of real-world situations the applicability of tools and techniques in extracting valuable insights from the data of different formats on time.	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-5 :	Get Hands-on Skills, knowledge, and expertise on the architectural components of a basic neural network that facilitates them with the flexibility to go ahead and implement a basic neural network.	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration (hour)		18	18	18	18	18
S-1	**SLO-1**	Deep Learning - Deep Dive	Back propagation	Cost Function	Improving Activation Maximization with an expert	Getting started with Deep Learning with Tensor Flow and Keras
	SLO-2	Optimization for Deep Learning	Gradient Descent	Gradient Descent	Performing Activation Maximization in a code space	
S-2	**SLO-1**	Aggregated Residual Transformations for Deep Neural Networks	Deep Learning in Real World Applications	Stochastic Gradient Descent	Explaining DNN Decisions	Getting started with TensorFlow
	SLO-2	Spatial Transformer Networks	Deep learning in Healthcare	Learning Rate	Backward Propagation Techniques	Getting started with Keras
S-3	**SLO-1**	End-to-end Optimized Image Compression	Deep learning in Retail	Batches, Epochs and Iteration	Deep Neural Net optimization, Tuning, Optimizers overview, Gradient Descent, Stochastic Gradient Descent (SGD),	Deep Learning Framework
	SLO-2	Generative Adversarial Nets, Improved Techniques for Training GANs	Deep learning in Energy, Deep Learning Approaches	Deep Neural Networks and Tools, Deep learning in Automobile	Mini Batch Stochastic Gradient Descent (MB-SGD),SGD with momentum, Difference between neural network and deep neural network	Tuning the layers, Hyperparameter Tuning
S-4 to 6	**SLO-1**	**Lab 1: Learning XOR Problem**	**Lab 4 : Data Augmentation lab**	**Lab 7: Generative Adversarial Networks**	**Lab 10 : Bidirectional LSTM**	**Lab 13: Install, Import Tensorflow and Keras. Create a Basic Neural Network with few layers.**
	SLO-2					
S-7	**SLO-1**	Learning Algorithms	Challenges of Deep Learning	Deep Learning Neural Network overview	learning rate, Momentum β, for RMSprop, etc, Mini-batch size, Number of hidden layers, learning rate decay, Regularization λ	Deep Learning Workflow
	SLO-2	Supervised Learning	Data Issues	Deep Convolutional Neural Network overview	Convolutional Neural Network	
S-8	**SLO-1**	Unsupervised Learning	Over fitting in neural networks	Improving accuracy of the neural networks	Convolution , ReLU layer, Pooling, Padding, Flattening	Deep Learning Model Features
	SLO-2	How to select a Deep Learning Algorithm	Hyper parameter optimization	The problem of explain ability	Full Conversion Layer, Softmax, Cross-Entropy	
	SLO-1	Deep Learning Workflow and applications	High Performance Hardware	Interpretability of Neural Networks	Recurrent Neural Network	Deep Learning Model Performance
	SLO-2	Challenges and Vision for the future	Neural network is a Black Box	Learned features	RNN intuition, Vanishing Gradient Problem, Tackling Vanishing Gradient Problem	
S-9	**SLO-1**	Analysis of Deep Learning applications	Lack of Flexibility	Feature visualization	Exploding Gradient Problem, Tackling Exploding Gradient Problem	Simple Deep Learning Implementation with the Iris Dataset

	SLO-2	Deep Learning Techniques	Multitasking	Feature Visualization through Optimization	Long Short-Term Memory, Applications of Recurrent Neural Networks	
S-10 to S-12	**SLO-1**	**Lab 2 : Image Classification using CNN**	**Lab 5 : Implementation of RNN**	**Lab 8: variational autoencoder**	**Lab 11: Data Augmentation lab I**	**Lab : 14 Install, Import Tensorflow and Keras. Create a Basic Neural Network with few layers.**
	SLO-2					
S-13	**SLO-1**	Classic Neural Networks	Deep Learning Security	Connection to Adversarial Examples	Auto Encoders and dimensionality reduction in networks	*Available Modules IN Keras*
	SLO-2	Convolutional Neural Networks	Artificial Neural Networks	Text and Tabular Data	Autoencoders overview	
S-14	**SLO-1**	Recurrent Neural Networks (RNNs)	Neuron	Network Dissection	Types of Autoencoders ✓ Deep Autoencoder ✓ Sparse Autoencoder ✓ Under complete Autoencoder ✓ Variational Autoencoder ✓ LSTM Autoencoders ✓ Hyperparameters of Autoencoders	*backend* module
	SLO-2	Generative Adversarial Networks	Weight	Network Dissection Algorithm, Experiments, Advantages of Feature visualization	Applications of Autoencoders ✓ Dimensionality reduction ✓ Anomaly detection ✓ Image denoising ✓ Image compression ✓ Image generation	
S-15	**SLO-1**	Self-Organizing Maps, Boltzmann Machines	Bias, Activation Function	Disadvantages of Feature visualization	Dimensionality Reduction with PCA, The Curse of Dimensionality	backend *module*
	SLO-2	Deep Reinforcement Learning, Autoencoders	Forward Propagation, Backward Propagation	Activation Maximization	Principal component analysis, Eigen Value Decomposition	Keras - Applications
S-16 to S-18	**SLO-1**	**Lab 3: Building a deep learning model**	**Lab 6: Restricted Boltzmann machine**	**Lab 9: LSTM**	**Lab 12: Data Augmentation lab II**	**Lab 15: Neural Networks using Keras**
	SLO-2					

Learning Resources	1. Machine Learning at Enterprise Scale by Piero Cinquegrana, Matheen Raza Released July 2019, Publisher(s): O'Reilly Media, Inc. 2. Learning Keras : keras.pdf (riptutorial.com)	3. Deep Learning for Business Managers Artificial Intelligence Prithwis Mukerjee

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, 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*	*Dr. S. Lakshmi, Assistant Professor, SRMIST, KTR*

Course Code	UDS23502J	Course Name	Big Data Analytics with Applications	Course Category	C	Disicipline 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 Apllications	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 :	Gain knowledge about the various tools and techniques used in big data analytics			
CLR-2 :	Learn the fundamentals of Hadoop and the related technologies			
CLR-3 :	Understand the basics of development of applications using MapReduce, HDFS, YARN			
CLR-4 :	Learn the basics of Pig, Hive and Sqoop			
CLR-5 :	Learn the basics of Apache Spark, Flink and understand the importance of NoSQL databases			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	Use the various tools and techniques in big data analytics	2	85	80
CLO-2 :	Apply Hadoop and related technologies to big data analytics	3	85	80
CLO-3 :	Apply MapReduce, HDFS and YARN develop big data applications	3	85	80
CLO-4 :	Develop applications using Pig, Hive and Sqoop	3	85	80
CLO-5 :	Apply Apache Spark and Flink to applications and understand the importance of NoSQL databases	3	85	80

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental 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	-	H	-	H	-	-	-	-	-	-	-	L	-	H
L	H	H	M	H	-	-	-	-	-	-	-	L	H	H
-	-	L	-	H	-	H	-	-	-	-	-	L	-	H
-	-	L	H	H	-	H	-	-	-	-	-	L	-	H
-	-	L	-	H	M	H	-	-	-	-	-	L	-	H

Duration (hour)		18	18	18	18	18
S-1	**SLO-1**	Overview of Big Data Analytics	MapReduce	Setting up a Hadoop cluster	Introducing Oozie	Enterprise Data Science Overview
	SLO-2	Introduction to data analytics and big data	Analyzing data with Unix tools and Hadoop	Cluster specification and setup		
S-2	**SLO-1**	Big data mining	Scaling Out – Data Flow,	Hadoop configuration	Apache Spark	Data Science Solutions in the enterprise
	SLO-2	Technical elements of the Big Data platform	Combiner Functions	YARN configuration		
S-3	**SLO-1**	Analytics Toolkit, Components of the analytics toolkit	Hadoop Streaming	Introduction to Pig	Limitations of Hadoop	Enterprise data science – Machine Learning and AI
	SLO-2	Distributed and Parallel Computing for Big Data	HDFS		overcoming the limitations	Enterprise Infrastructure solutions
S-4 to 6	**SLO-1**	**Lab 1: Install Apache Hadoop**	***Lab 4:Develop a MapReduce program to find the grades of student's.***	***Lab 7: Develop a MapReduce to analyze weather data set and print whether the day is shinny or cool day.***	**Lab 10: XYZ.com is an online music website where users listen to various tracks, the data getscollected which is given,**	**Lab 13: Develop a MapReduce program to analyze Uber data set to find the days on which each basement has more trips using the given dataset.**
	SLO-2					
S-7	**SLO-1**	Cloud computing and Big Data	*Hadoop filesystems*, *Java Interface to Hadoop*	*Installing and running pig*	Core components and architecture of	Visualizing Big Data , Using Python and R for visualization
	SLO-2	In-Memory Computing Technology for Big Data	YARN , Job Scheduling	Basics of Pig Latin	Spark Introduction to Apache Flink	Big Data Visualization Tools
S-8	**SLO-1**	Data Product	Hadoop I/O	Introduction to Hive	Installing Flink	Data Visualization with Tableau
	SLO-2	Building Data Products				
S-9	**SLO-1**	Leveraging large datasets	Data Integrity	Installing and running Hive	Batch analytics using Flink	Case Studies: Hadoop
	SLO-2					
S-10 to 12	**SLO-1**	**Lab 2: Develop a MapReduce program to calculate the frequency of a given word in agiven file.**	**Lab 5: Develop a MapReduce program to implement Matrix Multiplication.**	**Lab 8: Develop a MapReduce program to find the number of products sold in each country**	**Lab 11:Develop a MapReduce program to find the frequency of books published eachyear and find**	**Lab 14:Develop a program to calculate the maximum recorded temperature by yearwise for the weather dataset in Pig Latin**
	SLO-2					

	SLO-2			**by considering sales data containing fields**	**in which year maximum number of books were published usingthe given data.**	
S-13	**SLO-1**	Bigdata workflows , The core modules of Hadoop	Compression, Serialization	Introduction to HiveQL ,Introduction to Zookeeper	Big Data Mining with NoSQL ,Uses of NoSQL	Case Studies: Spark ,Case Studies: NoSQL
	SLO-2					
S-14	**SLO-1**	Fundamentals of Hadoop	File based Data Structures	Installing and running Zookeeper	Why NoSQL?	Machine Learning
	SLO-2	Hadoop Ecosystem		The Zookeeper Service	NoSQL databases	Scalable machine learning with Spark
S-15	**SLO-1**	Introduction to Hadoop MapReduce	Developing a MapReduce Application	Flume Architecture	Introduction to HBase	Collaborative Filtering
	SLO-2	Introduction to Hadoop YARN	Working with a Distributed file system	Introduction to Sqoop	Introduction to MongoDB, Cassandra	Classification, Clustering
S 16 to-18	**SLO-1**	**Lab 3: Develop a MapReduce program to find the maximum temperature in each year.**	**Lab 6: Develop a MapReduce to find the maximum electrical consumption in each year givenelectrical consumption for each month in each year.**	**Lab 9Develop a MapReduce program to find the tags associated with each movie by analyzing movie lens data.**	**Lab 12: Develop a MapReduce program to analyze Titanic ship data and to find the average age of the people (both male and female) who died in the tragedy. How many persons are survived in each class.**	**Lab 15: Write queries to sort and aggregate the data in a table using HiveQL.**
	SLO-2					

Learning Resources	1. *Raj Kamal; Preeti Saxena, BIG DATA ANALYTICS: Introduction to Hadoop, Spark, and Machine-Learning, McGraw-Hill Education, 2019* 2. *TomWhite,Hadoop:The Definitive Guide,3rdEdition,O'Reilly,2012.*	3. *Sridhar Alla,Big Data Analytics with Hadoop3,Packt,2018.* 4. *NatarajDasgupta,Practical Big Data Analytics,Packt,2018.*

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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr. R. Ramyadevi, SRMIST, Chennai***

Course Code	UDS23503J	Course Name	INTELLIGENT AUTOMATION	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 :	To make the participants understand the fundamental concepts of intelligent automation, it business benefits, challenges, tools and techniques involved and its overall framework.	1
CLR-2 :	To make the participants comfortable with the concepts how leading enterprises keep the customers at bay and delight shareholders who are looking beyond cost reduction and envisioning long-term success.	2
CLR-3 :	To make the participants have a clear understanding of intelligent automation with AI can help to make day to day business operations that are more humane to pleasant one by automating repetitive, monotonous and often tedious tasks	3
CLR-4 :	To provide the participants with enough insights about many of the barriers Intelligent Automation poses within an existing IT landscape of the enterprise and defining an end-to-end solution and then leveraging the appropriate enabling technologies against it.	
CLR-5 :	To provide the participants with enough insights about many of the barriers Intelligent Automation poses within an existing IT landscape of the enterprise and defining an end-to-end solution and then leveraging the appropriate enabling technologies against it.	

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 firm control of the fundamental concepts of intelligent automation and will be able to define intelligent automation from both academic and industry perspective	2	85	80
CLO-2 :	Have a complete control of the differences between intelligent automation and Robotic process automation in terms of processes, tools and techniques, implementation, framework, application etc.	3	85	80
CLO-3 :	Have a firm understanding of how Intelligent automation involves people, organizations and also technologies involving machine learning.	3	85	80
CLO-4 :	have a firm understanding of the barriers Intelligent Automation poses within an existing IT landscape of the enterprise and the possible ways of mitigating them so as to build and deploy an end-to-end solution and then leveraging the appropriate enabling technologies against it.	3	85	80
CLO-5 :	Have A firm understanding, knowledge and expertise in creating winning strategies for businesses by mitigating all the pitfalls and confront them well ahead before the actual planning phase of implementation.	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	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-2 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-3 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-4 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H
CLO-5 :	H	H	H	H	H	H	H	H	H	M	M	H	H	H	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration (hour)		18	18	18	18	18
S-1	**SLO-1**	**Unit 1**: Intelligent Automation Defined	Greater processing efficiencyand ease of use	Low Highly scaled automation deployments	Agile implementation	Public-private partnerships
	SLO-2	Intelligent Automation Overview	Workforce agility, Scalable infrastructure	Unit 7: Adoption and Barriers to Intelligent Automation Adoption	Unit 10: The value of intelligent automation	Private-sector initiatives
S-2	**SLO-1**	Intelligent Automation Defined from academic and industry perspective	Unit 4: Exploring the Possibilities of Intelligent Automation	Barriers of Intelligent Automation Adoption Overview	Increasing process efficiency	Structural and workforce change
	SLO-2	Business Benefits & challenges of Intelligent Automation	Identifying Opportunities for Intelligent Automation	Gaining Organizational Engagement	Improving customer experience	Building a future workforce
S-3	**SLO-1**	Intelligent Automation Tools and Techniques and Framework	Identifying Opportunities for Intelligent Automation	Internal Stakeholder and Governance Processes	Optimizing back-office operations	Components of Intelligent Automation Framework
	SLO-2	Intelligent Automation Techniques	Start with a Proof of Concept	Lack of Strategy	Optimizing the work force productivity	Business Objectives
S-4 to S-6	**SLO-1**	**Lab 1: Introduction to RPA Tools**	**Lab 4: Building a Robotic Process Automation Workflow**	**Lab 7: Exploring with python libraries**	**Lab 10: Web scraping and automation**	**Lab 13 : Build an Industry-Specific Automation Solution-1**
	SLO-2					
S-7	**SLO-1**	Intelligent Automation Framework	Involving the Business and the IT	Lack of Skill and Talent	Unit 11: Early adopters and positive returns	Develop Automated Processes
	SLO-2	**Unit 2**: RPA vs Intelligent Automation	How Intelligent Automation differs from IT Automation?	Change Management and Culture Readiness	Define your business outcomes first	Intelligent Operations
S-8	**SLO-1**	RPA Overview	How Automation is powered by artificial intelligence	**Unit 8:** Building a winning intelligent automation strategy	Process Analysis	Unit 14: Hands On Lab Usecase Implementation (Consumer-3)
	SLO-2	Business Benefits of RPA	How Intelligent automation addresses societal and business challenges	Defining your vision	Prioritization &	Self Driving Cars
S-9	**SLO-1**	Business Drivers of RPA	Unit 5: Rethinking Industries for Intelligent Automation	Organizational Design	Excellence	Problem statement
	SLO-2	Intelligent Automation Overview	Intelligent Automation to Be More Innovative	Architecture of technology components	Process Mapping	Problem type- Data engineering
S-10 to S-12	**SLO-1**					
	SLO-2	**Lab 2: Installation of RPA Blue Prism**	**Lab 5: Data Cleansing and Preprocessing for Automation**	**Lab 8: Process Automation with Python**	**Lab 11: Exploring cognitive automation**	**Lab 14: Build an Industry-Specific Automation Solution-2**
S-13	**SLO-1**	Business Benefits and drivers of Intelligent Automation	Success Factors, Strategy for intelligent automation	Unit 9: Factors for intelligent automation success Tuning	Data Management & Governance	Model selection

	SLO-2	RPA vs Intelligent Automation	Mature process definitions, standards, and processes, Innovative Applications, Preparing the Workforce	Designating automation as a strategic priority	The Human Factor	Model engineering
S-14	**SLO-1**	**Unit 3:**Benefits of Intelligent Automation	Unit 6: Moving Forward with Intelligent Automation	Pursuing people-focused initiatives	Monitoring Intelligent Automation	Mode outcome
	SLO-2	Working of Intelligent Automation	Implementation challenges of Intelligent Automation	Developing an operating model that enables scaling	Skill oriented education	Mode Analysis
S-15	**SLO-1**	Why is Intelligent Automation important	What Businesses Does Intelligent Automation Work For?	Modularity and packaged business capabilities	Engaging with the workforce	Model optimization
	SLO-2	Best practices of AI in Intelligent Automation	How Intelligent Automation Is The Best For Business	Automation guidelines	Lifelong learning programmes and incentives	Model pipeline
S-16 TO S-18	**SLO-1** **SLO-2** **SLO-2**	**Lab 3: Automation Implementation Strategies**	**Lab 6: Building a Predictive Model for Automation Tasks**	**Lab 9: Introduction to Web Scraping and Automation**	**Lab 12: Exploring AI Integration**	**Lab 15: Build an Industry-Specific Automation Solution-3**

Learning Resources	1. Pascal Bornet, Ian Barkin & Jochen Wirtz, "Intelligent Automation", 2020 2. Debanjana Dasgupta, "Intelligent Automation Simplified, BPB Publications, 2021

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, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

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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*	*Dr.J Dhilipan,SRMIST,Rampuram*
		Mrs. PM Kavitha, SRMIST,Ramapuram

Course Code	UDS23D01J	Course Name	Data Warehousing and Data Mining	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 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
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Learn in-depth concepts, methods and applications of data mining			
CLR-2 :	Learn how to start looking at data from the perspective of the data scientist			
CLR-3 :	Experimenting with different data mining techniques for knowledge discovery			
CLR-4 :	Use R software for data import and export, data exploration and visualization, and for data analysis tasks			
CLR-5 :	Demonstration on how to perform classification and clustering data mining tasks on real time datasets			

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 understand data mining process and the resulting patterns, types of data, attributes and knowledge discovery process	1	85	80	M	-	-	-	M	-	-	-	M	-	-	M	-	-	-
CLO-2 :	To study the different data preprocessing techniques before applying the data mining process	2	85	80	M	H	H	H	H	-	-	-	M	-	-	M	-	-	M
CLO-3 :	To characterize the kinds of patterns that can be discovered by association rule mining	2	85	80	-	-	H	H	H	M	L	M	M	-	L	-	L	-	M
CLO-4 :	To learn the different prediction, classification and clustering algorithms	3	85	80	-	M	M	H	M	-	-	-	M	-	-	M	-	M	M
CLO-5 :	To categorize and carefully differentiate between situations for applying different data mining techniques for different applications	3	85	80	-	M	H	H	H	-	-	-	M	H	-	-	-	-	M

Duration (hour)		15	15	15	15	15
S-1	**SLO-1**	Data Warehousing and Business Analysis	What kind of data can be mined? Data Mining Techniques	Data Generalization	Classification and Prediction	What is Cluster Analysis?
	SLO-2	Data warehousing Components	What kind of patterns can be mined? Are all patterns interesting?	Data Summarization	What is Prediction?	Overview of Basic Clustering Approaches
S-2	**SLO-1**	Building a Data warehouse	Data Objects and Attribute Types	Analysis of attribute relevance	Preparing the data for classification and prediction	Requirements for Cluster Analysis
	SLO-2	Data Warehouse Architecture	Nominal, Binary, Ordinal, Numeric, Discrete data types	Mining Class Comparisons	Comparing Classification and Prediction methods	Requirements for Cluster Analysis
S-3	**SLO-1**	DBMS Schemas for Decision Support	Data Mining Functionalities	Different measures of Dispersion?	Basic Concepts-What is Classification>	Similarity and Distance Metrics
	SLO-2	Data Extraction, Cleanup, and Transformation Tools	What technologies are used?	Frequent item-set mining	General Approach to Classification	Characteristics of Clustering Algorithms
S-4-5	**SLO-1**	**Lab 1: : Installation of WEKA Tool - Investigation the Application interfaces of the Weka tool**	**Lab 4: Pre-process a given dataset based on Attribute selection**	**Lab 7: Generate Association Rules using the Apriori Algorithm**	**Lab 10: Naïve bayes classification on a given data set**	**Lab 13: Applying k-means clustering on a given data set**
	SLO-2					
S-6	**SLO-1**	Metadata , reporting	Data Pre-processing- Introduction to Data Pre-processing, Data Cleaning,	Frequent pattern mining	Decision Tree Induction	Partitioning Algorithms
	SLO-2	reporting	Missing Values, Inconsistent Data	What is Association rule mining?	Attribute Selection Methods	k-Means Clustering- Centroid Based Technique
S-7	**SLO-1**	Query tools and Applications	Data Integration and Transformation	Methods to discover Association Rules	Decision Tree Classifier- Using Entropy	Partitioning Method: k-Means Clustering- Example

	SLO-2	Online Analytical Processing (OLAP)	Data Transformation, Entity Identification Problem.	Market Basket Analysis: A motivational Example	Decision Tree Classifier- Using Gini Index	k-Medoids Algorithms
S-8	**SLO-1**	OLAP and Multidimensional Data Analysis.	Redundancy and Correlation Analysis	Basic Concepts: Frequent Item Sets, Closed Item Sets	Tree Pruning Techniques	Example: k-Medoids
	SLO-2	Introduction to Data Mining	Tuple Duplication, Data Reduction	Frequent Item Set Mining- Apriori Algorithm	Rule Based Classifier	Hierarchical Methods
S-9-10	**SLO-1**	**Lab2: Overview -Working in the Console**	**Lab 5: Pre-process a given dataset based on Handling Missing Values**	**Lab 8: Generate Association Rules using the Apriori Algorithm**	**Lab 11: Finding Association Rules for Employee data.**	**Lab14:Distance Measures in Algorithmic Methods**
	SLO-2					
S-11	**SLO-1**	Why Data Mining? Evolution of Information Technology	Wavelet Transforms, Principal Components Analysis	Candidate Generation	Using IF-THEN rules for Classification	Agglomerative and Divisive Methods
	SLO-2	Datamining Foundations Stages of the Data Mining Process	Attribute Subset Selection, Numerosity Reduction	Generating Frequent Item Sets-Example	Rule Extraction from Decision Tree	Distance Measures in Algorithmic Methods
S-12	**SLO-1**	Different Types of Data in Data Mining	Bar Graphs and Histograms	Apriori Algorithm-Examples	Bayes Classification Methods	Dendogram
	SLO-2	Data Mining Functionalities, The Architecture of Data Mining	Under Sampling and Over Sampling	Improving the Efficiency of Apriori	Bayes Theorem	Density Based Methods: DBSCAN
S-13	**SLO-1**	Data Mining Tools, Knowledge Discovery in Databases or KDD process	Data Cube Aggregation	A Pattern Growth Approach for Mining Frequent Item Sets	Naïve Bayes Classifier	DBScan Algorithm
	SLO-2	KDD Vs Data Mining, Steps in KDD Process	Data Discretization	FP-Growth Algorithm – Basic Idea	Naïve Bayes –Example	Evaluation of Clustering

S 14, 15	**SLO-1** **SLO-2**	**Lab 3: Getting Help in weka tool and Quitting WEKA**	**Lab 6: Create a Weather Table with the help of Data Mining Tool WEKA.**	**Lab 9:Build a Decision Tree by using J48 algorithm**	**Lab 12: To Construct Decision Tree for Weather data and classify it..**	**Lab 15: Write a procedure for Employee data using MakeDensityBased Cluster Algorithm**

Learning Resources	1. *Arun K Pujari, Data Mining Techniques, Univeristy Press* **2.** *J Han and M Kamber , Data Mining : Concepts and Techniques, Third Edition, Morgan Kaufmann Publishers*	*1.G. K. Gupta, 2006, "Introduction to Data Mining with Case Studies", Eastern EconomyEdition, Prentice Hall of India.* *2.Pang-Ning Tan, Michael Steinbach and Vipin Kumar, 2007, "Introduction to Data Mining",Pearson .*

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.,

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Course Code	UDS23D02J	Course Name	Introduction to Cloud Computing	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 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
		Level of Thinking	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Understand the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges*			
CLR-2 :	*Learn cloud enabling technologies and get exposure to advanced clouds*			
CLR-3 :	*Explore cloud storage technologies and relevant distributed file systems, NoSQL databases and object storage;*			
CLR-4 :	*Understand the cloud security threats and protective mechanism for cloud computing*			
CLR-5 :	*Know the algorithms behind the protocols that helps data transfer*			
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:			
CLO-1 :	*Explain terms used in secured software development and life cycle process*	2	85	80
CLO-2 :	*Apply fundamental concepts in cloud infrastructures to understand the cloud system, network and virtualization and outline their role in enabling the cloud computing system model.*	3	85	80
CLO-3 :	*Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3and HDFS*	3	85	80
CLO-4 :	*Evaluate the security issues related to cloud computing and handle the security threats and construct different cloud delivery design models*	3	85	80
CLO-5 :	*Describe the Cloud Security i.e., Risks, Privacy and Privacy impacts assessments*	3	85	80

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

Duration (hour)		15	15	15	15	15
S-1	SLO-1	The cloud ecosystem - Introduction to Cloud Computing	Parallel processing and distributed computing - Computer architecture concepts	Cloud data storage - Introduction to Cloud Data Storage	Cloud Security - Introduction	Cloud applications - development and architectural styles
	SLO-2	Evolution of cloud computing	Grand architectural complications	The evaluation of storage technology	Security—the top concern for cloud users	Coordination of multiple activities
S-2	SLO-1	Network-Centric Computing	ARM architecture	Storage Models	Cloud security risks	Coordination based on a state machine model—zookeeper
	SLO-2	Network-Centric Content	SIMD architectures	Solid-state disks		
S-3	SLO-1	Origin of Cloud Computing	Graphics processing units	File Systems and databases	Cloud Security Mechanisms	MapReduce programming model
	SLO-2	Basic Concepts and Terminology	Tensor processing units			
S-4, 5	SLO-1	**Lab 1: Create a virtual machine**	**Lab 4:Create a drop box using Google AP**	**Lab 7: Encryption and Decryption of Text**	**Lab 10Develop a Hello World application using Google App Engine**	**Lab 13: Create a Warehouse Application in Sales force.Com**
	SLO-2					
S-6	SLO-1	Goals and Benefits	Data, thread-level, and task-level parallelism	Distributed file systems	Encryption	Case study: the GrepTheWeb application
	SLO-2	Risks and Challenges, Roles and Boundaries, Cloud Characteristics	Speedup, Amdhal's law, and scaled speedup	the precursors	Hashing	Hadoop, Yarn, and Tez
S-7	SLO-1	Cloud Service Models	Modularity. Soft modularity versus enforced modularity	General parallel file system	Digital Signature, Public Key Infrastructure	Current cloud applications and new applications opportunities
	SLO-2	Cloud Deployment Models	Layering and hierarchy			Clouds for science and engineering

S-8	**SLO-1**	Cloud Service Providers	Peer-to-peer systems	Google file system	Identity and Access Management	Social computing, digital content, and cloud computing
	SLO-2	the Cloud Ecosystem	Large-scale systems		Single Sign-On: Kerberos authentication	
S-9, 10	**SLO-1**	**Lab 2: Installation of Platforms** ,	**Lab 5: Transfer Data using Google APPs**	**Lab 8: Simple Experiments in Cloud Sim**	**Lab 11:Develop a Guestbook Application using Google App Engine**	**Lab 14:Create a Warehouse Application in Sales force.Com using Apex prog Lang**
	SLO-2					
S-11	**SLO-1**	Amazon Web Services(AWS), Google Clouds	Composability bounds and scalability (R)	Locks	One-time password	Software fault isolation
	SLO-2	Microsoft Windows Azure and online services	Distributed computing fallacies and the CAP theorem	Chubby—a locking service	Basic cloud data security mechanisms	Big Data
S 12	**SLO-1**	Cloud storage diversity and vendor lock-in	Blockchain technology	RDBMS	Virtual Machine Security	Data warehouses and Google databases for Big Data
	SLO-2	Cloud interoperability,	Blockchain technology applications	-cloud mismatch	Security of virtualization	
S-13	**SLO-1**	Service-level Agreements and Compliance-level Agreements	Cloud hardware and software - Cloud infrastructure challenges	NoSQL databases	Security risks posed by shared images	Dynamic data-driven applications
	SLO-1	Responsibility sharing between user and service provider	Cloud hardware; warehouse-scale computer (WSC)	NoSQL databases	Security risks posed by shared images	Data streaming
S 14 , 15	**SLO-1**	**Lab 3: Deploying existing Apps**	**Lab 6: upload and download using Google APPs**	**Lab 9: Simple Experiments in CloudSim**	**Lab 12: Develop a Windows Azure Hello World application**	**Lab 15: Implementation of SOAP Web Services**
	SLO-2					

Learning Resources	5. *Dan C. Marinescu, "Cloud Computing Theory and Practice", Third Edition Copyright © 2023 Elsevier Inc. ISBN: 978-0-323-85277-7Unit (I – V)* 6. *Rajkumar Buyya, James Broberg, AndrzejGoscinski, Cloud Computing Principles and Paradigms, Wiley Publications, 2017.* 7. *Thomas Erl, ZaighamMahmood, and RichardoPuttini, "Cloud Computing: Concepts, Technology & Architecture", Prentice Hall/PearsonPTR, Fourth Printing, 2014, ISBN: 978013338752.*	8. *K. Chandrasekaran, "Essentials of Cloud Computing", Chapman and Hall/CRC Press, 2014, ISBN 9781482205435* 9. *Arshdeep Bahga, Vijay Madisetti, "Cloud Computing: A Hands-On Approach", University Press, 2016, ISBN- 13: 978-0996025508.*

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 Expert(s)**
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr V Saravanan, FSH, SRMIST, RPM***
		Dr(Mrs). R. Ramyadevi, FSH, SRMIST, RPM

Course Code	UDS23G03J	Course Name	No-Code Applications	Course Category	G	Generic 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

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Accelerate the growth of business applications			
CLR-2 :	Bring ideas to life without learning code			
CLR-3 :	Reduce the coding time and build MVP rapidly			
CLR-4 :	Understand No-Code Development Principles			
CLR-5 :	Use GUI to create software applications			

Course Learning Outcomes (CLO):	The Learnerss 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 fundamentals of No-Code, Workflows and perform Web Scraping using No-Code App				H	M	M	L	H	H	L	L	L	L	L	L	H	M	M
CLO-2 :	Build Website using the popular No-Code Apps Webflow and Bubble.io				M	H	H	M	H	H	M	L	L	L	L	M	H	L	M
CLO-3 :	Build Mobile Apps using the popular No-Code Apps Glide and Thunkable				M	H	H	H	H	H	M	M	L	L	L	L	H	L	M
CLO-4 :	Build AI powered apps using No-Code AI Tools				M	H	H	M	H	H	H	H	M	M	L	M	H	L	M
CLO-5 :	Use No-Code Tools to automate workflows and build Ecommerce applications				M	H	H	H	H	H	M	M	M	M	L	M	H	L	M

Duration (hour)		15	15	15	15	15
S-1	SLO-1	No Code Fundamentals	Introduction to WebFlow	Evolution of Mobile App Builders	Traditional AI Journey	Introduction to No-Code Databases and Automation
	SLO-2	What is No-Code Development?	How websites are built?	The Fundamentals of Glide	Key AI Components	AirTable Sign Up and Create Database
S-2	SLO-1	Why No-Code?	Overview of Designer Interface	Benefits of glide for App Development	AI Superpowers	Design the Workflow
	SLO-2	No-Code Stacks	The Box Model	Glide App Editor Overview	No-Code AI Market	Formula Field Type
S-3	SLO-1	Top Benefits and limitations of No-Code Apps	Webflows Designer	Glide Settings Overview	Popular No-Code AI Platforms	Exporting/Importing Bases
	SLO-2	What can you build with No-Code?	The User Interface	Glide Components:Using Design elements	No-Code AI Considerations	Working with Filters
S-4, 5	SLO-1	**Lab 1: Tour around the different No-Code Tool landscape**	**Lab 4: Working with the Designer interface of WebFlow**	**Lab 7: Build a Midfullness app using Glide**	**Lab 10: Detect and Classify Face Masks using GoogleTeachable machine**	**Lab 13: Create a workflow in AirTable**
	SLO-2					
S-6	SLO-1	Who can use zero-code platforms?	Add and Edit Elements	Building Forms in Glide	What is Google Teachable Machine?	Managing Data with Groups
	SLO-2	What's the history and future of no-code?	Uploading Assets	Distribute, Install and Test the App	Model Training and Tesing in Google Teachable Machine	Sorting Functionality in AirTable
S-7	SLO-1	Popular No-Code development platforms	Aligning Elements And Spacing	Glide Data Editor	Introduction to Microsoft Lobe.ai	Views offered by AirTable
	SLO-2	Features of the No-Code platforms	Changing Font Style And Elements Size	Google Sheets Vs Glide Data Editor	Lobe Overview and Tool Walkthrough	Kanban View, Form View, Calendar View
S-8	SLO-1	Fundamentals of Workflow	Editing Content	Understanding Table Relations	Lobe.ai Examples	Working with multiple tables
	SLO-2	How can workflow automation help your business?	Editing Button And Using Classes	Glide Actions	What is a Chatbot?	Introduction to No-Code Ecommerce App
S-9, 10	SLO-1	**Lab 2: Building Workflow Automation using Low-Code**	**Lab 5: Create Responsive WebPage using WebFlow**	**Lab 8: Build a Task Tracker App Using Glide**	**Lab 11: Build a Image Classification Model Using Lobe.ai**	**Lab 14: Build Online Store using Shopify**
	SLO-2					
S-11	SLO-1	Steps involved in Workflow Automation, Benefits of Workflow Automation	Changing Background Color And Size, Working with Class and Inheritance, Reusing elements with Symbols	Simple Actions, Custom Actions, Glide User Management	How a Chatbot can improve your business? No-Code in Chatbots, Advantages of No-code chatbot developement	What is Shopify? Features of Shopify Platforms, Benefits of the Shopify platform for online store
	SLO-2	Examples of Workflow Automation, Workflow Usecases, Introduction to Web Scrapping	Publishing with WebFlow, Introduction to Bubble, Bubble Core Concepts	Enable User Profiles and Admin User, Introduction to Thunkable	Popular No-code chatbot builders, How to select the right no-code AI chatbot builder?	Steps to create an online store in Shopify

S-12	**SLO-1**	What is No-Code Web Scraping?, Tools for Web Scraping, Factors to consider when choosing a web scraping tool	What you can build with Bubble?, How to navigate Bubble.io?,	Getting Started: Sign In , creation of new projects, App Settings, Table View	Getting Started with Landbot, Optimize the welcome message, Add the first sequence	Create a Shopify Account Add Products to the Catalog, Customizing Your Shopify Online Store and Domain Setup
	SLO-2	Why you should build a no code web scraping tool?,	Structuring a Bubble Database, Flexbox responsive design	Assets, UI Components-Button, Label, Image	Ask Questions with different question types (button,button with pics, multiple choice,email)	Payment Processor Activation, Market and Advertise Shopify ecommerce website
S-13	**SLO-1**	Setting Up-ScrappingBee for Web scraping API	Bubble Element Types	UI components – Text Input, Switch, Slider, checkbox	Export data to Google Sheet, Create Segmented Mailing Lists on Mailchimp	What is No-Code Stack? Benefits of No-Code Stack, Different Layers of No-Code Stack
	SLO-2	Load an element using CSS selectors - Extract Data Usng ScrapingBee, Scheduled Scraping	Workflow creation in Bubble	Core Blocks, Open AI ChatGPT Integration, Publish to App and Web Store	Test and Customize Your ChatBot for better experience, Add Chatbot to your website	Layer1:The Database, Layer 2: Backend, Layer, 3: Front end, Layer 4; Saas Integration
S-14, 15	**SLO-1** **SLO-2**	**Lab 3: Create a web scraping tool using No-Code**	**Lab 6: Using Bubble build features like sign up forms, expense trackers, inboxes, shopping carts**	**Lab 9: Build an app using Thunkable to sell products**	**Lab 12: Build a Conversational Chatbot using LandBot**	**Lab 15: Develop a website using a No-Code Stack of your choice**

Learning Resources	**1. Paul.E.Love,"Mastering No-Code:Create Professional Quality Apps Without Coding (Vol.1)", ISBN: 979-8749478402**

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, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Expert(s)**
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	UDS23S05L	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	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
CLR-1 :	Learn the basics of working with Lua	1	2	3
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:	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
L	H	-	H	L	M	M	-	L	L	-	H	-	-	-
M	H	L	M	L	M	M	-	M	L	-	H	M -	-	-
M	H	M	H	L	M	L	L	M	L	-	H	-	-	L
M	H	M	H	L	M	M	-	M	L	-	H	-	-	-
H	H	M	H	L	M	M	-	M	L	-	H	M	-	-

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. *Gabor Szauer, (2018), "Lua Quick Start Guide", 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, 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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Mr.J. Venkata Subramanian, SRM IST***

Course Code	UDS23P02L	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
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 (%)	Program Learning Outcomes (PLO)														
		1	2	3	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 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 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				
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	UDS23601J	Course Name	INTRODUCTION TO COMPUTER VISION	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:
CLR-1 :	Understand the basics of Computer Vision
CLR-2 :	Learning the fundamentals of Image Processing Techniques
CLR-3 :	Learn image smoothing techniques
CLR-4 :	Understanding the feature matching algorithm
CLR-5 :	Understanding the Deep Learning algorithm for computer vision

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning		
		1	2	3
		Level of Thinking	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Implement image processing techniques for computer vision	3	80	70
CLO-2 :	Gain knowledge to work with image processing techniques	3	85	75
CLO-3 :	Apply Hough Transformation & Recognition Methodology	3	75	70
CLO-4 :	Explore feature matching techniques.	3	85	80
CLO-5 :	Develop applications using Deep Learning algorithm.	3	85	75

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental	Application of	Link with Related	Procedural Knowledge	Skills in Specialization	Ability to Utilize	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	H	H	M	M	M	H	H
H	H	H	H	H	-	M	-	H	H	M	M	M	H	H
H	H	M	H	H	-	M	-	H	H	M	M	M	H	H
H	H	H	M	M	M	M	-	H	M	M	M	M	H	H
H	M	M	M	M	M	M	-	H	H	M	M	M	H	H

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to Computer Vision	Overview of Binary Image Processing	Image Smoothing Techniques	Feature Matching	Image Classification Models
	SLO-2	Definition and scope of computer vision	Thresholding in Opencv	Box Blur, Gaussian Blur, Median Blur, Bilateral Filtering Comparison: Median VS Bilateral	Different Feature Matching Algorithms in OpenCV, RANSAC	Object Detection Techniques
S-2	SLO-1	Evolution of computer vision	Erosion and Dilation in OpenCV,	Introduction to Image Gradients	Application: Image Alignment, Creating Panorama	Pedestrian Detection in OpenCV
	SLO-2	Task of Computer Vision	Connected Component Analysis Technioques	First Order Derivative Filters Second Order Derivative Filters	Finding Known Objects using OpenCV	Face Detection using HAAR Cascade
S-3	SLO-1	Applications of computer vision in various fields	Connected Component Analysis in OpenCv	Application: Sharpening Filter,	Image segmentation using GrabCut	Face Detection in OpenCV

	SLO-2	Virtual Reality & Augmented Reality	Contour Analysis in OpenCV	Canny Edge Detection in OpenCV	Grabcut Theory Grabcut in OpenCV	Deep Learning with OpenCV: Image Classification
S4-6	**SLO -1** **SLO -2**	**Lab 1-Read, Displaying, Write images using OpenCV**	**Lab 4: Implement different Morphological Operations**	***Lab7: Implement Canny Edge Detection***	**Lab 10 : Image segmentation using GrabCut in openCV**	**Lab13 :Face Detection using OpenCV**
S- 7	**SLO-1**	Techniques in Computer Vision	Blob Detection in OpenCV	Hough Transforms	Image Classification	Image Classification using Caffe and Tensorflow
	SLO-2	Challenge in computer vision	Mouse and Trackbar using OpenCv	HoughLine: To detect a line in an image HoughCircle: To detect a circle in an image	Histogram of Oriented Gradients(HOG)	Object Detection : Single Shot Multibox Detector(SSD) You Only Look Once Detector(YOLO)
S-8	**SLO-1**	Image formation, Digital Image, Image as Matrix	Image Enhancement and Filtering	High Dynamic Range Imaging in OpenCV	Eyeglass Classifier in OpenCV	Face Detection: SSD based Face Detector
	SLO-2	Manipulating Pixels, Working with Color & Gray Scale images	Color Spaces : RGB, HSV and Other Color Spaces	Image Impainting	Object Detections	Neural Networks Models for Image Classifications
S-9	**SLO-1**	Image Operations: Creating Image, Cropping images,	Applications: Finding Dominant Color in an image,	Seamless Cloning	Motion Estimation using Optical Flow	Image Filtering Using Convolution in OpenCV
	SLO-2	Coping a region to another image, Resizing images creating Image mask	Desaturation Filter	Seamless Cloning in OpenCV	Lucas-Kanade Optical Flow	CNN architectures: region-based CNNs, Faster R-CNN
S-10-12	**SLO-1** **SLO-2**	**Lab 2:Working Basic Image operating using OpenCV**	**Lab 5 : Working with Contour Analysis**	**Lab 8 : Face Blending**	***Lab 11:* Motion*Detection in OpenCV***	**Lab 14 : Work with a YOLO/single shot object detection system**.
S-13	**SLO-1**	Mathematical Operations on Images: Data Type Conversion	Color Transform	Image In painting	Object Trackers in OpenCV	Implementing a CNN in TensorFlow & Keras
	SLO-2	Contrast Enhancement, Brightness Enhancement	Histogram Equalization	Geometric Transforms: Affine Transform Homography	Comparison of different trackers	Image Classification using Pre-Trained ImageNet Models in TensorFlow & Keras
S- 14	**SLO-1**	Image Channels, Splitting & Merging Channels	Advanced Histogram Equalization(CLAHE)	Geometric Transforms in OpenCV	Multiple Object Tracking using OpenCV	Implementing an MLP in TensorFlow & Keras
	SLO-2	Manipulating Color Pixels, Images with Alpha Channels	Color Adjustment using Curves	Image Features: Image Feature: ORB	Kalman Filter Tracker	Video Analysis: Motion Estimation using Optical Flow
S-15	**SLO-1**	Image Annotation: line over an image, Circle over an image	Image Filtering Techniques	ORB Feature in OpenCV	Tracking using MeanShift	Object Trackers in OpenCV
	SLO-2	Rectangle over an image, Ellipse over an image text over an image	Image filtering using Convolution in OpenCv	Application: Image Alignment, Creating Panorama	Tracking using CamShift	Multiple Object Tracking using OpenCV

S-16-18	**SLO-1** **SLO-2**	**Lab 3: Working with Image Annotation using OpenCV**	**Lab 6 : Convert the images into different color spaces**	***Lab 9 :* Implement Geometric Transforms in OpenCV**	***Lab 12:* Tracking using MeanShift and CamShift**	**Lab 15: Image Classification using OpenCV**

Learning Resources	1. Wesley E. Snyder, Fundamentals of Computer Vision , Cambridge University Press; 1st edition, 2017. 2. Computer Vision: Algorithms and Applications by Richard Szeliski. Available for free online. 3. Computer Vision: A Modern Approach (Second Edition) by David Forsyth and Jean Ponce. Available for free online. 4. https://learnopencv.com/image-filtering-using-convolution-in-opencv/

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, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

CourseDesigners

ExpertsfromIndustry	ExpertsfromHigherTechnicalInstitutions	InternalExperts
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr.Helen, SRMIST***

CourseCode	UDS23602J	CourseName	Advanced Analytics and Data Visualization for Enterprise	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:	To understand advanced analytics
CLR-2:	To advance in Analytics and data visualization
CLR-3:	To Getastronghands-onskill,knowledgeandexpertiseincreatingbeautifulstoriesusing Analyticalapplicationsthatareanintegralpartof SAPanalytics
CLR-4:	To apply hybrid solutions
CLR-5:	To use a hybrid solutions

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			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:	Haveastronghands-onskillsknowledgeandexpertiseintransformingdataintomoreusefulvisualswiththeuseofchartsandvisuals.	3	80	70	H	H	M	M	M	M	M	M	H	H	M	M	M	H	H
CLO-2:	Getastronghands-onskill,knowledgeandexpertiseincreatingbeautifulstoriesthatarean integralpartofSAPanalytics	3	85	75	H	H	H	H	H	-	M	-	H	H	M	M	M	H	H
CLO-3:	Getastronghands-onskill,knowledgeandexpertiseincreatingbeautifulstoriesusing analyticalapplicationsthatareanintegralpartofSAPanalytics	3	75	70	H	H	M	H	H	-	M	-	H	H	M	M	M	H	H
CLO-4:	BeintroducedtothescriptingworldinSAPanalyticsforcloudforcreatinganalyticalapplications	3	85	80	H	H	H	M	M	M	M	-	H	M	M	M	M	H	H
CLO-5:	UseahybridsolutionwhereSACservesasafront-endontopofyourBPCbackbonecalled FinancialPlanninginSAPSAC.	3	85	75	H	M	M	M	M	M	M	-	H	H	M	M	M	H	H

Duration(hour)		18	18	18	18	18
S-1	SLO-1	**Unit1:FoundationsofData Visualization**	BarChart, ColumnChart	DataModellinginSAPSAC, DataVisualization SAPSAC	CreatingAnalyticApplicationsinSAPDataWarehouseCloud	Pall The Right Information On The Page
	SLO-2	DataVisualizationOverview	PieChart	PredictivemodellinginSAPSAC	DefiningBusyIndicator, UsingPopups	Select The Right Typeof dashboard
S-2	SLO-1	Business Benefits ofDataVisualization	ScatterPlot	**Unit7:CreatingStoriesin SAPSAC**	**Unit10:Scripting inSAPSAC AnalyticApplications**	**Unit13:FinancialPlanningin AnalyticsDesigner**
	SLO-2	Business Challenges of DataVisualization	Entitle A Specific Audience And mark their needs	Stories SAPSAC Overview	ScriptinginSAP SAP overview	FinancialPlanninginAnalyticsDesigneroverview
S-3	SLO-1	When to use DataVisualization, TypesofDataVisualization, DataVisualizationtoolsand techniques	Choose The Right Visual, ApplyTextCarefullyand Intentionally	Business Benefits of APSAC Stories	CreateanewScriptobject, Create A Function	BusinessBenefitsofFinancial Planning SAPSAC
	SLO-2	**Unit 2: Why Would aCompanyWanttoVisualizeData**	Use The Predictable Pattern For Layouts	StepstoCreatestoriesinSAPSAC, SavetheStory	Edit The Script Function	CostcenterPlanning, ProductCostPlanning,SalesandProfitability Planning
S-4-6	SLO-1	Lab1: Data Visualization Tools	Lab4: Working with comment widgets and scripting objects	Lab7: Business Benefits of APSAC Stories	Lab10: Placing the Right information on the page	Lab13: Model Creation
	SLO-2					
S-7	SLO-1	Solving Data innefficiencies And Data Visuals	Select the right data visualization tool	**Unit8:TypicalWorkflowincreating anAnalytic Application?**	Create A New Argument For The Function	Project Planning, Internal Order Planning
	SLO-2	Speed of Decision Making	Use Attractive Colors For Telling Data Stories	Analytic Application , SAPSAC Overview, Placethewidgetinthecanvas	SavetheAnalyticapplication	Capital Expense Planning

S-8	SLO-1	IdentifyDataInaccuracies	**Unit5:TypesofData Visualization**	ChoosetheDataVisualization Component	**Unit11:Scripting inSAPSAC AnalyticApplications**	Financial Statement Planning
	SLO-2	Access Real-time information	Types of DataVisualization	Add More Widgets, AddScriptstoyourwidgets	Widgets SAPSAC overview	**Unit 14: Predictive Modelling in SAP SAC**
S-9	SLO-1	Promote Storytelling, Exploring businessInsights	Business Benefits of DataVisualization	SavetheAnalyticapplication	UsesofWidgetsinSAPSAC, CreateaNewWidget	Predictive Modelling in SAP SAC Overview
	SLO-2	Discover latest Trends, Tailor Made Reports	Charts, Tables, Graphs	**Unit9:CreatingStoriesusingAnalyticApplicationinSAP SAC**	AddingaCustomWidget, ModifyingtheCustomWidget	Business Benefits of Predictive Analytics in SAP SAC
S-10-12	SLO-1	Lab2: Visualizing location based data for business insights	Lab5: Applying Color theory in Data Visualization	Lab8: Data Modeling in SAPSAC	Lab11: Scripting in SAPSAC Analytic Applications	Lab 14: Predictive Modeling in SAPSAC
	SLO-2					
S-13	SLO-1	**Unit3:WhatDoestheFuture HoldforVisualizingData**	Maps	Analytic Application SAPSAC Overview, Create New Analytic Application	**Unit12:Scripting inSAPSAC AnalyticApplications**	Steps to implement Predictive modelling in SAP SAC
	SLO-2	FutureofDataVisualizations, LocationBasedAnalysis	Infographics, Dashboards	ChangingtheNameofWidgets, AddingCommentstoWidgetsandTableCells	SAPSACBestPractices	Identify the ML Scenario
S-14	SLO-1	Storytelling Will Become Crucial	**Unit6:TypesofData Visualization**	WorkingwiththeComment WidgetinanAnalyticApplication	Determine Your Goals	Data Acquisition, Data Discovery
	SLO-2	InteractiveDashboards, Data Visualization for everyone	SAPAnalyticsforCloudOverview	CopyingandPastingWidgetsand ScriptingObjects	ChooserelevantKPIs	Data Processing
S-15	SLO-1	**Unit4:TechniquesandBest PracticesTechniques**	Features of APSAC	Copying and Pasting WidgetsfromStorytoAnalyticApplication	Tellastory With Your Data, Providecontext	Model Creation
	SLO-2	DataVisualizationtechniques Overview	Business Benefits of APSAC, Key Capabilities of APSAC	RestoringDeletedWidgetsor ScriptingObjects	Palltherightinformationonthe page	Generating Predictions

S-16-18	**SLO-2**	Lab3: **TechniquesandBest PracticesTechniques**	Lab6:**TypesofData Visualization**	Lab9: Analytic Application SAPSAC	Lab12: **Scripting inSAPSAC** **Analyti cApplic ations**	Lab15:Model Creation

LearningResources	**Textbooks:** 1. DataVisualization:asuccessfuldesignprocessbyAndyKirkPublisher(s):PacktPublishinglink:https://www.oreilly.com/library/view/data-visualization-a/9781849693462/ 2. SAPAnalyticsCloudbyAbassinSidiqpublisher:SAPpresswithRheinwerkpublisher	**References:** 1. TheTruthfulArt:Data,Charts,andMapsforCommunicationbyAlbertoCairo Publisher(s):NewRiders 2. LearningSAPAnalyticsCloud byRiazAhmedPublisher(s):PacktPublishing

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

	Total	100 %	100 %	100 %	100 %	100 %

CourseDesigners

ExpertsfromIndustry	ExpertsfromHigherTechnicalInstitutions	InternalExperts
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr.R.Thilagavathy, 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 Applications		Data Book / Codes/Standards	Nil	

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

		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understand Research principles while developing software.	1	2	3
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:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To understand the Research and Evaluation techniques.	2	85	80
CLO-2 :	To plan and manage hypothesis value at each stage of the Research.	3	85	80
CLO-3 :	To learn about the Research Type and find the correct methods to the	3	85	80
CLO-4 :	To develop Research skill.	3	85	80
CLO-5 :	To develop skills to manage the various phases involved in Research.	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	H	H	H	H	-	M	M	L	-	H	-	M	H
L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
L	H	H	H	H	H	-	M	M	L	-	H	-	M	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

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 Sample enumerations	Introduction to parametric and nonparametric tests
	SLO-2					
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											
	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 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***	***Dr. V.Raja SRM IST, Vadapalani***

Course Code	UDS23D03J	CourseName	MACHINE LEARNING FOR ENTERPRISE	CourseCategory	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 :	To make the participants comfortable with the fundamentals of some of the advanced machine learning concepts, their working principles, and their functions in a business scenario.
CLR-2 :	To make the participants understand the methods of teaching machines in performing cognitive works just as humans do.
CLR-3 :	To Teach the participants to build intelligent and automated real-world machine learning applications and use cases spanning healthcare, retail, energy verticals by intelligently Analyzing different datasets collected from diverse data sources.
CLR-4 :	To Select the right set of features the model training in order for the model to learn only the required information eliminating anomalies, outliers, noise and other unnecessary information.
CLR-5 :	To understand all the steps and process involved the in model engineering process for training, validating, testing, deploying machine learning models in the production system for the user consumption.

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: 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 :	Have skills and expertise to train, validate, test, deploy the models in the production for the consumption of users.	2	85	80	H	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-2 :	Have a firm understanding of the importance and challenges of learning agents that make decisions is of vital importance today	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-3 :	a hands-on skills and knowledge to develop an ensembled based learning system by combining diverse machine learning models together	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-4 :	Have a hands-on skills, expertise and knowledge to develop Recommendation systems using collaborative filtering or a content-based techniques that suggests an user with Products they are likely to buy, movies to watch etc	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-5 :	Have a hands-on skills, expertise and knowledge to use and design automated approaches for determining Machine Learning pipelines efficiently.	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration(hour)		15	15	15	15	15
S-1	SLO-1	**Unit 1: Machine Learning – DeepDive**	✓ Classification ✓ Binary Class Classification ✓ Multiclass Classification	**Unit 10: Supervised MachineLearning-ClassificationTypeProblems**	ValueBasedLearning	Howdoesarecommendationengineework? ✓ DataCollection ✓ DataStorage ✓ FilteringtheData
	SLO-2	Machinelearningadvancedconcepts	✓ Clustering ✓ Density-basedmethods ✓ Hierarchical methods ✓ Partitioning methods ✓ Grid-based methods	DecisionTreeClassification	PolicyBasedLearning	Why Recommendationsystemsareneeded,Whatcan beRecommended
S-2	SLO-1	Bias and Variance trade off	Neural networks	RandomForest Classification	ModelBased Learning	UserandItemmatching,Typesof Recommendation systems,Content basedRecommendationsystems, Collaborativefiltering
	SLO-2	Testing and Validation, Cross validation,	Perceptron learning -single and multi layer perceptron	LinearSupportVectormachines	MarkovDecisionProcesses,Bellman Equations	**Unit18:AutoMachineLearning(Auto ML)**
S-3	SLO-1	Classification Metric: The confusion matrix in ML,	**Unit4:MachineLearninginRealWorldApplications**	Non-LinearSupportVectormachines	ReinforcementLearningModels,Monte-Carlo Methods	AutoMLoverview,TypesofAuto ML

S-3	**SLO-2**	Accuracy, Precision, Recall, F1-Score	✓ Machinelearningin Healthcare ✓ Machinelearningin Automobile ✓ ML in Product Recommendation ✓ ML in Banking sector ✓ ML in NLP-Sentiment analysis ✓ ML in Computer Vision	LogisticRegression	Temporal-DifferenceLearning	WorkingofAutoML,AutoMLin Google Cloud, AutoML inMicrosoftAzure
S-4 to 5	**SLO-1**	**Lab1:Machine Learning Approaches**	**Lab4: Demonstrate Markov Decision Processes**	**Lab7:Gaussian Naïve bayes**	**Lab10: application of ReinforcementLearningRealWorldExample**	**Lab13: demonstration of AutoMLClassification**
	SLO-2					
S-6	**SLO-1**	Regression Metrix: Mean Squared Error (MSE).	Unit 5: Data PreprocessingforMachineLearningModels	Gaussian NaïveBayes	SARSA:On-PolicyTDcontrol,Q-Learning:Off-policyTD control,DeepQ-Network	WhentouseAutoML,BusinessBenefits,BusinessChallenges ofAutoMachineLearning
	SLO-2	Root Mean Squared Error (RMSE). Mean Absolute Error (MAE)	Data Pre-processing overview,Why is Data Pre-processingImportant,Data Pre-processingBestPractices	Bagging and Boosting	Unit 15: ReinforcementLearningRealWorld Example -SelfDrivingCars	AutoML Regression, AutoMLClassification, AutoML TimeSeriesForecasting,AutoML ComputerVision
S-7	**SLO-1**	Iris classification and house price prediction using simple regression and classification algorithm with its metrics	Steps in Data Pre-processingformachinelearningmodels ✓ DataCollection ✓ DataIntegration ✓ DataPreparation ✓ DataProvisioning	**Unit 11: Supervised MachineLearning-ClassificationTypeProblems**	SelfDrivingCarsOverview	**Unit 19: Machine LearningHandsOnLabWork2-Build,Test and Deploy ML Models(Consumer2)**
	SLO-2	Role of loss function and optimization	Unit 6: Feature Engineering	**Unsupervised Algorithm:** K-Means Clustering	ComponentsofSelfDrivingCarsystem ✓ Cameras ✓ LIDAR ✓ RADAR ✓ Ultrasonics	CustomerSegmentation

S-8	**SLO-1**	Gradient descent weigh optimization	Features overview, Why areFeatures Important, FeatureEngineeringoverview, WhyisFeatureEngineering Important	DensityBasedClustering	Scene Understanding,Localizationa ndMapping	Problemstatement
	SLO-2	LearningAlgorithms, SupervisedLearning	Problem Feature EngineeringSolves,Importance ofFeatureEngineering,	DimensionalityReduction	PlanningandDrivingpolicy,Cont rol	Problemtype
S-9 to S-10	**SLO-1**	**Lab2: Python Code for Binary Class classification**	**Lab5: Steps involved in Data Preprocessing Feature EngineeringBestPractices**	**Lab8: Demonstrate Clustering Problems CollaborativeFiltering**	**Lab11: Demonstrate LearningAgent**	**Lab14: Data Pipeline**
	SLO-2					
S-11	**SLO-1**	Unit 2: Machine LearningApproaches	Feature Extraction, Feature Selection, Feature Construction, Feature Learning	CollaborativeFiltering	StateSpaceRepresentation	Data engineering
	SLO-2	UnsupervisedLearning	Iterativeprocessof feature eengineering	AssociationRuleLearning	ActionSpaceRepresentation	Datapipeline
S-12	**SLO-1**	Semi-SupervisedLearning	Unit 7: Model Engineering (Model Selection, ModelTrain, Test,Validate,Analyze, Deploy)	Apriori-AssociationMeasures ✓ Support ✓ Confidence ✓ Lift	RewardFunction	Modelselection
	SLO-2	Reinforcement Learning, Similarity Algorithms,	Model Selection Model Training Model Validation Model Testing Model Outcome Model Analysis Model Deployment Model Re-training Model Re-testing	Unit 12: UnsupervisedMachineLearning-Clustering Problems	DiscreteQ-LearningAgent	Modelengineering
S-13	**SLO-1**	How to selecta Machine Learning Algorithm	Unit8:SupervisedMachine Learning	K-Means Clustering Density Based Clustering Hierarchical Clustering	DeepQ-NetworkAgent,DeepQ-Training, Unit16:MachineLearningEnsembl e LearningTechniques IncludingBagging,Boosting	Modeloutcome

	SLO-2	Machine Learning Workflow and applications, Challenges and Vision for the future Analysis of machine learning applications	Continuous Target Variable,DiscreteT arget Variable Perceptron classifier Support Vector Machines(SVM) Decision tree classifier K-nearest classifier Naïve Bayesclassifier	Unit13:Unsupervised Machine Learning –Association, KNN, PCA Dimensionality reduction, Agent,Action,Environment	Ensembling Techniques Overview, Basis Ensembling Techniquesin machine learning Advanced Ensembling Techniques in machinelearning BaggingandBoosting	Model analysis, Model optimization, Model pipeline, Data visualization
S14 to 15	**SLO-1** **SLO-2**	**Lab3:Perform K-Means Clustering algorithm**	**Lab6: Decision Tree Regression**	**Lab 9: Reinforcemen tLearning**	**Lab12: Bagging and Boosting Algorithms**	**Lab15:Datavisualization**

LearningRe sources	1. Statistical and Machine-Learning Data Mining Techniques for BetterPredictiveModelingandAnalysisofBigData,ThirdEdition-BruceRatner 2. DataMiningPracticalMachineLearningToolsandTechniques, 3. SecondEdition -IanH.Witten	

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

CourseDesigners		
ExpertsfromIndustry	ExpertsfromHigherTechnicalInstitutions	InternalExperts
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor,* *Department of Computer Science, University of Madras, Chennai*	*Dr.S.AlbertAntonyRaj,SRMIST*
		Dr.M.Pandiyan,SRMIST

Course Code	UDS23D04J	Course Name	Blockchain Technology	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	
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 :	State core blockchain concepts, the benefits, and the limitations of blockchain technologies.	Level of Thinking	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related	Procedural	Skills in	Ability to	Skills in Modeling	Analyze, Interpret	Investigative Skills	Problem Solving Skills	Communication Skill s	Analytical Skills	ICT Skills	Professional	Life Long Learning
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																		
Course Learning Outcomes (CLO):	The Learners will be able to																		
CLO-1 :	Contentedly discuss and describe the history, types and applications of Blockchain	2	85	80	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	80	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	85	80	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	80	M	H	H	H	H	H	M	M	M	M	L	M	H	L	M

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			Wallets for Ethereum	pairing on

			Bitcoin Networks and PaymentsWallets	Database vs. Blockchain Architecture		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
S 9,10	**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			
S 14,15	**SLO1**	**Lab3: Explore available tools for blockchain technology**	**Lab6:** implementation of Cryptographic hash functions used in password verification.	Block chain network creation – with application	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

	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
Experts from Industry	Experts from Higher Technical Institutions	*Dr.P.Chanthini, SRMIST, KTR Campus*
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	

Course Code	UDS23G04J	Course Name	INTRODUCTION TO ANIMATION	Course Category	G	Generic 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 Science and Applications	Data Book / Codes/Standards	Nil		

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

CLR-1 :	Study the basics and Fundamentals of Multimedia.
CLR-2 :	Understand the Multimedia components and Tools
CLR-3 :	Understand how Multimedia can be incorporated
CLR-4 :	Innovate best practices for elements of design, virtual reality and gaming
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:	Learning: Level of Thinking	Expected Proficiency	Expected Attainment	PLO 1: Fundamental Knowledge	PLO 2: Application of Concepts	PLO 3: Link with Related	PLO 4: Procedural Knowledge	PLO 5: Skills in Specialization	PLO 6: Ability to Utilize	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 :	Acquire the basics of Multimedia systems	2	85	80	L	M	-	-	-	-	L	-	M	M	-	-	-	-	M
CLO-2 :	Define what Multimedia is and how that works in gaming fields	3	85	80	M	M	-	-	M	H	-	-	M	-	-	-	-	M	M
CLO-3 :	Understand multimedia components using various tools and techniques	3	85	80	L	M	-	-		-	-	M	M	M	-	-	-	-	M
CLO-4 :	Analyze and interpret Multimedia data.	3	85	80	L	M	H	H		M	-	-	M	-	-	-	L	-	M
CLO-5 :	Discuss about different types of media format and their properties.	3	85	80	L	M	H	H	M	-	L	-	M	H	-	-	-	-	M

Duration (hour)		15	15	15	15	15
S-1	SLO -1	*What Is Multimedia? Definitions- Where to Use Multimedia*	*Animation -The Power of Motion*	*Making Multimedia - The Stages of a Multimedia Project*	*Designing and Producing - Designing*	*The Internet and Multimedia -Internet History*
	SLO -2	*Delivering Multimedia*	*Principles of Animation*	*What You Need: The Intangibles*	*Designing the Structure*	*Internetworking*
S-2	SLO -1	*Text - The Power of Meaning- About Fonts and Faces-Using Text in Multimedia*	*Animation by Computer*	*What You Need: Hardware*	*Designing the User Interface*	*Internet Addresses -Connections*
	SLO -2	*Font Editing and Design Tools- Hypermedia and Hypertext*	*Making Animations That Work*	*What You Need: Software*	*A Multimedia Design Case History*	*The Bandwidth Bottleneck - Internet Services*
S-3	SLO -1	*Images*	*Sample animations*	*What You Need: Authoring Systems*	*Producing*	*MIME-Types -The World Wide Web and HTML*
	SLO -2	*Making Still Images*	*Video - Using Video*	*Helpful Ways to Get Started*	*Starting Up*	*Multimedia on the Web*
S 4-5	SLO -1 SLO -2	***Lab 1: a) Extract The Flower Only From Given Photographic Image And Organize It On A Background. Selecting Your Own Background For Organization b)Use Effective Cropping Techniques to design a collage***	***Lab 4: a)Create An Animation To Represent The Growing Moon b) Simulation of cricket game***	***Lab 7: Draw The Fan Blades And To Give Proper Animation***	***Lab 10: Design a poster for 2024 election and show the difference in resolution and quality for Print and Web***	***Lab 13: a) Study the notes of a piano and simulate them using keyboard and save your file b) Create a web page for your institution which contains all the branches of study and at least 10 links to other web pages***
S-6	SLO -1	*Color*	*How Video Works and Is Displayed*	*Making Instant Multimedia - Types of Authoring Tools*	*Working with Clients*	*Tools for the World Wide Web- Web Servers- Web Browsers*
	SLO -2	*Image File Formats*	*Digital Video Containers*	*Objects Choosing an Authoring Tool*	*Tracking*	*Search Engines -Web Page Makers and Site Builders*
S-7	SLO -1	*Sound - The Power of Sound*	*Codecs*	*Multimedia Skills*	*Copyrights*	*Plug-ins and Delivery Vehicles - Beyond HTML*

	SLO -2	*Digital Audio*	*Video Format Converters*	*The Team*	*Hazards and Annoyances*	*Designing for the World Wide Web - Developing for the Web*
S-8	**SLO -1**	*MIDI Audio*	*Obtaining Video Clips*	*Project Manager*	*Content and Talent*	*Text for the Web*
	SLO -2	*MIDI vs. Digital Audio*	*Shooting and Editing Video*	*Multimedia Designer*	*Acquiring Content*	*Images for the Web*
S 9-10	**SLO -1**	***Lab 2: a)To Use Appropriate Tool(S) From The Toolbox, Cut the Objects From 3 Files (F1.Jpg, F2.Jpg & F3.Jpg); Organise Them Ina Single File And Apply Feather Effects b)Paint a scenery of a park using different tools of Photoshop.***	***Lab 5: a)Create An Animation To Indicate A Ball Bouncing On Steps b) Character Walk Animation in Flash***	***Lab 8: Create An Animation With The Following Features.- Welcome* Letters Should Appear One By One* The Fill Colour Of The Text Should Change To A Different Colour After The Display Of The Full Word***	***Lab 11 Make a 3D animation from an A.I generated image***	***Lab 14:Working with DREAMWEAVER and creating minimum of two programs with this tool***
	SLO -2					
S-11	**SLO -1**	*Multimedia System Sounds*	*The Shooting Platform*	*Interface Designer*	*Using Content Created by Other*	*Sound for the Web*
	SLO -2	*Audio File Formats*	*Storyboarding*	*Writer*	*Ownership of Content Created for a Project*	*Animation for the Web*
S-12	**SLO -1**	*Adding Sound to Your Multimedia Project*	*Lighting*	*Audio Specialist*	*Acquiring Talent*	*GIF89a*
	SLO -2	*Space Considerations*	*Chroma Keys*	*Multimedia Programmer*	*Locating the Professionals You Need*	*Video for the Web*
S-13	**SLO -1**	*Audio Recording*	*Composition*	*Producer of Multimedia for the Web*	*Working with Union Contracts*	*Plug-ins and Players*
	SLO -2	*Keeping Track of Your Sounds - Audio CD*	*Titles and Text -Nonlinear Editing (NLE)*	*The Sum of Parts*	*Acquiring Releases*	
S	**SLO -1**	***Lab 3: a)Picture manipulations using all possible tools of Photoshop.***	***Lab 6: a)Simulate Movement Of A Cloud***	***Lab 9: Create An Animated Cursor Using Startdrag("Ss", True); Mouse.Hide()***	***Lab 12: Design an animation for banning of mobile phones using a suitable software***	***Lab 15: Adding Video, Audio, and Animation to Webpages using Dreamweaver***

14 - 15	**SLO -2**	***b) Pick any picture of a magazine cover page make changes using selection tool.***	***b) Simulations of change of shapes***			

Learning Resources	1. *Tay Vaughan, Multimedia: Making it Work , 8 th Edition, McGraw Hill Education* 2. *Ranjan Parekh, Principles of Multimedia, 2 nd Edition, McGraw Hill Education, 2013* .	

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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***N.Krishnamoorthy, SRMIST, RPM***

Course Code	*UDS23P04L*	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)

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 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 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	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.

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

SEMESTER-VII

Course Code	UDS23701J	Course Name	Data Science for business Analytics	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 :	Understand the fundamental concepts and techniques of data science
CLR-2 :	Gain proficiency in statistical analysis and exploratory data analysis.
CLR-3 :	Develop skills in applying machine learning algorithms for business analytics.
CLR-4 :	Learn to visualize and communicate data insights effectively.
CLR-5 :	Apply data science techniques to solve 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 :	Explore and summarize data effectively	2	85	80	L	L	L	M	M	M	-	M	L	M	-	H	-	M	H
CLO-2 :	Handle and analyze large-scale datasets	3	85	80	L	M	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-3 :	Evaluate and interpret the performance of machine learning models	3	85	80	L	M	M	H	H	H	-	H	M	L	-	H	-	M	H
CLO-4 :	Apply various predictive analytics techniques	3	85	80	L	M	H	M	H	H	-	M	M	M	-	H	-	M	H
CLO-5 :	Analyze real-world business problems and develop data-driven solutions	3	85	80	L	L	M	H	H	M	-	M	M	L	-	H	-	M	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to Data Science and Business Analytics	Linear regression for predicting continuous variables	Time Series Analysis and Forecasting	Model Evaluation and Selection	Business Analytics and Decision Making
	SLO-2	Overview of data science and its role in business analytics	Logistic regression for classification problems	Understanding time series data and its characteristics	Performance metrics for regression and classification models	Application of data science techniques in business decision-making.
S-2	SLO-1	Understanding the data science lifecycle and its stages	Decision trees and random forests for classification and regression	Time series decomposition and trend analysis	Overfitting and underfitting in machine learning models	Optimization models and techniques
	SLO-2	Ethical considerations in data science and responsible data usage	Support Vector Machines (SVM) for classification	Forecasting methods (moving averages, exponential smoothing, ARIMA)	Model selection techniques: cross-validation, regularization, and feature selection	A/B testing and experimental design
S-3	SLO-1	Data Acquisition and Data Preprocessing	Evaluation metrics for regression	Evaluation metrics for time series forecasting models	Data Visualization and Communication	Social Network Analysis-Introduces social network analysis and its applications in understanding relationships and influence
	SLO-2	Data collection methods and sources	Classification models	Mean Absolute Error (MAE), Root Mean Squared Error (RMSE)	Principles of effective data visualization	Covers network metrics, community detection, and link prediction
S-4 to S-6	SLO-1	*Lab1:* Loading Data: Demonstrate how to load data from different sources (e.g., CSV, Excel) using Pandas' read functions.	*Lab 4:* Removing missing values and outliers from a dataset	*Lab 7:* Applying PCA for feature extraction and data visualization.	*Lab 10:* Evaluating recommender system performance using metrics like precision and recall	*Lab 13:* Collecting data from APIs and integrating it into data analysis tasks
S - 7	SLO-1	Data cleaning techniques and handling missing values	Clustering Techniques	Data Visualization and Communication	Data Science Tools and Resources	Data summarization and feature engineering
	SLO-2	Data transformation and feature scaling	Introduction to clustering and its applications	Principles of effective data visualization and storytelling	Introduction to popular data science tools (e.g., Python, R)	Hypothesis testing and statistical inference
S-8	SLO-1	Handling categorical data and feature encoding	K-means clustering algorithm	Using visualization libraries (e.g., Matplotlib, Seaborn) to create insightful plots	Introduction to libraries and frameworks (e.g., Pandas, NumPy, Scikit-learn)	Predictive Analytics using Statistical Techniques

	SLO-2	Feature engineering and dimensionality reduction techniques	Hierarchical clustering algorithms (agglomerative and divisive)	Interactive visualization tools (e.g., Tableau, Power BI)	Accessing and manipulating data using SQL Introduction to cloud-based data platforms (e.g., AWS, Azure)	Machine Learning Algorithms for Business Analytics
S-9	**SLO-1**	Exploratory Data Analysis	Evaluation metrics for clustering algorithms	Dashboard design	Case Studies and Real-World Applications	Anomaly Detection- Discusses techniques for detecting unusual patterns and anomalies in data
	SLO-2	Descriptive statistics and data summaries	Confusion Matix - example	Storytelling with data and communicating analytical insights	Analyzing customer behavior and segmentation	Covers statistical methods, clustering-based approaches, and outlier detection algorithms
S-10 to S-12	**SLO-1**	*Lab2* Generating descriptive statistics and visualizations for a dataset	*Lab 5:* Evaluating forecast accuracy and selecting appropriate models for time series forecasting	*Lab 8:* Applying association rule mining for market basket analysis	*Lab 11:* Data Manipulation with Pandas: Loading, cleaning, and transforming data using the Pandas library.	*Lab 14:* Applying named entity recognition and sentiment analysis to analyze text data
S-13	**SLO-1**	Data visualization techniques using libraries such as Matplotlib and Seaborn	Text Mining and Sentiment Analysis	Big Data Analytics	Forecasting sales and demand	*Case Studies:* Applying data science techniques to real-world business problems
	SLO-2	Correlation and covariance analysis	Introduction to text mining and natural language processing (NLP)	Introduction to big data concepts and challenges	Fraud detection and anomaly detection	Identifying and formulating a business problem
S-14	**SLO-1**	Outlier detection and treatment strategies	Text preprocessing techniques (tokenization, stemming, stop word removal)	Distributed computing frameworks (e.g., Hadoop, Spark)	Sentiment analysis and text mining	Data collection, preprocessing, and analysis
	SLO-2	Hypothesis testing and statistical inference	Sentiment analysis using machine learning approaches	Processing and analyzing big data using distributed systems	Recommendation systems	Model development, evaluation, and interpretation
S-15	**SLO-1**	Predictive Modeling Techniques	Topic modeling	Introduction to NoSQL databases	Tools and libraries for data visualization (e.g., Tableau, Matplotlib, ggplot)	Presenting project findings and recommendations
	SLO-2	Introduction to supervised and unsupervised learning	Document classification	MongoDB, Cassandra	Storytelling with data: conveying insights to non-technical stakeholders	Developing end-to-end data science solutions.
S-16 to S-18	**SLO-1**	*Lab 3:* Creating interactive visualizations using libraries like Matplotlib and Seaborn	*Lab 6:* Applying k-means clustering to group similar data points	*Lab 9:* Pre-processing text data by removing stop words, tokenizing, and stemming	*Lab 12:* Creating interactive dashboards and visualizations using Tableau's drag-and-drop interface	*Lab 15:* Understanding privacy regulations and implementing data anonymization techniques

LearningResources	1. "Data Science for Business" by Foster Provost and Tom Fawcett. Published by O'Reilly Media, 2013.	2. "Python for Data Analysis" by Wes McKinney. Published by O'Reilly Media, 2017. 3. "Applied Predictive Modeling" by Max Kuhn and Kjell Johnson. Published by Springer, 2013. 4. "Data Science from Scratch" by Joel Grus. Published by O'Reilly Media, 2019.

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, 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***	***Dr.T.PapithaChristobel, SRM IST, Ramapuram***

Course Code	UDS23D05J	Course Name	DIGITAL TRANSFORMATION	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,

		Learning
CLR-1 :	Enable the participants hone their skills, tools, and techniques to lead digital transformation in an business Organization	1
CLR-2 :	To Inculcate the principles of digital business models, rapid innovation, and data-driven thinking.	
CLR-3 :	Get Exposed to gaining leadership skills to navigate an era of technology shifts and disruptive business models	
CLR-4 :	Able to deliver methodologies for organizations to deconstruct their value chain to gain a competitive advantage over their competitors	
CLR-5 :	Look into the major business drivers of digital transformation, opportunities they create and opportunities they have already created, the challenges they bring to the table	

Program Learning Outcomes (PLO)

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 :	Create a system for correct data gathering and incorporating it at a higher level for business intelligence.	2	85	80	H	H	H	M	H	H	H	H	H	H	H	H	H	H	H
CLO-2 :	Have excellent skills and knowledge to lead process innovation and efficiency across units	3	85	80	H	H	H	M	H	H	H	H	H	H	H	H	H	H	H
CLO-3 :	Understand the customer needs and building impactful insights that help a great deal in drive the business growth.	3	85	80	H	H	H	M	H	H	H	H	H	H	H	H	H	H	H
CLO-4 :	Have excellent skills and knowledge for providing a great digital experience high customers' expectations..	3	85	80	H	H	H	M	H	H	H	H	H	H	H	H	H	H	H
CLO-5 :	Encourage digital culture with improved collaboration to help move the entire organization ahead digitally.	3	85	80	H	H	H	M	H	H	H	H	H	H	H	H	H	H	H

Duration (hour)		18	18	18	18	18
S-1	**SLO-1**	Digital Transformation- Introduction	AI-digitized supply chains	Digital Transformation in Automobile	Internet Of Things	Building bridges between technologies
	SLO-2	Digital Transformation from academic perspective	Improved decision making and productivity	Digital Transformation Business Cases	Mobile	Bridging technologies and innovation
S-2	**SLO-1**	Digital Transformation from industry perspective	Role of AI in Digital Transformation	Creating a Roadmap	Augmented Reality	Digital Transformation Implementation Framework
	SLO-2	Business Benefits of Digital Transformation	How can AI be applied in the digital transformation process	Destination	Cloud Technology	What is a digital transformation implementation framework?
S-3	**SLO-1**	Business Challenges of Digital Transformation	AI-driven digital transformation	Means of getting to the destination	Artificial Intelligence and Machine Learning	Why do organizations need to digitally transform
	SLO-2	Role of Digital Transformation in AI	Challenges ahead	Key digital transformation activities	Digital Twin	The benefits of a digital transformation framework
S-4 to 6	**SLO-1**	**Lab 1: QR Code for Business card generation**	**Lab 4: Website traffic Management**	**Lab 7: Developing Customer Relationship Management**	**Lab 10: Health Monitoring system**	**Lab 13: Surveillance system**
	SLO-2					
S-7	**SLO-1**	Opportunities for Digital Transformation	Role of Augmented analytics	Main milestones	API Based Integration	Choosing the right digital transformation framework
	SLO-2	The Process of Digital Transformation	Role of Automation	Define Metrics	Robotic Process Automation	Things to avoid
S-8	**SLO-1**	Digital Business Models	Enhanced Consumer engagement and insights	User Lifetime Value	Additive Manufacturing	Things in return
	SLO-2	Industry Demand and Business Needs for Digital Transformation	AI-digitized supply chains	Inbound and outbound marketing performance	Security and Data Privacy	Digital Transformation Implementation Framework
S-9	**SLO-1**	Digital Transformation in future	Improved decision making and productivity	Customer Experience	Digital Transformation Strategy ✓ Process ✓ Model ✓ Domain ✓ Culture	Amazon Business – Improving Customer experience
	SLO-2	Business Drivers towards digital Transformation	Role of Intelligent Automation and Data Science in Digital Transformation	Use Organizational Change Management	Technology for digitally transforming business processes ✓ Team Collaboration ✓ CRM ✓ Storage ✓ Project Management ✓ Accounting ✓ Payroll ✓ Communication	Netflix – On-demand Subscription based video services

S-10 to 12	**SLO-1** **SLO-2**	**Lab 2: Generating E-Receipt for purchase order**	**Lab 5: Automating Customer based demand**	**Lab 8: Creating smart assistance in commercial websites**	**Lab 11: Project Management system using ML Algorithm**	**Lab 14: Demand forecasting**
S-13	**SLO-1**	Digital Transformation across industries	Why are Businesses Undergoing Digital Transformations?	Digital Transformation Business Cases	How is data security at risk from digital transformation	Tesla Connected Car Technology
	SLO-2	Innovation from digital transformation, How can AI be applied in the digital transformation process	Future of Intelligent Automation Data Transformation, Adding more values with Machine learning	Destination	Mitigate data security risks	Glassdoor Recruitment
S-14	**SLO-1**	Competitive Edge, Challenges ahead, AI-driven digital transformation	Future of Data science in Data Transformation, Real-World Applications of Digital Transformation	Means of getting to the destination, User Lifetime Value	Investing in Privacy Tools, Building Bridges between IT and the Business, Components for deploying your strategy	Under Armour Connected Fitness, Ensure a culture that allows for change
	SLO-2	Changing Operational processes through digital transformation, Role of Augmented analytics	How does Data Science Benefit to Business?, Digital Transformation in Retail, Digital Transformation in Healthcare	Key digital transformation activities, Use Organizational Change Management, Inbound and outbound marketing performance	Ensuring Digital Transformation Strategy is Secure, Building bridges between the business and information/processes	Digital Transformation Best Practices and Adoptions, Ensure a culture that allows for change
S-15	**SLO-1**	Changing organizational model, Role of Automation	Authorizing decision-making via a data-driven approach, Digital Transformation in Energy	Main milestones, Digital Transformation Technologies and Infrastructure	Global Digital Deployment and Rollout Strategy, Building bridges for actionable intelligence	Define of the business problem, perspective of customers or users, Introduce a corporate governance system
	SLO-2	Role of AI in Digital Transformation, Enhanced Consumer engagement and insights	Classifying warnings, opportunities, and scopes via data-insights, Digital Transformation in Oil and Gas	Define Metrics, Big Data And Real-Time Analytics, Customer Experience	Review your strategy, Building human bridges in a digital transformation strategy, Bridges to build new ecosystems	Prioritize collaboration between teams, Take risks and try new methods, Technology legacy cost
S-16 to 18	**SLO-1** **SLO-2**	**Lab 3: Creating Chat Bot**	**Lab 6: Prediction of Sales process**	**Lab 9: Prediction of Stock market using AI**	**Lab 12: Security screening for Crime file management**	**Lab 15: Legacy cost management**

Learning Resources	1. Jyothi R. Korem, Srinivas R. Pingali, Shankar Prakash, (2021), "Digital Transformation Strategies - Theory and Practice, SAGE publishing, 2021 2. Daniel R. A. Schallmo , Christopher A. Williams, (2018), "Digital Transformation Now! - Guiding the Successful Digitalization of Your Business Model", Springer, 2018	3. Alp Ustundag ,Emre Cevikcan , (2017), "Industry 4.0: Managing The Digital Transformation" , Springer Series in Advanced Manufacturing 4. Alexander Borek and Nadine Prill, (2020), Driving Digital Transformation through Data and AI, Kogan Page

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, 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
Experts from Industry	Experts from Higher Technical Institutions	*Dr. N. Vijayalakshmi, SRM IST, Ramapuram campus*
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	*Mrs. S. Suriya, SRM IST,Ramapuram campus*

Course Code	UDS23D06J	Course Name	REAL WORLD COMPUTER VISION APPLICATIONS	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,	Learning
CLR-1 :	Inculcate the participants with the fundamentals of computer vision, their working principles and their functions in a business scenario.	
CLR-2 :	To teach the participants the functions of a Computer vision techniques involved in training the Computer vision models on different problems like image classification, image detection, Object recognition, object detection etc, with a deep dive into the role the computer vision techniques play in building a scalable enterprise machine learning solutions.	
CLR-3 :	To teach the participants to build intelligent and automated real-world Computer vision applications and use cases spanning healthcare, retail, and energy verticals by intelligently analyzing different datasets collected from diverse data sources.	
CLR-4 :	To teach the participants choosing the right set of frameworks involved in building critical Computer Vision solutions which are efficient, reliable and working at scale.	
CLR-5 :	To introduce the participants to the modelling pedigree of Text classification, Image classification, Image detection, Object recognition, and Object detection techniques.	

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 strong control over the fundamental concepts of Computer vision including the ability to clearly define Computer vision from both academic and industry perspective.	2	85	80
CLO-2 :	Gain hands-on solid skills, knowledge and expertise of real-world situations the applicability of tools and techniques in extracting valuable insights from the data of different formats on time.	3	85	80
CLO-3 :	Have solid hands-on skills, knowledge and expertise in Data gathering, Data collection, Model training, and model evaluation with domain-specific components.	3	85	80
CLO-4 :	Have a good Hands-on skills, knowledge and expertise on applying all the computer vision techniques to real -world industry problems.	3	85	80
CLO-5 :	Have solid hands-on skills, knowledge and expertise in applying the right computer vision techniques for the problem statement at hand.	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	H	H	H	H	M	M	M	M	M	M	L	L	H
H	H	M	H	M	H	M	H	L	H	M	M	L	M	H
H	H	M	L	M	H	L	H	L	H	M	M	M	M	H
H	H	H	H	H	H	M	H	L	H	M	M	M	M	H
H	H	M	M	H	H	M	H	L	H	M	M	L	L	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

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 to 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**
	SLO-2					
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 to 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**
	SLO-2					
S-13	**SLO-1**	Data Type, Training Data, Validation Data, Test Data	Data Ingestion, Data Pre-processing, Multiprocessing, Transfer Learning/Model Processing	Image Detection, Image Segmentation, Image Classification	Benefits, Challenges, High level decisions	Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Virtual Reality and Augmented Reality
	SLO-2	Image Processing Techniques Image Restoration, Linear Filtering,Independent Component Analysis, Pixelation, Template Matching, Image Generation Technique (GAN)	Data Transformation, Parallel Processing	Object Detection, Object Recognition	Customer Image Segmentation, Problem statement Problem type,	Computer vision applications in Construction, Computer Vision applications in Agriculture
S-14	**SLO-1**	Filtering Techniques in Image Processing Linear Filter, Non-Linear Filter	User Interface and Advanced Analytics, Computer Vision Implementation Framework	Object Classification, Computer Vision Models, Computer Vision Models overview	Data engineering, Data pipeline, Model selection	Computer Vision applications in Pedestrian detection, Computer vision applications in Parking Occupancy
	SLO-2	Computer Vision Development Hardware and Software Requirements	What is a Computer Vision framework?, Features of a good Computer Vision framework	Image Processing Models An overview,	Model engineering Model outcome, Model analysis Model optimization Model pipeline	Computer Vision application in road Conditions Monitoring
S-15	**SLO-1**	Building a Computer Vision Hardware system, Benefits, Choosing the software components, Choosing the OS	Popular Computer Vision frameworks OpenCV TensorFlow Matlab	Hough Transformers	Data visualization,	Computer Vsion applications in Traffic flow analysis, CV in Manufacturing
	SLO-2	Adding Packages	CUDA YOLO	SURF, Canny Edge Detectors	User interface	Case Study: Self driving cars using Computer vision technology
S-16 to 18	**SLO-1**	**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**
	SLO-2					
	SLO-2					

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	1. Computer Vision: Algorithms and Applications by Richard Szeliski. Available for free online. 2. Computer Vision: A Modern Approach (Second Edition) by David Forsyth and Jean Ponce. Available for free online. 3. Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani, and Jerome Friedman. Available for free online (Warning: Direct PDF link). 4. 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

	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. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr.S.Meenakshi, SRM IST, RMP***
		Dr.T.Papitha Christobel, SRM IST, RMP

Course Code	UDS23G05J	Course Name	Digital Marketing	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 :	As we are in implementing the Industry 4.0 in the all our business practices. Learning to apply the concepts of Digital marketing and social media is eminet for all grandaunts of marketing.	
CLR-2 :	The Concepts of SEO and SEM are the backbones of digital marketing. So getting an acumen on these concepts would enhance the understanding of digital marketing.	
CLR-3 :	Engaging with the online customers through content and win strategy will position and brand the product well in the market.	
CLR-4 :	Having the perspective of online behaviour of consumer, their experience and service will elevate the growth of the loyal customers and acquiring more customers.	
CLR-5 :	Digital Analytics aid the decision making of the marketing performed online. Learning various tools would ease the understanding of the online consumers.	

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 understand the concepts of digital marketing	2	85	80
CLO-2 :	To distinguish the components of web traffic plan and SEO	3	85	80
CLO-3 :	To understand online consumer behaviour and concept of cyber branding	3	85	80
CLO-4 :	To explicate the technology catalysis in delivering value	3	85	80
CLO-5 :	To adopt the latest tools and technologies in practices	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	H	H	H	H	H	H	H	M	M	L	M	M
H	H	M	M	H	L	H	H	H	H	M	M	L	L	M
H	H	M	H	H	L	L	H	H	H	M	M	L	L	M
H	H	M	L	H	H	H	H	H	H	M	M	L	L	M
H	H	M	H	H	H	H	M	H	H	M	M	L	M	M

Duration (hour)		18	18	18	18	18
S-1	SLO-1	The Virtual World	Traffic Building	Customer Engagement	CRM-Needs-Goals	Mobile Marketing
	SLO-2	Changing Marketing Landsacpe	Internet Traffic Plan	Engagement Marketing through Content	Benefits of CRM	Mobile Overview
S-2	SLO-1	The Internet & Business	Search Marketing Methods for Traffic	Content Management	CX- Customer Experience of service	Emergence of Application
	SLO-2	Online Marketing Domains	Traffic volume & quality	Online Campaign Management	Digital Marketing,Data & Analytics	Marketing with Networks- Social World
S-3	SLO-1	The Behavioral Internet	Search Engine Marketing (SEM)	Using FB,Twitter,Blogs	Social Listening	Integrated Social Media & Digital Strategies
	SLO-2	E-Marketing & CRM	Tools available for SEM	Affiliate Marketing	Web Analytics	Social Media Analytics
S-4-5	SLO-1	Digital Marketing Implementation in Business Scenario- Lab-1	Using Google Analytics to analyze website performance-Lab-4	Creating YouTube Channel for Marketing-Lab-7	Digital Marketing Final Analysis and Report-Lab-10	Lab-13 : Social Media Analytical Tools
	SLO-2					
S-6	SLO-1	Online Advertising	Search Engine Optimizations(SEO)	Strategic Partneships	Social Media Analytics	Social Media Tools
	SLO-2	Internet & Integrated Marketing Communication	Stategies for SEO	Email Marketing	Electronic Customer relationship	The Social Web
S-7	SLO-1	Sales & Trade Promotion	Keyword advertising	Content Strategies	Key CRM applications	Viral Marketing
	SLO-2	Digital Marketing Optimization	Keyword value	Consumer Online Segmentation	Next Generation CRM	Success & Failures of Viral Marketing
S-8	SLO-1	The Need for Digital Engagement	Keyword portfolio evaluation	Targeting	A Mobile App & Community	Inbound Marketing
	SLO-2	Implications of Digital Change	Social Media Strategies	Positioning	The New Age E-enterprise	Process of Inbound
S-9-10	SLO-1	Create the Digital Marketing Webpage- Lab 2	Creating Promotional banner through Canva-Lab-5	Twitter Marketing-Lab-8	Digital Marketing Final Analysis and Report Lab-11	Lab-14 : Social Web
	SLO-2					
S-11	SLO-1	Generation Y	Social Media Marketing	Peer Review, Word of Mouth	Web Business Models	Co Creation

	SLO-2	Expectations & Influence	Internet Marketing Metrics	Opinion Leaders	Customer Centric web Business Model	Online Communities
S-12	**SLO-1**	Online Marketing Mix	Metrics Sites	Cyber Branding	E-Commerce	Amazon Communities
	SLO-2	Online Consumer	Sites Ranking	Digital Brand Ecosystem	The Spiral of Prosperity Model	Digital Business Model in Future
S-13	**SLO-1**	Case Study of Online Marketing	Case Study of Search Engine Marketing	Case Study of Digital Brand Experience	Case Study of WEB Busuness Model	Case Study of Social Web
	SLO-2					
S-14-15		Conducting the Search Engine Optimization and Search Engine Marketing-Lab-3	Facebook Promotion using banners-Lab-6	Email Marketing-Lab-9	**Lab-12** Case Study of WEB Busuness Model	**Lab-15:** Case Study of Social Web

Learning Resources	1.Damian Ryan,Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation Paperback-Import,Kogan Page 2014. 2. Vandana Ahuja, Digital Marketing Paperback Oxford University Press. 3.Hanlon Annmarie, Akins Joanna, Quickwin Digital Marketing: Answera to your Top 100 Questions Paperback PHI 2012.

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, 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**
Experts from Industry	**Experts from Higher Technical Institutions**	***Dr.J.DHILIPAN, SRM IST.***
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Mr.D.B.SHANMUGAM, SRM IST.***

Course Code	UDS23G06J	Course Name	Introduction to Internet of Things	Course Category	G	Generic Elective Courses	L	T	P	O	C
							3	0	2	2	4

Perquisite Courses	Nil	Co-perquisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Application	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning
CLR-1 :	Demonstrate the design, communication model and enabling technologies for IoT.	1
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 :	Explore IoT design paradigms for various IoT 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 :	Understand the architectural overview and deployment templates of the IoT and its applications in the real time scenario.	3	80	70
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
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
CLO-4 :	Function successfully as an individual, and as a member or leader in assorted teams, and in multidisciplinary settings.	3	85	80
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

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	-	H	L	-	-	-	L	L	-	H	-	-	-
M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
H	H	M	H	L	-	-	-	M	L	-	H	-	-	-

Duration (Hour)		18	18	18	18	18
S-1	SLO-1	Introduction	Introduction	IoT and M2M	IOT Platforms Design Methodology	Introduction about RESTful API
	SLO-2	Definition & Characteristics of IoT	Application of IoT	M2M	Purpose & Requirements, process model specification, domain model specification	Designing a RESTful Web API
S-2	SLO-1	Physical design of IoT	Home Automation	Difference Between IoT and M2M	Information model specifications, service specifications, Iot level specifications	Amazon Web Services
	SLO-2	Things in IoT	Smart Lighting	Software Defined Networking	Functional view specifications, operational view specifications.	Amazon Web Services for IoT
S-3	SLO-1	IoT protocols	Smart Appliances	Network function virtualization	Device & component Integration, Application development	Creating a ID in Amazon
	SLO-2	Logical Design of IoT	Intrusion Detection	Introduction about Iot protocols	IoT System for Weather Monitoring	EC2
S-4 , 5	SLO-1	**Laboratory 1: Sketch the architecture of IOT Toolkit and explain each entity in brief.**	**Laboratory 4:Demonstrate a smart object API gateway service reference implementation in IoT toolkit**	**Laboratory7: Explain working of Raspberry Pi.**	**Laboratory 10: Home Automation – Level 0**	**Laboratory 13: Air Pollution Monitoring System.**
	SLO-2					
S -6	SLO-1	IoT Functional Blocks	Smoke / Gas Detection	Infrastructure	Purpose & Requirements, process model specification, domain model specification	Implementation of EC2
	SLO-2	IoT Communication Model	Cities	6LowPAN	Information model specifications, service specifications, IoT level specifications	Autoscaling
S-7	SLO-1	IoT Communication APIs	Smart Parking	Architecture of 6LowPAN	Functional view specifications, operational view specifications.	Implementation of Autoscaling
	SLO-2	IoT Enabling Technologies	Smart Lighting	Ipv6	Device & component Integration, Application development	S3
S-8	SLO-1	Wireless Sensor Networks	Smart Roads	Architecture of Ipv6	IoT System for Agriculture	Implementation of S3
	SLO-2	Cloud Computing	Structural Health Monitoring	Data Protocols	Purpose & Requirements, process model specification, domain model specification	RDS

S-9,10	**SLO-1**	**Laboratory 2: Design a circuit to display LED light using Raspberry Pi.**	**Laboratory 5: Design the circuit to measure the distance using ultrasonic sensor**	**Laboratory 8: Describe gateway as a service deployment in Iot toolkit**	**Laboratory 11: Smart Irrigation System**	**Laboratory 14: Weather Reporting Systems**
	SLO-2					
S-11	**SLO-1**	Big Data Analytics	Environment	MQTT	Information model specifications, service specifications, Iot level specifications	Implementation of RDS
	SLO-2	Communication Protocols	Weather Monitoring	Applications of MQTT	Functional view specifications, operational view specifications.	DynamoDB
S -12	**SLO-1**	Embedded Systems	Air Pollution Monitoring	Difference between MQTT and HTTP	Device & component Integration, Application development	Implementation of DynamoDB
	SLO-2	IoT Levels and Deployment Templates	Noise Pollution Monitoring	CoAP	Introduction to Cloud Storage Models	Kinesis
S-13	**SLO-1**	Level 1,2	Forest Fire Detection, Agriculture	Request and Response methods, Pros and Cons of CoAP	Introduction to Cloud Storage Communication APIs, Python Web Application Framework	Implementation of Kinesis, Case studies - Environment
	SLO-1	Level 3,4	Smart Irrigation, Green House Control	AMQP, Applications of AMQP, Advantages	Django Architecture, Design of Weather Monitoring using Django	IoT systems for weather Reporting Bot
S-14-15	**SLO-1**	**Laboratory 3: Design a circuit to display LED light using Raspberry Pi.**	**Laboratory 6: Design the circuit to measure the distance using ultrasonic sensor**	**Laboratory 9: Describe gateway as a service deployment in Iot toolkit**	**Laboratory 12: Django Architecture**	**Laboratory 15: Case studies - IoT system for Energy**

Learning Resources	1. ArshdeepBahga and Vijay Madisetti, (2015), "Internet of Things - A Hands-on Approach", Universities Press 2. Dieter Uckelmann et.al, (2011), "Architecting the Internet of Things", Springer	3. Adrian McEwen, Hakim Cassimally, (2014), "Designing the Internet of Things", Wiley 4. HonboZhou, (2012), "The Internet of Things in the Cloud: A Middleware Perspective ", CRC Press 5. Olivier Hersent, David Boswarthick, Omar Elloumi, (2012), "The Internet of Things – Key applications and Protocols", Wiley

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**
		Mrs.T.Kanimozhi, SRMIST, RPM
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	***Dr .V. Saravanan, SRMIST, RPM***

Course Code	UDS23P03L	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
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	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 :	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 :	M	H	M	H	L	M	L	L	M	L	L	M	M	H	M
CLO-4 :	M	H	M	H	L	M	L	L	M	L	L	M	M	H	M
CLO-5 :	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 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				
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	UDS23P05L	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	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.

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Learning Assessment

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

SEMESTER VIII

Course Code	UDS23801J	Course Name	*AI and Intelligent Automation for Enterprise*	Course Category	*C*	*Discipline Specific Core 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		*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 make the participants understand the fundamental concepts of intelligent automation, it business benefits, challenges, tools and techniques involved and its overall framework.*			
CLR-2:	*To make the participants comfortable with the concepts how leading enterprises keep the customers at bay and delight shareholders who are looking beyond cost reduction and envisioning long-term success.*			
CLR-3:	*To make the participants have a clear understanding of intelligent automation with AI can help to make day to day business operations that are more humane to pleasant one by automating repetitive, monotonous and often tedious tasks*			
CLR-4:	*To provide the participants with enough insights about many of the barriers Intelligent Automation poses within an existing IT landscape of the enterprise and defining an end-to end solution and then leveraging the appropriate enabling technologies against it.*			
CLR-5:	*To provide the participants with enough insights about many of the barriers Intelligent Automation poses within an existing IT landscape of the enterprise and defining an end-to end solution and then leveraging the appropriate enabling technologies against it.*			

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:	*Have a firm control of the fundamental concepts of intelligent automation and will be able to define intelligent automation from both academic and industry perspective*				2	85	80	*H*	*H*	*H*	*H*	*M*	*H*	*M*	*L*	*M*	-	*L*	-	*L*	*M*
CLO-2:	*Have a complete control of the differences between intelligent automation and Robotic process automation in terms of processes, tools and techniques, implementation, framework, application etc.*				3	85	80	*H*	*H*	*H*	*M*	*M*	*M*	-	*L*	-	*M*	-	*L*	-	*L*	*L*
CLO-3:	*Have a firm understanding of how Intelligent automation involves people, organizations and also technologies involving machine learning.*				3	85	80	*H*	*M*	*M*		*H*	*M*	-	*L*	-	-	-	*L*	-	*L*	*M*
CLO-4:	*Have a firm understanding of the barriers Intelligent Automation poses within an existing IT landscape of the enterprise and the possible ways of mitigating them so as to build and deploy an end-to-end solution and then leveraging the appropriate enabling technologies against it.*				3	85	80	*H*	*H*	-		*H*	*M*	-	*M*	-	-	-	*M*	-	-	-

CLO-5 :	*Have A firm understanding, knowledge and expertise in creating winning strategies for businesses by mitigating all the pitfalls and confront them well ahead before the actual planning phase of implementation.*						3	85	80	*H*	*H*	-		*H*	*H*	-	*H*	-	-	-	*M*	-	-	*H*

Duration (hour)		**18**	**18**	**18**	**18**	**18**
S-1	**SLO-1**	**Unit 1: Intelligent Automation Defined**	Greater processing efficiency	Low Highly scaled automation deployments	Agile implementation	Public-private partnerships
	SLO-2	Intelligent Automation Overview	Ease of use	**Unit 7: Adoption and Barriers to Intelligent Automation Adoption**	Democratization of app development	Private-sector initiatives
S-2	**SLO-1**	Intelligent Automation Defined from academic	Workforce agility, Scalable infrastructure	Barriers of Intelligent Automation Adoption Overview	CIO leadership	Structural change
	SLO-2	Intelligent Automation Defined industry perspective	**Unit 4: Exploring the Possibilities of Intelligent Automation**	Gaining Organizational Engagement	**Unit 10: The value of intelligent automation**	Workforce change
S-3	**SLO-1**	Business Benefits of Intelligent Automation	Identifying Opportunities for Intelligent Automation	Internal Stakeholder and Governance Processes	Increasing process efficiency	Building a future workforce
	SLO-2	Business Challenges of Intelligent Automation	Identifying Opportunities for Intelligent Automation	Making the Business Case Stack	Improving customer experience	Components of Intelligent Automation Framework
S-4,5	**SLO-1**	**Lab 1 : Intelligent Automation Tools and Techniques**	**Lab 4 : Customer relationship management – Intelligent Automation**	**Lab 7: Adoption and Barriers**	**Lab: 10 Optimizing the work force productivity**	**Lab 13: Business Process Analysis**
	SLO-2					
S-6	**SLO-1**	Intelligent Automation Tools and Techniques and Framework	Start with a Proof of Concept	Not enough Enough Processes to Automation	Optimizing back office operations	Business Objectives
	SLO-2	Intelligent Automation Techniques	Choosing the Right Processes	Lack of Strategy	Reducing costs as well as risks	Business Process Analysis
S-7	**SLO-1**	Intelligent Automation Framework	Involving the Business and the IT	Lack of Skill and Talent	More effective monitoring and fraud detection	Develop Automated Processes
	SLO-2	**Unit 2: RPA vs Intelligent Automation**	How Intelligent Automation differs from IT Automation?	Change Management and Culture Readiness	Product and service innovation	Intelligent Operations
S-8	**SLO-1**	RPA Overview	How Automation is powered by artificial intelligence	**Unit 8: Building a winning intelligent automation strategy**	**Unit 11: Early adopters and positive returns**	**Unit 14: Hands On Lab Usecase Implementation (Consumer-3)**

	SLO-2	Business Benefits of RPA, Business Drivers of RPA, Intelligent Automation Overview	How Intelligent automation addresses societal and business Challenges, Unit 5: Rethinking Industries for Intelligent Automation	Defining your vision, Organizational Design, Governance and Pipeline	Define your business outcomes first, Process Analysis	Self Driving Cars
S-9,10	**SLO-1**	**Lab 2 : Develop simple application (Intelligent Automation)**	**Lab 5 : RPA top 5 tools**	**Lab 8: intelligent automation strategy**	**Lab 11: Process Analysis**	**Lab 14: Hands On Lab Usecase Implementation (Consumer-3)**
	SLO-2					
S-11	**SLO-1**	Business Benefits of Intelligent Automation	Intelligent Automation to Be More Innovative, Success Factors, Strategy for intelligent automation, Combining RPA and artificial intelligence	Delivery Methodology, Service Model, Roles and Responsibilities of candidates	Prioritization & Excellence, Process discovery	Problem statement, Problem type
	SLO-2	Business Drivers of Intelligent Automation, RPA vs Intelligent Automation	Technology, infrastructure, and cybersecurity, Mature process definitions, standards, and processes,	Architecture of technology components	Process Mapping, Process Mapping	Data engineering, Data pipeline, Model selection
S-12	**SLO-1**	**Unit 3: Benefits of Intelligent Automation**	Innovative Applications, Preparing the Workforce	**Unit 9: Factors for intelligent automation success Tuning**	Data Management & Governance	Model engineering, Mode outcome
	SLO-2	Working of Intelligent Automation, Why is Intelligent Automation important	**Unit 6: Moving Forward With Intelligent Automation,** Implementation challenges of Intelligent Automation	Designating automation as a strategic priority, Pursuing people-focused initiatives	The Human Factor, Monitoring Intelligent Automation, Skill oriented education	Mode Analysis, Model optimization
S-13	**SLO-1**	How to adopt Intelligent Automation, Best practices of AI in Intelligent Automation	What Businesses Does Intelligent Automation Work For?, How Intelligent Automation Is The Best For Business	Developing an operating model that enables scaling,	Engaging with the workforce	Model pipeline
	SLO-2	Best Intelligent Automation, Accuracy, Speed, Service Continuity	How Intelligent Automation is coming of the age, More process work is pivoting to machines	Modularity and packaged business capabilities, Automation guidelines	Lifelong learning programmes and incentives	Data visualization, User interface
S-14,15	**SLO-1**	**Lab 3:Top 5 open-source RPA frameworks**	**Lab 6: Explore Taskt tool**	**Lab 9: intelligent automation success Tuning**	**Lab 12: Data Management**	**Lab 15: Design User interface**
	SLO-2					

Learning Resources	***1. Pascal Bornet, Ian Barkin & Jochen Wirtz, "Intelligent Automation", 2020*** ***2. Debanjana Dasgupta, "Intelligent Automation Simplified, BPB Publications, 2021***

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, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
		Internal Experts
Experts from Industry	***Experts from Higher Technical Institutions***	***Dr. L. Selvam SRMIST***
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	***Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai***	

Course Code	UDS23D07J	Course Name	TECHNOLOGY LEADERSHIP AND INNOVATION MANAGEMENT	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	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 :	Teach the students how to lead transformational growth by developing an understanding of exponential and digital technologies and innovations																			
CLR-2 :	Learn how to apply prevalent best practices within business organizations, sectors, and industries																			
CLR-3 :	Make the students understand, embrace, and deploy the appropriate innovations at scalefor business organizations to not only survive but thrive.																			
CLR-4 :	Learn to create new opportunities and shape the future of their organizations and industries by harnessing transformational technologies.																			
CLR-5 :	Understand how business leaders are provided with responsibility to drive tech innovation and strategy across their organization																			
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	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 :	Walk away with cocepts of how digital transformation offers a technology-based solution to a business problem that you face in your organization	2	85	80		H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
CLO-2 :	Have excellent Knowledge of Frameworks that help with the practical application of AI-related modeling and possibilities of implementing AI-driven solutions in your business	3	85	80		H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
CLO-3 :	Have excellent Techniques that advance their leadership acumen with a focus on topics that will help you gain maximum traction on your tech initiatives	3	85	80		H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
CLO-4 :	Understand the various applications of AI in business and the opportunities being created by advances in AI	3	85	80		H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
CLO-5 :	Understand applications of digital strategies successfully adopted by global brands, and contemplate which strategies might prove most effective in your organization	3	85	80		H	H	H	H	H	H	H	H	H	H	H	H	L	H	H

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Management - General vs. Business, Management Overview	Issues in Technology Innovation Management	Performance Measurement, Performance Management, and Improvements, Need of Technology Forecasting	Steps of technology implementation ✓ Plan ✓ Design ✓ Implement Support	Technology Assessment: Technology Choice, Technology Assessment Process
	SLO-2	Principles of Management, Financial Management	Research Methods in Technology Innovation Management, Customer Value Creation in Technology Firms	Technology Lifecycle, Technological Roadmaps and Forecasting	Automation overview,	Technology Assessment overview, Importance of technology assessment
S-2	SLO-1	Business Environment, Human Resource Management	Management of Software Engineering Projects, Integrated Product Development	Technology Adoption and Diffusion, Technology Adoption and Diffusion Overview	Automation and business cases	Business Benefits and challenges of technology assessment
	SLO-2	Marketing Research	Designing Innovation Communities	Technology Adoption Lifecycle, Stages of Technology Adoption Lifecycle	Business case for automation	Various elements in technology assessment, Steps to conduct technology assessment
S-3	SLO-1	Communication skills, Leadership skills	Program, Project, People, and Product Management	How a Business leverages from Technology Adoption Lifecycle, Why Companies need to focus on Technology Adoption Lifecycle, How Technology Adoption works	Technological Change and Impact of Technological Change, Technology change Overview	Evaluating and Choosing Technologies, Evaluating Criteria
	SLO-2	Business laws, Customer Relations Management	Program Management overview, Foundations of Program Management, Program Management Life Cycle and Methodologies, Program Management Skills	Business Benefits of Improving Adoption rates	Process of Technology Changes, Importance of Technology Changes, Characteristics of Technology Changes	Technology and Innovation Business Case Development
S-4,5	SLO-1	**Lab1:**Analyse different tools to perform financial management	**Lab4:**Analyze different Project management tools	**Lab7:**Using the performance metrices of various technologies given, analysis and provide the case study about which is the best performing tech	**Lab 10:**Plan, Design and Implement a new technology (I.E. AI, chat bot)	**Lab 13:**Building a business case for introducing new technologies
S-6	SLO-1	Computer Applications	Projects, Programs, and Portfolios, Role and Responsibilities of a Program Manager, Leading a Program, Leading a Program vs Leading a project	Technology Adoption Challenges	Example of Technology Changes, Impacts of Technology Changes, Emerging Technologies	Business cases overview, Data and assumptions

	SLO-2	Operations Management, Organizational Behavior	Project Management overview, Foundations of Project Management, Project Management Life Cycle and Methodologies, Project Management Skills, Role of a Project Manager	Diffusion of Innovation	Impact on the workforce	Business cases – organizational context, Business case opportunity identification
S-7	SLO-1	Economics	Organizational structure and culture, People Management overview, Foundations of People Management, People Management Life Cycle and Methodologies, People Management Skills, Getting Work Done Through Others	Companies and Technological Diffusion	Implications for public policy	Business case considerations, Effective Decision-making structures, Business case Opportunities., Building a business case for introducing new technologies
	SLO-2	Business Fundamentals	Assessment and Evaluation, Building Peer Networks, Essentials of communication	Pattern of Technological Diffusion	Corporate Learning, Research, and Innovation	Evaluating Industry Trend, Market Demand, and Business Needs, Market Research and competitive analysis
S-8	SLO-1	Retail Management	Managing Self, Product Management overview, Foundations of Product Management	Product Diffusion	Organizational learning	Use market research to find customers, Find a Market advantage, Five Force analysis, Rivalry among competitors in an industry
	SLO-2	Understanding Industry and Markets	Product Management Life Cycle and Methodologies, Product Management Skills, Managing Innovative Product Teams	Characteristics of Technology Diffusion	Obstacles to organizational learning	Threat of potential new entrants, Threat of Substitutes for an Industry's Offerings, Power of Suppliers to an Industry, Power of an Industry's Buyers
S-9,10		**Lab2:**Case Studies- Retail management application using salesforce	**Lab5:** Case study on how to use different tools and equipment for Designing Innovation Communities	**Lab 8:**Technology forcast using data tool	**Lab 11:** Select a process that we do day by day, automate it using any programming language	**Lab 14:** Case study: Study the inventory system of any factory and present it
S-11	SLO-1	Digital Marketing	Roles and Responsibilities of the Product Manager, Marketing Challenges and Guiding Principles, Customer Development and Crossing the Chasm	Implementation of New Technology, Automation, and Business Case Development	Building a learning organization	Limitations of Five Forces Analysis, Market Demand Analysis ✓ Market identification ✓ Business cycle ✓ Product niche Evaluate competition

	SLO-2	Leadership and Ethics	Technology Acquisition and Forecasting	Implementing New Technologies overview	Implementing an Effective Corporate Learning Strategy	Evaluating Industry Trend, Market Demand, and Business Needs
S-12	SLO-1	Strategic Management	Acquisition Laws, Regulations, and Policies	Marketing Perspective	Corporate research overview	Technology Leader overview, Technology steward overview, Aspects of Technology Leadership
	SLO-2	Technology and Innovation Management	Business Planning, Need and Establishing the Acquisition Team	Framework for implementation	Importance of Corporate research	Assessment and forecasting Technology assessment Technology forecasting
S-13	SLO-1	Principles of Technology Innovation Management	Planning for IT Acquisitions	Multiple internal markets	Business Benefits of Corporate research	Technology management and transfer, Technology assessment techniques, Adopting Project management methodologies from different industries
	SLO-2	Technology Entrepreneurship	Acquisition Strategy, Plan, and Implementation	Promotion vs hype	Why is corporate innovation needed, Getting started with corporate innovation	Build in time to experiment and fail, Taking the management out of project management
S- 14-15	SLO-1	**Lab3:**perform SWOT analysis of any website using tool	Lab 6: Program management using tool	**Lab 9:** Market analysis (Analysis the market and produce a case study about the current market needs)	**Lab 12:** Casestudy: Implementing an Effective Corporate Learning Strategy	**Lab 15:**Case studies with top leaders like Rata Tata, Narayana Murthy, Laxmi Mittal etc

Learning Resources	1. V. K. Narayanan, Gina Colarelli O'Connor, (2010), "Encyclopediaof Technology and Innovation", John Wiley & SonsLtdScott Shane, (2008), "The Handbook of Technology and Innovation Management", John Wiley & Sons Ltd 2. Robert S. Friedman, Desiree M. Roberts, Jonathan D. Linton, (2008),"Principle Concepts of Technology and Innovation Management: Critical Research models", Information science reference 3. Marc J. de Vries, (2021), "Innovation Research in Technology andEngineering Management – A Philosophical Approach", Routledge Mark Dodgson, David Gann, Ammon Salter, (2008), "The Management of Technological Innovation – Strategy and Practice", Oxford University Press

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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 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts from Industry	Experts from Higher Technical Institutions	*Mrs. K. Kanmani, SRMIST*
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	

Course Code	UDS23D08J	Course Name	SOCIAL MEDIA AND TEXT ANALYTICS	Course Category	D	Discipline Specific Elective Course	L	T	P	C	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)

		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
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	To leverage the power of the R eco-system to extract, process, analyze, visualize and model social media data																		
CLR-2 :	Visualize and analyze data from social media platforms to understand and model complex relationships using various concepts and techniques																		
CLR-3 :	Understand the fundamentals of text mining																		
CLR-4 :	Utilize text for prediction techniques																		
CLR-5 :	Understand the relevance between information retrieval and text mining																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	Understand the basics of social media analytics and R language	3	80	70	L	H	-	H	L	M	L	-	L	L	-	H	-	L	-
CLO-2 :	Analyze data from major social media channels such as Twitter & Flickr	3	85	75	M	H	L	M	L	M	-	-	M	L	-	H	-	-	M
CLO-3 :	Acquire knowledge on fundamentals of text mining	3	75	70	M	H	M	H	L	M	-	-	M	L	-	H	-	-	-
CLO-4 :	Perform prediction from text and evaluate it	3	85	80	M	H	M	H	L	M	-	-	M	L	L	H	-	L	M
CLO-5 :	Perform document matching	3	85	75	H	H	M	H	L	M	-	-	M	L	-	H	M	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Getting Started with R and Social Media Analytics	Visualizing data	Overview of Text Mining	Using Text for Prediction	Finding Structure in a Document Collection
	SLO-2	Understanding social media	Managing packages	What's Special About Text Mining?	Recognizing that Documents Fit a Pattern	
S-2	SLO-1	Advantages and Significance of social media	Data analytics - Analytics workflow	Structured or Unstructured Data	How Many Documents Are Enough?	Clustering Documents by Similarity
	SLO-2	Disadvantages and Pitfalls of social media	Machine learning techniques	Is Text Different from Numbers?	Document Classification	Similarity of Composite Documents
S-3	SLO-1	Social media analytics	Supervised learning, Unsupervised learning	What Types of Problems Can Be Solved?	Learning to Predict from Text	k-Means Clustering
	SLO-2	A typical social media analytics workflow	Text analytics	Document Classification	Similarity and Nearest-Neighbor Methods	
S-4,5	**SLO-1**	***Lab 1: Simple Text Analytics***	***Lab 4: Text Analytics***	***Lab 7: Working with Classification***	***Lab 10: Working with Document Classification***	***Lab 13: implementing clustering algorithm***
S-6	SLO-2	Opportunities and Challenges	Registering an application	Clustering and Organizing Documents	Decision Rules	
	SLO-2					
S-7	SLO-1	Data Science vs. Artificial Intelligence	Connecting to Twitter using R	Information Extraction	Decision Trees	The EM Algorithm
	SLO-2	Types of Analysis	Extracting sample Tweets	Prediction and Evaluation	Scoring by Probabilities	
S-8	SLO-1	Similarities Between Data Science and Business Intelligence	Trend analysis	From Textual Information to Numerical Vectors	Linear Scoring Methods	What Do a Cluster's Labels Mean?
	SLO-2	Data Science alignment with Business Intelligence		Collecting Documents	Evaluation of Performance - Estimating Current and Future Performance	Applications, Evaluation of Performance
S-9,10	SLO-1	***Lab 2: Working with Data structures***	***Lab 5: Working with Twitter data***	***Lab 8: Information Extraction***	***Lab 11: Decision Trees***	***Lab 14: EM Algorithm***
S-11	SLO-1	Data Science Reinforcement with Business Intelligence	Sentiment analysis	Document Standardization	Getting the Most from a Learning Method	Case Study: Market Intelligence from the Web
	SLO-2	Data Science and Business Intelligence Together: Future	Key concepts of sentiment analysis – Subjectivity, Sentiment polarity	Tokenization	Errors and Pitfalls in Big Data Evaluation	

S-12	SLO-1	Three Features for Data Science and Business Intelligence	Opinion summarization	Lemmatization-Inflectional Stemming	Information Retrieval and Text Mining	Case Study: Lightweight Document Matching for Digital Libraries
	SLO-2	Getting Started with Data Science, BusinessIntelligence and AI Journey	Features	Stemming to a Root	Is Information Retrieval a Form of Text Mining?	
S-13	SLO1	Functions - Built-in functions User-defined functions	Sentiment analysis in R	Vector Generation for Prediction Multiword Features	Key Word Search Nearest-Neighbor Methods	Mining social media
	SLO-2	Controlling code flow - Looping constructs, Conditional constructs	Follower graph analysis, Flickr Data Analysis	Labels for the Right Answers, Feature Selection by Attribute Ranking, Sentence Boundary Determination	Measuring Similarity -Shared Word Count, Word Count and Bonus, Cosine Similarity	E-mail Filtering
S-14,15	SLO-1	***Lab 3: Working with Looping and functions***	***Lab 6: Working with Flickr Data Analysis***	***Lab 9: Phrase Recognition***	***Lab 12: Nearest-Neighbor Methods***	**Lab 15: Developing social media Listening Program**

Learning Resources	Raghav Bali, Dipanjan Sarkar, Tushar Sharma, (2017)," Learning Social Media Analytics with R", Packt Publishing.	2. Sholom M. Weiss, Nitin Indurkhya, Tong Zhang, (2015), "Fundamentals of Predictive Text Mining", Second Edition, Springer London.
	3. 5. Matthew A.Russell, "Mining the social web", 2nd edition- O'Reilly Media, 2013 4. Seven Layers of Social Media Analytics_ Mining Business Insights from Social Media Text, Actions, Networks, Hyperlinks, Apps, Search Engine, and Location Data, Gohar F. Khan,(ISBN-10: 1507823207).	5. Mining the Social Web_ Analyzing Data from Facebook, Twitter, LinkedIn, and Other Social Media Sites, Matthew A Russell, O'Reilly, Media.,2013 6.Charu Aggarwal (ed.), Social Network Data Analytics, Springer, 2011

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 %

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Experts from Industry	Experts from Higher Technical Institutions	*Mrs. K. Kanmani, SRMIST*
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	

Course Code	UDS23D09T	Course Name	*Statistical Analysis and Business Applications*	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:	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking	Expected	Expected Attainment (%)
CLR-1 :	Create an understanding on the use of Statistical concepts applied in Business Applications			
CLR-2 :	Give overview to Applications of Differential/Inferential Statistics in Business Applications			
CLR-3 :	Clarify the concepts of Exploratory Data Analysis, Types of Distributions, Anova, Regression, Bagging and Boosting.			
CLR-4 :	Learn about the Statistical Machine Learning			
CLR-5 :	Implementation of Statistics in data science			
CLR-6 :	Apply Statistical analysis in data science for Business Applications			

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	Application of	Link with Related	Procedural	Skills in Specialization	Ability to Utilize	Skills in Modeling	Analyze, Interpret	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Learning the importance of Exploratory Data Analysis and Correlation	2	85	80	H	-	-	-	-	-	-	M	-	L	-	-	-	-	-
CLO-2 :	Applying Statistics in data science and learning about Hypothesis Tests and Distributions	3	85	80	-	H	-	-	-	-	-	-	M	L	-	-	-	-	-
CLO-3 :	Understanding about Anova, Multiple Linear Regression and classification	3	85	80	-	H	-	-	-	-	-	-	M	M	-	H	-	-	H
CLO-4 :	Interpretation of hypothesis testing, ROC curve, One Hot Encoder and sampling methods	3	85	80	-	-	H	-	L	-	-	M	-	-	-	H	-	L	H
CLO-5 :	Knowledge of Bagging and Boosting	3	85	80	L	-	M	-	H	-	-	H	M	L	-	H	-	-	L

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Exploratory Data Analysis	Confidence Intervals	Degrees of Freedom	Predicted Values from Logistic Regression	Impurity
	SLO-2	Types of data	Normal Distribution	Anova, two-way Anova	Linear and Logistic Regression: Similarities and Differences	pruning
S-2	SLO-1	Rectangular and non Rectangular data	Long-Tailed Distributions	Chi-Square Test	Fitting the model	Measuring Homogeneity or Impurity
	SLO-2	Estimates of Location Mean, Median, mode, robust. outlier	Student's t-Distribution	Regression and Prediction	Evaluating Classification Models	Stopping the Tree from Growing
S-3	SLO-1	Deviations, Variance	Binomial Distribution	Simple Linear Regression	Accuracy	Bagging and the Random Forest
	SLO-2	Standard deviation,Mean absolute deviation,Median absolute deviation from the median, range, percentile, inter quartile range,	Chi-Square Distribution	Fitted Values and Residuals	Confusion matrix	Bagging
S-4	SLO-1	Exploring the Data Distribution	F-Distribution	Least Squares	Sensitivity,Specificity,	Random Forest
	SLO-2	Estimates of Variability	Poisson and Related Distributions	Multiple Linear Regression	Precision,ROC curve	Variable Importance
S-5	SLO-1	Percentiles and Boxplots	Exponential Distribution	Cross-Validation	Lift	Hyperparameters
	SLO-2	Density Plots and Estimates	Statistical Experiments and Significance Testing	Factor Variables in Regression	AUC	Boosting
S-6	SLO-1	Frequency Tables and Histograms	A/B Testing	Dummy Variables Representation	Strategies for Imbalanced Data	The Boosting Algorithm
	SLO-2	Exploring Binary and Categorical Data	Control Group	Multicollinearity	Undersampling	XGBoost
S-7	SLO-1	Correlation	Hypothesis Tests	Multicollinearity	Down sampling	Regularization: Avoiding Overfitting
	SLO-2	Scatterplot	Null hypothesis	Heteroskedasticity error	Data Generation	Hyperparameters and Cross-Validation

S-8	**SLO-1**	Plot for Exploring Two or More Variables	The Null Hypothesis	Non-Normality errors	Statistical Machine Learning	Unsupervised Learning
	SLO-2	Hexagonal Binning and violin, Contours plot	Alternative Hypothesis	Correlated errors	K-Nearest Neighbors	Principal Components Analysis
S-9	**SLO-1**	Categorical and Numeric Data	One-Way Versus Two-Way Hypothesis Tests	Classification	Distance Metrics	A Simple Example
	SLO-2	Data and Sampling Distributions, Random Sampling and Sample Bias	Resampling	Related terms in classification	One Hot Encoder	Computing the Principal Components
S-10	**SLO-1**	Sampling types	Permutation test	Naive Bayes	Standardization	Interpreting Principal Components
	SLO-2	Size Versus Quality	Statistical Significance and p-Values	Conditional probability	Choosing K	K-Means Clustering
S-11	**SLO-1**	Sampling Distribution of a Statistic	p-value, Alpha	Posterior probability	KNN as a Feature Engine	A Simple Example
	SLO-2	Central limit theorem	Type 1 and Type 2 Errors	Discriminant Analysis	Tree Models	Steps for K-Means Algorithm
S-12	**SLO-1**	Standard Error	Test statistic	Covariance Matrix	Key terms for tree model	Interpreting the Clusters
	SLO-2	Resampling Versus Bootstrapping	t-statistic, t-distribution	Logistic Regression	Loss	Selecting the Number of Clusters

Learning Resources	1. Text Book: Practical Statistics for Data Scientists, Author: Peter Bruce & Andrew Bruce, Publisher(s): O'Reilly Media, Inc. 2. Reference: R FOR STATISTICS, Authors: Pierre-Andre Cornillon, Arnaud Guyader, Francois Husson, publisher: CRC Press

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%	-	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, 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
Experts from Industry	Experts from Higher Technical Institutions	*Dr. P. Chanthini, Assistant Professor, SRMIST*
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	

Course Code	UDS23D10T	Course Name	Applications of Edge IoT and ML	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			

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 concepts of IoT and its possible application areas			
CLR-2 :	Understand the various IoT architectures along with compute and management stack across layers			
CLR-3 :	Understand the architecture dissected at physical, Communication and Access levels			
CLR-4 :	Be able to understand and manage the knowledge of models and principles and key techniques for IOT data analytics.			
CLR-5 :	Understand the various enabling technologies for IOT including Big data analytics, Machine learning, Cloud and Streaming analytics			
Course Learning Outcome: At the end of this course, learners will be able to:				
CLO-1 :	Appreciate the omnipotent presence of IOT in all fields across globe	2	80	85
CLO-2 :	Compare and contrast various architectures and be able to justify the right choice for adoption	2	75	80
CLO-3 :	Choose appropriate protocols for various levels/layers based on the requirement in hand	2	85	80
CLO-4 :	Implement using the available resources and demonstrate quick to deployment skills wherever applicable	2	80	75
CLO-5 :	Be able to identify and implement practical IOT applications with data analytics techniques	2	75	85

	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
CLR-1 :															
CLR-2 :															
CLR-3 :															
CLR-4 :															
CLR-5 :															
CLO-1 :	H	-	-	-	-	M	-	-	-	-	-	-	-	-	-
CLO-2 :	H	H	-	-	-	-	-	-	-	-	-	H	-	L	-
CLO-3 :	H	M	H	-	-	M	-	-	M	M	-	-	-	-	-
CLO-4 :	H	H	H	M	H	-	L	H	-	M	-	M	-	-	H
CLO-5 :	H	M	H	H	H	-	-	M	M	-	-	-	-	L	H

Duration (hour)		12	12	12	12	12
S-1	**SLO-1**	Introduction to IoT	IoT Network Architecture and Design	Smart Objects: The "Things" in IoT	Introducing IoT Analytics	Apache Spark for data processing
	SLO-2	Genesis of IoT	Drivers Behind New Network Architectures	Sensors, Actuators, Micro-Electro-Mechanical Systems	IoT Analytics for the Cloud	Spark and big data analytics
S-2	**SLO-1**	IoT and Digitization	Scale	Smart Objects: A Definition	Building elastic analytics	Using Spark for IoT data processing
	SLO-2	IoT Impact	Security	Trends in Smart Objects	Designing for scale	Lambda architectures
S-3	**SLO-1**	Convergence of IT and IoT	Constrained Devices and Networks	Sensor Networks	Cloud security and analytics Public/private keys, Public versus private subnets	Getting to Know Your Data - Exploring IoT Data, Exploring and visualizing data
	SLO-2	IoT Challenges	Constrained Devices and Networks	Connecting Smart Objects	Access restrictions, Securing customer data	The Tableau overview
S-4	**SLO-1**	Introduction, IoT Data and BigData	Comparing IoT Architectures	Communications Criteria	The AWS overview: AWS key concepts, AWS key core services	Techniques to understand data quality
	SLO-2	IoT Conceptual Framework	The oneM2M IoT Standardized Architecture	IoT Access Technologies – Introduction	AWS key services for IoT analytics	Data completeness
S-5	**SLO-1**	Data Flow of IoT	The IoT World Forum (IoTWF) Standardized Architecture	IoT Access Technologies-Definitions	Microsoft Azure overview: Azure Data Lake Store, Azure Analysis Services	Data validity
	SLO-2	IoT Architectural View	Layer 1: Physical Devices and Controllers Layer	IP as the IoT Network Layer	The ThingWorx overview	Basic time series analysis
S-6	**SLO-1**	Technology Behind IoT	Layer 2: Connectivity Layer	The Business Case for IP	Creating an AWS Cloud Analytics Environment:	Machine Learning
	SLO-2	Sources of IoT	Layer 3: Edge Computing Layer	The Need for Optimization	The AWS Virtual Private Cloud (VPC) setup walk-through	Machine Learning Overview
S-7	**SLO-1**	M2M Communication	Upper Layers: Layers 4-7	Optimizing IP for IoT	Creating a key pair for the NAT and bastion instances	Supervised Learning
	SLO-2	Examples of IoT	A Simplified IoT Architecture	Profiles and Compliances	Creating an S3 bucket to store data	Unsupervised Learning
S-8	**SLO-1**	Design Priciples for Connected Device	The Core IoT Functional Stack	Internet Protocol for Smart Objects (IPSO) Alliance	Creating a VPC for IoT Analytics	Machine Learning and Getting Intelligence from Big Data
	SLO-2	IoT/M2M Systems, Layers and Designs Standardisation	Layer 1: Things: Sensors and Actuators Layer	Wi-SUN Alliance	How to terminate and clean up the environment	Predictive Analytics
S-9	**SLO-1**	Modified OSI Model for the IoT/M2M Systems	Layer 2: Communications Network Layer	IPv6 Ready Logo	ThingSpeak an Overview	Edge Streaming Analytics
	SLO-2	ITU-T Reference Model	Layer 3: Applications and Analytics Layer	IoT Application transport methods-Definitions	Setup and Configuring ThingSpeak	Comparing Big Data and Edge Analytics

S-10	**SLO-1**	ETSI M2M Domains and High-level Capabilities	Analytics Versus Control Applications	Application Layer Protocol Not Present SCADA	Collecting All That Data - Strategies and Techniques:	Edge Analytics Core Functions
	SLO-2	Communication Technologies	Data Analytics Versus Business Benefits	A Little Background on SCADA	Designing data processing for analytics	Distributed Analytics Systems
S-11	**SLO-1**	Wired Communication Technology	IoT Data Management and Compute Stack	Adapting SCADA for IP	Applying big data technology to storage: Hadoop	Network Analytics
	SLO-2	Communication Technologies—A Comparison	Fog Computing	SCADA Protocol Translation	Hadoop cluster architectures	Flexible NetFlow Architecture
S-12	**SLO-1**	Data enrichment, data Consolidation and device Management at gateway	Edge Computing	IoT Application Layer Protocols	Hadoop Distributed File System	FNF Components
	SLO-2	Device-management Gateway	The Hierarchy of Edge, Fog, and Cloud	Message Queuing Telemetry Transport (MQTT)	Parquet, Avro, Hive,SerDe, YARN	Flexible NetFlow in Multiservice IoT Networks

Learning Resources	1. ***Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill Education (India) Private Limited, ISBN-13: 978-93-5260-522-4*** 2. ***IIoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by Rob Barton, Gonzalo Salgueiro, David Hanes, Publisher: Cisco Press, Release Date: June 2017, ISBN: 9780134307091 (https://www.oreilly.com/library/view/iot-fundamentals-networking/9780134307091/)***

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%	-	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, 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
Experts from Industry	Experts from Higher Technical Institutions	*Dr. L. Selvam SRMIST*
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	

Course Code	UDS23G07T	Course Name	BASICS OF CYBER SECURITY	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	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1:	Learn the foundations of Cyber security and threat landscape			
CLR-2:	Equip with the technical knowledge and skills needed to protect and defend against cyber threats.			
CLR-3:	Develop skills that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.			
CLR-4:	Expose students to responsible use of online social media networks.			
CLR-5:	Expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of cyber security			

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 concept of Cyber security and issues and challenges associated with it.	2	85	80	H	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-2:	Analyze about the various kinds of Cyber Security threats and scan them.	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-3:	Identify the privacy and challenges related to social media and E-Commerce	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-4:	Identify the Tools and Technologies for Cyber Security	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-5:	Analyze the best practice of Cyber Security	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H

Duration (hour)		12	12	12	12	12
S-1	**SLO-1**	Introduction to Cyber security	Cyber Security Threats	Introduction to Social media platforms	Digital Devices Security, Tools and Technologies for Cyber Security:	Ethical and Unethical Hacking
S-2	**SLO-1**	Cyberspace	Cyberthreat actors	Social media monitoring-Hashtag	End Point device and Mobile phone security	Classification of cyber crimes
S-3	SLO-1	Architecture of cyberspace	What are information security threats?	Social media privacy	Password policy	cyber crime targeting computers and mobiles
S-4	SLO-1	Communication and web technology	Malware attack	Challenges and issues related to social media	Security patch management	cyber crime against women and children
S-5	SLO-1	Overview of Computer and -Web-technology	Social engineering attacks	Laws regarding posting of inappropriate content	Data backup	financial frauds
S-6	SLO-1	Advent of internet	Software supply chain attacks	Best practices for the use of Social media, Case studies.	Downloading and management of third party software	Reporting of cyber crimes
S-7	SLO-1	IT infrastructure	Advanced persistent threats (APT)	Definition of E- Commerce, E-Commerce threats	Device security policy	Remedial and mitigation measures
S-8	SLO-1	Types of IT infrastructure	Distributed denial of service (DDoS)	Digital payments	Cyber Security best practices	Legal perspective of cyber crime
S-9	SLO-1	Regulation of cyberspace	Man-in-the-middle attack (MitM)	Modes of digital payments	Significance of host firewall and Ant-virus	IT Act 2000 and its amendments
S-10	SLO-1	Concept of cyber security	Password attacks	Digital payments related common frauds and preventive measures	Management of host firewall and Anti-virus	Cyber-crime and offenses
S-11	SLO-1	Issues in cyber Security	Emerging information security threats and challenges	RBI guidelines on digital payments	Wi-Fi security	Organizations dealing with Cyber-crime and Cyber security in India
S-12	SLO-1	Challenges of cyber security	Threat intelligence for threat prevention	Customer protection in unauthorized banking transactions	Configuration of basic security policy and permissions	Case studies

Learning Resources	
	1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011) **2.** Cyber Security: Threats and Responses for Government and Business, Jack Caravelli, Nigel Jones · 2019 **3.** Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001) **4.** Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd. **5.** Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.

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	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 Industry	Experts from Higher Technical Institutions	Internal Experts
Experts from Industry	Experts from Higher Technical Institutions	*Dr. P. Chanthini, Assistant Professor, SRMIST,KTR,Campus.*
Mr. Vignesh Mani, Tech Lead, HCL Technology, Chennai	*Dr. S. Gopinathan, Professor, Department of Computer Science, University of Madras, Chennai*	

Course Code	UDS23P06L	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)

		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:	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
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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)	
Project Phase-II	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)

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 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 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
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

	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
internship	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,

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:	Learning: 1 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 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 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 :	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

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Learning Assessment

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

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 Level of Thinking (Bloom)	2 Expected Proficiency (%)	3 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
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

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

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 (%)	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
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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				
	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
internship	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,

CLR-1 :	Demonstrate skills learnt in the real time environment.
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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

Learning

Program Learning Outcomes (PLO)

	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 :	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

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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	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		

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