## ACADEMIC CURRICULA

## UNDERGRADUATE DEGREE PROGRAMMES

**Bachelor of Science** 

(B.Sc. Mathematics)

Three Years

Learning Outcomes based Curriculum Framework(LOCF)

Academic Year

2020 - 2021



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

Kattankulathur-603203, Chengalpattu District, Tamil Nadu, India

Department Vision Statement	4
Department Mission Statement	4
Program Education Objectives (PEO)	4
Program Specific Outcomes (PSO)	4
Consistency of PEO's with Mission of the Department	4
Consistency of PEO's with Program Learning Outcomes (PLO)	4
Programme Structure	5
	6
Program Articulation Matrix	7
Structure of LIG Courses in Mathematics	8
SEMESTER I	0
Tamil-I	Q
Hindi,I	12
French-I	14
	14
	10
	22
	22
Soft Skille	23
SEMESTED II	20
	30
	20
	34
	36
	38
Vector calculus Fourier series and Transforms	
	41
	44
	40
	40
Serves FER III	40
	49 51
	53
	55
	50
	59
	62
Java Programming	03
Scientific Documentation and Statistical Tools	67
Python Programming	60
	09
SEMSTER IV	74
	71
Fuzzy Mathematics	74
	11
Astronomy	08
	83
My India Project	85
Mathematical Software Matlab	86
Mathematical Software Scilab	88
Professional Skills	90

SEMESTER V	
Algebraic Structures	92
Real Analysis	94
Graph Theory	97
Sequence and Series	100
Linear Algebra	103
Environmental Studies	106
Leadership and Management Skills	108
SEMESTER VI	
Complex Analysis	110
Mechanics	113
Project Work	116
ALLIED	
Allied Mathematics I	117
Allied Mathematics II	119



<b>1.</b> Dep	partment Vision Statement										
Stmt - 1	Stmt - 1 To impart education and disseminate knowledge with high standards in Mathematics, Engineering and Technology in our academic pursuit.										
Stmt - 2	To emerge as a world class hub of research that creates a center of excellence in mathematics.										
Stmt – 3	To develop mathematical thinking and applying it to solve problems, designing mathematical modeling for systems involving global level technology.										

2.	Depa	Department Mission Statement												
Stmt -	t – 1 To upgrade the student's knowledge to meet the academic changes.													
Stmt -	- 2	To equip the students with the necessary mathematical tools to meet the competitive global environment.												
Stmt -	- 3	To provide an environment where students can learn and become competent users of mathematics and its applications.												
Stmt -	- 4	To enable students pursue more advanced study in pure mathematics, applied mathematics and related areas.												
Stmt -	- 5	Developing the students for professional careers in disciplines which make use of the mathematical sciences.												

3.	Program Educational Objectives (PEO)											
PEO -	1	Acquire knowledge, Skill, Aptitude and Analytical ability.										
PEO -	2	Creates mathematical models.										
PEO -	3	Develops the skill to think critically on abstract concepts of mathematics.										
PEO -	4	Formulate and develop mathematical arguments in a logical manner.										
PEO -	5	Acquire domain knowledge to pursue higher education and research.										

4.	. Program Specific Outcomes (PSO)												
PSO -	- 1 Graduates will acquire good knowledge and understanding in advanced areas of mathematics and statistics.												
PSO -	2	Graduates will develop and formulate mathematical arguments in a logical manner.											
PSO -	3	Graduates will be able to use the facility with mathematical and computational modeling of real decision making.											

5. Cons	5. Consistency of PEO's with Mission of the Department														
	Mission Stmt. – 1 Mission Stmt. – 2 Mission Stmt. – 3 Mission Stmt 4 Mission Stmt 4														
PEO – 1	Н	М	Н	L	М										
PEO – 2	Н	Н	Н	М	М										
PEO – 3	Н	М	Н	Н	Н										
PEO – 4	Н	L	Н	М	Н										
PEO - 5	Н	Н	М	Н	М										

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

6. Con:	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	Н	Н	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	Н	Н	Н
PEO – 2	Н	М	Н	Н	Н	Н	Н	Н	Н	Н	L	Н	Н	Н	Н
PEO – 3	Н	Н	Н	L	Н	Н	Н	Н	Н	Н	Н	М	Н	Н	Н
PEO – 4	Н	Н	Н	Н	Н	М	Н	Н	Н	Н	Н	Н	L	Н	Н
PEO - 5	Н	Н	Н	Н	Н	Н	Н	L	Н	Н	Н	Н	Н	Н	Н

7. Prog	gramme Structure							Γ									
	1. Professional Co	ore Courses (C)															
	(12 C	ourses)								2. [	Disci	pline Sp	pecific Elect	tive Cours	ses	(E)	
Course	Co	urse	١	lour: Nee	s/ k						(4	4 Cours	es)				
Code	Т	itle	L	Т	Ρ	С		Course				Course	e	H	lour Nee	s/	
UMA20101T	Algebra and Trigon	ometry	5	1	0	6								1100	, K		
UMA20102T	Analytical Geometry	/	5	1	0	6		Code				Title		L	Т	Ρ	С
UMA20103T	Numerical Analysis		5	1	0	6		UMA20D01	T Nu	umber Th	eory						
UMA20201T	Transforms	ns and Laplace	5	1	0	6		UMA20D02	т Ор	perations	Res	earch		5	1	0	6
UMA20202T	Calculus		5	1	0	6		UMA20D03		ombinato	rics	atics					
UMA20203T	Vector calculus, For	urier series and	5	1	0	6				roduction	n to F	Partial D	ifferential		4		c
UMA20301T	Probability and Stat	istics	5	1	0	6	-	UWAZUDUS	' Eq	uations				5	1	0	0
UMA20401T	Discrete Mathemati	CS	5	1	0	6		UMA20D06	T Ast	tronomy							
UMA20501T	Algebraic Structure	S	5	1	0	6		UMA20D07	T Gra	aph The	ory						_
UMA20502T	Real Analysis		5	1	0	6		UMA20D08	T Se	quence	and S	Series		5	1	0	6
UMA20601T	Complex Analysis		5	1	0	6								0	0	10	c
UMA20602T	Mechanics		5	1	0	6		UMAZUDTU		oject vvo	rk	<b>T</b> ( )		0	0	12	0
	To	tal Learning Cred	its			72						Total	Learning Cr	edits			24
	4 Skill Enhance	ment Courses (S															
	(6 Co	urses)	·						3	3. Gene	ric El	lective (	Courses (G)				
Course	Co	irse		Ηοι	urs/						(4 (	Courses	;)) ;))				
Course			_	We	ek	_		Course			(	Course			Ηοι	irs/	
Code	Ti	tle	L	. T		P (	)	Code				Title			We	ek ·	
UMA20S01L			(	0	) .	4 2	2		Tamil_I	<u> </u>		Tiue				F	
UMA20S02L	Java Programming								-lindi I					2	0	2	2
UMA20S03L	Scientific Documentat	ion and Statistical				, ,	,			. 1				2		2	3
UMA20S04L	PYTHON Programmir	ng	-		, I.	7	-			I-I II							
UMA20S05L	Mathematical Softwar	e MATLAB		+													
LIMA20.506L	Mathematical Softwar	e SCILAB	- (	0	)	4 2	2	ULH20G02J	2J Hindi-II							2	3
	My India Proiect		0			0 /	1	ULF20G02J	-rench	1-II							
	Soft Skills				<u>, , , , , , , , , , , , , , , , , , , </u>	2 /	1	UPY20A01J	Allied F	Physics				4	0	4	6
		and Passoning			, ·	2	1			Inemistr	y		O an all'the	4	0	4	0
000203021	Total Learn	ning Credits			, ,	2	, )			l Ota	ai Le	arning	Credits				18
	f leaven l																
	6. Jeevan i (4 Co	vausnai(Jrv) urses)							5	Ability E	Inha	ncomor	t Courses	(A)			
Course	( · · · ·	1700		Hour	rs/				J. /	Ability E	(2	Courses	s)	(~)			
Course			_	Wee	ek –			Course				Course		H	lou	rs/	
		tle			P	0		Orde				T'll.			Wee	ek –	~
UJK2UZUTL	Communication Skills	5	0	0	4	2		Code				litte		L		P	C
UJK203011	Diversal Human va	lues	2	0	0	2		ULEZUAETT	Englis	sn	0	P		4	0	0	4
	Protessional Skills	anoment ekille	2	0	0	2		UESZUAETT	EIIVIIO	onmental	Siuc		Learning C	د ا redite	0	0	3 7
0JK205011		agement skills	2	0	0	2						Total	Leanning Ci	icuits			'
	Total Leali		7 5	- <b>1</b>		0			4								
			7. E	aen	510	1 acti (1 C	oun	(NG/NC/NU/YG se)	)								
		Course				Co	ours	e		Hour	s/						
		Code				Т	- itle			VVee	K P	C					
		UNS202011 NS	S	_	_		au					5					
		UNC20201L NC	C	_								0					
		UNO20201L NS	0								U	0					
		UYG20201L YO	GA														
							T	otal Learning C	redits			0					
S SRMIST STR HE STUDENTS	RONGLY ENCOURAG ARE ENCOURAGEI SOR AND THE CREDI	ES THE USE OF TO CHOOSE A TS WILL BE TRA	SWAY TLEAS NSFEF	AM T O RREI	(St )NE D	udy V COR	T Veb E/ I	otal Learning C of Active Learn ELECTIVE COU	ning by RSE F	y Learn FROM S	ing k WAY	0 by Your (AM ON	ng and Aspi I THE RECO	ring Mino OMMEND	ds) ATI	PLA' ON (	TFO DF

<b>8.</b> Im	plementation Plan												
	Semester – I							Semester – II					
Code	Course Title	H V	ours Veek	/ P	С		Code	Course Title	L	Hour Wee T	s/ k P	С	
ULT20G01J	Tamil-I	-	•	•			ULT20G02J ULH20G02J	Tamil-II Hindi-II	2	0	2	3	
ULH20G01J	Hindi-I	French-II Differential Equations and Laplace	_										
ULF20G01J	French-I	UMA20201T Differential Equations and Explace 5 UMA20202T Calculus 5								1	0	6 6	
ULE20AE1T	English	4	0	0	4		UMA20203T	Vector calculus, Fourier series and Transforms	5	1	0	6	
UMA20101T	Algebra and Trigonometry	5	1	0	6		UCD20S02L	Quantitative Aptitude and Reasoning	0	0	2	1	
UMA20102T	Analytical Geometry	5	1	0	6		UJK20201L		0	0	4	2	
UMA20103T	Numerical Analysis	5	1	0	6		UNC20201L	NCC			0	0	
UCD20S01L	Soft Skills	0	0	2	1		UNO20201L	NSO			0	0	
	Total Looming Credito				26		UYG20201L	YOGA					
	Total Learning Credits				20			Total Learning Credit	S			24	
	Total number of hours /week				30			Total number of hours /wee	k			30	
	Semester – III							Semester - IV					
		ł	Hour	s/					Hours/				
Code	Course Title	L	Wee T	k P	C		Code	Course Title	V L	Veek T	P	С	
UMA20301 UMA20D01	T Number Theory	5	1	0	6		UMA20401T	Discrete Mathematics	5	1	0	6	
UMA20D02	T Operations Research	5	1	0	6		UMA20D04T	Fuzzy Mathematics					
UMA20D03	T Combinatorics		/ 	, v	0		UMA20D05T	Introduction to Partial Differential Equations	5	1	0	6	
	J Allied Physics	4	0	4	6	-	UMA20D06T	Astronomy	Ŭ	'	Ĭ	Ū	
UMA20S02	L JAVA Programming	0	0	4	2		UCY20A03J	Allied Chemistry	4	0	4	6	
111111	Scientific Documentation and Statistical						UMI20S01L	My India Project Mathematical Software MATLAB	0	0	0	1	
	Tools	0	0	4	2		UMA20S06L	Mathematical Software SCILAB	0	0	4	2	
UMA20504		2	0	0	2		UJK20401T	Professional skills	2	0	0	2	
0011200011	Total Learning Credi	ts		U	24			Total Learning Credits				23	
	Total number of hours /wee	ek			28			Total number of hours /week				24	
	-												
	Semester –V	1	Hour	s/				Semester - VI					
Code	Code     Course Title     Week     C       L     T     P     Code     Course Title								ł	Hour Wee	s/ k	С	
UMA20501	T Algebraic Structures	5	1	0	6		10000000	Complex Analysis	L	1	P	6	
UMA20502	real Analysis	5	1						5	1	0	0	
UMA20D07	T Sequence and Series	5	1	0	6		UMA20602T	Mechanics	5	1	0	6	
UMA20D09	T Linear Algebra						UMA20D10L	Project Work	0	0	12	6	
UES20AE1 UJK20501	Environmental Studies     Leadership and Management skills	3	0	0	3			Total Learning Credits	arning Credits				
	Total Learning Credits 23 Total number of hours (week 24												
	Total number of hours /wee	ek			23			I OTAL NUMBER OF NOURS /WEE	ĸ			24	

9. Progran	n Articulation Matrix															
						Pr	ogran	nme l	Learn	ing C	)utcor	nes				
																1
																1
																1
																1
Course Code	Course Name															
Course Coue	Course Marine			Des			ge									
		ge	ots	ild.	a	E	/led		ŋ							
		vlec	leo	Disc	fight	atic	NOL N		Dat		kills	kills			vior	_
		Nor	Cor	1 2 2	wle	aliz	고	бu	ret	kills	gS	S			sha	ing
		ТК	of (	late	ŝ	ci.	lize	Jelli	de	Ś	Vin	tior	kills		Å	arr
		ente	no	R	폡	Spe	Ę	Moc	Int	Itive	So	lica	S	6	ona	Ľ
		ame	cati	۲ţ	npe	Ľ.	/to	Ш.	Ze,	tiga	em	nur	tice	kili	ssic	l Ď
		pu	plic	ξ	00	dills	ilit	dills	laly	ves	lqo	Ш	Jal y	Ξ	ofe	e.
		ц	AF	<u> </u>	2	т,	Ak	ъ.	Ar	<u> </u>	4	ŭ	Ar	<u> </u>	۲ <u>۲</u>	<u> </u>
UMA20101T	Algebra and Trigonometry	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	M	Н	L_	Н	H
UMA20102T	Analytical Geometry	н	Н	н	н	н	н	н	н	н	н	M	Н		Н	H
UMA20103T	Numerical Analysis	н	Н	н	н	н	н	н	н	н	н	M	Н	M	Н	H
UMA20201T	Differential Equations and Laplace Transforms	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	M	Н	<u>⊢</u> L	Н	H
UMA20202T	Calculus	H	H	Н	H	Н	Н	M	Н	Н	Н	M	Н	<u>⊢ L</u>	H	H
UMA20203T	Vector calculus, Fourier series and Transforms	н	Н	н	M	н	н	M	н	н	н	M	Н		H	H
UMA20301T	Probability and Statistics	н	Н	н	M	н	н	M	н	н	н	M	Н		H	H
UMA204011	Discrete Mathematics	н	н	н	н	н	н	н	н	н	н	M	Н	<u>⊢</u> L	Н	H
UMA205011	Algebraic Structures	н	н	н	M	н	н	н	н	н	н	M	н		н	H
UMA205021	Real Analysis	н	н	н	н	н	н	н	н	н	н	M	н		н	H
UMA206011	Complex Analysis	н	н	н	н	н	н	н	н	н	н	M	н		н	H
UMA206021	Mechanics	н	н	н	M	н	н	н	н	н	н	M	н		H	H
UMA20D01T	Number Theory	н	н	н	н	н	н	н	н	н	н	Н	н	M	н	H
UMA20D021	Operations Research	н	н	н	н	н	н	н	н	н	н	M	н	н	н	H
UMA20D031		н	н	H	н	Н	н	н	н	н	н	M	н	H	H	M
UMA20D04T	Fuzzy Mathematics	н	H	IVI	IVI	IVI	н	н	Н	н	Н	IVI	Н	IVI	IVI	M
		н	Н	н	IVI	н	н	п	н	н	н	н	н	н	н	н
	Astronomy						п									
	Graph Theory		п				п									
					П		П			П		M		M		
	Droject Work				Ц	Ц			Ц		Ц	M		M		
		н	н	н	M	н	н	M	н	н	н	Н	н	M	н	н
	Hindi-I	н	н	н	M	н	н	M	н	M	н	н	н	Н	н	н
UILE200013	French-I	н	н	н	H	н	н	M	н	H	н	н	н	н	н	H
UI T20G02.	Tamil-II	н	н	н	M	н	н	M	н	н	н	н	н	M	н	H
ULH20G02J	Hindi-II	н	н	M	H	н	н	н	н	M	н	н	н	M	н	H
UI F20G02J	French-II	H	H	M	H	Н	H	Н	Н	M	Н	Н	Н	M	H	H
UPY20A01J	Allied Physics	H	H	H	H	H	H	Н	H	H	H	M	H	M	H	H
UCY20A03J	Allied Chemistry	Н	H	Н	H	Н	Н	Н	Н	Н	Н	M	H	М	H	H
UMA20S01L	C Programming	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	L	Н	М	М	H
UMA20S02L	JAVA Programming	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	L	Н	М	М	Н
UMA20S03L	Scientific Documentation and Statistical Tools	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	L	Н	М	Μ	Н
UMA20S04L	PYTHON Programming	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	L	Н	Н	Μ	Н
UMA20S05L	Mathematical Software MATLAB	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	L	Н	Н	Μ	Н
UMA20S06L	Mathematical Software SCILAB	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	L	Н	М	М	Н
UMI20S01L	My India Project	Н	Н	Μ	М	М	Н	Н	М	Н	Н	Н	Μ	М	Н	Н
UCD20S01L	Soft Skills	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	L	Н	М	М	Н
UCD20S02L	Quantitative Aptitude and Reasoning	Н	Н	Μ	М	М	Н	Н	М	Н	Н	Н	Μ	М	Н	Н
ULE20AE1T	English	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	Н	Н	Н	Н	Н
UES20AE1T	Environmental Studies	Н	Η	Η	Н	Н	Η	М	Н	Н	Н	L	Η	М	М	Н
UJK20201L	Communication Skills	H	Η	Η	Η	Η	Η	Н	Η	H	Η	Н	H	Н	Н	Н
UJK20301T	Universal Human Values	Η	Η	М	Н	Η	Н	Н	Η	М	Η	Н	Η	Н	Н	Н
UJK20401T	Professional skills	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	L	Н	М	М	Н
UJK20501T	Leadership and Management skills	Н	Н	М	М	М	Н	Н	М	Н	Н	Н	М	М	Н	Н
	Program Average	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н

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

				Cours	e Structures				
Semester	Professional Core Courses (CC)	Discipline Specific Electives (DSE)	Generic Electives(GE)	Life Skill (Jeevan Kaushal)	Skill Enhancement Courses(SEC)	Ability Enhancement Compulsory Courses(AECC)	Extension Activity	Total Credits	No. of Periods
Sem I	CC-1(6) CC-2 (6) CC-3 (6)	-	GE-1 (3)- Tamil/Hindi/French-I		SEC-Soft skills(1)	AECC-English(4)		26	30
Sem II	CC-4(6) CC-5(6) CC-6 (6)	-	GE-2 (3)- Tamil/Hindi/French-II	JK1(2)- Com.Skills	SEC-Quantitative Aptitude & Reasoning(1)		NSS/NCC/NSO /Yoga(0)	24	30
Sem III	CC-7(6)	DSE-1(6)	GE-3 (6)- Allied Physics	JK2(2)-UHV	SEC- 1 (2) SEC-2 (2)			24	28
Sem IV	CC-8(6)	DSE-2(6)	GE-3 (6)- Allied Chemistry	JK3(2)- ProfSkills	SEC-3 -My India Project (1) SEC-4(2)			23	24
Sem V	CC-9(6) CC-10(6)	DSE-3(6)	-	JK4(2)- Leadership & Management Skills		AECC-EVS(3)		23	23
Sem VI	CC-11(6) CC-12 (6)	DSE-4 (6)- Project	1					18	24
Total Credits	72	24	18	8	8	8	0	138	159

Cours Code	e ULT20G01	r20G01J Course Tamil-I Name						Cou ate	rse gory	G			Ger	neric	: Ele	ctiv	e Co	ours	e		L 2	T 0	P 2	C 3
Pre-re Cou	quisite Irses			Co-requisite Courses	Nil			F	Progro Cou	essiv rses	ssive <sub>Nil</sub> ses													
Course Depart	e Offering tment		Tamil			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 enable the	em to lea	arn the nuand	es of modern po	oetry ir	n Tamil	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2: CLR- 3:	To explore Ne enlighten the Inculcate Way learning Tam	re New historicism through the works of art written in Tamil to 1 the students to understand the changes in the modern society 2 Ways of life, moralities and ethical factors as an essential part of Tamil literature																						
CLR- 4 :	Develop strat	Develop strategies of comprehension of texts of different origin							(%)	ge	s	plines			edge									
CLR- 5 :	Strengthen th	e langu	age of the stu	idents both in or	al and	written	(Bloo	sucy (	nent (9	owled	oncept	Disci	ledge	ation	Knowl	6	t Data	s	Skills	Skills				
CLR- 6 :	Express their situations	sentime	ents, emotion	s and opinions, r	reactin	g to information,	<b>Thinking</b>	Proficie	Attainm	ental Kn	on of Co	Related	al Know	specializ	Utilize	Aodelinç	Interpre	tive Skil	Solving	ication S	l Skills			
Course Outco	e Learning mes (CLO):	At the	e end of this c	course, learners	will be	able to:	Level of 7	Expected	Expected	Fundame	Applicatio	Link with	Procedur	Skills in S	Ability to	Skills in N	Analyze,	Investiga	Problem	Commun	Analytica	PSO -1	PSO -2	PSO-3
CLO- 1:	Extend and e the needs of t	xpand ti the moo	heir savoir-fai Iern era.	re through the a	cquisi	tion of skills to cater	2	75	60	н	н	н	-	Н	н	М	н	Н	-	Н	Н	Н	Н	Н
CLO- 2:	Enable the str thinking capa	able the students to appreciate their mother tongue and to Enhance thei inking capacity						80	70	н	Н	-	Н	-	-	Н	-	-	Н	Н	-	Н	Н	Н
CLO- 3 :	Make them learn the basic rules of Language and make them communicate better						2	70	65	Н	Н	Н	М	-	-	Н	-	-	Н	Н	-	Н	Н	Н
CLO- 4:	Develop strategies of comprehension of texts based on different culture and life styles					different culture and	2	70	70	Н	-	Н	Н	Н	-	М	-	-	Н	Н	-	Н	Н	Н
CLO- 5 :	Strengthen spoken and written skills of the student						2	80	70	-	н	-	М	-	Н	Н	-	-	Н	Н	-	Н	Н	Н
CLO- 6 :	Will be able to clear government examinations						2	75	70	Н	н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н

Du (h	ration our)	12	12	12	12	12
	SLO-1	தமிழ் இலக்கியப் போக்குகள்	நவீன கவிதை தோற்றம்	தமிழரின் வீரமரபு	சிற்றிலக்கியத் தோற்றம்	மொழி வரலாறு
5-1	SLO-2	இலக்கிய நட்பங்கள்	நவீன கவிதை வரலாறு	போர் விழுமியங்கள்	சிற்றிலக்கிய வகைமை	மொழிப் பயிற்சி
	SLO-1	தமிழ்க் கவிதை மரபு	நவீன கவிதை செல்நெறிகள்	பரணி அறிமுகம்	சிற்றிலக்கியங்கள்	தமிழும் அகராதியியலும்
S-2	SLO-2	காலந்தோறும் கவிதை உள்ளடக்கம்	செல்நெறிகளில் கோட்பாடுகள்	பரணி இலக்கியங்கள்	முதன்மைச் சிற்றிலக்கியங்கள்	அகரவரிசைப்படுத்தல்
	SLO-1	காலந்தோறும் கவிதை வடிவம் –	கவிதை மொழி	கலிங்கத்துப்பரணி (484)	புதுக்கவிதையும் இதழ்களும்	கலைச்சொல் அறிமுகம்
S-3	SLO-2	தற்கால இலக்கியம்	நவீன கவி மொழியின் நட்பங்கள்	தலைவனின் வீரம்	மணிக்கொடி இதழ்	கலைச்சொல் உருவாக்க நுட்பங்கள்
	SLO-1	புதுக்கவிதை உருவாக்கம்	நவீன கவி ஆளுமைகள்	தமிழ் இலக்கிய மரபில் தாது	எழுத்து இதழ்	தமிழில் கலைச்சொற்கள்
S-4	SLO-2	புதுக்கவிதை செல்நெறிகள்	நவீன கவி ஆளுமைகளின் கவித்துவம்	தாது இலக்கியங்கள்	வானம்பாடி இதழ்	நிலைபெற்ற கலைச்சொற்கள்
6.6	SLO-1	பாரதியார் – காலத்தின் அடையாளம்	விளிம்புநிலை மனிதர்கள்	அழகர் கிள்ளைவிடு தாது (கண்ணிகள்)	சிறுகதை தோற்றம்	மரபுத்தொடர்
3-3	SLO-2	பாரதியார் - பன்முக ஆளுமை	விளிம்புநிலை இலக்கியம்	தாது மரபில் கிளியும் பாராட்டும்	சிறுகதை வளர்ச்சி	தமிழில் மரபுத்தொடர்கள்
S-6	SLO-1	பாரதியார் - கண்ணன் என் சேவகன்	ராஜா சந்திரசேகரரின் கைவிடப்பட்ட குழந்தை	செய்யுள் மரபில் கலம்பகம்	சிறுகதை – வரலாறு	நாட்டார் வழக்காறுகள்
	SLO-2	கண்ணன் என் சேவகன் கவிதை	புறக்கணிப்பும் வாழ்வியலும்	கலம்பக இலக்கியங்கள்	சிறுகதை ஆசிரியர்கள்	பழமொழி அறிமுகம்

		சொல்லும்				
		வாழ்வியல்				
S-7	SLO-1	20 ஆம் நூற்றாண்டுக் கவிதை மரபில் பாரதிதாசன்	புலம்பெயர்தல்	நந்திக் கலம்பகம் (77)	புதினம் தோற்றம்	தமிழில் பழமொழிகள்
	SLO-2	பாரதிதாசனும் தமிழும்	புலம்பெயர் வாழ்வியல்	மகள் மறுத்தலில் வீரம்	புதினம் வளர்ச்சி	பழமொழியும் பயன்பாடும்
	SLO-1	பாரதிதாசன் – தமிழினி இனிமை,	அனார் - மேலும் சில இரத்தக் குறிப்புகள்	குறவஞ்சி அறிமுகம்	புதினத்தின் வகைமை	தமிழ் இலக்கண நட்பங்கள்
S-8	SLO-2	தமிழின் பெருமையும் வளமையும்	உள்நாட்டுப் போர்ச்சூழலும் பெண் உளவியலும்	குறவஞ்சி இலக்கியங்கள்	புதின ஆசிரியர்கள்	இலக்கணமும் பயன்பாடும்
	SLO-1	வானம்பாடியில் அப்துல்ரகுமான்	காலந்தோறும் பெண்	குற்றாலக் குறவஞ்சி (9)	அச்சு ஊடக வரலாறு	தமிழில் சொல் வகைகள்
S-9	SLO-2	அப்துல்ரகுமான் கவிதையின் தனித்தன்மைகள்	பெண் இலக்கியம்	மலையும் வாழ்வும்	அச்சு ஊடகமும் தமிழும்	சொல்லும் பயன்பாடும்
	SLO-1	அப்துல்ரகுமான் - அவதாரம்	சுகிர்தராணியின் அம்மா	காப்பிய இலக்கணம்	அச்சு ஊடகமும் உரைநடை வளர்ச்சியும்	பெயர்ச்சொற்கள்
S-10	SLO-2	அவதாரம் - நம்பிக்கையும் வெற்றியின் பாதைகளும்	பெண்மையும் தாய்மையும்	காப்பிய வகைமைகள்	தமிழில் உரைநடை	பெயர்ச்சொற்கள் அறிதல்
	SLO-1	சுற்றுச்சூழலியல்	சமத்துவம்	தமிழில் பௌத்த இலக்கியங்கள்	சுவடிகள்	வினைச்சொற்கள்
S-11	SLO-2	தமிழ்க் கவிதையில் சுற்றுச்சூழலியல்	பாலியல் சமத்துவம்	ഥങ്ങിഥേക്ക	சிவதருமோத்திரச் சுவடி பெற்ற வரலாறு	வினைச்சொற்கள் அறிதல்
S 12	SLO-1	நரசிம்மன் – மகனே என்னை மன்னித்து விடு	நா. முத்துக்குமாரின் தூர் கவிதை	பெண் சாபமும் காயசண்டிகையும்	புழங்குபொருள் பண்பாடும் தமிழர் வாழ்வியலும்	தமிழில் பெயரடை, வினையடை
5-12	SLO-2	நவீன வாழ்வும் சுற்றுச்சூழலியல் அறிதலும்	தூர் கவிதை முன்வைக்கும் பெண் சமத்துவம்	பெண் வரலாற்றில் சாபங்களின் கதைகள்	கூஜாவின் கோபம்	பெயரடை, வினையடை அறிதல்
		1 ക്രസിക്കി	க்கேன் சொகப்பய	ப் பகிப்பம் - சுமிம்ச்	துறை அடுரியர்கள்	ா எஸ் வர் எம்

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	2.	அறிவியல் மற்றும் தொழில்றுட்டிக் கல்வநிறுவனம், காட்டாங்குளத்துர், 00200, 2020 வல்லிக்கண்ணன், புதுக்கவிதை தோற்றமும் வளர்ச்சியும், ஆழி பதிப்பகம், சென்னை,
Learning		2018
Resources	3.	கா. சிவத்தம்பி, தமிழில் சிறுகதை தோற்றமும் வளர்ச்சியும், என்.சி.பி.எச்., சென்னை,
		2013
	4.	தமிழ் இணையக் கல்விக்கழகம் - <u>http://www.tamilvu.org/</u>
	5.	மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம் - https://www.projectmadurai.org/

			Contir	nuous Le	arning As		Einel Examination (50% weighters)							
	Bloom's Level of Thinking	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#					
	g	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice			
Lovel 1	Remember	200/	200/	200/	200/	200/	200/	200/	20%	20%				
Levei i	Understand	30%	30%	30%	30 %	30%	30%	30%	30%	30%	-			
	Apply	40%	400/	50%	50%	50%	E00/	E00/	50%	50%				
Level Z	Analyze	40%	40%	50%	50%	50%	50%	50%	50%	50%	-			
	Evaluate	200/	200/	200/	200/	200/	200/	200/	20%	20%				
Level 3	Create	30%	30%	2070	20%	20%	20%	20%	20%	20%	-			
	Total	10	0 %	10	100 % 100 % 100 %		00 %	100 %						

Course Designers											
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts									
	1. Dr. RSrinivasan Associate Professor, Department of Tamil, Presidency College, Chennai,	1. B.Jaiganesh, Assistant Professor & Head, FSH, SRMIST									

2. T.R.Hebzibah Beulah Suganthi, Assistant Professor, FSH, SRMIST
3.S.Saraswathy, Assistant Professor, FSH, SRMIST

Course Code	ULH20G01	JLH20G01J Course HINDI-I Name						Co Cate	urse egory	1	G		G	Gene	eric I	Elec	tive	Cοι	irse		L 2	Т 0	P 2	C 3
Pre-rec Cour	uisite rses <i>Nil</i>			Co-requisite Courses	Nil			Ρ	rogre Cou	essiv rses	ve N	lil												
Course Depart	Offering ment	ŀ	HINDI			Data Book / Codes/Standards										Nil								
Course Rationa	Learning ale (CLR):	1	The purpose	e of learning this	cours	e is to:			Learı	ning			I	Proç	gram	n Lea	arnii	ng C	)utc	ome	s (Pl	LO)		
CLR- 1:	To be able to o	e able to converse well in the Hindi Language 1 2 3 1 2 3 4 5 6 7 8 9 10 11 12 13								14	15													
CLR- 2 :	To read and write and clarity																							
CLR- 3 :	To be willing listeners and translators –where need be																							
CLR- 4:	To acquire the life.	values/t	hought con	tents of the write	ers and	d practice in it in						Jes			ge								Ì	
CLR- 5:	To find motiva overcome any	tion throu challeng	igh the vari ies of life.	ious forms of lite	rature	and learn to	(mool	y (%)	ıt (%)	edge	cepts	sciplir	lge	ы	owled		ata		ills	s		ļ	ĺ	
CLR- 6 :	To discover th means of grow	e importa rth in life	ance of the and not me	language in mal ere literacy.	king ed	ducation as a	king (B	oficienc	tainmer	al Knowl	of Conc	lated Di	<b>Snowled</b>	cializati	lize Kno	deling	erpret D	e Skills	lving Sk	tion Ski	kills			
Course Outcor	Learning nes (CLO):	At the	e end of thi	s course, learne	rs will	be able to:	Level of Thir	Expected Pr	Expected At	Fundamenta	Application o	Link with Re	Procedural P	Skills in Spe	Ability to Util	Skills in Moc	Analyze, Inte	Investigative	Problem Sol	Communica	Analytical SI	PSO -1	PSO -2	PSO-3
CLO- 1:	To appreciate	appreciate the Hindi language in its various forms.					2	75	60	Н	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 2 :	To understand the philosophy of life and living through stories.						2	80	70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO- 3 :	To help the students learn and develop the fundamentals of life, through One-Act plays.					2	70	65	Н	-	-	Н	-	-	-	-	-	-	-	-	-	-	-	
CLO- 4 :	To share the richness of thought and content presented in the Hindi language, into other languages so that the readers would stand to gain.					in the Hindi d stand to gain.	2	70	70	Н	-	Н	Н	Н	-	-	-	-	-	Н	-	-	-	-
CLO- 5 :	To guide the students in the learning of the technical aspect of the Hindi language, this would help them in the field of administration.					pect of the Hindi tion.	2	80	70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO- 6 :	To encourage the students to communicate with the public, on a large scale with the medium of Main stream and Documentary films.					2	75	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Di (	uration hour)	12	12	12	12	12
	SLO-1	Kahani kya Hai	Ekanki aur Natak kya hai	Patrkarita ka arambh	Film Samiksha	Takniki Shabdavali
S-1	SLO-2	Jivan ka anubhav	Vidhyarthiyon dono ke antar ko smajhkar apne dwara use prastut kar sakta hai	Vidhyarthiyon ka apne samaj ke prti jagrukta	Film ka prabhav ko smajhna	Vaignik tarike se bhashaon ka avishkaar karna
	SLO-1	Kahani ke Tatva	EKANKI KA ARTH	Aazdi aur Patrkarita ka daiytava	SAMIKSHA KYA HAI	ARTH
S-2	SLO-2	Vishleshan karne ki Kshmta	Vidhyarthi ke bhitar vishkleshan ki kshamta jagrit	Vidhyarthiyon ko patrkarita ka ihas smajkar samaj nirman ke liye sahyog dena	Tarkik vishleshan kshmta paida karta hai	Vidhyarthi uske arth dwara hi uske mahtav smjhenge
6.2	SLO-1	Vo Tera Ghar Ye Mera Ghar Parivar me Buzargon ke Mahtav ko Samjhana	PARIBHASHA	PATRKARITA KA MAHTAVA	SAMIKSHA KE PRAKAR	PARIBHASHA
S-3	SLO-2	Bhartiya Sanskriti Se Vidhyarthiyon ko Jodna	Vidvano ke mat se parichay	Patrkarita se bhut se sawal ka smadhan ho jata hai	/idhyarthiyon ka un prkaro ka idhyaan karna jisse vidhyarthi us samiksha ko tayaar kar payenge	Vibhinn vidwano dwara di gai paribhasha se us baat ko smjhenge vidhyathi
C 1	SLO-1	Mithaiwala Pyar Bantne se dukh kam hota hai	SWAROOP	PTRAKARITA KA ARTH	SAMIKSHA KA UDDESHYA	HABDAVALI KI AVSHYAKTA
3-4	SLO-2	Manavata ka Path	/idhyarthiyon me iski samajh se lekhan kshmata badegi	Vibhinn vidhvono ko padhne se vidhyarthiyon ki tarkik kshmta badhti hai ,	Vidhyarthi ke andar smaj ke rati Kartavya bodh paida hoga	Vaignikon ka awiskar kitna mahtavpurn
S-5	SLO-1	Bechadri Pal Chatro me Utsah Vardhan Karna	PATHYA VACHAN	PTRAKARITA KI PARIBHASHA	FILM KA SAMAJIK MAHTAVA	BHASHA VAIGYANIK
	SLO-2	Beta-beti ek saman ke mahtav ko smjhana.	'idhyarthiyon ka path kaushal bdhega	vidhvaono ki ukti ek smadhan bhi hota hai	Samajik uttar daiytav ko smjhana	Bhasha vaignikon ki jankari
5-6	SLO-1	Nadi aur Jeevan Paryavaran ke mahtav se awagat karana.	PRASTUTI	PRAMUKH SAMACHAR PATR	FILM KA VISHLESHAN	KARYALYIN SHABD
3-0	SLO-2	Manav Jeevan me nadi ki upyogita aur Mahtav.	Natak khelne par bahut si takniki bate samajhenge	Vidhyarthiyon ki jankari badhegi	Vidhyarthi tarkik vishleshan sikhega	habd kaise tayar kiye jate hain vidhyorthiyon ko jankari

0.7	SLO-1	Pachees chauka Ded Sau Jamindari Pratha se awagat karana	MAHTVA	TV.PATRKARITA	DRISTIKON NIRMAN	ANGREZI SE HINDI ANUVAD
5-1	SLO-2	Asprishya Vicharao ke Prati Sakaratamak Bnana.	Natak ka mahtav ko majhkr samaj ke hito ke sath judna.	TV patrkar ke daiytav ko smajkar vidhyarthi ise apne rozgar se jod sakta hai	Vidhyarthi ka drishtikon nirmit hoga	Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna
	SLO-1	Kahani ka Uddeshya	PRASHAN-ABHYAS	PHOTO PATRKARITA	DOCUMENTRY FILM	HINDI SE ANGREZI ANUVAD
S-8	SLO-2	Vidhyarthiyon ko Samaj se Jode rakhna	Vidhyarthiyon ka lekhan kshmata Badhna	/idhyarthiyon me photo patrkarita ke mahtav ka smajh paida hona	Vidhyarthi samajik dharatal ki kathinai ko smajhkar desh se judega	lindi adhikari aur anuvadak ke pad ke liye tayaar karna.
	SLO-1	Kahani Lekhan	UDDESHYA	PRASTUTIKARAN	MAIN STREAM FILM	EK DIN EK SHABD
S-9	SLO-2	Vidhyarthi Ko likhne ki aur Prerit karna	Vidhyarthi ko smaj upyog hito ki jankari dena	Vifhyarthi apni baat rakhne ki kshmta vikstit karta hai	Vidhyarthion ko jivan ke anchue pahluon se bhi sakshaktkar	Vidhyarthiyon ko rozgaar se jodna
	SLO-1	Seminar	PARICHARCHA	BHASHA-SHAILI	FILM KE DARSHAK	ATI MAHTVAPURN SHABD
S-10	SLO-2	Vidhyarthiyon dwara Prastuti karan	Vidhyarthi me vak- kaushal bdhana	Vidhyarthi ko apni report me bhasha-shaili ko sikh kar ek badhiya reporter ban sakta hai	Vidhyarthiyon ka samajik gyan	Shabdon ke mahtav ko smajhkar use yaad karna
C 11	SLO-1	Prashan Abhyas	BHASHA SHAILI	PATRKARITA KE NIYAM	FILM AUR BAZAAR	SAMANYA SHABD AUR PARIBHASHIK SHABDAVALI ME ANTAR
5-11	SLO-2	Vidhyarthiyon me Lekhn Kaushal ki kshmata Viksit karna.	Vidhyarthiyon ko bhasha ka mahtav smjhna	Vidhyarthi ise sikh kar ek nyay priya patrkar ban sakta hai	Vidhyarthiyon ko rozgaar se jodna	Vidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samaj
	SLO-1	Path-Punravarti	EKANKI AUR RANGMANCH	PATRKAR KA DAIYTVA	FILM DARSHAK KA MAHTAVA	PARIBHASHIK SHABDAVALI KA MAHTAV
S-12	SLO-2	Pariksha ke liye Saksham	Vidhyarthi isse rangmanch ke mahtav ko smajhenge	Vidhyarthiyon ko patrkar ka daityva sikhkar smaj ke uttar daityva ko nibhana hai	Vidhyarthiyon ko darshak ki ruchiyon se awagat karvana	Rozgaar se vidhyarthiyon ko jodnaw

Learning Resources

The Prescribe Text Book Compiled and Edited by Department of Hindi www.gadyakosh.com www.shabdkosh.com

Learning	arning Assessment													
	<b>.</b>		Continu	uous Lea	arning Ass	sessmen	Final Examination (E0% uninhtens)							
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50 % weightage)				
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice			
	Remember	30%	30%	30%	30%	30%	30%	30%	30%	30%				
Level I	Understand	30 /0	30 %	30 %	30 /0	30 %	30 %	50%	50 %	50%	-			
2 امریم ا	Apply	10%	10%	50%	50%	50%	50%	50%	50%	50%	_			
LEVEIZ	Analyze	40 /0	4070	50 %	5070	5070	5070	50%	5070	50%	-			
Loval 3	Evaluate	30%	30%	200%	20%	20%	20%	20%	20%	20%				
Level 3	Create	30 /0	30 %	20 /0	2070	20 /0	20 /0	20 /0	20 /0	2078	-			
	Total 100 %			10	0 %	10	0 %	1(	00 %	100 %				

Course Designers											
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts									
	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									

Course Code	ULF2	ULF20G01J Course French-I Name						c	Cou ateç	rse gory	G	Generic Elective Course $\begin{tabular}{c c c c c c c c } L & T & P \\ \hline 2 & 0 & 2 \\ \hline \end{array}$							P 2	C 3					
Pre-re Cou	quisite rses	Nil			Co-requisite Courses	Nil			P	rogr Cou	essiv rses	<sup>/e</sup> N	il												
Course Depart	e Offeri ment	ng	F	rench			Data Book / Codes/Standards										Nil								
Course Ration	e Learn ale (CL	ing R):	7	he purpose	e of learning this	cours	se is to:			Lear	ning				Proç	gram	n Lea	arniı	ng C	)utco	ome	s (P	LO)		
CLR- 1:	Extend scenari	and exp	oand the	ir savoir-fai	ire through the a	cquisi	ition of current	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	Enable and tak	the stuc e positio	lents to on as a f	overcome t oreigner sp	he fear of speak beaking French	ing a	foreign language																		
CLR- 3:	Make t	nem leai	m the ba	sic rules of	f French Gramm	ar.																	1		
CLR- 4:	Develo	p strateg	gies of c	omprehens	ion of texts of di	fferen	t origin	_					ines			dge							1		
CLR- 5:	Strengt	hen the	languag	e of the stu	idents both in or	al and	l written	Bloom	cy (%)	nt (%)	/ledge	cepts	liscipli	dge	tion	lowlec		Data		kills	ills				
CLR- 6:	Expres situatio	s their s ns	entimen	ts, emotion	s and opinions, r	eactir	ng to information,	B) (I	oficien	tainme	al Know	of Con	elated D	Knowle	ecializat	lize Kr	deling	erpret [	e Skills	lving SI	tion Sk	kills	1		
Course Outcor	e Learn nes (Cl	ing _O):	At the e	end of this c	course, learners	will be	e able to:	Level of Thi	Expected Pr	Expected At	Fundamenta	Application	Link with R€	Procedural	Skills in Spe	Ability to Uti	Skills in Moo	Analyze, Int	Investigative	Problem So	Communica	Analytical S	PSO -1	PSO -2	PSO-3
CLO- 1:	To acq	o acquire knowledge about French language						2	75	60	н	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 2 :	To stre of Fren	o strengthen the knowledge on concept, culture, civilization and translation f French					ation and translation	2	80	70	-	Н	-	Н	-	Н	-	-	-	1	М	1	-	-	1
CLO- 3 :	To dev	To develop content using the features in French language					ge	2	85	75	Н	-	-	Н	-	Н	-	-	-	-	М	-	-	-	-
CLO- 4 :	To inte	To interpret the French language into other language						2	70	80	Н	-	Н	Н	Н	-	-	-	-	-	Н	-	-	-	-
CLO- 5 :	To improve the communication, intercultural elements in French language				French language	2	80	70	-	Н	-	Н	-	-	-	-	-	-	Н	-	-	-	-		
CLO- 6 :										-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Du (ł	ration nour)	12	12	12	12	12
6.4	SLO-1	Bonjour, ça va ?	Salut ! Je m'appelle Agnès	Qui est –ce ?	Dans mon sac, j'ai…	II est comment ?
3-1	SLO-2	Salut	Paul, Valérie, Manish	Les exemples	Da ns ton sac	Les objectifs
	SLO-1	Les pays	Les pronoms personnels sujets	Les professions	La formation du féminin (3)	L'aspect physique
S-2	SLO-2	Les nationalités	Je, Tu, II/Elle Nous, vous, IIs/Elles	Les exemples	Les féminins	Le corps
5-3	SLO-1	Les animaux domestiques	Les verbes être et avoir	Quelques objets	La phrase interrogative	Le caractère
0-0	SLO-2	Les animaux	Les verbes auxiliaires	Objets	Les interrogatives	Les exemples
S-1	SLO-1	Les jours de la semaine	Les articles définis et indéfinis	La fiche d'identité	qu'est – ce que ?	Les prépositions de lieu (1)
3-4	SLO-2	Les mois de l'année	Les exemples	La carte d'identité	Les exemples	Dans, sur, sous etc,
S-5	SLO-1	Les nombres de 0 à 69	La formation du féminine (1)	La liaison	Qu'est – ce que C'est	Les nombre à partir de 70
	SLO-2	Les nombres	Les féminins	Les activités	Les objets	Les exemples
66	SLO-1	La famille (1)	La formation du pluriel (1)	L'élision	Qui est – ce ?	Allo ?
3-0	SLO-2	Ses parents	Les exemples	Les activités	Les personnes	Portable
S 7	SLO-1	L'accent	Les adjectifs possessifs	Intonation descendre	la phrase négative	La formation du féminin(3)
5-1	SLO-2	L'accent tonique	Les exemples	Les descendre	La négation	Les exemples
<b>c</b> 0	SLO-1	Les articles définis	Entrer en contact : salut	Intonation montante	C'est	Les articles contractés
3-0	SLO-2	Les articles indéfinis	Entrer en contact : demander	Les montantes	ll est	Les articles partitifs
S-9	SLO-1	Bonjour, - Salut !	Dire comment ça va	Dans mon sac	Les verbes du premier group	Les pronoms personnels toniques
	SLO-2	Ca va	Comment allez-vous ?	Des objets	Les exemples	Les pronoms
S-10	SLO-1	Je m'appelle Agnès	Se présenter	Les Mots	Les verbes aller	Les adverbes interrogatifs
0-10	SLO-2	Quel est votre nom	Présenter quelqu'un	Les expressions	Le verbe venir	Les interrogatifs
S-11	SLO-1	Les Mots	Demander	Demander poliment	Demander et répondre poliment	Les verbes du deuxième group
•	SLO-2	Les Expressions	Demander le temps	Répondre poliment	Les exemples	Les exemples
S-12	SLO-1	Entrer en contact	Demander la date	Demander des informations personnelles	Demander des informations personnelles	Décrire l'aspect physique

SLO-2	Se présenter.	Dire la date	Les exemples	Les activités	Décrire le caractère
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Learning
Resources 1.
2.
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Theory: "Génération-Al" Méthode de français, Marie-Noëlle COCTON, P.DAUDA, L.GIACHINO, C.BARACCO, Les éditions Didier, Paris, 2018. Cahier d'activités avec deux discs compacts.

Learnii	earning Assessment											
	Bloom's		Contin	uous Lea	arning Ass	Final Framination (FOO/ unsightang)						
	Level of	CLA – 1 (10%)		CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examinat	ion (50% weightage)	
	Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	
1	Remember	200/	200/	200/	200/	200/	200/	200/	200/	200/		
Level 1	Understand	- 30%	30%	30%	30%	20%	20%	20%	20%	30%	-	
	Apply	409/	400/	E00/	E00/	E00/	E00/	E00/	E00/	E00/		
Levei Z	Analyze	40%	40%	50%	50%	50%	50%	50%	50%	50%	-	
ا میرما ک	Evaluate	200/	200/	200/	200/	200/	200/	200/	200/	200/		
Level 3	Create	30%	30%	20%	20%	30%	30%	30%	30%	20%	-	
	Total	10	0 %	10	0 %	10	0 %	10	0 %		00 %	

Course Designers											
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts									
	1. Dr. C.Thirumurugan Associate Professor, Department of French, Pondicherry University	1. Kumaravel K. Assistant Professor & Head, SRMIST									
		2. Ponrajadurai M Assistant Professor, SRMIST									

Cours Code	e ULE2	<sup>e</sup> ULE20AE1T Course English							Cou Cate	urse A Ability Enhancement Course L T F							P 0	C 4							
Pre-re Cou	Pre-requisite Co-requisite Courses																								
Course Depart	e Offeri tment	ng	E	inglish			Data Book / Codes/Standards										Nil								
Course Ration	e Learn ale (CL	ing R):	T	he purpose	of learning this	cours	e is to:			Lear	ning				Pro	gran	n Le	arni	ng C	Dutc	ome	s (P	LO)		
CLR- 1:	Extend him/her	and exp r to com	and the promise	integrity in upon a not	an individual wh ble way of living	nich sh	all never allow	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2:	Enable and ena	the stud able the	lents to o m to thin	overcome t k through a	he fear of speak a foreign languag	ing a f ge.	oreign language																		
3 : CLR-	Make th Develor	nem con o stratec	nmunicat vies of co	te an unbia	ssed way of thir	king ir	n a better manner																		
4:	life style	es	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	mpronono		a on c							les			e									
CLR- 5 :	Strengt	hen spo	ken and	written skil	Is of the student	in Eng	glish	3loom)	cy (%)	nt (%)	/ledge	cepts	lisciplir	dge	ion	lowledo		Data		kills	ills				
CLR- 6:	Help the to inform	em expr mation a	ess their nd situa	r sentiment tions in a c	s, emotions and ivilized, cultured	opinic and h	ns, and reactions umane manner.	nking (E	roficien	ttainmei	al Know	of Con	elated D	Knowle	ecializat	ilize Kr	deling	terpret [	e Skills	Iving SI	ation Sk	kills			
Course Outco	e Learn mes (Cl	ing LO):	At the e	nd of this c	ourse, learners	will be	able to:	Level of Thi	Expected P	Expected A	Fundament	Application	Link with Re	Procedural	Skills in Spe	Ability to Ut	Skills in Mo	Analyze, Ini	Investigativ	Problem Sc	Communica	Analytical S	PSO -1	PSO -2	PSO-3
CLO- 1:	To acqu Langua	uire knou ige and i	wledge o Literatur	of becoming e	g better beings ti	hrough	the tools of	2	75	60	Н	Н	Н	-	-	Н	-	Н	-	Н	Н	Н	-	-	-
CLO- 2 :	To acquire a strong knowledge on concept, culture, civilization through English Literature						2	80	70	-	Н	-	Н	-	Н	-	Н	-	-	Н	Н	-	-	-	
CLO- 3 :	To develop own content and to be able to translate using the features in English Language						2	70	65	Н	-	-	Н	-	Н	-	Н	-	-	Н	Н	-	-	-	
CLO- 4 :	To interpret the contents in the texts presented in English Language						Language	2	70	70	Н	-	Н	Н	Η	Н	-	Н	-	-	Н	-	-	-	-
CLO- 5 :	To present an improved and healthier communication and intercultural elements acquired through English Literature						d intercultural	2	80	70	-	Н	-	Н	-	Н	-	Н	-	-	Н	-	-	-	-
CLO- 6 :	To participate in any level of conversation and discussion presented in English with both proficiency in the language and positive caliber in the content of speech						n presented in e caliber in the	2	75	70	н	н	-	Н	М	н	М	Н	Н	Н	н	Н	н	Н	Н

D n	uratio (hour)	12	12	12	12	12
S-	SLO -1	Introduction to the art of poetry writing will be done	Post-colonial impacts in India as observed in their language and culture will be discussed.	Story through images is explained to the students	The definition and purpose of monologue is explained	Homophones and Homonyms are to be explained in the class along with examples of usage.
	SLO -2	The rationale behind this unit will be discussed.	The students will be encouraged to impart their views	The students are asked to create their own stories from those images	the sample monologues are to be provided to the learners	How where and when these as vocabulary can be used is to be explained
S- 2	SLO -1	Feminism through Kamaladas' poem' In Kindergarten' is explained	Mathraboothan and the mother tongue influence in English – a discussion	Every day the students are made to bring their own cartoons to tell stories related to social issues and political issues.	The learners are made to create their own monologue contents.	Cross word puzzles are to be given to the students to make them understand the differences and usage of homophones and homonyms
	SLO -2	feminist critique's stand through poets like Meena Kandasamy is discussed	Students from different regions are asked to talk. The peculiarity in their pronunciation is to be identified by them	How to identify irony and sarcasm is taught	The contents are assessed and the lacuna is informed	The students are evaluated by making them use homophones and homonyms on their own
S- 3	SLO -1	The writer Meena Kandasamy is invited to read her poems on women.	Enjoywithinlimits, says Mr Mathruboothamistaught and discussed	International Political memes to be created in the class	Discuss the contents created by the students and reiterate the idea that a monologue should mimic a story and has to have a proper beginning middle and an end.	How exactly to decide a proper word at a given situation is to be practically explained in the class.
	SLO -2	Questions on her perspectives are to be posed by the students	Everymistakefound in the textisanalysed	Memes on popular issues to be created in the class	The created monologues are to be assessed by the students themselves	Mundane situations are to be given to the students to check their ability to use those words

S- 4	SLO -1	Gender inequality is discussed through A K Ramanujam and his poetry	The structure of sentence in English and the distorsion of the sentence isverified	Autobiography and biography differences are explained	To ask the students to bringnewspaper to class and makethem select a column and readitloudly.	To give all the parts of speech not according to the grammar book order but according to a method which would easily make one understand correlation of one with the other. For instance – Noun, Pronoun, Adjective, Verb, Adverb will have to be the order
	SLO -2	Different legal situations where both the genders suffer is explained in the class	Diffèrent sentences are given and tested	Certain Classic autobiographies and biographies are presented	No meaningis to beexplained. Just the flow is to bechecked.	The students are made to use as many adjectives as possible for describing their friends
S-	SLO -1	Kalki the poetisinvited to conduct a guets lecture on herownpoem.	Nobel? What Nobel, asks MrMathrubootham is discussed	How to give voice to an inanimate object.	Another reading loud session of the same passages are to be conducted along with dictionary checking for meanings are to be done.	The parts of speech must beused in different sentences
5	SLO -2	Questions on her perspectives are to be posed by the students	The attitudes of people in a ludicrous manner is discussed	Different objects are given to the students and they are asked to give autobiographical notes to them	The new meanings that the students get must be compared with the given word and the distance between the meanings are to be explained	the teacherought to use the board to draw a situation to make one understandeachpart's usage.
S- 6	SLO -1	Seminar to generate discussion to enhance gender sensitivity is conducted	The Text is analyzed in detail	Practically test the students in class by giving them different concrete objects.	To make them compare and realize how they had overcome their fear for English	Along with parts of speech particularly when Verb is being taught Tenses ought to be taught with same methodology mentioned above.
	SLO -2	Case studies are to be incorporated by the students in their seminar	More insights into Indian English is given	Ask the students to evaluate each other's autobiography on concrete objects	The comprehensive techniques are taught	The students are asked to create a lighter vein situation and asked to use all the tenses
S-	SLO -1	Human interest columns in news papers - tragedies on women men and transgender documented is read aloud and discussed in the class room.	Neutral accent is taught along with right pronunciation	Caption writing is taught	To develop the ability to pick up a conversation istaugh	The rules of Tenses are taught with live examples in the classes.
1	SLO -2	. how much are the students able to relate with or able to feel emotionally for those situations is to be checked and analysed	Test is to be conducted to check how far a student is able to understand neutral accent	The purpose of the caption writing is to be instilled	to engage in conversations and be able to interupt and end conversation appropriatelywilllbetaug ht	Ability to use all the rules in tenses is taught.
c	SLO -1	Case studies to be given to the students to document their reactions	Mr Mathruboothamisfullysupporting all new technologies – discussion	Different examples for captions are given	Different situations to be given to the students to engage in a conversation.	The basic way to pick an error is by already knowing the rules of grammar thoroughly.
8	SLO -2	Find out if there is any student finding it hard to emote or is insensitive toward the moment	Humor and sarcasmisskimmedfrom the text	The studenst are asked to create captions similar to the ones shown in the class	The students are asked to find errors in each others' monologue	Hence all the rules are to be brushed up
S- 9	SLO -1	Students are to made to createtheirownenactable content on the prevailinggenderinequaliti es	How to write a statement and question is to be taught with reference to the text.	The students are made to give captions different news articles, products and situations	To test how much one is able to use ironyhumor and sarcasm in one's conversation	Excercises on all sorts of possible errors are given to the students and asked to rectify.
	SLO -2	The students are asked to improvise on dialogue on theirown	The way sentences are constructed according to the regional impact is discussed	The best is appreciated for its qualities of being best	Natural usage of punisexplained	Mathrabootham's passages are given to the studentsagain to check the errors.
S- 10	SLO -1	Feminism vs Gender inequality a test for the students to chart out the existing gulf	Pizza maavu : Welcome to Mr Mathruboothamfoodrecipiewebsiteisdiscuss ed	Public Speakingexamplessinc e Julius Caesar to Martin Luther isgiven	To teachdifferentkinds of readingskimming scanning and intensive reading extensive reading is taught	Definesynonym and antonym. Ask the sudents to identifysynonyms and antonyms in text.

	SLO -2	False allegations and Legal situations sometimes created by women to corner men only degrades the freedom struggle of women – discuss	The students are made to explain the textthemselves	The techniques used by different leaders sinceagesisdiscussed	Teh students are practicallyasked to use thosemethodology to understand a text	Demonstartetheriunderstandi ng of synonyms and antonyms in active learning. Introduce thesaurus reference.
s-	SLO -1	A detailed discussion on the 4 poets is done in the class through comparative method	Identify the errors and make students to rewrite first two texts	The Ted X talks are played in the class, different political leader's canvasing is presented	The students are made to read the passages loudly	Demeonstrateunderstanding of words by relatingthem to their opposites ( antonyms)
11	SLO -2	While comparison the students are able to get a deeper analytical way of thinking and are able to present an all encompassed points	Check if they are able to retain the humor in the text after correcting the sentences	What makes a talk impressive is identified and discussed	The students are asked questions from the passages to check their retention capacity	Demonstrateunderstanding of wordswithsimilar but not identicalmeanings (synonyms)
S-	SLO -1	The comprehension and retention and application of all the acquired knowledge of the student is checked by initiating an informal discussion in the class.	Identify the errors and make the students to rewrite the last two texts	The students are givendifferent topics to give impromptu	The learner is made to select phrases and words from the given passages and is asked to use it in own sentences	With the studentsbrainstormshortlist of commonlyusedwords
12	SLO -2	he overall development the student's EQ ertaining to gender iented issues will be ensible and objective. Check if they are able to retain the humor in the text after correcting the sentences. Explain the result to them		The best talk isrecorded and made available for other'srefferences	The ability to converse with humor sarcasm or deep thoughts and with the capacity to emote the desired emotion in the other is checked	Askthem to rapidlygivesynonyms and antonyms to thosewords

Learning
Resources

3. 4. Theory: Horizon- English Text Book – Compiled and Edited by the Faculty of English Department, FSH, SRMIST, 2020 English Gramar in Use by Raymond Murphy

Learning	Learning Assessment												
			Continu	uous Lea	arning As	sessmer		Final Examination //	500/ weightege)				
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA –	4 (10%)#	That Examination (50% weightage)			
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice		
Loval 1	Remember	200/		200/		200/		200/		200/			
Lever	Understand	30%	-	30%	-	30%	-	30%	-	30 %	-		
	Apply	200/		200/		200/		200/		200/			
Leveiz	Analyze	30%	-	30%	-	30%	-	30%	-	30 %	-		
Loval 2	Evaluate	100/		100/		100/		100/		400/			
Level 3	Create	40%	-	40 %	-	40%	-	40%	-	40%	-		
	Total	100 % 100 % 100 % 100 %		00 %	100 %								

Course Designers										
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts								
	1. Prof. Daniel David, Prof & Head, Department of English, MCC,	1. Dr. Shanthichitra, Associate Professor, & Head, Department								
	Chennai	of English, FSH,SRMIST								
		2. Dr K B Geetha, Assistant Professor, Department of English,								
		FSH, SRMIST								

Course Code UMA20101T Course Name ALGEBRA AND TRIGONOMETRY	C Ci	Cours	se ory	С	Professional Core Course L 5							T 1	P 0	C 6				
Pre- requisite Courses     Nil     Co- requisite Courses     Nil       Courses     Data Book / Codes/Standards	·	Pro C	gress ourse	sive es	Nil													
Course Learning Rationale (CLR): The purpose of learning this course is to:		L	earn	ing				Pro	gran	n Lea	arnir	ng O	utco	mes	(PL	0)		
CLR- To learn rank of a matrix, orthogonal transformation of a matrix and solving 1: differential equations using matrix	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2:       To understand the relation between roots and coefficient of equations         CLR- 3:       Learn the concept of reciprocal equations         CLR- 4:       Study in detail the transformation of equations         CLR- 5:       Apply the concepts of matrices , in solving a system of linear equations         CLR- 5:       Get exposed to the transformation of equations and find the summation of 6:         CLR- 5:       Trigonometric series	el of Thinking (Bloom)	ected Proficiency (%)	ected Attainment (%)	ntific Knowledge	lem Analysis	gn & Development	ysis, Design, Research	em Tool Usage	ety & Culture	ronment & Sustainability	SS	ridual & Team Work	imunication	ect Mgt. & Finance	Long Learning	-1	-2	1 – 3
Outcomes (CLO):	Leve	ЕXр	ЕXр	Scie	Prot	Desi	Anal	Mod	Soci	Envi	Ē	Indiv	Corr	Proj	Life	PSC	PSC	PSC
1: Know the fundamental application of theory of equations	3	85	80	Н	Н	L	-	-	-	-	-	М	L	-	Η	-	-	-
2: degree equations	3	85	80	М	Н	-	Μ	Μ	-	-	-	Μ	-	-	Н	-	-	-
CLO- Understand the concept of different methods of finding the roots of a 3 : polynomials	3	85	80	Н	н	-		-	-	-	-	М	-	-	Н	- 1	-	-
CLO- 4 : Apply the concepts of matrices, in solving a system of linear equations.	3	85	80	Н	Н	Н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO- 5 : Associate Descartes' rule in finding the roots of a polynomials	3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- 6 : Solve trigonometric series and logarithm of a complex number	3	85	80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-

		( <u> </u>				
Du (h	ration nour)	Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module-V (18)
S-	SLO- 1	Introduction to type of matrices-Hermitian, Skew Hermitian and Unitary	Introduction to polynomial equations	Introduction to sum of the powers of the roots of an equation	Introduction to increase the roots of a given equation by a given quantity	Introduction to expansions of sin $n\theta$
1	SLO- 2	Orthogonal and unitary matrices-properties- problems	Standard rational integral equation of nth degree	sum of the powers of the roots of an equation	Problems in increase the roots of a given equation by a given quantity	Problems in expansions of sinn $\theta$
S-	SLO- 1	Linear dependency and linear independency of vectors	Fundamental theorem in the theory of equations	sum of the powers of the roots of an equation using coefficient of power of k+1	Decrease the roots of a given equation by a given quantity	Expansions of cosnθ
2	SLO- 2	Cramer's rule for system of linear equations- theorem with proof	Describe standard rational integral equation of nth degree	sum of the powers of the roots of an equation using coefficient of power of k-1	Problems in decrease the roots of a given equation by a given quantity	Problems in expansions of $cosn\theta$
0	SLO- 1	Solution of system of linear equations by Cramer's rule	Problems in polynomial equations	Problems in sum of the powers of the roots of an equation using detached coefficient division	Increase or decrease the roots of a given equation by a given quantity	Expansion of tannθ
3	SLO- 2	Introduction to sub matrix of a matrix and minor of a matrix	Standard rational integral equation of nth degree types of solution	Solving problems in sum of the powers of the roots of an equation using detached coefficient division	Diminishing the roots of an equation	Problems in expansions of tann $\theta$
S-	SLO- 1	rank of a matrix-the rank of transpose of a matrix	Problems in Standard rational integral equation of nth degree	Newton's theorem on the sum of the powers of the roots	Problems Diminishing the roots of an equation	Expansions of $\sin^n \theta$ , $\cos^n \theta$ , and $\tan^n \theta$ in terms of $\cos \theta$ and $\sin \theta$
4	SLO- 2	Elementary transformations- equivalent matrices	Imaginary and irrational roots	Describe Newton's theorem on the sum of the powers of the roots	Removal of terms	Expand $\sin^n \theta$ , $\cos^n \theta$ and $\tan^n \theta$ in terms of $\cos \theta$ and $\sin \theta$
9	SLO- 1	Rank of a matrix- elementary transformations	Theorems in imaginary and irrational roots	Find sum of the powers of the roots	Compute square of roots by Removal of terms	Expansions of $sin^n\theta$ in terms of multiple angles of $\theta$
S- 5 SL 2	SLO- 2	Problems in finding the rank of a matrix	Finding the other roots of the equations from the given equation and its roots	Possible values of sum of powers of the roots	Problems in Removal of terms – square of the roots	Problems in $\sin^n \theta$ in terms of multiple angles of $\theta$

_	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
6	I SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-	SLO- 1	Test for consistency of linear equations	Solving imaginary and irrational roots	Transformation of	Transformations in general	$\cos^n \theta$ in terms of multiple angles of $\theta$
7	SLO- 2	Condition for consistency theorem with proof	Forming the equation from the given roots	Possible ways of transforming the equation	Problems in transformations in general	Express $cosn\theta$ in terms of cosines of multiples of $\theta$
S-	SLO- 1	Consistency of systems of linear equations-unique solution	Problems in imaginary and irrational roots	Multiplication of roots by m	Transforming the equations by removal of terms	Expansion of $ an  heta$
8	SLO- 2	Consistency of systems of linear equations-many solutions	Problems in imaginary and irrational roots	Form the equation whose roots are multiplied by m	Form the new equation by Transforming the equations by removal of terms	Introduction to hyperbolic functions and their properties
S.	SLO- 1	Inconsistency of systems of linear equations	Introduction relation between roots and coefficients of equations	Problems in forming the equation	Problems in transformations in general	Problems in hyperbolic functions and their properties
9	SLO- 2	Problems in solutions of systems of linear equations	Solving the equations whose roots are in A.P	roots of the equation in A.P	Descarte's rule of signs	inverse hyperbolic functions and their properties
S- 10	SLO- 1	Eigen values of matrices	Solving the equations whose roots are in A.P	Form the equation whose roots are the squares of the difference of roots of the given equation	Problems in Descarte's rule of signs	Problems in inverse hyperbolic functions and their properties
	SLO- 2	Eigen vectors of matrices	Solving the equations whose roots are in G.P	Solving roots of the equation with sign changed	Descarte's rule of signs for negative roots of an equation	Eulers's formula and Formula for $\sin\theta$ and $\cos\theta$ in terms of exponential functions
S-	SLO- 1	Properties of Eigen values –proof	Problems in relation between roots and coefficients of equations	Problems in roots with sign changed	Find possible real roots - Descarte's rule of signs	Periodicity of exponential functions, Addition formulae
11	SLO- 2	Properties of Eigen	Solving the equations whose roots are in H P	Problems in roots with sign changed	Imaginary roots - Descarte's rule of signs	Relation between circular and hyperbolic functions
c	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-	SLO- 1	Problems in Eigen values and Eigen vectors	Solving the equations whose roots are in H.P	Roots multiplied by a given number	Horner's method	Addition formulae for hyperbolic functions
13	SLO- 2	Properties of Eigen values and Eigenvectors	Symmetric functions of roots in terms of coefficients of third degree equation	Problems in Roots multiplied by m	Real root – Horner's method	Periods of hyperbolic functions
S-	SLO- 1	Introduction to Cayley Hamilton theorem with proof	Problems in symmetric functions of roots in terms of coefficients of third degree equation	Solving problems in Roots multiplied by a given number	Positive roots-Horner's method	Introduction to logarithm of a complex number
14	SLO- 2	Cayley Hamilton theorem- characteristic polynomial	Problems in symmetric functions of roots in terms of coefficients of third degree equation	Reciprocal equations	Negative roots - Horner's method	Real parts of logarithm of a complex number
	SLO- 1	Problems in Cayley Hamilton theorem	Solving cubic equations by cardano's method	Properties of a reciprocal equation	Solving more problems in Horner's method	Imaginary parts of logarithm of a complex number
5- 15	SLO- 2	Computing inverse of a matrix and integral power of the matrix	Problems in cubic equations by cardano's method	Condition for an equation to be a reciprocal equations	Newton's method	Problems in real and imaginary parts of logarithm of a complex number
S-	SLO- 1	Introduction to Diagonalisation of Matrices by similarity transformation	Problems in cubic equations by cardano's method	Solving the reciprocal equation of odd degree with like signs	Real root - Newton's method	Logarithm of a negative real number
10	SLO- 2	Problems in Diagonalisation of Matrices	Computing cubic equations by eliminating square term	Solving the reciprocal equation of odd degree with unlike signs	Find the real root of an equation - Newton's method	Problems in logarithm of a negative real number
S-	SLO- 1	Introduction to Diagonalisation of Matrices by Orthogonal transformation	Solving cubic equations by comparing the product and sum	Solving the reciprocal equation of even degree	Negative root of an equation - Newton's method	General and principal values
17	SLO- 2	Problems in Diagonalisation of Matrices by Orthogonal transformation	Finding the roots of cubic equations by cardano's method	Solving the reciprocal equation of even degree with middle term missing	Newton's method, Horners method to find roots of an equation	Problems in general and principal values
S-	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

	1.
Learning Resources	2. 3.

Calculus, Vol.I, S. Narayanan and T K Manicavachagom Pillay, S. ViswanathanPrinters and Publishers Pvt. Ltd., 2010 Calculus Vol.II, S. Narayanan and T K Manicavachagom Pillay, S. ViswanathanPrinters and Publishers Pvt. Ltd., 2010. Advanced Engineering Mathematics by H.K. Doss, S.Chand, 2008

- 4. Mathematics, Volume 1, P. Kandasamy and Thilagavathy, S. Chand, New Delhi, 2004. Calculus, Thomas and Finney, Pearson Education, 9th Edition, 5.
  - 2006.

Learning	Learning Assessment												
	<b>.</b>		Continu	uous Lea	arning Ass	sessmer	it (50% we	eightage)		Final Examination //	EQU/ unighters)		
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50% weightage)			
	Lever of Thinking		Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice		
Loval 1	Remember	400/		200/		200/		200/		200/			
Level 1	Understand	40%	-	30%	-	30%	-	30%	-	30%	-		
Lovel 2	Apply	10%	_	10%		10%		10%		40%	_		
Leverz	Analyze	40 /0	-	40 /0	-	40 /0	-	40 /0	-	40 %	-		
	Evaluate	20%	_	30%		30%		30%		30%	_		
Level 3	Create	2070	-	50 /0	-	50%	-	50%	-	50 %	-		
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	0		

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Course	11111020102T	Course Name
Code	UIVIAZU IUZ I	Course Marine

ANALYTICAL GEOMETRY

Course Category С Professional Core Course LTPC 5 1 0 6

Pr requ Cou	Pre- equisite Nil requisite Courses Nil Progressive Courses																								
Cours Depai	Course Offering Department     Mathematics     Data Book / Codes/Standards																								
Course Learning Rationale (CLR): The purpose of learning this course is to:										Learr	ning				Pro	grar	n Le	arnii	ng O	utco	mes	(PL	0)		
CLR- 1 :	To le	arn about c	conics	in polar coord	linates.			1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	To ur	nderstand a	about s	straight lines i	n three dime	ension.																			
CLR- 3 :	To ga sphe	ain knowlec re.	dge ab	out sphere, p	roperties inv	olving pl	ane section of a																		1
CLR- 4 :	To ga	ain knowled	dge ab	out cone				- -	-	_				Irch			bility								
CLR- 5 :	To ga	ain knowled	dge ab	out cylinder				(Bloon	sucy (%	nent (%	adge		pment	Resea	ge		ustaina		n Work		Jance	b			1
CLR- 6 :	To le	arn the con	ncepts	of conicoides				Thinking	I Proficie	d Attainm	: Knowle	Analysis	(Develo	Design,	Fool Usa	& Culture	nent & Si		ll & Tean	lication	1gt. & Fir	j Learnin			1
Cours Outco	e Lea mes (	ming CLO):	At the	end of this co	ourse, learne	ers will be	able to:	Level of <sup>-</sup>	Expected	Expected	Scientific	Problem	Design 8	Analysis	Modern <sup>-</sup>	Society 8	Environn	Ethics	Individua	Commur	Project N	Life Lonç	PSO - 1	PSO - 2	PSO-3
CLO- 1:	Deriv	e equation	is of co	onics in polar	coordinates	and to so	lve simple problems	3	85	80	н	н	L	-	-	-	-	-	М	L	-	н	-	-	-
CLO- 2 :	Derive equation of straight lines in different forms and to understand the properties of straight lines							3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO- 3 :	LO- Solve problems in sphere and plane section of the sphere						3	85	80	н	н	-		-	-	-	-	М	-	-	н	-	-	-	
CLO- 4 :	CLO- 1 Derive and solve problems in cone and right circular cone						3	85	80	Н	Н	Н	М	-	-	-	-	М	L	-	Н	-	-	-	
CLO- 5 :	Deriv	e and solve	e prob	lems in cylind	er and right	circular o	ylinder	3	85	80	М	н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- 6 :	-O- Solve problems in conicoids and derive the condition of tangency							3	85	80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-

Dura (ho	ation our)	Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module- V (18)
0.1	SLO- 1	Introduction to conics	Introduction to straight line in three dimension	Introduction to Sphere	Introduction to cone	Introduction to conicoids
5-1	SLO- 2	Introduction to polar coordinates	Equation to straight line in symmetric form	Introduction to Sphere	Introduction to cone	Introduction to conicoids
6.2	SLO- 1	Derivation of conics in polar coordinates	Equation of straight line in general form	Equation of Sphere passing through four given points	General Equation of a cone	Standard types of conicoids
3-2	SLO- 2	Derivation of conics in polar coordinates	Equation of straight line in general form	Equation of Sphere passing through four given points	General Equation of a cone	Standard types of conicoids
6.2	SLO- 1	Classification of conics in polar coordinates	Conditions for the straight line to be Parallel	Equation of Sphere passing through end points of the diameter	Right Circular cone	Graphical representation of types of conicoids
3-3	SLO- 2 Problems to identify the types of conic		Conditions for the straight line to be Parallel	Equation of Sphere passing through end points of the diameter	Right Circular cone	Graphical representation of types of conicoids
64	SLO- 1	Problems to find the equation of a conic with given directrix and eccentricity	Conditions for the straight line to be Perpendicular	Properties of Sphere	Equation of a cone with given vertex and guiding curve	General equation of the central conicoid
3-4	SLO- 2	Problems to find the equation of a conic with given directrix and eccentricity	Conditions for the straight line to be Perpendicular	Properties of Sphere	Equation of a cone with given vertex and guiding curve	General equation of the central conicoid
S 5	SLO- 1	To find the Graphical representation of a conic	Condition that a line will lie on a Plane	Problems with Plane and a Sphere	Equation of cone with vertex as origin	Simple problems
3-5	SLO- 2	To find the Graphical representation of a conic	Condition that a line will lie on a Plane	Problems with Plane and a Sphere	Equation of cone with vertex as origin	Simple problems
5.6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-7	SLO- 1	Deriving the Equation of Directrix of a conic	Intersection of line and a Plane	Condition for a plane to to touch a sphere	Equation of cone with three axes as its generators	Equation of the tangent plane to the central conicoid

	SLO- 2	Deriving the Equation of Directrix of a conic	Intersection of line and a	Condition for a plane to touch a sphere	Equation of cone with three	Equation of the tangent plane
	-	Problems related to	The necessary and sufficient	Point of contact of plane	Simple problems	
	SLO- 1	Directrix of a conic	condition that the two lines will be coplanar	and a sphere		Simple problems
5-8	SLO- 2	Problems related to Directrix of a conic	The necessary and sufficient condition that the two lines will be coplanar	Point of contact of plane and a sphere	Simple problems	Simple problems
	SLO- 1	Deriving the Equation of chord of a conic	Condition of coplanarity of two lines, one in general form and the other in symmetric form	Tangent plane of a sphere	Condition that a general equation of second degree may represent a cone	Necessary and Sufficient conditions for a plane to touch the central conicoid
S-9	SLO- 2	Deriving the Equation of chord of a conic	Condition of coplanarity of two lines, one in general form and the other in symmetric form	Tangent plane of a sphere	Condition that a general equation of second degree may represent a cone	Necessary and Sufficient conditions for a plane to touch the central conicoid
S-10	SLO- 1	Problems related to chord of a conic	Condition of coplanarity of two lines, both in general form	Plane section of a sphere	Equation of a cone with vertex, axis and semi-vertical angle	Simple problems
	SLO- 2	Problems related to chord of a conic	Condition of coplanarity of two lines, both in general form	Plane section of a sphere	Equation of a cone with vertex, axis and semi-vertical angle	Simple problems
C 11	SLO- 1	Problems related to conics	Condition of coplanarity of two lines, both in symmetric form	Problems in Plane section of a sphere	Simple problems	Point of contact of the tangent plane to the conicoid
5-11	SLO- 2	Problems related to conics	Condition of coplanarity of two lines, both in symmetric form	Problems in Plane section of a sphere	Simple problems	Point of contact of the tangent plane to the conicoid
	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Deriving the Equation of Tangent of a conic	Angle between two lines	Condition for Two Spheres to touch internally and Externally	Enveloping cone of a sphere	Simple problems
	SLO- 2	Deriving the Equation of Tangent of a conic	Angle between two lines	Condition for Two Spheres to touch internally and Externally	Enveloping cone of a sphere	Simple problems
C 14	SLO- 1	Problems related to Tangent of a conic	Angle between a line and a Plane	Equation of sphere through the circle of intersection of two sphere	Introduction to cylinder	Locus of the point of intersection of three mutually perpendicular tangent planes to a conicoid
3-14	SLO- 2	Problems related to Tangent of a conic	Angle between a line and a Plane	Equation of sphere through the circle of intersection of two sphere	Introduction to cylinder	Locus of the point of intersection of three mutually perpendicular tangent planes to a conicoid
	SLO- 1	Deriving the Equation of Normal of a conic	Equation of two skew lines in symmetric form	Equation of sphere through the circle of intersection of two sphere	General Equation of a cylinder	Simple problems
S-15	SLO- 2	Deriving the Equation of Normal of a conic	Equation of two skew lines in symmetric form	Equation of sphere through the circle of intersection of plane and a sphere	General Equation of a cylinder	Simple problems
S 16	SLO- 1	Problems related to Normal of a conic	Shortest distance between two skew lines	Equation of sphere through the circle of intersection of plane and a sphere	Right circular cylinder	Director sphere and Director plane
3-10	SLO- 2	Problems related to Normal of a conic	Shortest distance between two skew lines	Equation of sphere through the circle of intersection of plane and a sphere	Right circular cylinder	Director sphere and Director plane
C 17	SLO- 1	Problems related to conics	Shortest distance between two skew lines	Angle of intersection of two spheres	Simple problems	Simple problems
0-17	SLO- 2	Problems related to conics	Shortest distance between two skew lines	Angle of intersection of two spheres	Simple problems	Simple problems
0.40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
2-10	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

	1.	P. Duraipandian, Laxmi Duraipandian , D.Muhilan, Analytical	4.	T.K.Manicavachagom Pillay, T.Natarajan, A text book of Analytical
		Geometry-3 Dimensional, Emerald Publishers, 1983.		Geometry- Part-I- Two Dimensions, Viswanathan Publications,
	2.	G.S.Pandey, R.R.Sharma, Vectors and Geometry, Wishwa		1986.
Learning		Prakashan.1988.	5.	M.L.Khanna, Solid Geometry, Jai Prakashnath & Co Publishers,
Resources	3.	N.P. Bali, Solid Geometry, Laxmi Publications (P) Ltd, 2005.		Meerut, 2008.
			6.	P.R.Vittal, Coordinate Geometry, Margham Publishers, 2003.
			7.	G.B.Thomas& R.L.Finney, Calculus & Analytic Geometry, Addison
				Wesley, Mass (Indian Print), 1998.

Learning	g Assessment												
	<b>_</b>		Contin	uous Lea	arning As	sessmer	nt (50% we	eightage)	)	Final Francis offices (	FOO(		
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50% weightage)			
	Level of Thinking		Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice		
Loval 1	Remember	400/		200/		200/		200/		200/			
Level 1	Understand	40% -		30%	-	30%	-	30 /0	-	30%	-		
	Apply	400/		100/		100/		100/		40%			
Level Z	Analyze	40 %	-	40%	-	40%	-	40 %	-	40%	-		
	Evaluate	200/		200/		200/		200/		200/			
Level 3	Create	- 20% -		30%	-	30%	-	30%	-	30%	-		
Total		10	0 %	10	0 %	10	0 %	1(	00 %	100 %	6		

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Course		Course						Cour	9											L	Т	Ρ	С
Code	UMA20103T	Name		NUME	RICAL	ANALYSIS	C	Categ	jory	С			Profe	siona	I Cor	e Co	urse			5	1	0	6
Pre-				Co-				D															
requisit Course	te Nil es			requisite Courses	Nil			C	Cours	ssive	Nil												
Course ( Departm	Offering ent	Math	ematics			Data Book / Codes/Standards																	
Course L Rational	_earning e (CLR):	The	purpose c	of learning th	is course	e is to:		l	Lean	ning	] [		F	rogra	m Le	arninę	g Ou	tcorr	nes	(PL	D)		
						1						1		1		-	- 1	-	-	-			
CLR-Ur	nderstand the juations	methodol	logies to s	olve algebra	iic and tr	ranscendental	1	2	3	1	2	3	4 5	6	7	8	9 1	10 1	11	12	13	14	15
CLR-Ac 2: eq	cquaint knowle juations	dge on d	irect and i	terative met	hods to s	solve system of linear																	1
CLR- Gain knowledge on interpolating and extrapolating methods in various									1														

3:	intervals in rea	ife																		
CLR- 4 :	Understand the	concept of numerical differentiation and integration							ų			ity								
CLR- 5 :	Acquire knowle final value prob	(mool	:y (%)	nt (%)	e		ent	esearc			ainabi		Vork		JCe					
CLR- 6 :	CLR- Familiarise in applying various numerical methods in real life problems						lysis	velopm	sign, R	Usage	lture	& Sust		Feam V	on	& Finar	arning			
		Thin	J Pro	d Att	돈	Ana	De	De	Tool	s Cu	nent		ll & 1	licat	Agt.	Le				
Cours Outco	e Learning omes (CLO):	At the end of this course, learners will be able to:	-evel of	Expected	Expected	Scientific	Problem	Design 8	Analysis	Modem -	Society 8	Environn	Ethics	ndividua	Commur	Project N	-ife Lonç	- SO - 1	- SO - 2	-SO - 3
CLO- 1:	Solve algebraid	and transcendental equations using numerical methods.	3	85	80	Н	Н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO- 2 :	Apply direct an	d iterative methods to system of linear equations	3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO- 3 :	Apply interpolating and extrapolating methods				80	Н	Η	-		-	-	-	-	М	-	-	Н	-	-	-
CLO- 4 :	Compute numerical differentiation and integration				80	н	Η	н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO- 5 :	Interpret initial and final value problems in differential equations				80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- 6 :	Analyse and in methods	nalyse and interpret various realistic cases using existing numerical nethods				М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-

Dura (ho	ition ur)	18	18	18	18	18
C 1	SLO- 1	Introduction and review of fundamentals.	Introduction to Finite Differences	Introduction to Numerical differentiation	Numerical solution of ordinary differential equations	Numerical solution of parital differential equations
	SLO- 2	Algebraic and transcendental equations	Forward and backward differences	Newton's forward difference formula for derivatives	Single step methods-	One dimensional Parabolic equation
S-2	SLO- 1	A solution of numerical equation by Bisection method	Central difference	Numerical differentiation Examples	Taylor series method	Finite difference and mesh points
	SLO- 2	Bisection method	Relation between operators	Numerical differentiation Examples	Taylor series method	Explicit scheme
S_3	SLO- 1	A solution of numerical equation by Method of false position.	Differences of a polynomial – Factorial polynomial	Numerical differentiation Examples	Euler's method	Crank-Nicholson scheme
3-3	SLO- 2	False position method.	Newton's interpolation - Newton's forward interpolation for equal intervals	Newton's backward difference formula for derivatives	Euler's method	Stability of the above schemes
6.4	SLO- 1	False position method.	Newton's forward interpolation for equal intervals	Numerical differentiation Examples	Euler's method	Solution of one dimensional parabolic equation by Explicit scheme
5-4	SLO- 2	A solution of numerical equation by Fixed point iteration method	Newton's backward interpolation for equal intervals	Numerical differentiation Examples	Improved Euler's method	Solution of one dimensional parabolic equation by Explicit scheme
85	SLO- 1	Iteration method	Newton's backward interpolation for equal intervals	Numerical differentiation Examples	Improved Euler's method	Solution of one dimensional parabolic equation by Crank- Nicholson scheme
3-0	SLO- 2	iteration method	Newton's forward and backward interpolation for equal intervals		Improved Euler's method	Solution of one dimensional parabolic equation by Crank- Nicholson scheme
<u> </u>	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

S-7	SLO- 1	A solution of numerical equation by Newton- Raphson method	Central difference interpolation	Numercal Integration – Trapezoidal rule	Modified Euler's method	One dimensional Hyperbolic equation
	SLO- 2	Newton-Raphson method	Stirling's formula for interpolation - Examples	Trapezoidal rule	Modified Euler's method	Methodology for solving hyperbolic equation
S-8	SLO- 1	A solution of numerical equation by Newton- Raphson method	Stirling's formula for interpolation – Examples	Simpson's one-third rule	Modified Euler's method	Finite difference scheme
	SLO- 2	Newton-Raphson method Solving system of linear	Bessel's formula for interpolation – Examples	Simpson's one-third rule Simpson's three-eigth	Improved and Modified Euler's method Improved and Modified	Solution of hyperbolic equation with finite difference scheme
S-9	SLO- 1	equation by Gauss Elimination method	Bessel's formula for interpolation – Examples	rule	Euler's method	Examples with various boundary conditions
	SLO- 2	Gauss Elimination method	Divided differences and Properties	Simpson's three-eigth rule	Improved and Modified Euler's method	Examples with various boundary conditions
S-10	SLO- 1	Gauss Elimination method	Interpolation with unequal intervals by newton's divided difference	Gaussian quadratures	Examples	Examples with various boundary conditions
	SLO- 2	Solving system of linear equation by Gauss Jordan method	Newton's divided difference formula for unequal intervals	Gaussian quadratures	Examples	Examples with various boundary conditions
0.11	SLO- 1	Gauss Jordan method	Interpolation for unequal intervals	Gaussian quadratures	Runge kutta method of fourth order	Practice problems
5-11	SLO- 2	Gauss Jordan method	Interpolation for unequal intervals	Gaussian quadratures	Examples	Practice problems
C 10	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Solving system of linear equation by Crout's method	Lagrange's interpolation formula for unequal intervals	Best Approximations -	Runge kutta method of fourth order	Elliptic equations
	SLO- 2	Crout's method	Lagrange's interpolation formula for unequal intervals	Least squares polynomial approximation	Runge kutta method of fourth order	Finite difference scheme
C 1/	SLO- 1	Crout's method	Lagrange's interpolation formula for unequal intervals	Least squares polynomial approximation	Runge kutta method of fourth order	Mesh points
5-14	SLO- 2	Solving system of linear equation by Gauss Jacobi iterative method	Inverse interpolation– Lagrange's formula for inverse interpolation	Least squares polynomial approximation	Multi step methods	Diagonal five point finite difference formula
S-15	SLO- 1	Gauss Jacobi iterative method	Lagrange's formula for inverse interpolation	Approximation with Chebyshev polynomials	Milne's method	Standard five point finite difference formula
	SLO- 2	Gauss Jacobi iterative method	Lagrange's formula for inverse interpolation	Chebyshev polynomials	Milne's method	Solution of elliptic equation using finite difference scheme
S 16	SLO- 1	Solving system of linear equation by Gauss seidal iterative method	Spline Interpolation	Chebyshev polynomials	Milne's method	Solution of elliptic equation using finite difference scheme
0-10	SLO- 2	Gauss seidal iterative method	Cubic Spline interpolation	Piecewise Linear & Cubic spline approximation	Adams Bashforth method	Examples on different regions with various boundary values
	SLO- 1	Gauss seidal iterative method	Spline Interpolation	Cubic spline approximation	Adams Bashforth method	Examples on different regions with various boundary values
S-17	SLO- 2	Solving system of linear equation by Gauss Jacobi and seidal iterative method	Cubic Spline interpolation	Cubic spline approximation	Adams Bashforth method	Revision
	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

1 2 earning 3 esources 4 5	<ul> <li>Kandasamy P, Thilagavathy. K and G. Gunawathy, Numerical Methods, S.Chand &amp; Sons, 3rd Revised Edition, 2013.</li> <li>Isaacson E. and Keller, H.B., "Analysis of Numerical Methods" Dover Publication, 1994.</li> <li>Philips G.M and Taylor P.J., "Theory and Applications of Numeri Analysis", Academic Press, 1996.</li> <li>Jain M.K, "Numerical Methods for Scientific and Enginee computation", 3rd Edition, New Age International, 1999.</li> <li>Conte S.D. and Carl de Boor, "Elementary Numerical Analysis", Edition, Tata McGraw-Hill Publishing Company. 2004.</li> </ul>	6. 7. 8. 19 9. d 10.	Atkinson K.E., "An Introduction to Numerical Analysis", Wiley & Sons, 2nd Edition, 1989. Brian Bradie (2006), A Friendly Introduction to Numerical Analysis. Pearson. Robert J. Schilling & Sandra L. Harris (1999). Applied Numerical Methods for Engineers Using MATLAB and C. Thomson- Brooks/Cole. F. B. Hildebrand (2013). Introduction to Numerical Analysis: (2nd edition). Dover Publications. Balagurusamy. E, Numerical Methods, Tata Mcgraw Hill Publishing Company. 3rd Edition.

Learning	Learning Assessment													
	Continuous Learning Assessment (50% weightage)													
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (	50% weightage)			
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice			
Loval 1	Remember	400/		200/		200/		200/		200/				
Lever	Understand	40%	-	30%	-	30%	-	30%	-	30%	-			
	Apply	400/		100/		100/		100/		40%				
Level Z	Analyze	40 %	-	40%	-	40%	-	40 %	-	40%	-			
	Evaluate	200/		200/		200/		200/		200/				
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30%	-			
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	6			

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanvasiraju, IIT Madras.	Dr. A. Govindarajan, SRMIST
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	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Mrs. T. Leelavathy, SRMIST

Course	1100205011	Course	Soft Skills	Course	ç	Skill Enhancoment Course	L	Т	Ρ	С	
Code	0CD20301L	Name	SUIT SKIIIS	Category	3	Skill Enhancement Course	0	0	2	1	

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

Cours Ratio	e Learning nale (CLR):	Le	arni	ng				Pro	gran	n Lea	arni	ng C	Dutc	ome	s (P	LO)				
CLR- 1 :	Expose student same through a	s to right attitudinal and behavioral aspects and to build the ctivities	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2:	Develop and n and group activ																			
CLR- Increase efficiency and leadership skills and to improve team results. 3 :																				
CLR- 4 :	Acquire time m	anagement skills and develop creative skills						es			Je									
CLR- 5 :	CLR- Drofessional environment						cepts	isciplin	dge	ion	owledg		)ata		cills	ills			ior	
CLR- 6 :	Instill confident challenges of co	e in students and develop skills necessary to face the ompetitive exams and placements	inking (E	roficiend	ttainmei	al Know	of Con	elated D	Knowle	ecializat	ilize Kn	deling	terpret D	e Skills	olving Sk	ation Sk	skills		al Behav	earning
			of Th	ted P	ted A	ment	ation	ith R	dural	in Sp	to UI	in Mo	ze, In	igativ	em Sc	unica	ical S	kills	sion	ong L
Cours	se Learning omes (CLO):	At the end of this course, learners will be able to:	Level	Expec	Expec	Funda	Applic	Link v	Proce	Skills i	Ability	Skills i	Analyz	Invest	Proble	Comr	Analyt	ICT SI	Profes	Life Lo
CLO- 1:	Re-engineer the	ir attitude and understand its influence on behavior	3	80	70	М	М	М	-	М	Η	М	-	-	Η	Η	Η	М	Н	Н
CLO- 2 :	Acquire inter pe	rsonal skills and be an effective goal oriented team player	3	80	70	М	М	М	-	М	Η	М	-	-	Η	Η	Η	М	Н	Н
CLO- 3 :	Understand the	3	85	75	М	М	М	-	М	Η	М	-	-	Η	Η	Η	М	Н	Н	
CLO- 4 :	Build confidenc	3	85	75	М	М	М	-	М	Η	М	-	-	Η	Η	Η	М	Н	Н	
CLO- Develop interpretation skills and intercultural communication 5 :					75	М	М	М	-	М	Η	М	-	-	Η	Η	Η	М	Η	Η
CLO- 6 :	CLO- Help the students succeed in competitive exams and placements					М	М	М	-	М	Η	М	-	-	Η	Η	Η	М	Η	Η

Duration (hour)		6	6	6	6	6
S-1	SLO- 1	IKIGAI	Interpersonal Skills	Creating brands – activity (posters, flyers, business cards)	Value of Time	Intercultural communication – beliefs, customs and attitude of people in different countries (US, UK, Japan, West Asia, China, Russia)
	SLO- 2	IKIGAI	Emotional Intelligence	Creating brands – activity (posters, flyers, business cards)	Diagnosing Time Management	Social and cultural etiquettes
s.2	SLO- 1	Attitude	Importance of Team Work	Causes of Stress and Its Impact	Weekly Planner, To do list, Prioritizing work	Communication etiquettes
0-2	SLO- 2	Factors influencing Attitude	Team Building Activity	How to Manage Stress and Distress?	Time management activity	Telephone etiquettes
	SLO- 1	SWOT Analysis	NOT Analysis Leadership skills Understanding the Circle of Control		Creativity – think out of the box	Dinning etiquettes
5-3	SLO- 2	Individual SWOT Analysis – activity	Leadership skills based Activity	Creativity Activity	Grooming etiquettes	
e 4	SLO- 1	Extempore Practice Session	Networking skills	Conflicts in Human Relations – reasons	Creativity Assessment Activity	Ice breaking
3-4	SLO- 2	Extempore Practice Session	Networking skills based Activity	Approaches to conflict resolution	Creativity Assessment Activity	Designing ice breaker games
S-5	SLO- 1	Extempore Practice Session	Negotiation skills	Conflict resolution – case studies	Brainstorming, use of groups and individual brainstorming techniques to promote idea generation	Ice breaker activity
	SLO- 2	Extempore Practice Session	Negotiation skills based Activity	Conflict resolution – case studies	Brainstorming session activities	Ice breaker activity
	SLO- 1	Extempore Practice Session	Entrepreneurial Skills	Importance and necessity of Decision Making	Brainstorming session	Introduction to resume building
<b>S-6</b> SLO- 2		Extempore Practice Session	Entrepreneurial knowledge, Focus, Investment, Risk tolerance, Resilience, Negotiation, Ethics, Networking	Process of Decision Making, Practical Way of Decision Making, Weighing Positives and Negatives	Brainstorming session	Introduction to resume building

	1.	Jeff Butterfield, Soft Skills for Everyone, CENGAGE, India,	
		2015	4. Carnegie Dale, How to win friends and influence people, Simon and
Learning	2.	Dr. K. Alex, Soft Skills, S.Chand Publishing & Company,	Schuster, New York, 2016
Resources		India, 2014	5. Thomas A Harris, I am ok, you are ok, Arrow, London, 2012
	3.	Covey Sean, Seven habits of highly effective teens, Simon	6. Daniel Coleman , Emotional Intelligence , Bloomsbury, India, 2016
	& So	chuster, New York, 2014	

Learning Assessme	ent											
	<b>_</b>	Continuous Learning Assessment (100% weightage)										
Level	Bloom's Level of	CLA-1 (20%)	CLA-2 (20%)	CLA-3 (30%) #	CLA-4 (30%)##							
	Thinking	Practice	Practice	Practice	Practice							
	Remember	100/	109/	200/	150/							
Level 1	Understand	10%	10%	30%	15%							
	Apply	F00/	F00/	400/	F0%/							
Level 2	Analyze	50%	50%	40%	50%							
	Evaluate	400/	409/	200/	250/							
Level 5	Create	40%	40%	30%	33%							
	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
		1. Mr Priyanand, Assistant Professor, CDC, E&T, SRMIST
1. Ajay Zener, Director, Career	-	2. Ms Sindhu Thomas, Head in charge, CDC, FSH, SRMIST
		3. Ms Mahalakshmi, Assistant Professor, CDC, FSH, SRMIST

Course Code	ULT20	)G02J	Course Name	9	Tamil-II			I	(	Cou Cate	urse gory	G			Ge	neri	c Ele	ectiv	ve C	ours	e		L 2	T 0	P 2	C 3
Pre-ree Cou	quisite rses	Nil			Со-і Со	equisite ourses	Nil			Progressive Courses Nil																
Course Depart	e Offerin ment	g	T	amil				Data Book / Codes/Standards										Nil								
Course Ration	Course Learning         The purpose of learning this course is to:           Rationale (CLR):         The purpose of learning this course is to:							se is to:			Learı	ning			I	Proç	gram	n Lea	arni	ng C	)utco	ome	s (P	LO)		
CLR- 1:	To generate in students a sensitivity to gender marginalization and Eco sensitivity.						1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
CLR- 2 :	An evolved consciousness in the minds to accommodate all is developed					e all is developed																				
CLR- 3 :	The ability to accept all and to co- exist is initiated																									
CLR- 4:	To create community connectivity and interdependence is initiated					is initiated						ies			ge											
CLR- 5:	To instill	langua	ge skills	3					(mool	y (%)	ıt (%)	ledge	cepts	isciplir	lge	ы	owled		lata		ills	s				
CLR- 6 :	To give t	them al	I the his	torical ins	sights				nking (B	roficienc	ttainmen	al Knowl	of Conc	elated Di	Knowlec	ecializati	ilize Kno	deling	terpret D	e Skills	Iving Sk	ation Ski	skills			
Course Outcor	Course Learning Dutcomes (CLO): At the end of this course, learners will be able to:				Level of Thi	Expected P	Expected A	Fundament	Application	Link with Re	Procedural	Skills in Spe	Ability to Ut	Skills in Mo	Analyze, In	Investigativ	Problem Sc	Communica	Analytical S	PSO -1	PSO -2	PSO-3				
CLO- 1:	To acqui	ire knov	vledge a	about Tan	nil Langi	ıage			2	75	60	н	Н	Н	-	-	Н	н	н	Н	Н	Н	Н	Н	н	н
CLO- 2 :	To streng of Tamil	gthen tl	he know	ledge on	concept	, culture,	civiliz	ation and translation	2	80	70	-	Н	-	Н	Н	Н	Н	-	-	Н	Н	Н	Н	Н	Н
CLO- 3 :	To develop content using the features in Tamil language				2	70	65	Н	-	-	Н	-	Н	Н	Н	-	Н	Н	Н	Н	Н	Н				
CLO- 4 :	To use Tamil Language and Literature to enhance their creativity				creativity	2	70	70	Н	-	Н	М	Н	-	-	-	Н	Н	Н	Н	Н	Н	Н			
CLO- 5 :	To improve communication and creative expression in Tamil language			2	80	70	-	Н	-	Н	-	Н	Н	-	-	Н	Н	Н	Н	Н	Н					
CLO- 6 :	O- : To enable the students to speak and write in chaste Tamil			2	75	70	Н	Н	Н	H-	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н					

D	uration (hour)	12	12	12	12	12
S- 1	SLO-1	தமிழில் காலந்தோறும் அகமரபு	களப்பிரர் காலம்	பல்லவர் காலம்	சங்ககால வரலாறு	தமிழ்ச் சிறுகதைப் போக்குகள்
	SLO-2	அக இலக்கியப் போக்குகள்	அறமும் வாழ்வியலும்	பல்லவர் கால இலக்கியம்	சங்ககால மக்களின் வாழ்வியல்	தமிழ்ச் சிறுகதையும் தமிழ்ச் சமூக வாழ்வியலும்
S- 2	SLO-1	எட்டுத்தொகை நூல்களும் பெயர்களும்	திருக்குறள் - உலகப்பொதுமறை	பக்தியும் தமிழும்	முச்சங்கம் – அறிமுகம்	புதுமைப்பித்தன் - அகல்யை
	SLO-2	எட்டுத்தொகை யில் அக நூல்கள்	திருக்குறள் கட்டமைப்பு	பக்தி இலக்கியங்கள்	முச்சங்க வரலாறு	தொன்மம் – கட்டுடைப்பு
S- 3	SLO-1	ஐங்குறுநூறு (203)	தமிழில் வினை	சைவ சமய இலக்கியங்கள்	செம்மொழி இலக்கியங்கள்	அகிலன் ஒருவேளைச் சோறு
	SLO-2	தலைவனின் நாட்டுப் பெருமை	திருக்குறள் - வினைத்திட்பம் (67)	தேவார மூவர்	பாட்டும் தொகையும்	தொழிற்புரட்சியும் விவசாயமும்
S- 4	SLO-1	குறுந்தொகை (130)	உழவும் தமிழர் வாழ்வும்	தேவாரம் – திருஞான சம்பந்தர் பாடல்	எட்டுத்தொகை உருவாக்கப் பின்புலம்	ஆண்டாள் பிரியதர்ஷினி – மாத்திரை
	SLO-2	அகவாழ்வில் நம்பிக்கை வேர்கள்	திருக்குறள் - உழவு (104)	தேவாரம் – திருநாவுக்கரசர் பாடல்	எட்டுத்தொகையும் தமிழர் வாழ்வியலும்	குடும்பம் – கட்டமைப்பு
S- 5	SLO-1	பண்டைத் தமிழரின் வாழ்வியல்	சமண சமய இலக்கியங்கள்	திருவாசகம் அறிமுகம்	பத்துப்பாட்டு உருவாக்கப் பின்புலம்	பாரததேவி - மாப்பிள்ளை விருந்து
	SLO-2	பண்டைத் தமிழர் உணர்வியல்	நாலடியார்	மாணிக்கவாசகர் பாடல்	பத்துப்பாட்டும் தமிழர் வாழ்வியலும்	எளிய மனிதர்களின் கதை
S- 6	SLO-1	அகநானூறு (44)	இலக்கியங்களில் வைணவ சமய நட்பு வளர்ச்சிப் போக்கு		பதினெண் கீழ்க்கணக்கு நூல்கள்	சிங்கார வடிவேலு – தவிப்பு

	SLO-2	புறவாழ்வோடு கூடிய அகம்	நட்பில் பிழை பொறுத்தல் (221)	வைணவ சமய இலக்கியங்கள்	பதினெண் கீழ்க்கணக்கும் தமிழர் அற மரபும்	புறக்கணிப்பின் வலி
S- 7	SLO-1	கற்றறிந்தார் ஏத்தும் கலி	தமிழர் மருத்துவம்	நாலாயிரத் திவ்யப் பிரபந்தம்	நீதி இலக்கியங்கள்	செய்தி அறிக்கை அறிமுகம்
	SLO-2	கலித்தொகை கட்டமைப்பு	நீதி இலக்கியத்தில் மருத்துவ நூல்கள்	பெரியாழ்வார் பாடல்	நீதி இலக்கியங்களின் பன்முகத் தன்மைகள்	செய்தி அறிக்கை தயாரித்தல்
S- 8	SLO-1	கலித்தொகை (149)	திரிகடுகம்	ஆண்டாள் பாடல்	காப்பிய இலக்கணம்	விமர்சனம்
	SLO-2	வாழ்வியல் அறமும் அகமும்	செங்கோல் அரசு	தொண்டரடிப்பொ டி ஆழ்வார் பாடல்	காப்பியப் போக்குகள்	இலக்கியம், கலை விமர்சனம்
S- 9	SLO-1	தமிழர் புறமரபு	இனியவை நாற்பது அறிமுகம்	தமிழில் இஸ்லாமிய இலக்கியங்கள்	ஐம்பெருங்காப்பிய ங்கள்	நேர்காணல் அறிமுகம்
	SLO-2	புற இலக்கியங்கள்	இனியவை நாற்பதின் தனித்தன்மைகள்	இஸ்லாமிய இலக்கியங்களின் கொடை	ஐம்பெருங்காப்பிய ங்களின் சிறப்புகள்	நேர்காணல் – நுட்பங்கள்
S- 10	SLO-1	புறநானூறு (235)	இனியவை நாற்பது (14)	சீறாப்புராணம்	தமிழ்ச் சமூகமும் சமயத் தத்துவங்களும்	நேர்காணல் கேள்வி தயாரிப்பு
	SLO-2	கையறுநிலை	இனிமையும் அழகும்	மானுக்குப் பிணைநின்ற படலம் (5 பாடல்கள்)	சமயத் தத்துவங்களும் வாழ்வியல் விழுமியங்களும்	நேர்காணல் பதிவும் எழுது முறையும்
S- 11	SLO-1	ஆற்றுப்படை அறிமுகம்	பண்டைக்காலப் போரும் வாழ்வும்	கிறித்தவ சமய இலக்கியங்கள்	பன்னிரு திருமுறை – அறிமுகம்	பேச்சுக்கலை அறிமுகம்
	SLO-2	ஆற்றுப்படை மரபுகள்	போர் இலக்கியங்கள்	கிறித்தவ இலக்கியங்களின் கொடை	பன்னிரு திருமுறை – வரலாறு	தமிழரின் பேச்சுக்கலை
S- 12	SLO-1	சிறுபாணாற்றுப் படை	களவழி நாற்பது (14)	ஆதிநந்தாவனப் பிரளயம்	நாலாயிரத் திவ்யப் பிரபந்தம் – அறிமுகம்	பேச்சுக்கலையின் வகைகள்
	SLO-2	நல்லியக்கோடனு ம்பாணர் வாழ்வியலும்	தமிழர் வீர்ம்	ஏதேன் தோட்ட வருணனை	பன்னிரு ஆழ்வார்கள் வரலாறு	பேச்சுப் பயிற்சி

	1.	மௌவல், தொகுப்பும் பதிப்பும் - தமிழ்த்துறை ஆசிரியர்கள், தமிழ்த்துறை, எஸ்.ஆர்.எம்.
	2.	அறிவியல் மற்றும் தொழில்நுட்பக் கல்விநிறுவனம், காட்டாங்குளத்தூர், 603203, 2020. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை,
Learning		2017
Resources	3.	மு. அருணாசலம், தமிழ் இலக்கிய வரலாறு, நூற்றாண்டு முறை ( 9ஆம் நா. முதல் 16 வரை), தி பார்க்கர், சென்னை, 2005
	4.	தமிழ் இணையக் கல்விக்கழகம் - http://www.tamilvu.org/
	5.	மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம் - https://www.projectmadurai.org/

Learnin	g Assessment														
			Conti	nuous Le	arning Ass		Final Framination (FOO( uninhtana)								
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50% weightage)					
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Loval 1	Remember	200/	200/	200/	200/	200/	200/	200/	200/	200/					
Level 1	Understand	- 30% - 30%		30%	30%	30%	30%	30%	30%	30%	-				
	Apply	10%	40%	50%	50%	50%	50%	50%	50%	50%	_				
Leverz	Analyze	40 /0	4070	50 %	5078	5070	50 /6	5070	50 %	5078	-				
	Evaluate	30%	30%	20%	20%	20%	20%	20%	20%	20%	_				
Level 3	Create	30 %	30 /6	20 /0	20 /0	2070	20 /0	2070	20 /0	2070	-				
	Total	10	0 %	10	0 %	10	0 %	10	00 %	100 %					

Course Designers		
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
	1. Dr. RSrinivasan, Associate Professor, Department of Tamil, Presidency College, Chennai.	1. B.Jaiganesh, Assistant Professor & Head, FSH, SRMIST
		2. T.R.Hebzibah Beulah Suganthi, Assistant Professor, FSH, SRMIST
		3.S.Saraswathy, Assistant Professor, FSH, SRMIST

Code     ULH20G02J     Name     HINDI-II     Codes     G     Generic Elective Course     2     0     2     3	Course		Course	HINDI-II Course Category G			L	T	Ρ	С	
	Code	ULH20G02J	Name	HINDI-II	Category	G	Generic Elective Course	2	0	2	3

Pre-requisite Courses	Co-requisite Courses		Progressive Courses	Nil
Course Offering Department	HINDI	Data Book / Codes/Standards		Nil
Course Learning Rationale (CLR):	The purpose of learning this cour	se is to:	Learning	Program Learning Outcomes (PLO)
CLR- To be able to co	nverse well in the Hindi Language	1	2 3 1 2 3	4 5 6 7 8 9 10 11 12 13 14 15

1:				-	-	-	-	-	-	-	-	-	-	-					1 1	1
CLR- 2:	To read and w	rite and clarity																		
CLR- 3 :	To be willing li	steners and translators –where need be																		
CLR- 4 :	To acquire the life.	values/thought contents of the writers and practice in it in	Ē	-	(			lines			dge									
CLR- 5 :	To find motivat overcome any	find motivation through the various forms of literature and learn to ercome any challenges of life.				wledg	ncepts	Discip	ledge	ation	<pre></pre>		t Data	s	Skills	skills				
CLR- 6 :	To discover the importance of the language in making education as a means of growth in life and not mere literacy.				Attainm	tal Kno	l of Cc	telated	Know	ecializ	tilize F	odeling	Iterpret	ve Skill	olving	ation S	Skills			
					ed ⊿	nen	ation	th R	ural	р Sp	to U	Mc	e, Ir	gativ	ηS	unic	cal		~	
Cours Outco	Course Learning         At the end of this course, learners will be able to:		-evel o	Expect	Expect	Fundar	Applica	Link wi	Proced	Skills ir	Ability 1	Skills ir	Analyz	Investi	Problei	Comm	Analyti	PSO -1	PSO -2	PSO-3
CLO- 1:	To acquire knowledge about Medieval and Modern Poetry.		2	75	60	Н	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 2 :	To consider the relevance of the present trends in Hindi and their contemporary relevance.				70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO- 3 :	To help develop better understanding of the Hindi language by studying the stories with reference to current reality.			70	65	н	-	-	Н	-	•	1	1	-	1	1	-	-	-	-
CLO- 4 :	To understand the usage of the present Advertising trends and its creative angles with the varied skills of Hindi Language.			70	70	н	-	Н	Н	Н	-	-	-	-	-	Н	-	-	-	-
CLO- 5 :	To make translation of good literature and any relevant document from the Hindi Language to English and Vice-versa.		2	80	70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO- 6 :	To help the learner to tackle Administrative terminologies, help them use Idioms and Phrases in their daily life, with ease.		2	75	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Du	uration	12	12	12	12	12
	SLO-1	Kavye ke guno se awagat karana - Jaysi	Kahani Idkiyan	VIGYAPAN	ANUVAD	Takniki Shabdavali
S-1	SLO-2	Ishk hakiki evam moksh bhava se awagat karana	Nari Shakti ki sarthakata	Srijnatamak kshmata jagrit karna	Vidhyarthiyon ko sikhaya jayega anuvad kitna upyogi hai	Vaignik tarike se bhashaon ka avishkaar karna
	SLO-1	Surdas – Vatsalya ras se awagat karana	Kahani gunda Prem ki prakashtha se awagat karvana	VIGYAPAN KYA HAI	ARTH	ARTH
S-2 SI	SLO-2	Bhakti Bhavna se vidhyarthiyon ko jodna	Prtantr bharat ki samajik vyavstha se awagat karvana	Shabdavali evam chitratamakta se awagat karvana	Vidhyarthiyon dwara arth smajkar samaj ke liye mahtavpurn karya kar payenge	/idhyarthi uske arth dwara hi uske mahtav smjhenge
	SLO-1	Tulsidas-Manav mulyon ki prabal bhavna jagrit karna	KAHANI KE TATVA	VIGYAPAN KI BHASHA	PARIBHASHA	PARIBHASHA
S-3	SLO-2	Dharmik Parvarti se awagat karana	Kahani ke tatva ki mahatta se awagat karvana	Bhasha ki abhivyakti ke pryog ko smjhana	/ibhinn vidwano dwara di gai paribhasha se us baat ko smjhenge vidhyathi	ibhinn vidwano dwara di gai paribhasha se us baat ko smjhenge vidhyathi
	SLO-1	Tiruvaluvaar – naitik mulyon ko jagrit karna	KAHANI KE AAYAM	VIGYAPAN KA PRBHAV	MAHATVA	SHABDAVALI KI AVSHYAKTA
S-4	SLO-2	Vidhyarthiyon ko nitivaan bnana	Vidhyarthiyon ko kahani ke vidhinn ayam se awagat karvana	Shravaya-drishya samgri ke prbhav ki upyogita	Samijik jan-jeevan ke liye anuvad ke mahtav ko smjhana.	Vaignikon ka awiskar kitna mahtavpurn
	SLO-1	Desh prem ki bhavna bharna	LEKHAK PARICHAY	VIGYAPAN AUR BAZAR	UDDESHYA	BHASHA VAIGYANIK
S-5	SLO-2	Krantikari vicharon se Awagat karana	Lekhako ke jivan se awagat karvana	Vidhyarthioyon ko vigyapan se bazar me kaise sthapit kiya ja skata hai batana	Vidhyarthi anuvad ke uddeshya ko smajhkar samaj upyogi karya krne me apni sarthak bhumika nibhayenge	Bhasha vaignikon ki jankari
	SLO-1	Badal Raag- Desh prem ki bhavna bhrna	KAHANI PATH	VIGYAPAN AUR ROZGAR	HINDI-ENGLISH	KARYALYIN SHABD
S-6	SLO-2	Krantikari vicharo se awagat karana	Vidhyarthiyon ko kahani path ke dwara unka vak kausal majbut karna	Vidhyarthi savam ka ad- ajency bhi bna paye	Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna	Shabd kaise tayar kiye jate nain vidhyorthiyon ko jankari

St.0-1         Pret ka Byaan -Bhukhmari evam akaal se awagat karana         KAHANI KA SARANSH         VIGYAPAN KI NIYAM         ENGLISH-HINDI         ANGREZI SE HINDI ANUVAD           St.0-2         Samajik samanta banaye rkhne ki pravarti jagana         Lekhan kshmata ka vikas hona         Vigyapan ka ek hi niyam basha ka kashav jo vidhyarthiyon me viksi kiya jayega         Hindi adhikarai aur anuvadak ke pad ke liye tayaar kama         Indi adhikarai aur anuvadak ke pad ke liye tayaar kama           St.0-1         Lahro se dark a nauka paar nhi hoti -chatro ko sahashi banana         KAHANI KA UDDESHYA KAHANI KA UDDESHYA         VIGYAPAN KA MAHTVA         ANUVAD KI UPYOGITA ANUVAD KI UPYOGITA         HINDI SE ANGREZI ANUVAD           St.0-1         Karmathra pum bhavna ko jagrit karna         Kahani ke uddeshy unke jiwan ke mahtav ko smjhne me sahayk banna         Vartman me uski prasangikta vidhyarthiyon ko smjhana         Vidhyarthiyon ko vibhin karyalayon me hindi adhikar jankari prapt         HINDI SE ANGREZI ANUVAD           S-0         St.0-1         Javani -rashtr prem ki bhavna jagrit karna         KAHANI KA VISHELESHAN         PRINT VIGYAPAN         ANUVAD KI UBHUMIKA ki bhumika ka mahtav sikhenge         KAUANI KA VIGHyarthiyon ko rozgaar se jodna         FK DIN EK SHABD           S-10         St.0-1         Dhooi-saman vyavhar ki pravarti jagana         KAHANI PARICHARCHA KAHANI KA SADI TV.VIGYAPAN         SAHITYIK ANUVAD         PRYOJANMULAK SHABD KA MAHTAVA           S-10         St.0-1         KAVYA BIBM <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>							
S-7         SLO-2         Samajik samanta banaye rkhne ki pravarti jagana         Lekhan kshmata ka vikas hona         Vigyapan ka ek hi niyam bhasha ka kashay jo vidhyarthiyon me viksit kiya jayega         Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna         Indi adhikarai aur anuvadak ke pad ke liye tayaar karna           S-8         SLO-1         Lahro se dark a nauka paar nhi hoti -chatro ko sahashi bnana         KAHANI KA UDDESHYA         VIGYAPAN KA MAHTVA         ANUVAD KI UPYOGITA         HINDI SE ANGREZI ANUVAD           SLO-2         Karmaththa pum bhavna ko jagrit karna         Kahani ke uddeshy unke jiwan ke mahtav ko smjihne me sahayk banna         Vatman me uski prasangikta vidhyarthiyon ko smjhana         Vidhyarthiyon ko vibhin karyalayon me hindi adhikari pad ki jankari prapt         Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna.           SLO-1         Javani -rashtr prem ki bhavan jagrit karna         KAHANI KA VISHELESHAN         PRINT VIGYAPAN         ANUVADk KI BHUMIKA         EK DIN EK SHABD           SLO-2         Vir ras evam virat ki pravati se awagat karana         Vishleshan kshmata viksit pravarti jagana         Vidhyarthiyon ko anuvadak ko rkhne ki yogyata banna         Vidhyarthiyon ko anuvadak ko rkhne ki yogyata banna         Vidhyarthiyon ko anuvadak ki banmika ka mahtav sikhenge         Vidhyarthiyon ko anuvadak ki banmika ka mahtav sikhange         Vidhyarthiyon ko anuvadak ki banmatav         Vidhyarthiyon ko anuvadak ki banmatav         Vidhyarthiyon ko anuvadak ki banmatava         Vidhyarthiyon ko anuvadak ki samaj         PRYOJANMUL		SLO-1	Pret ka Byaan -Bhukhmari evam akaal se awagat karana	KAHANI KA SARANSH	VIGYAPAN KI NIYAM	ENGLISH-HINDI	ANGREZI SE HINDI ANUVAD
S-8SLO-1Lahro se dark a nauka paar nih ioti -chatro ko sahashi bnanaKAHANI KA UDDESHYAVIGYAPAN KA MAHTVAANUVAD KI UPYOGITAHINDI SE ANGREZI ANUVADS-8SLO-2Karmathha pum bhavna ko jagrit karnaKahani ke uddeshy unke jiwan ke mahtav ko smjhane me sahayk bannaVartman me uski prasangikta vidhyarthiyon ko smjhanaVidhyarthiyon ko vibhin karyalayon me hindi adhikari pad ki jankari praptHindi adhikari aur anuvadak ke pad ke liye tayaar karna.S-9SLO-1Javani -rashtr prem ki bhavna jagrit karnaKAHANI KA VISHELESHANPRINT VIGYAPANANUVAD KI UBHUMIKAEK DIN EK SHABDS-9SLO-2Vir ras evam virta ki pravati se awagat karanaVishleshan kshmata viksit hotaVidhyarthi iski bhasha sikhengeVidhyarthiyon ko anuvadak ki bhumika ka mahtav smajh aayega jiske adhar par vo kaam karengePRYOJANMULAK SHABD KA MAHTAVAS-10SLO-2Satah se jude rahne ke prema dena.Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata bannaVidhyarthiyon ko abhyas karvaya jayegaVidhyarthiya ka anuvad kaise siya ka anuvad kaise ki ya ka a	S-7	SLO-2	Samajik samanta banaye rkhne ki pravarti jagana	Lekhan kshmata ka vikas hona	Vigyapan ka ek hi niyam bhasha ka kashav jo vidhyarthiyon me viksit kiya jayega	Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna	lindi adhikarai aur anuvadak ke pad ke liye tayaar karna
SLO-2         Karmaththa pum bhavna ko jagrit karna         Kahani ke uddeshy unke jiwan ke mahtav ko smjhen me sahayk banna         Vartman me uski prasangikta vidhyarthiyon         Vidhyarthiyon ko vibhin karyalayon me hindi adhikari pad ki jankari prapt         Indi adhikari aur anuvadak ke pad ke liye tayaar karna.           S-9         SLO-1         Javani -rashtr prem ki bhavna jagrit karna         Vishleshan kshamta viksit vishleshan         PRINT VIGYAPAN         ANUVADk KI BHUMIKA         EK DIN EK SHABD           S-9         SLO-2         Vir ras evam virta ki pravati se awagat karana         Vishleshan kshmata viksit hota         Vidhyarthi iski bhasha sikhenge         Vidhyarthiyon ko anuvadak ki bhumika ka mahtav         Ki bhumika ka mahtav           S-10         SLO-2         Vir ras evam virta ki pravati jagana         KAHANI PARICHARCHA kAHANI PARICHARCHA         RADIO, TV.VIGYAPAN         SAHITYIK ANUVAD         PRYOJANMULAK SHABD KA MAHTAVA           S-10         SLO-2         Satah se jude rahne ke prema dena.         Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata banna         Vidhyarthiyon ko abhyas karvaya jayega         Sahitya ka anuvad kaise kiya jane ki chunouti ko samijajh payenge         Vidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samaji           S-11         SLO-2         Vidhyarthiyon ko naye-naye bilm ki jankari prapt hona         KAHANI ANDOLAN         Ad agency se jodna         Anuvad ke niyamo ko vidhyarthi smajh payenge         ViBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAV <th>6.0</th> <th>SLO-1</th> <th>Lahro se dark a nauka paar nhi hoti –chatro ko sahashi bnana</th> <th>KAHANI KA UDDESHYA</th> <th>VIGYAPAN KA MAHTVA</th> <th>ANUVAD KI UPYOGITA</th> <th>HINDI SE ANGREZI ANUVAD</th>	6.0	SLO-1	Lahro se dark a nauka paar nhi hoti –chatro ko sahashi bnana	KAHANI KA UDDESHYA	VIGYAPAN KA MAHTVA	ANUVAD KI UPYOGITA	HINDI SE ANGREZI ANUVAD
S-9SLO-1Javani -rashtr prem ki bhavna jagrit karnaKAHANI KA VISHELESHANPRINT VIGYAPANANUVADK KI BHUMIKAEK DIN EK SHABDS-0SLO-2Vir ras evam virta ki pravati se awagat karanaVishleshan kshmata viksit hotaVidhyarthi iski bhasha sikhengeVidhyarthiyon ko anuvadak ki bhumika ka mahtav smajh aayega jiske adhar par vo kaam karengeVidhyarthiyon ko anuvadak ki bhumika ka mahtav smajh aayega jiske adhar par vo kaam karengePRYOJANMULAK SHABD KAMATAVAS-10SLO-1Dhool- saman vyavhar ki pravarti jaganaKAHANI PARICHARCHA Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata bannaRADIO, TV.VIGYAPANSAHITYIK ANUVADPRYOJANMULAK SHABD KA MAHTAVASLO-2Satah se jude rahne ke prema dena.Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata bannaVidhyarthiyon ko abhyas karvaya jayegaVibhinn bhashaon ke sahitya ka anuvad kaise kiya jane ki chunouti ko samaji payengeViBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAVS-11SLO-1KAVYA BIBMKAHANI ANDOLAN bhi awagat karanaAd agency se jodnaAnuvad ke niyamo ko vidhyarthi smajh payengeVIBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAVS-12SLO-1SAMUHIK PARICHARCHAKAHANI KA BADLTA SWAROOPVIGYAPAN KA SWARUPSHABDO KA MAHATAV SHABDO KA MAHATAVSLO-2Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhanaSmay ke sath unke swarup b dalav ka bhi vidyarthi samijh paide honaVidhyarthiyon ko shabdo ki samijh utann honaSLO-2Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhan	SLO	SLO-2	Karmaththa purn bhavna ko jagrit karna	Kahani ke uddeshy unke jiwan ke mahtav ko smjhne me sahayk banna	Vartman me uski prasangikta vidhyarthiyon ko smjhana	Vidhyarthiyon ko vibhin karyalayon me hindi adhikari pad ki jankari prapt	Hindi adhikari aur anuvadak ke pad ke liye tayaar karna.
S-9SLO-2Vir ras evam virta ki pravati se awagat karanaVishleshan kshmata viksit hotaVidhyarthi iski bhasha sikhengeVidhyarthiyon ko anuvadak ki bhumika ka mahtav smajh aayega jiske adhar par vo kaam karengeVidhyarthiyon ko rozgaar se jodnaS-10SLO-2Dhool- saman vyavhar ki pravarti jaganaKAHANI PARICHARCHARADIO, TV.VIGYAPANSAHITYIK ANUVADPRYOJANMULAK SHABD KA MAHTAVAS-10SLO-2Satah se jude rahne ke prerna dena.Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata bannaVidhyarthiyon ko abhyas karvaya jayegaVibinin bhashaon ke sahitya ka anuvad kaise kiya jane ki chunouti ko samjajh payengeVidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samajS-11SLO-1KAVYA BIBMKAHANI ANDOLANAd agencyANUVAD KE NIYAMVIBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAVS-12SLO-1SAMUHIK PARICHARCHAKAHANI KA BADLTA SWAROOPAd agency aur swarozgaar se jodnaAnuvad ke niyamo ko vidhyarthi smajh payengeHindi adhikari pad par karyaratS-12SLO-2Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhanaSmay ke sath unke swarup ke bdlav ka bhi vidyarthi me samajh paida honaVidhyarthiyon ko vigyapan lekha ki barikayon ki samaih utban honaShabda anuvad ke mahtva ko vidhyarthi smajhenge		SLO-1	Javani –rashtr prem ki bhavna jagrit karna	KAHANI KA VISHELESHAN	PRINT VIGYAPAN	ANUVADK KI BHUMIKA	EK DIN EK SHABD
SL0-1Dhool- saman vyavhar ki pravarti jaganaKAHANI PARICHARCHARADIO, TV.VIGYAPANSAHITYIK ANUVADPRYOJANMULAK SHABD KA MAHTAVAS-10SL0-2Satah se jude rahne ke prema dena.Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata bannaVidhyarthiyon ko abhyas karvaya jayegaVibhinn bhashaon ke sahitya ka anuvad kaise kiya jane ki chunouti ko samjajh payengeVidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samajS-11SL0-1KAVYA BIBMKAHANI ANDOLANAd agencyANUVAD KE NIYAMViBHINN KSHETRO ME PRYOJANMULAK 	S-9	SLO-2	Vir ras evam virta ki pravati se awagat karana	Vishleshan kshmata viksit hota	Vidhyarthi iski bhasha sikhenge	Vidhyarthiyon ko anuvadak ki bhumika ka mahtav smajh aayega jiske adhar par vo kaam karenge	/idhyarthiyon ko rozgaar se jodna
S-10SLO-2Satah se jude rahne ke prerna dena.Vaad-vivad se vidhyarthiyon me apni baat ko rkne ki yogyata bannaVidhyarthiyon ko abhyas karvaya jayegaVibhinn bhashaon ke sahitya ka anuvad kaise kiya jane ki chunouti ko samjajh payengeVidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samajS-10SLO-1KAVYA BIBMKAHANI ANDOLANAd agencyANUVAD KE NIYAMVIBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAVS-11SLO-2Vidhyarthiyon ko naye-naye bibm ki jankari prapt honaVibhinn kahani andolan se bhi awagat karana SWAROOPAd agency aur swarozgaar se jodnaAnuvad ke niyamo ko vidhyarthi smajh payengeVIBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAVS-12SLO-1SAMUHIK PARICHARCHA kaushal kshamta ko bdhanaKAHANI KA BADLTA SWAROOPVIGYAPAN KA SWARUP VIGhyarthiyon ko vigyapan 		SLO-1	Dhool- saman vyavhar ki pravarti jagana	KAHANI PARICHARCHA	RADIO, TV.VIGYAPAN	SAHITYIK ANUVAD	PRYOJANMULAK SHABD KA MAHTAVA
SL0-1         KAVYA BIBM         KAHANI ANDOLAN         Ad agency         ANUVAD KE NIYAM         VIBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAV           SL0-2         Vidhyarthiyon ko naye-naye bibm ki jankari prapt hona         Vibhinn kahani andolan se bhi awagat karana         Ad agency aur swarozgaar se jodna         Anuvad ke niyamo ko vidhyarthi smajh payenge         Hindi adhikari pad par karyarat           SL0-1         SAMUHIK PARICHARCHA         KAHANI KA BADLTA SWAROOP         VIGYAPAN KA SWARUP         SHABDO KA MAHATAV         VAIGYANIK SHABDAVALI KI AVSHYAKATA           SL0-2         Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhana         Smay ke sath unke swarup bolav ka bhi vidyarthi me samajh paida hona         Vidhyarthiyon ko vigyapan lekha ki barikayon ki samajh utpann hona         Shabda anuvad ke mahtva ko vidhyarthi smajhenge         Vidhyarthiyon ko shabdo ki vaignikta se jodna	S-10	SLO-2	Satah se jude rahne ke prerna dena.	Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata banna	Vidhyarthiyon ko abhyas karvaya jayega	Vibhinn bhashaon ke sahitya ka anuvad kaise kiya jane ki chunouti ko samjajh payenge	Vidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samaj
SLO-2         Vidhyarthiyon ko naye-naye bibm ki jankari prapt hona         Vibhinn kahani andolan se bhi awagat karana         Ad agency aur swarozgaar se jodna         Anuvad ke niyamo ko vidhyarthi smajh payenge         Hindi adhikari pad par karyarat           SLO-1         SAMUHIK PARICHARCHA         KAHANI KA BADLTA SWAROOP         VIGYAPAN KA SWARUP         SHABDO KA MAHATAV         VAIGYANIK SHABDAVALI KI AVSHYAKATA           S-12         SLO-2         Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhana         Smay ke sath unke swarup ke bdlav ka bhi vidyarthi me samajh paida hona         Vidhyarthiyon ko vigyapan lekha ki barikayon ki samajh upann hona         Shabda anuvad ke mahtva ko vidhyarthi smajhenge         Vidhyarthiyon ko shabdo ki vaignikta se jodna	S-11	SLO-1	KAVYA BIBM	KAHANI ANDOLAN	Ad agency	ANUVAD KE NIYAM	VIBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAV
S-12         SLO-1         SAMUHIK PARICHARCHA         KAHANI KA BADLTA SWAROOP         VIGYAPAN KA SWARUP         SHABDO KA MAHATAV         VAIGYANIK SHABDAVALI KI AVSHYAKATA           SLO-2         Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhana         Smay ke sath unke swarup ke bdlav ka bhi vidyarthi me samaih paida hona         Vidhyarthiyon ko vigyapan lekha ki barikayon ki samajh utpann hona         Shabda anuvad ke mahtva ko vidhyarthi smajhenge         Vidhyarthiyon ko shabdo ki vaignikta se jodna		SLO-2	Vidhyarthiyon ko naye-naye	Vibhinn kahani andolan se	Ad agency aur swarozgaar	Anuvad ke niyamo ko	Hindi adhikari pad par
S-12 SLO-2 Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhana ko bdhana samajh paida hona samajh utpann hona Shabda anuvad ke mahtva samajh utpann hona ka vidhyarthi sama ka vidhyarthi samajh utpann hona ka vidhyarthi samajh utpan		SLO-1	SAMUHIK PARICHARCHA	KAHANI KA BADLTA SWAROOP	VIGYAPAN KA SWARUP	SHABDO KA MAHATAV	VAIGYANIK SHABDAVALI KI AVSHYAKATA
	S-12	SLO-2	Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhana	Smay ke sath unke swarup ke bdlav ka bhi vidyarthi me samajh paida hona	Vidhyarthiyon ko vigyapan lekha ki barikayon ki samajh utpann hona	Shabda anuvad ke mahtva ko vidhyarthi smajhenge	Vidhyarthiyon ko shabdo ki vaignikta se jodna

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Learnin	Learning Assessment														
	<b>.</b>		Continu	uous Lea	arning Ass	sessmer	Final Franciscation (F00/ uninhtana)								
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (50% weightage)					
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Level 1	Remember	200/	200/	200/	200/	200/	200/	200/	200/	200/					
	Understand	30%	30%	30%	30%	20%	20%	20%	20%	30%	-				
	Apply	100/	40%	E00/	50%	50%	E00/	E00/	E0%	500/					
Level 2	Analyze	40%	40%	50%	50%	50%	50%	50%	50%	50%	-				
	Evaluate	200/	200/	200/	200/	200/	200/	200/	200/	200/					
Level 3	Create	30%	30%	20%	20%	30%	30%	30%	30%	20%	-				
	Total	100 %		10	0 %	10	0 %	1(	00 %	100 %					

Course Designers		
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
	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

Course Code	se le ULF20G02J Course Name French-II							II		Co Cat	Course G Generic Elective Course								L 2	Т 0	P 2	C 3				
Pre-re Cou	quisite rses <i>Nil</i>				Co-re Cor	equisite urses	Nil				Prog Co	gress ourse	sive es	N	il											
Course Depart	e Offering ment		Fre	ench				Data Book / Codes/Standards					Nil													
Course Ration	e Learning ale (CLR):		The	e purpose	e of lear	ning this	cours	se is to:			Learning Program Learning Outcomes (PLO)															
CLR- 1:	Strengthen the language of the students both in oral and written								1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	Express their sentiments, emotions and opinions, reacting to information situations																									
CLR- 3 :	Make them le	earn the	e basi	ic rules of	f French	Gramm	nar.																			
CLR- 4:	Develop stra	egies c	of con	nprehensi	ion of te	exts of d	ifferen	t origin						nes			ge									
CLR- 5:	Enable the st and take pos	udents ition as	to ov a for	reigner sp	he tear beaking	ot speal French	king a	foreign language	moo	(%) k	t (%)	edge	epts	scipli	ge	uc	wlec		ata		lls	s				
CLR- 6:	Extend and e scenario	xpand	their	savoir-fair	re throu	igh the a	acquis	ition of current	king (BI	oficienc	ainmen	Know	f Conc	ated Di	inowled	cializati	ize Kno	eling	erpret D	Skills	ving Ski	ion Skil	ills			
									Thin	d Pro	d Att	enta	o uo	l Rel	ral K	Spec	Utili	Mod	, Inte	ative	Solv	licat	al Sk			
Course Outcor	e Learning nes (CLO):	At th	ne end	d of this c	ourse, l	earners	will be	e able to:	Level of	Expecte	Expected	Fundam	Applicati	Link with	Procedu	Skills in	Ability to	Skills in	Analyze	Investig:	Problem	Commui	Analytica	PSO -1	PSO -2	PSO-3
CLO- 1:	To acquire ki	nowledg	ge ab	out Frenc	ch langu	iage			2	75	60	Н	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 2:	To strengthe of French	n the kr	nowle	dge on co	oncept,	culture,	civiliz	ation and translation	2	80	70	-	Н	-	Н	-	-	-	-	-	-	М	-	-	-	-
CLO- 3 :	To develop content using the features in French language						ge	2	70	65	Н	-	-	Н	-	-	-	-	-	-	Н	-	-	-	-	
CLO- 4 :	To interpret the French language into other language						2	70	70	Н	-	Н	Н	Н	-	-	-	-	-	Н	-	-	-	-		
CLO- 5 :	<b>D-</b> To improve the communication, intercultural elements in French language					French language	2	80	70	-	Н	-	Н	-	-	-	-	-	-	Н	-	-	-	-		
CLO- 6:	<ul> <li>D- To enable the students to overcome the fear of speaking a foreign languaç</li> <li>and take position as a foreigner speaking French</li> </ul>						g a foreign language	2	75	70	Н	-	М-	Н	Н	-	-	-	-	-	-	-	-	-	-	

Du (I	iration hour)	12	12	12	12	12			
S-1	SLO-1	Les loisirs	La routine	Où faire ses courses ?	Découvrez et dégustez	Tout le monde s'amuse			
	SLO-2	Les activités	Les exemples	Les courses	Dégustez	Le monde			
S-2	SLO-1	Les activités quotidiennes	Les adjectifs interrogatifs	Les aliments	Les articles partitifs	Les sorties			
0-2	SLO-2	Les quotidiennes	Les trois formes	Les exemples	Du, De la, De l', Des	Les exemples			
S-3	SLO-1	Les matières	Les nombres ordinaux	Les quantités	Le pronom en (la quantité)	Situer dans le temps			
	SLO-2	Les exemples	Les nombres	Les exemples	Le bon quantité	Les activités			
	SLO-1	Le temps	L'heure	Les commerces	Très ?	Les vêtements			
S-4	SLO-2	L'heure	Quelle heure est-il ?	Les activités	Beaucoup ?	Les accessoires			
6	SLO-1	Les fréquences	Le pronom personnel COD	Les commerçants	La phrase négative (2)	Les ados au quotidien			
3-5	SLO-2	Les activités	Les exemples	Les exemples	Les négations	La vie quotidienne			
<b>S</b> 6	SLO-1	Les sons [u]	Les pronominaux	Demander le prix	C'est /II est	Les adjectifs démonstratifs			
3-0	SLO-2	Les sons [y]	Se promener, se coucher etc,	Dire le prix	Les activités	Ce, Cet, Cette, Ces			
S-7	SLO-1	Les loisirs	Les verbes du premier groupe	Les services	L'impératif	La formation du féminin			
	SLO-2	Les exemples	Parler, Demander, Poser	Les exemples	Les exemples	Les exemples			
S-8	SLO-1	La routine	groupe en –e_er,é_er,-eler,-eter	Les moyens de paiement	Les verbes devoir, pouvoir	Le pronom indéfini on			
	SLO-2	Les activités	Appeler, Jeter etc,	La carte de crédits	Les verbes savoir, vouloir	Les activités			
	SLO-1	Les Mots	Le verbe prendre	les sons [ã]	ll faut	Le futur proche			
S-9	SLO-2	Les expressions	Les exemples	Les sons [an]	Le verbe impersonnel	S+Aller+Infinitif du verbe			
S-10	SLO-1	Exprimer ses gouts	Parler de ses gouts	Découvrez !	Au restaurant : Commander et commenter	Le passe composé			

	SLO-2	Les exemples	Des gouter	Dégustez !	Les restaurant	Les exemples
SLO-1		Exprimer ses préférences	Parler de ses préférences	Au restaurant : commander	Inviter à une invitation	Les verbes voir et sortir
3-11	SLO-2	Les activités	Les exemples	Au restaurant : commenter	Répondre à une invitation	Décrire une tenue
SLO-1		Décrire sa journée	Décrire sa journée	Inviter à une invitation	Les Mots	écrire un message amical
	SLO-2	Les exemples	Les activités	Répondre à une invitation	Les expressions	Lire un message

Learning Resources Theory: 1. "Génération-Al" 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.

Learnin	g Assesment																
	<b>.</b>		Contin	uous Lea	arning As	sessmer	nt (50% we	eightage	)	Final Examination (50% weightage)							
	Bloom's	CLA -	· 1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50 % weightage)							
	Lever of Finiking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice						
Lovel 1	Remember	200/	200/	200/	200/	200/	200/	200/	200/	200/							
Level I	Understand	30%	30%	30%	30%	20%	2070	20%	20%	30 %	-						
Lovel 2	Apply	400/	10%	E00/	F0%	E00/	E00/	E00/	E0%	F0%							
Level Z	Analyze	40 %	40%	50%	50%	50%	50%	50%	50%	50%	-						
Lovel 2	Evaluate	200/	200/	200/	200/	200/	200/	200/	200/	20%							
Level 3	Create	30%	30%	20%	20%	30%	30%	30%	30%	20%	-						
	Total	10	0 %	10	0 %	10	0 %	1(	00 %		100 %						

Course D	Designers	
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
	1. Dr. C.Thirumurugan Associate Professor, Department of French, Pondicherry University	1. Kumaravel K. Assistant Professor & Head, SRMIST
		2. Ponrajadurai M Assistant Professor, SRMIST

Co C	ode	JMA20201T	Cours Name	e DIFF	ACE	(	Cou Cateo	rse gory	e C Professional Core Course									L 5	T 1	P 0	C 6				
re	Pre- equisite		Nil		Co- requisite	Nil			Pr	ogre: Cours	ssive ses							N	lil						
Co De	urse Of partme	fering nt		Ma	thematics	Data Book / Codes/Standar	rds																		
Со	urse Le	arning Ratio	onale (C	LR)	The purpose	e of learning this course i	is to:			Learr	ning				Pro	grar	n Le	arnir	ng O	utco	mes	(PL	0)		
CL	R- To	understand	the con	cepts of firs	t order differ	ential equations.		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CL	R- To	learn the co	oncepts	of ODEs by	different me	thods.		(mo	- (%)	(%)			t t	-	-	-	-	-	ork		e				
CL	.R- To	learn the co	o solve o oncepts o	of the metho	od of multipli	ers.		olB) gr	ciency	nment	vledge	sis	lopmei	'n,	sage	Ire			am Wo	_	Financ	jing			
CL CL	.R- To .R- To	learn the di understand	learn the different types of Laplace transform and properties. understand the evaluation of inverse Laplace transforms.							d Attaiı	Kno	Analy	& Deve	, Desiç	Tool U	& Cultu	nent &		al & Te	nication	Agt. &	g Learr			
Co		aming Outo								xpecter	cientific	oblem	esign 8	nalysis	odem	ociety a	Ivironr	thics	dividua	ommur	oject N	fe Lon	so - 1	SO - 2	SO – 3
CL	.O- An	alyzing the	ing the second order differential equations.							ഥ 80	М	Ч	Ľ	- A	Ź	- S	山 -	ш -	ي M	Ŭ L	<u>م</u> -	E. H	- P	ď.	<u>م</u> -
CL	.0- Ex .0- Ca	amine soun Iculate the s	d Knowl several fa	edge in map acts on testi	ppings of OD ing of Lagrar	)E. nge's.		2	85 85	80 80	M	H H	-	М	M -	-	-	-	M M	-	-	H H	-	-	-
CL	0- To	apply the m	nethod o	f multipliers.		-		2	85	80 80	H	Н	1	Μ	-	-	-	-	M		-	Н	-	-	-
CL	.0- To	know the ap	pplicatio	ns of Laplac	ce transform.			2	85	80	M	H	-	-	-	-	-	-	M	-	-	Н	-	-	-
[	Duratior (hour)	<sup>1</sup> 1	8	1	18	18				18										18					
S-	SLO-	1 Introdu to differ	ction rential	Introductio differentia	on to Il equation	Introduction to simultaneous	Introc	lucti form	on to	Lap	lace			lr	nitial	valu	ie th	eore	m						
1	SLO-	2 Introdu to differ	ction rential	Application differentia	ns of Il equation	Applications of simultaneous	Appli	catio	ns a	nd pi	roper	ties		Ρ	Problems in initial value theorem										
S-	SLO-	1 Applica of Diffe	tions rential	Complement function	entary	Simultaneous differential equation	Linea	rity	orop	erty				F	Probl	lems	s in i	nitial	l valu	ie th	eore	m			
2	SLO-	2 Applica of Diffe	itions rential	Problems compleme	based on entary	Problems in Simultaneous	Probl prope	ems erty	bas	ed or	n Line	earit	у	F	Probl	lems	s in i	nitial	valu	ie th	eore	m			
S-	SLO-	1 Proble differen	ms in ntial	Particular	Integral	Linear differential equations with	First	shifti	ng p	rope	rty			F	inal	valu	ue th	eore	em						
3	SLO-	2 Probler differer	ms in ntial	Problems Particular	in Integral	Problems in Cauchy's homogeneous linear	Probl prope	ems erty	in F	irst s	hiftin	g		Ρ	roble	ems	in fi	nal v	alue	the	orem	ı			
S-	SLO-	1 Type I Solvab	– le for p	Particular Type I : e <sup>a</sup>	Integral -	Method of reduction of order	Chan	ge c	f sca	ale of	prop	erty	1	L	Laplace transform: Residue theo							eorer	n		
4	SLO-	2 Type I Solvab	– le for p	Problems Particular	in Integral -	Problems in method of reduction of order	Probl prope	ems erty	in C	hang	je of	scal	e of	L	Laplace transform: Residue theo							eorer	n		
S-	SLO-	1 Equation Solvabl	on e for p	Particular Type II : s	Integral - sin ax or	Transformation of the equation by changing	Lapla	ice t	ranst	form	of de	rivat	tives	Ρ	robl	ems	on F	Resi	due f	theo	rem				
5	SLO-	2 Equation Solvable	on e for p	Problems Particular	in Integral -	Problem in Transformation of the	Probl of de	ems rivat	in L ives	aplac	ce tra	nsfc	orm	Ρ	roble	ems	on F	Resi	due f	theo	rem				
S-	SLO-	1 Tutoria Session	l n	Tutorial Se	ession	Tutorial Session	Tutor	ial S	essi	on				Т	utori	ial S	essi	on							
6	SLO-	2 Tutoria Sessio	l n	Tutorial Se	ession	Tutorial Session	Tutor	ial S	essi	on				Т	utori	ial S	essi	on							
S-	SLO-	1 Probler solvabl	ms in e for p	Particular Type III : 2	Integral - x <sup>n</sup>	Reduction to canonical (or) normal	Lapla	ice t	ransi	form	of int	egra	als	L	apla	ce ti	ranst	form	- Co	onvo	lutio	n the	eore	m	
7	SLO-	2 Probler solvabl	ms in e for p	Problems Particular	in Integral -	Problems based on Reduction to	Probl of inte	ems egra	in L Is	aplac	ce tra	nsfc	nm	L	apla	ce ti	anst	form	- Co	onvo	lutio	n the	eore	m	
S-	SLO-	1 Type II Solvab	– le for y	Particular Type IV :	Integral – e <sup>ax</sup> f(x)	Special types of equations	Lapla functi	ice ti ion	ransi	form	of pe	riod	ic	Ρ	roble	em l	base	d on	l Cor	nvolu	ition	theo	orem	ı	
8	SLO-	2 Type II Solvab	– le for y	Problems Particular	in Integral -	Application of special types of equations	Lapla functi	ice t ion	ransi	form	of pe	riod	ic	Ρ	roble	em t	base	d on	l Cor	nvolu	ution	theo	orem	ı	
S-	SLO-	1 Equations 1 Solvabl	ons e for y	Particular Type V : x <sup>n</sup> sin a:	Integral – x or x <sup>n</sup> cos	Special types of equations Type I : $f(x, \frac{dy}{dx})$	Probl	ems	in p	eriod	ic fur	nctio	'n	L	apla	ce ti	ranst	form	– Pa	artia	frac	tion	S		
9	SLO-	2 Equations Solvable	ons e for y	Problems Particular x <sup>n</sup> sin a:	in Integral x or x <sup>n</sup> cos	Special types of equations Type I · f ( x. <sup>dy</sup> )	Probl	Problems in periodic function					n	L	apla	ace f	rans	sform	1 – P	artia	l fra	ction	S		
S- 10	SLO-	1 Probler solvabl	ms in e for y	Particular Type VI :	Integral – x f(x)	Problems based on $f\left(x, \frac{dy}{dx}\right)$	Inver	se L	apla	ce Tr	ansfo	orm		P p	Problem based on Laplace transform – partial fractions										
	SLO-	2 Probler solvabl	ms in e for y	Problems Particular Type VI :	in Integral x f(x)	Applications of Inverse Laplace Problem based on Laplace transform partial fractions							nsfoi	rm –	-										
S-	SLO-1	Type III – Solvable for x	Problems based on the particular integral	Special types of equations Type II · f (y, dy)	Inverse Laplace Transform – Linearity property	Application of Laplace transform to solve differential equations																			
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11	SLO-2	Type III – Solvable for x	Problems based on the particular integral	Special types of equations Type II : $f(y, \frac{dy}{dy})$	Problems in Inverse Laplace Transform – Linearity property	Application of Laplace transform to solve differential equations																			
S-	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session																			
<sup>12</sup> SLO-2		Tutorial Session Tutorial Session Tuto		Tutorial Session	Tutorial Session	Tutorial Session																			
S-	SLO-1	Equations solvable for x	Linear differential equations with	Problems in: $f\left(y, \frac{dy}{dx}\right)$	Inverse Laplace Transform – first shifting property	Problems in Laplace transform to solve differential equations																			
13	SLO-2	Equations solvable for x	Problem in Linear differential	Problems in: $f\left(y, \frac{dy}{dx}\right)$	Problems in Inverse Laplace Transform – first shifting	Problems in Laplace transform to solve differential equations																			
S-	SLO-1	Problems in solvable for x	Linear differential equations with	Equations $f(x, y, y', y'') = 0$	Inverse Laplace Transform – change of scale property	Laplace transform simultaneous linear differential equation																			
14	SLO-2	Problems in solvable for x	Problem in Linear differential	Equations $f(x, y, y', y'') = 0$	Problems in Inverse Laplace Transform – change of scale	Laplace transform simultaneous linear differential equation																			
S-	SLO-1	Type IV – Clairauťs	Method of variation of parameters	Problems in equations	Inverse Laplace Transform of derivatives	Problems in simultaneous linear differential equation																			
15	SLO-2	Type IV – Clairauťs	Applications of Method of variation	Problems in equations	Problems in Inverse Laplace Transform of derivatives	Problems in simultaneous linear differential equation																			
S-	SLO-1	Problems based on Clairaut's	Problems in Method of variation of parameters	Solution of the equation	Inverse Laplace Transform of integrals	Solution of differential and integral equations																			
16	SLO-2	Problems based on Clairaut's	Problems in Method of variation of parameters	Solution of the equation $\frac{dy}{dy} + Py + O$	Problems in Inverse Laplace Transform of integrals	Solution of differential and integral equations																			
S-	SLO-1	Problems in Clairaut's	Problems in Method of variation of	Problems in $\frac{dy}{dx}$ +	Problems based on inverse Laplace transform	Problems in Solution of differential and integral equations																			
17	SLO-2	Problems in Clairaut'sProblems in Method of variation ofProblems in $\frac{dy}{dx}$		Problems in $\frac{dy}{dx}$ +	Problems based on inverse Laplace transform	Problems in Solution of differential and integral equations																			
S-	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session																			
18	SLO-2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session																			

<ol> <li>T.Veerarajan, Engineering Mathematics – II, MC-Graw Hill Education(India) Private Limited, 2014. Chapter 1: Section 1.10 – 1.13: Chapter 2: Section 2.1-2.3, 2.4, 2.7: Chapter 3: Section 3.1 –</li> </ol>	4.
<ol> <li>Chapter 3: Section 3.9, 3.10, 3.11.</li> <li>T.Veerarajan, Transforms and Partial Differential Equations, Third Edition, MC-Graw Hill Education(India) Private Limited, 2016.</li> <li>J.N.Sharma, Kehar Singh, Partial Differential Equations for Engineers and Scientistics, Narosa Publishing house, New Delhi, 2000.</li> </ol>	5. 6.
1	<ol> <li>T.Veerarajan, Engineering Mathematics – II, MC-Graw Hill Education(India) Private Limited, 2014. Chapter 1: Section 1.10 – 1.13; Chapter 2: Section 2.1-2.3, 2.4, 2.7; Chapter 3: Section 3.1 – 3.6; Chapter 3: Section 3.9, 3.10, 3.11.</li> <li>T.Veerarajan, Transforms and Partial Differential Equations, Third Edition, MC-Graw Hill Education(India) Private Limited, 2016.</li> <li>J.N.Sharma, Kehar Singh, Partial Differential Equations for Engineers and Scientistics, Narosa Publishing house, New Delhi, 2000.</li> </ol>

4.

Narayanan, T.K. Manickavasagam Pillai, Calculus, Vol. I, S. Viswanathan Printers Pvt. Limited, 2007. K. Thilagavathy, Mathematics for B. Sc Branch – I, Volume 3, 1st Edition, S. Chand and Co.Ltd., New Delhi, 2004. B.S.Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publications. 2012. 5.

Learning	Learning Assessment														
			Continu	uous Lea	arning As	sessmen		Final Examination (50% weighters)							
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50% weightage)					
	Lover of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Lovel 1	Remember	100/		200/		200/		200/		200/					
Level	Understand	40% -		30%	-	30%	-	30%	-	30 %	-				
Lovel 2	Apply	10%		40%	_	40%	-	40%		40%					
Leverz	Analyze	40 /0	-	40 /0	-	40 /0	-	40 /0	-	40 %	-				
Lovel 2	Evaluate	200/		200/		200/		200/		200/					
Level 3	Create	- 20%		30%	-	30%	-	30%	-	30 %	-				
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %					

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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Cours Code	e UM/	A20202T	Course Name	9		CAI	LCULUS	C	Cour Categ	rse jory	С			Prof	essi	iona	l Coi	re C	ours	e		L 5	T 1	P 0	C 6
Pre requi Cour	e- isite l' rses	Nil			Co- requisite Courses	Nil			Pro	ogres Cours	sive es	Nil													
Course Depar	e Offer tment	ing	Mat	hematics			Data Book / Codes/Standards																		
Course Learning Rationale (CLR): The purpose of learning this course is to:									Learning Program Learning Outcomes (PLO)																
CLR- 1 :	R- To learn n <sup>th</sup> derivative of product of two functions and understand the concept of partial derivatives of homogeneous functions										1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 : CLR-	- To understand the concept of extreme values of functions involving two and three variables - L earn the concept of integration by means of various methods -																								
3 : CLR- 4 :	Study	in detail tł	he topic	on definite	integrals as	well as	reduction formulae	(mo	(%)	(%)			Ħ	earch			nability		ž		a)				[]
CLR- 5: CLR-	Apply Apply	the geom	etrical a	pplications egration in	of integratio	n lume		iking (Blo	oficiency	tainment (	lowledge	alysis	velopmer	sign, Res	Usage	ulture	: & Sustai		Team Wo	ion	& Finance	arning			1
Course	e Learr	ning	At the er	nd of this co	ourse, learne	ers will b	e able to:	evel of Thir	xpected Pr	xpected At	cientific Kr	oblem Ana	esign & De	nalysis, De	odern Too	ociety & Cu	nvironmen	thics	dividual &	ommunica	oject Mgt.	fe Long Le	so - 1	SO - 2	SO – 3
CLO-	mes (C Know	the funda	mental a	application	of partial der	ivatives		3	ய் 85	ய் 80	м Н	Ē	۵ L	- A	· M	ى -	<u>تت</u> -	ш -	ے M	Ŭ	- Ь	H	ě.	<u>ă</u>	- B
1: CLO- 2:	Identify the extremum of a function with two and three variables								85	80	М	н	-	М	М	-	-	-	М	-	-	н		-	-
CLO- 3 :	Understand the concept of different methods of solving integrals								85	80	Н	н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO- 4 :	<sup>)-</sup> Apply the reduction formula to evaluate the given integral.							3	85	80	н	н	Н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO- 5 :	O- Associate the rule of integration in finding length and area of a curve						area of a curve	3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- 6 :	O- Solve multiple integrals						3	85	80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-	

Dura (ho	ition ur)	18	18	18	18	18
<b>C</b> 1	SLO- 1	Introduction to Differential Calculus	Introduction to Maxima and Minima function of two variables	Introduction to Integration	Introduction to definite integral	Introduction to geometrical applications of integration
5-1	SLO- 2	Limits and Continuity	Introduction to Maxima and Minima function of two variables	Introduction to Integration	Definition of definite integral	Introduction to geometrical applications of integration
	SLO- 1	Continuity of Functions, Graphical meaning of Continuiity	Working rule to find Maxima and minima	Methods of Integration	Rule to find $\int_{a}^{b} f(x) dx$	Areas in polar coordinates
S-2	SLO- 2	Differentiation of inverse functions, hyperbolic and inverse hyperbolic function	Working rule to find Maxima and Minima	Method of Integration- Substitution method	Properties of definite integrals	Formula to find areas in polar coordinates
6.2	SLO- 1	Function of function rule	Problems in Maxima and Minima	Method of Integration- Substitution method	Properties of definite integrals	Problems in areas in polar coordinates
0-0	SLO- 2	Function of logarithmic differentiation	Problems in Maxima and Minima	Method of Integration- Substitution method	Problems in properties of definite integrals	Problems in areas in polar coordinates
	SLO- 1	Differentiation of implicit function	Problems in Maxima and Minima	Method of Integration- Substitution method	Problems in properties of definite integrals	Problems in areas in polar coordinates
S-4	SLO- 2	Problems in n <sup>th</sup> derivative	Problems in Maxima and Minima	Method of Integration- Decomposition in to a sum.	Reduction formulae $I_n = \int x^n e^{\alpha x} dx$	Problems in areas in polar coordinates
S E	SLO- 1	Problems in n <sup>th</sup> derivative	Problems in Maxima and Minima	Method of Integration- Decomposition in to a sum.	<b>Reduction formulae</b> $I_n = \int x^n e^{\alpha x} dx$	Problems in areas in polar coordinates
3-3	SLO- 2	Problems in n <sup>th</sup> derivative	Problems in Maxima and Minima	Method of Integration- Decomposition in to a sum.	Reduction formulae $I_n = \int x^n \cos ax dx$	Problems in areas in polar coordinates
S-6 SLO- 1		Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
	SLO- 1	Formation of equations involving derivatives	Lagrange's method of undetermined multipliers	Method of Integration-	<b>Reduction formulae</b> $I_n = \int x^n \cos ax dx$	Length of a curve in Cartesian coordinates
S-7	SLO- 2	Formation of equations involving derivatives	Problems in Lagrange's method of undetermined multipliers	Method of Integration- Integration by parts	<b>Reduction</b> formulae $I_n = \int x^n \cos ax dx$	Length of a curve in Polar coordinates
<b>C</b> 0	SLO- 1	Problems in Leibnitz formula for the n <sup>th</sup> derivative of a product	Problems in Lagrange's method of undetermined multipliers	Method of Integration- Integration by parts	<b>Reduction</b> formulae $I_n = \int \sin^n x dx$	Problems in Length of a curve in Cartesian coordinates
3-0	SLO- 2	Problems in Leibnitz formula for the n <sup>th</sup> derivative of a product	Problems in Lagrange's method of undetermined multipliers	Method of Integration- Integration by parts	<b>Reduction formulae</b> $I_n = \int \cos^n x dx$	Problems in Length of a curve in Cartesian coordinates
	SLO- 1	Problems in Leibnitz formula for the nth derivative of a product	Problems in Lagrange's method of undetermined multipliers	Method of Integration- Successive reduction	Reduction formulae $I_n = \int \cos^n x dx$	Problems in Length of a curve in Cartesian coordinates
S-9	SLO- 2	Partial differentiation	Problems in Lagrange's method of undetermined multipliers	Method of Integration- Successive reduction	<b>Reduction formulae</b> $I_{m,n} = \int \sin^m x \cos^n x dx$	Problems in Length of a curve in Cartesian coordinates
S-10	SLO- 1	Partial differentiation	Problems in Lagrange's method of undetermined multipliers	Method of Integration- Successive reduction	<b>Reduction formulae</b> $I_{m,n} = \int \sin^m x \cos^n x dx$	Problems in Length of a curve in Polar coordinates
	SLO- 2	Successive partial derivatives - problems	Definition of Envelope	Method of Integration- Successive reduction	<b>Reduction formulae</b> $I_n = \int \tan^n x dx$	Problems in Length of a curve in Polar coordinates
S-11	SLO- 1	Successive partial derivatives -Problems	Method of finding the Envelope	Method of Integration- Successive reduction	<b>Reduction formulae</b> $I_n = \int \tan^n x dx$	Problems in Length of a curve in Polar coordinates
0-11	SLO- 2	Successive partial derivatives -Problems	Problems in Envelope	Method of Integration- Successive reduction	Reduction formulae $I_n = \int \cot^n x dx$	Problems in Length of a curve in Polar coordinates
C 12	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Function of function rule -Problems	Problems in Envelope	Problems in integration by parts	<b>Reduction</b> formulae $I_n = \int \cot^n x dx$	Area of surface of revolution
	SLO- 2	Function of function rule-problems	Problems in Envelope	Problems in integration by parts	Reduction formulae $I_n = \int \sec^n x dx$	Area of surface of revolution
S 14	SLO- 1	Total differential coefficient-problems	Problems in Envelope	Problems in integration by parts	Reduction formulae $I_n = \int \sec^n x dx$	Problems in Area of surface of revolution(Cartesian coordinates)
0-14	SLO- 2	Problems in Implicit functions	Problems in Taylor series	Problems in integration by parts	Reduction formulae $I_n = \int \sec^n x dx$	Problems in Area of surface of revolution(Cartesian coordinates)
S-15	SLO- 1	Problems in Implicit functions	Problems in Taylor series	Problems in Bernoulli's formula	Reduction formulae $I_n = \int \operatorname{cosec}^n x dx$	Problems in Area of surface of revolution(Cartesian coordinates)
0-10	SLO- 2	Problems in Homogeneous function	Problems in Taylor series	Problems in Bernoulli's formula	<b>Reduction formulae</b> $I_n = \int \operatorname{cosec}^n x dx$	Problems in Area of surface of revolution(Cartesian coordinates)
0.40	SLO- 1	Problems in Homogeneous function	Problems in Taylor series	Problems in Bernoulli's formula	<b>Reduction formulae</b> $I_{m,n} = \int x^m (\log x)^n dx$	Problems in Area of surface of revolution(Polar coordinates)
5-10	SLO- 2	Problems in Euler theorem	Problems in Jacobians	Problems in Bernoulli's formula	<b>Reduction formulae</b> $I_{m,n} = \int x^m (\log x)^n dx$	Problems in Area of surface of revolution (Polar coordinates)
C 17	SLO- 1	Problems in Euler theorem	Problems in Jacobians	Practice problems	Reduction formulae $I_n = \int \csc^n x dx$	Problems in Area of surface of revolution(Polar coordinates)
5-17	SLO- 2	Problems in partial differential equation of function of two functions	Problems in Jacobians	Practice problems	Problems involving reduction formula	Problems in Area of surface of revolution (Polar coordinates)
0.40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-18	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
	2					

	1.	Calculus, Vol.I, S. Narayanan and T K ManicavachagomPillay,	3. Mathematics, Volume 1, P. Kandasamy and Thilagavathy, S. Chand,
		S. Viswanathan Printers and Publishers Pvt. Ltd., 2010.	New Delhi, 2004.
		Chapter 3: Sections 1.1 – 1.6, 2.1, 2.2, Chapter 8: Sections 1.1 –	
Looming		1.6, Chapter 8: Sections 4.1, 5, Chapter 10: Sections 1.1, 1.2, 1.3.	4. Calculus, Thomas and Finney, Pearson Education, 9th Edition, 2006.
Deseuroon	2.	CalculusVol. II, S. Narayanan and T K ManicavachagomPillay,	
Resources		S. ViswanathanPrinters and Publishers Pvt. Ltd., 2010.	
		Chapter 1: Sections 5, 6.1 – 6.6, 7.1 – 7.5, 8, 9, 10, 12, 15.1,	
	Chap	ter 1:	
		Sections 11, 13.1 – 13.10,14,	

Learnin	Learning Assessment														
	Bloom's Level of Thinking		Continu	ious Lea	arning As	sessmer	Final Examination (E0% weighters)								
		CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (50% weightage)					
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
	Remember	100/		200/		200/		200/		200/					
Level I	Understand	40%	-	30%	-	30%	-	30%	-	30 %	-				
	Apply	100/		100/		100/		40%		100/					
Leverz	Analyze	40%	-	40 %	-	40%	-	40%	-	40%	-				
	Evaluate	200/		200/		200/		200/		200/					
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30 %	-				
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %					

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions maheshwaranv@yahoo.com	Prof. Y.V.S.S. Sanyasiraju, IIT Madras, sryedida@iitm.ac.in	Dr. A. Govindarajan, SRMIST Prof. K. S. Ganapathy Subramanian, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. S. Vidyanandini, SRMIST Mrs. V. Padma

Cours Cod	e L	JMA20203	BT C	ourse lame	Vector cal	culus, Fourier series and	ns		Cou Cate	urse egory	,	C Professional Core L T P Course 5 1 0									)	C 6			
	Pre	-requisite	Course	s	Integral calculus	Co-requisite Courses	Nil	Nil						ogre	ssiv	e Co	ourse	es	Nil						
Course	Course Offering Department Mathematics Data B									ook / Codes/Standards Nil															
Course Ration	Course Learning Rationale (CLR): The purpose of learning this course is to:									Learning         Program Learning Outcomes (PLO)											0)				
CLR- 1 :	Evalu	ation of de	ouble ar	nd triple in	itegrals in C	Cartesian and polar coord	dinates	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	Evalu	ation of lir	ne, surfa	ace and vo	olume integ	rals																			
CLR- 3 :	Study	of Fourie	r series	expansio	n in full ran	ge																	1		
CLR- 4 :	Study	of half ra	nge seri	ies expan	sion in cosi	ne and sine		(m	(%	(%)				arch			ability		¥			i	1		
CLR- 5 :	Study	of Fourie	r transfo	orms and i	its techniqu	e for evaluating integrals	6	(Bloo	ency (	nent ( <sup>c</sup>	edge	s	pmen	, Rese	age	an an	ustain		n Wor		nance	þ			
CLR- 6 :	Study integr	of Fourie als	er sine a	nd Cosine	e transform	s and its technique for e	valuating	hinking	Profici	Attainr	Knowl	nalysi	Develo	Design	ool Us	Culture	ent & S		& Teaı	cation	jt. & Fi	Learnii			
Course		mina						l of T	ected	ected .	ntific	lem A	gn & I	ysis, I	ern To	ety &	onme	ş	idual	munic	ect Mo	-ong	-	- 2	۳ ۱
Outcor	mes ((	CLO):	At the e	end of this	course, le	arners will be able to:		Leve	Expe	Expe	Sciel	Prob	Desi	Anal	Mode	Soci	Envi	Ethic	Indiv	Com	Proje	Life I	PSO	PSO	PSO
CLO- 1:	Stude	nts will be	e able to	evaluate	double and	d triple integrals		1	85	80	н	н	L	-	-	-	-	-	Μ	L	-	Н	-	-	-
CLO- 2 :	Stude	nts will be	e able to	evaluate	line, surfac	ce and volume integrals		2	85	80	М	н	-	М	М	-	-	-	М	-	-	н	-	-	-
CLO- 3 :	CLO- Students will be able to expand a given function as a Fourier series in full range								85	80	н	Н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO- 4 :	CLO- Students will be able to expand a given function as a Fourier cosine and sine 4 : series								85	80	н	н	Н	М	-	-	-	-	М	L	-	н	-	-	-
CLO- 5 :	CLO-         Students will be able to apply the technique for evaluating integrals using         5:         Fourier transform							3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- 6 :	CLO- Students will be able to apply the technique for evaluating integrals using : Convolution								85	80	М	Η	-	-	-	-	-	-	М	-	-	Н	-	-	-

Du (ł	iration hour)	Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module-V (18)
S-1	SLO-1	Introduction to the concept of integrals	Introduction to Vector Calculus	Introduction to Fourier series	Introduction to Half range Fourier series expansion	Introduction to integral transforms
	SLO-2	Evaluation of integrals	Scalar and Vector Point function	Dirichlet's condition	Sine series expansion over(0,I)	Fourier integral theorem
S-2	SLO-1	Problems in evaluation of integrals	Gradient of the function	Euler constants	sine series expansion over $(0,\pi)$	Fourier transform(FT)
	SLO-2	Problems in evaluation of integrals	Finding the grad of a scalar function	Convergence of Fourier series in the interval (a, b)	Sine series for x-x <sup>2</sup>	FT of f(x)=1- x  in x <1
S-3	SLO-1	Concept of double integrals	Normal vector, unit normal vector	Fourier series expansion over (0,2l)	sine series expansion over(0,I)	FT of $F(x)=1-x^2$ in $ x <1$
0-0	SLO-2	Evaluation of double integrals	Finding the unit normal vector to the given suface	Finding series expansion for cosine and sine function	Sine series expansion for x(1-x)	FT of F(x)=cosx in0 <x<1< td=""></x<1<>
	SLO-1	Evaluation of double integrals	Angle between the two surfaces	Fourier series expansion over (0,2l)	cosine series expansion over(0,I)	Application Of Inverse fourier transform
S-4	SLO-2	Evaluation of double integrals	Finding the angle between two surfaces at a given point	Finding series expansion for cosine , sine function and polynomials	Problems	FT of f(x)=a²-x² in  x  <a and="" evaluating="" hence="" integrals<="" some="" td=""></a>
<b>S</b> 5	SLO-1	Double integrals in polar coordinates	Concept of divergence	Fourier series expansion over (-l, l)	cosine series expansion over(0,I)	FT of f(x)=a- x  in  x  <a and<br="">hence evaluating some integrals</a>
3-3	SLO-2	Evaluation of double integrals in polar coordinates	Finding the divergence of a vector function	Finding series expansion for even and odd functions	Problems	
99	SLO-1	Tutorials	Tutorials	Tutorials	Tutorials	Tutorials
0-0	SLO-2	Tutorials	Tutorials	Tutorials	Tutorials	Tutorials
S-7	SLO-	Concept of triple integrals	Solenoidal Field	Fourier series expansion of even function over (-l, l)	RMS value of the function in (0,a)	Parseval's identity
0-7	SLO-2	Problems in triple integrals	Problems in solenoidal field	Fourier series expansion of odd function over (-I, I)	Related problems	Related problems
S-8	SLO-1	Problems in triple integrals	Concept of Curl	Fourier series expansion of odd function over (-I, I)	Parseval's identity	Problems on inverse Fourier transform and Parseval's identity

	SLO-2	Problems in triple integrals	Problems in finding the curl of a vector	Problems	Cosine series expansion for $(x-1)^2$	Problems on inverse Fourier transform and Parseval's identity
S-9	SLO-1	Llimit of double integrals for a given region	Irrotational Field	Fourier series expansion of neither even nor odd function over (-I, I)	Parseval's identity	Properties of Fourier transform
	SLO-2	Problems in finding the limits of double integrals	Problems on divergence and curl of vector function	Fourier series expansion of eax in(-1,1)	Related Problems	Properties of Fourier transform
S-	SLO-1	Problems in finding the limits of double integrals	Scalar potential function	Problems in full range over (- $\pi$ , $\pi$ )	Convergence of Half range series	Problem based on Properties of Fourier transform
10	SLO-2	Problems in finding the limits of double integrals	Problems in finding the scalar potential function	Fourier series expansion of e <sup>ax</sup> in (-π, π)	Related Problems	Problem based on Properties of Fourier transform
S-	SLO-1	Application of double integrals-Using Cartesian coordinates	Vector integrals	Fourier series expansion over (0, 2π)	Problems in sines with deduction	Fourier sine transform
11	SLO-2	Problems in finding the area of a given region	Line integrals	Related Problems	Problems in sines with deduction	Sine transform of eax
S-	SLO-1	Problems in finding the area of a region	Problems on Line integrals	Fourier series expansion of even function over $(-\pi \pi)$	Problems in cosine series with deduction	Inverse Fourier sine transform
10	SLO-2	Problems in finding the area of a given region	Problems on Line integrals	Series expansion of x-x <sup>2</sup>	Problems in cosine series with deduction	Evaluation of integrals
S-	SLO-1	Problems in finding the area of a given region using polar coordinates	Surface integrals	Fourier series expansion of odd function over $(-\pi,\pi)$	Application of sine series expansion	Inverse Fourier cosine transform
11	SLO-2	Problems in polarcoordinates	Evaluation of surface integrals	Series expansion of x sinx	Problems	Cosine transform of e <sup>a</sup> xand evaluating integrals
S-	SLO-1	Tutorials	Tutorials	Tutorials	Tutorials	Tutorials
12	SLO-2	Tutorials	Tutorials	Tutorials	Tutorials	Tutorials
S-	SLO-1	Change of order of integration	Green's theorem and its application	Root mean square value of the functions	Application of cosine series expansion	Properties of Fourier sine and cosine transform
13	SLO-2	Problems in change of order of integration	Problems on Green's Theorem	RMS values for f(x)=x <sup>2</sup> in(-1,1)	Cosine seies for f(x)= x <sup>2</sup>	Properties of Fourier sine and cosine transform
S-	SLO-1	Problems in change of order	Gauss divergence theorem and its Application	Parseval's indentity	Application of sine series expansion	Related problems
14	SLO-2	Problems in change of order	Verification of Gauss Divergence Theorem for Cubes	Deduction of $\Sigma(1/n^{4)}$	Sine series for f(x)=x	Cosine transform of 1/(x <sup>2</sup> +a <sup>2</sup> )
S-	SLO-1	Change of variable	Verification of Gauss Divergence Theorem for Cubes	Deduction of $\Sigma(1/n^4)$ where n is odd	Harmonic Analysis for sine series	Convolution theorem
15	SLO-2	Problems in change of variable	Verification of Gauss Divergence Theorem for Cuboid	Related problems	Related Problems	Proof of convolution theorm
S-	SLO-1	Problems in change of variable	Stoke's theorem	Harmonic Analysis	Harmonic Analysis for sine series	Problems using convolution
16	SLO-2	Problems in change of variable	Application	Problems	Related Problems	Self reciprocal under sine transform
S-	SLO-1	Application of triple integrals	Verification of Stoke's Theorem	Harmonic Analysis	Harmonic Analysis for cosine series	Self reciprocal under cosine transform
17	SL0-2	Problems	Verification of Stoke's Theorem	Problems	Related Problems	Evaluation of integrals using identities
S-	SLO-1	Tutorials	Tutorials	Tutorials	Tutorials	Tutorials
18	SLO-2	Tutorials	Tutorials	Tutorials	Tutorials	Tutorials
Lear	ning					
Resc	ources					

Learning Resources	1. 2. 3.	<ul> <li>P. R. Vittal &amp; V. Mallini. Vector Calculus, Fourier series and Fourier transforms, Margham Publications, 2004.</li> <li>Grewal B.S. Higher Engineering Mathematics, Khanna Publications, 42<sup>nd</sup> Edition, 2012.</li> <li>S. Narayanan and Manickavachagam Pillai, Vector algebra and Analysis, S. Viswanathan Pvt, Ltd., 1995.</li> </ul>	<ol> <li>S.Narayanan and Manickavachagam Pillai, calculus, Volume III,Vija Nicole Imprints Pvt.Ltd, Chennai, 2004.</li> <li>A.R.Vasistha and R.K.Gupta, Integral transforms, Krishna Prakashan media Pvt Ltd., New Delhi, 2011.</li> <li>S.Narayanan, R.Hanumantha and T.K.Manickavachagam Pillai, Ancillary Mathematics, Volume I &amp; II, S.Viswanathan Printers, Chennai, 2007.</li> </ol>
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Leannin	Assessment		Contin	uous Lea	arning Ass	sessmer	nt (50% we	ightage			
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA -	4 (10%)#	Final Examination (	50% weightage)
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
a	Remember	400/		200/		200/		200/		200/	
Levei i	Understand	40%	-	30%	-	30%	-	30%	-	30%	-
aval 0	Apply	400/		400/		400/		400/		400/	
-evel Z	Analyze	40%	-	40%	-	40%	-	40%	-	40%	-

Loval 2	Evaluate	200/		200/		200/		200/		200/	
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30%	-
	Total	10	0 %	10	0 %	10	0 %	100 %		100 %	6

# 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. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanyasiraju, IIT Madras, sryedida@iitm.ac.in	Dr. A. Govindarajan, SRMIST Dr. K. Ganesan, SRMIST
maheshwaranv@yahoo.com	Prof. B. V. Rathish Kumar, IIT Kanpur,	Mr. L. S. Senthilkumar, SRMIST
	bvrk@iitk.ac.in	Mrs. G. Krishnaveni, SRMIST

Course Code	UCD20S02L	Course Name	Quantitative Aptitude and Reasoning	Course Category	S
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Skill Enhancement Course

L	Т	Ρ	С
0	0	2	1

								U.	logo.	,											0	0	2	
Pre-	requisite Cour	ses	Nil	Co (	-requisite Courses	Nil		F	Progr Cou	essiv rses	ve	N	il											
Cours Depa	se Offering rtment		Career E	Developr	ment Centre	Data Book / Codes/Standards																		
Cours Ratio	se Learning nale (CLR):	The	, purpose	of learn	ning this cours	e is to:	Le	earni	ing				Pro	gran	n Le	arni	ng C	Outc	ome	s (P	LO)			
CLR- 1 :	Demonstrate v	variou	ıs principl	les invol	ved in solving	mathematical concepts	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	Develop intere calculations a	est an nd av	d awaren erage	iess in s	tudents regard	ding profit/ loss, interest																		
CLR- 3 :	Critically evalu alligations, pe	iate b rmuta	asic math tion and	nematica combina	al concepts re ation, time and	lated to mixtures and work																		
CLR- 4 :	Provide stude	nts wi ed to	ith skills n time, spe	iecessai ed and	ry to generate distance and l	and interpret data and blood relation.						es			е									
CLR- 5 :	Enable studer	ts to	understar	nd reaso	oning skills		loom)	(%) (%)	nt (%)	ledge	cepts	isciplin	lge	on	owledc		ata		ills	ills			ior	
CLR- 6 :	Create awarer aptitude and re exams	iess i easor	n student ning skills	ts regard and als	ding the variou to its importan	is concepts in quantitative ce in various competitive	hinking (B	Proficienc	Attainmer	ntal Know	n of Conc	Related D	al Knowlec	pecializati	Jtilize Kno	lodeling	Interpret D	ive Skills	Solving Sk	cation Sk	Skills		nal Behav	Learning
Cours	se Learning omes (CLO):	At t	he end o	f this co	urse, learners	will be able to:	Level of T	Expected	Expected	Fundame	Applicatio	Link with	Procedura	Skills in S	Ability to I	Skills in N	Analyze, I	Investigat	Problem (	Communi	Analytical	ICT Skills	Professio	Life Long
CLO- 1 :	Understand, a	nalyz	e and sol	lve ques	tions based o	n numbers, logarithms.	3	80	70	Н	Н	М	Н	L	М	-	Η	1	Η	-	Н	М	-	Η
CLO- 2 :	Create, solve, applicable in c	interp our da	oret and a ly to day l	apply ba life	sic mathemat	ical models which are	3	80	75	М	Н	М	Н	-	М	-	Η	-	Η	-	Н	М	-	Η
CLO- 3 :	Understand th combinations, simpler and ir	e con proba inova	cepts of i ability, tin itive meth	mixtures ne and w nod	s and alligatior vork and to ap	ns, permutation and proach questions in a	3	85	70	М	Н	М	Н	-	М	-	Н	-	Н	-	Н	М	-	Η
CLO- 4 :	Understand th	e con	icept in tii	me ,spe	ed and distan	Ce	3	85	80	М	Н	М	Η	-	М	-	Η	-	Η	-	Н	М	-	Η
CLO- 5 :	Ability to solve	the p	problems	on reas	oning		3	85	75	М	Н	М	Н	-	М	-	Η	-	Η	-	Н	М	-	Η

CLC 6 :	)- Able	e to face different competitive e	xams		3	80	70	1	М	Η	М	Η	-	М	-	Η	-	М	-	Н	М	-	Н
Du (h	ration our)	6	6		6								6				6						
C 1	SLO- 1	Classification of numbers	Profit and Loss- Introduction	Mixtures and Alligations- Introduction					-	Time, Speed and Distance- Problems on Trains							Direction Sense- Introduction						
3-1	SLO- 2	Test of divisibility	Profit and Loss-Basic Problems	Mixtures and Problems	d All	igat	ions	-		Time, Speed and Distance- Boats & Streams							Direction Sense-Problems						ns
6.2	SLO- 1	Unit digit	Statistics-Introduction	Permutation Basics	-In	trod	uctio	Suc	ا & ا	Data cha	a Inte rt	erpr	etati	on -	Bar		Nun	nber	Ser	ies			
3-2	SLO- 2	Tailed zeroes	Statistics-Mean, Median, Mode	Combination-Introduction& Basics					:   (	Data cha	a Inte rt	erpr	etati	on –	· Pie		Word Series						
<u></u>	SLO- 1	HCF, LCM	Simple Interest- Introduction,Formulas &Problems	Probability-Introduction &Basics				I	Data Interpretation – Table							Seating Arrangements - Linear						-	
3-3	SLO- 2	HCF, LCM - Solving problems	Compound Interest- Introduction ,Formulas &Problems	Probability-F	Prob	lem	s			Data Interpretation – Line graph						e	Seating Arrangements - Circular						
S 1	SLO- 1	Logarithm –Introduction of log rules	Word problems on Line equations-Introduction	Time and work-Introduction				ו י	Data sufficiency- Introduction and Basics							Puzzles-Concepts							
3-4	SLO- 2	Logarithm –Applications of log rules	Word problems on Line equations- Basic problems	Time and work-Men and Work				I	Data sufficiency-Problems							Puz	zles	-Pro	blen	ns			
с <b>г</b>	SLO- 1	Percentage -Introduction	Averages-Introduction & Basics	Time and work-Pipes &Cisterns(Introduction)				I	Blood relation-Introduction						on	Cloc Disc	cks- cuss	Con ion	cept	s			
3-5	SLO- 2	Percentage- Basic problems	Averages-Tricky Problems	Time and work-Pipes &Cisterns(Problems)					1	Blo	od re	latio	on-P	robl	ems		Cloc	:ks-	Prob	olem	s		
	SLO- 1	Percentage-Increasing & Decreasing functions	Ratio and Proportions- Introduction	Time, Speed and Distance- Introduction					- (	Coding – Decoding- Introduction							Calendars-Introduction of basic concept					of	
5-6	SLO- 2	Percentage- Miscellaneous problems	Ratio and Proportions- Basics & problems	Time, Speed and Distance- Basic problems					- ( 	Coding – Decoding- Different types							Calendars-Problems						

	1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata	4. Edgar Thrope, Test Of Reasoning for Competitive Examinations, Tata
	McGraw Hill, 5th Edition	McGraw Hill, 6th Edition
Learning	2. Dr. Agarwal.R.S, Quantitative Aptitude for Competitive Examinations, S.	5. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for
Resources	Chand and Company Limited, 2018 Edition	competitive examinations, Pearson, 3rd Edition
	3. Archana Ram, PlaceMentor: Tests of Aptitude for Placement Readiness,	6. P A Anand, Quantitative Aptitude for competitive examinations,
	Oxford University Press, Oxford, 2018	Wiley publications, e book, 2019

Learning Assessment					
		(	Continuous Learning As	sessment (100% weight	age)
Level	Bloom's Level of Thinking	CLA-1 (20%)	CLA-2 (20%)	CLA-3 (30%) #	CLA-4 (30%) ##
		Practice	Practice	Practice	Practice
Level 1	Remember	100/	100/	200/	150/
	Understand	10%	10%	30%	10%
Laural D	Apply	F00/	F00/	400/	F0%/
Level 2	Analyze	50%	50%	40%	50%
Laural D	Evaluate	400/	400/	200/	250/
Level 3	Create	40%	40%	30%	35%
	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										
1 Aigu Zonor, Diractor, Caroor Launcher		1. Dr. P Madhusoodhanan, HoD, CDC, E&T, SRMIST										
T. Ajay Zener, Director, Career Launcher	-	2. Dr. M Snehalatha, Assistant. Professor, CDC, E&T, SRMIST										

Cou Co	rse de <sup>UJ,</sup>	K20201L Cou Na	urse me	Communicatio	on Skills			Co Cate	urse egory	,	JK			L	ife S	kill	Cou	rse			L 0	Т 0	P 4	C 2
Pr	e-requis	ite Courses	Nil C	o-requisite Courses	Nil				Prog Co	ress urse	ive s	Nil												
Cou Dep	rse Offe artment	ring	English		Data Book Codes/Sta	/ ndards										Nil								
Cou Rati	rse Lear onale (C	ning LR):	The purpos	e of learning this cours	se is to:				Lear	ning	]		I	Proę	gram	n Lea	arnii	ng C	outco	ome	s (P	LO)		
CLF CLF	<b>:-1</b> : То : <b>-2</b> : То	make the stud educate them	ents learn the about word s	native speakers' acce ress of English	ent.		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2-3: The	e enable them	to participate	in group discussion an	nd debates		(H	(9	(9	e	s	olines			edge									
CLR	<b>-5</b> : To	improve the lis	tening and sp	ng and speaking abilities in English					ient (%	owledc	oncept	l Discip	rledge	ation	Knowle	-	t Data	s	Skills	Skills				
CLF	8-6 :  LSI	RW skills all to	gether is dev	er is developed in every student					Attainm	ital Kn	n of C	Related	l Know	oecializ	Itilize	odelinç	nterpre	ve Skil	olving	cation S	Skills			
Cou (CLC	rse Lear D):	ning Outcom	es At to:	the end of this course,	learners will	l be able	Level of Th	Expected I	Expected /	Fundamer	Application	Link with F	Procedura	Skills in Sp	Ability to L	Skills in M	Analyze, lı	Investigati	Problem S	Communic	Analytical	PSO -1	PSO -2	PSO-3
CLC	)-1 : Uno	derstand the na	ative speaker	s' exact pronunciation			2	75	60 70	Н	Н	Н	Н	-	-	-	Н	Н Н	Н Н	Н	Н Н	-	-	-
CLC	<b>)-3</b> : Ha	ie a better Wo	rd stress, Rh	thm and Intonation			2	70	65	H	H	H	-	H	H	-	-	H	H	H	H	-	-	-
CLC	0-4 : Dei 0-5 : Pai	velop Neutral A ticipate in any	Accent conversation	with any native speak	er		2	70 80	70 70	H H	н Н	н -	- H	Н -	- H	-	- Н	- H	- H	н Н	н Н	-	-	-
CLC	0-6 : Cle abi	ar any standar lity like IELTS a	rdized tests co and TOEFL	onducted to measure th	he English la	nguage	2	75	70	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	-
Du (I	ration nour)		12	12				12						12	2						12			
S-1	SLO-1	Introduction to language lab listening skills an interactive to the student	o Digital - helps in the s by providing environment ts	Learners are enable their speech and list order to correct thei	ed to record ten to it in r lacuna	Reading facilitate for the s	g software is used to e reading exercises students To enable the students to familiarize with word processor blogging								to	Students are enabled to learn and pronounce stressed and unstressed words								
	SLO- 2	The students converse flue	will be able to ntly	One will know himse he/ she has gone wi	elf where rong	Flow in I improve	read d	ling v	vill be	)	oı le	online publishing. Will be learnt by the students					e	The practice will lead the to acquire neutral accent and understand foreign accent					em It	
S-2	SLO-1	Students are functional lan	exposed to guage	Fluency and Pronun be evaluated	nciation to	The usa be mand	ge c date	of pho d.	onetic	cs wi	Ei II le Ia	Enable the students in learning situational language						Common topics in IELTS speaking test and TOFE will be provided to asses the students.					S EL SS	
	SLO- 2	This exposure them pick up	e will help fluency	Their standard will n	neasured	reading class	will	be d	one ii	n the	Ci ar er	reate nd st ngag	e ima uden e in c	gina ts a conv	ary si re al /ersa	tuat lowe ation	ions ed to s	As: pro	sess ovide	mer d fo	nts w r sel	ill be f scr	e utiny	/
S-3	SLO-1	Lab 1 In the v Floyed to be j students	vall of Pink played for the	Lab 4 Students are s situation, they need respond for it by wri requesting informati explaining the situat	given a to write a ting a letter ion or tion	Lab 7 In conversa speaken native sj	trod atior / inte oeal	uctio n of a ervie ker	n to t a nati w of a	he ve a	La to in ta ov	ab 10 des form ble/c wn w	) lear cribe ation harts ord	ners son ( s/na	s are ne vi ture)	ask sual	ked I heir	La a p to g	b 13 bassa give	stud age a su	ents and ıitabl	will they e titl	liste nee e	n to ed
S-4	SLO- 2	The students understand th a wall. It help enhance their	s will be able in the isolation of them to r pronunciation	o This will lead to und English letter conver n	lerstand the ntions	Learners fluency l	s wil by li:	l pro steni	ve th ng	e	TI OI US in	hey r gani sing a ac	need zed t langu xader	to h hou iage nic s	ave ght o acc style	a we of it curat	ell ely	As: lan voo	sess gua cabu	mer ge ci lary	nt on omp	thei eten	r cy a	nd
S-5	SLO-1	They get fam. pronunciation	iliarized with styles	Learners to record a new wordsagain and	and repeat d again	New wo referred passage	rds a in th es ar	are to ne re nd ch	o be ading necke narie	l d wit	Fa wi gu th Bo	amili ith e∙ uidar ooks	arize jourr ice, e , e-Li	the nals e-ma ibrai	stud , e- agaz ry	lents ines	с, е-	Lis IEL TC	tenir _TS   PFEL	ng to lister will	pics ning be p	in th test provi	ne and ded	
	SLO- 2	American and are differentia	d British style: ated	Untill right prononcia isaquiredis not allow the Next session	ation ved to go to	the help of dictionaries Those new words are to be used in different contexts and sentences					e th	elp s em a	tudei as mi	nts t ich	to ac as p	cess ossii	s ble	As: list pro	sess enin ovide	mer g ca d	nt on paci	thei ty is	r to b	е
S-6	SLO-1	Listening to n and songswill help them to use of vocabl	ews bulletins Ibeenabled to understand ulary	Learnerscanspeak E compare the notes a exchange ideas	English and and	Compre enhance level	nprehensive skills are anced and checked the I					<i>the</i> Enable the students to versatile writing					Reading topics in the IELTS reading test and TOFEL will be provided to assess the students.					to		
	SLO- 2	Will beenable exact accent prononciation	ed ti imitae the and	From the exchangedideascon questions willbeaske otherstudents	nprehensive ed by the	The leve the stud explaine	els are informed to lents and Icuna is ed					Diffrerence in writing and readingisexplained						Assesment on their capacity is explained						

S-7	SLO-1	Lab 2TedX will be played for the student	Lab 5 introduction to semi- formal/ neutral discursive essay will be taught.	Lab 8 television news will be broadcasted to them	Lab 11learners are given with a set of images where they need to write a story from it	Lab 14 students will listen to the great monologues of the time
- S-8	SLO- 2	It will help them to improve their fluency	It will teach them to write coherently and cohesively.	It will help them to understand the usage of words and the fluency of speaker	It helps them to keen on observation as well as to know their creativity.	They will learn the importance of pronunciation, stress and pause in a speech
5 0	SLO-1	To enable to listen to authentic sounds of the target language	Give different topics to debate to enable them talk fluently	The right pronunciation is checked with an access to articles fiction verses and speeches	Focus on writing is done	writing topics in the IELTS writing test and TOFEL will be provided to assess the students.
SI	SLO- 2	To enable them imitate the different sounds and accents and make them repeat it	To check the pace of their speech	Minute details and differences are marked and rectified	Conversational skills are enhanced	Writing skills are assessed and tested
S-	SLO-1	To enable to practice different accents focusing on intonation and voice modulation	Dialogue delivery be checked by asking them to prepare for their own e- learning materials	Read and repeat passages	Help in professionalwriting	Model IELTS and TOFEL test will be conducted for the students
10	SLO- 2	The differences between intonation stress and modulations are explained	Make the students speak and record	Check the ability to repeat the exact pronounciation	Check and asses theirwritings	Assessment will be provided to the learners
S 11	SLO-1	Lab3 After listening to TedX, students need to jot down set of question.	Lab 6 learners will be taught to write a review for a film after watching	Lab 9 conversation between two people in every day context will be played for the studetns	Lab 12 students will listen to the writers note on publishing a novel/ short story	Lab 15 they will listen to grammar usage in the form of visual image and song
s 12	SLO- 2	This will help them to identify the key information in listening text.	Leaner will need to think for the apt word. Through this language competency will be evaluated	It Will help them to understand the target language	It will helps them to enhance their creativity also the language compétence	They will the foreign language easily and it enhances their competency of it

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

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

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
	1. Prof. Daniel David, Prof & Head, Department of English, MCC, Chennai	1. Dr. Shanthichitra, Associate Professor, & Head, Department of English, FSH,SRMIST
		2. Dr K B Geetha, Assistant Professor, Department of English, FSH, SRMIST

	UNS20201L/						L	Τ	Ρ	1	)
Course Code	UNC20201L UNO20201L/	Course Name	NSS/NCC/NSO/YOGA	Course Category	EA	Extension Activity	0	0	0	1	)
Code	UNO20201L/ UYG20201L	Name	NSS/NCC/NSU/YUGA	Category	EA	Extension Activity	0	0	1	0	0 0

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

Course		Course		Course			L	Т	Ρ	С	
Code	UMA20301T	Name	PROBABILITY AND STATISTICS	Category	С	Professional Core Course	5	1	0	6	

	· · · · · · · · · · · · · · · · · · ·																						
Pre	e- site N	il	Co- requisite		Nil		Pr	ogre: Cours	ssive ses							Ν	lil						
Course	Offering		Courses		Data Book /																		
Denart	ment	Ν	lathematics		Codes/Standards																		
Dopun	mont				Couco, Clandardo																		
Course	Learning Rationale	The	purpose of lea	rning this	s course is to:		Learning Program Learning Outcomes (PLO)																
(ULR)				•					•						•				,				
CLR-	To understand the o	oncepts of p	probability and	standard	distributions.	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-	o learnt the concepts of two dimensional random variables.																						
CLR-	To know how to test the hypothesis.											ų			lity								
CLR-	To learnt the concepts of correlation and regression lines.					(mo	(%)	(%)			Ħ	searc			inabi		¥		e				
CLR-	To learnt the differe	nt types of a	nalysis of varia	nce.		(Blo	ency	nent	edge		pme	, Res	ige		ustai		n Wo		nanc	þ			
CLR-	To understand the e	valuation of	quality control	chart.		lking	oficie	tainn	hwor	alysis	evelo	sign	I Use	ulture	t & S		Tear	tion	& Fi	arnir			
						Ţ	d Pr	d At	ž	Ani	Ľ	, De	10 0	S S	nen		al &	jica	٨gt.	g Le			
Course (CLO)	e Learning Outcomes	At the end	d of this course	, learner	s will be able to:	-evel of	Expecte	Expecte	Scientifi	<sup>2</sup> roblem	Jesign 8	Analysis	Modem	Society	Environr	Ethics	ndividua	Commui	<sup>o</sup> roject I	-ife Lon	- SO - 1	- SO - 2	- OSC
CLO-	Get exposed to the	random varia	able and distrib	utions.		3	85	80	H	Η	L	•	-	-	-	-	M	L	-	Н	-	-	
CLO-	Have sound Knowle	dge in mapp	oings of transfo	rmation.		3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO-	Grasp several facts on testing of hypothesis.				3	85	80	Н	Н	-		-	-	-	-	М	-	-	Н	-	-	-	
CLO-	Be familiar with Pearson correlation, regression and properties.					3	85	80	Н	Н		М	-	-	-	-	М		-	Н	-	-	-
CLO-	To learnt the different types of Analysis of variance.					3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO-	To know the fundamental concepts in statistical quality control.					3	85	80	Μ	Н	-	-	-	-	-	-	М	-	-	Н	-	-	- 1

Dura (ho	tion ur)	Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module-V (18)				
C 1	SLO- 1	Introduction to Probability Concepts and Axioms	Introduction to two dimensional random	Introduction to testing of hypothesis	Introduction to correlation coefficient	Introduction to statistical quality control				
5-1	SLO- 2	Conditional probability and Multiplication theorem	Two dimensional random variables	Sampling distribution, null and alternative hypothesis	Applications of correlation coefficient	Control chart and types				
6.2	SLO- 1	Discrete Random Variable	Applications of Two dimensional discrete	One tailed and two tailed test	Karl Pearson's correlation coefficient	Control charts for variable				
5-2	SLO- 2	Probability mass function, Cumulative distribution	Problems in Two dimensional discrete	Level of significance and critical region	Problems in Karl Pearson's correlation	Applications for control charts for variable				
6.2	SLO- 1	Continuous Random Variable	Joint probability mass function	Introduction to Large sample test	Problems based on correlation coefficient	Control charts for mean and range				
3-3	SLO- 2	Probability density function, Cumulative	Cumulative distribution function	Large sample – single proportion	Problems based on correlation coefficient	Applications of control charts for mean and				
C /	SLO- 1	Expectation and Variance	Marginal probability distribution	Large sample – difference proportion	Spearman's Rank Correlation coefficient	Problems based on control charts for $\overline{X}$ and R.				
5-4	SLO- 2	Problems based on Expectation and Variance	Problems in Marginal probability distribution	Problems in Large sample – difference proportion	Problems in Spearman's Rank Correlation	Problems based on control charts for $\overline{X}$ and R.				
0.5	SLO- 1	Moment Generating Function	Applications of Two dimensional continuous	Large sample – single mean	Repeated Rank Correlation coefficient	Problems based on control charts for $\overline{X}$ and R.				
5-5	SLO- 2	Problems on Moment Generating Function	Problems in Two dimensional continuous	Problems in Large sample – single mean	Problems based on Repeated Rank	Problems based on control charts for $\overline{X}$ and R.				
0.6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session				
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session				
0.7	SLO- 1	Introduction to Binomial distribution	Joint probability density function	Large sample – difference mean	Introduction to Regression	Control charts for mean and standard deviation				
5-1	SLO- 2	MGF, mean and variance of Binomial distribution	Cumulative distribution function	Problems in Large sample – difference mean	Properties of Regression coefficient	Applications of control charts for mean and				
<b>C</b> 0	SLO- 1	Applications of Binomial distribution	Marginal probability density function	Introduction to Small samples	Problems based on regression lines	Problems based on control charts for $\overline{X}$ and S				
3-0	SLO- 2	Problems in Binomial distribution	Problems based on Marginal probability	Small samples – 't' test - single mean	Problems based on regression lines	Problems based on control charts for $\overline{X}$ and S				
0.0	SLO- 1	Introduction to Poisson	Conditional probability distribution	Small samples – 'ť test – difference mean	Introduction to design of experiments	Problems based on control charts for $\overline{X}$ and S				
2-9	SLO- 2	MGF, mean, variance of Poisson distribution	Conditional probability	Problems based on 't' test - difference mean	Principles of design of experiments	Problems based on control charts for $\overline{X}$ and S				
S-10	SLO- 1	Applications of Poisson distribution	Independent random variables	Applications of paired 't' test	Analysis of Variance	Control charts for attributes				

	SLO- 2	Problems in Poisson distribution	Applications on Independent random	Problems of paired 't' test	Application of Analysis of Variance (ANOVA)	Applications for control charts for attributes
0.44	SLO- 1	Introduction to Geometric distribution	Expectation and variance for two dimensional	Standard deviation	Analysis of Variance – One way classification	Control charts for number of defective
5-11	SLO- 2	MGF, mean, variance and Memory less Property	Problems based on Expectation and variance	Difference between standard deviation	Applications of Analysis of Variance – One way	Applications of control charts for number of defective
C 10	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
9-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Applications of Geometric distribution	Covariance and correlation	Introduction to small sample ' F' - test	Problems in ANOVA - one way classification	Problems based on control charts for number
	SLO- 2	Problems in Geometric distribution	Problems based on Covariance and	Applications and properties	Problems in ANOVA - one way classification	Problems based on control charts for number
C 1/	SLO- 1	Introduction to Exponential distribution	Transformation of random variables.	Problems based on small sample 'F' - test	Problems based on Analysis of Variance - one	Control charts for fraction defective
0-14	SLO- 2	MGF, mean, variance and Memoryless Property	Applications of transformation of random	Problems in 'F' - test	Problems based on Analysis of Variance - one	Applications of control charts for fraction
C 15	SLO- 1	Applications of Exponential distribution	Problems in transformation of random	Introduction to Chi square test	Analysis of Variance – Two way classification	Problems in p - chart
0-10	SLO- 2	Problems in Exponential distribution	Problems in transformation of random	Applications and properties	Applications of Analysis of Variance – Two way	Problems in p - chart
C 16	SLO- 1	Introduction to Normal distribution	Central limit theorem (theorem without proof)	Chi square test - Goodness of fit	Problems in ANOVA - Two way classification	Control charts for number of defects per unit
3-10	SLO- 2	Normal distribution with Properties	Applications of Central limit theorem	Problems in Chi square test - Goodness of fit	Problems in ANOVA - Two way classification	Applications of control charts for number of
C 17	SLO- 1	Applications of Normal distribution	Problems based on Central limit theorem	Chi square test - independence of attributes	Problems based on Analysis of Variance - Two	Problems in C - chart
0-11	SLO- 2	Problems in Normal distribution	Problems based on Central limit theorem	Problems in Chi square test - independence of	Problems based on Analysis of Variance - Two	Problems in C - chart
C 10	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-10	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

1. Learning Resources 2. 3. T. Veerarajan, Probability, Statistics and Random process, Tata Major Core Graw Hill, 1<sup>st</sup> reprint, 2004.
S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, 11<sup>th</sup> edition, Sultan chand & sons, reprint, 2007.
S. P. Gupta, Statistical Methods, sultan chand publication, 35<sup>th</sup> edition, New Delhi, 2007.

4. R. A. Johnson, Miller and Freund's, Probability and Statistics for

Engineer's, 6<sup>th</sup> edition, Pearson Education, Delhi, 2006.
P. R. Vittal, Mathematical Statistics, Margham Publications, Chennai,

2013.

Learnin	g Assessment										
	<b>_</b>		Continu	uous Lea	arning As	sessmer	nt (50% we	eightage)	)	Final Examination //	500/ weightege)
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (	50% weightage)
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Loval 1	Remember	400/		200/		200/		200/		200/	
Level I	Understand	40%	-	30%	-	30%	-	30%	-	30%	-
Lovel 2	Apply	100/		100/		100/		100/		400/	
Level Z	Analyze	40%	-	40%	-	40%	-	40%	-	40%	-
Lovel 2	Evaluate	200/		200/		200/		200/		200/	
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30 %	-
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	0

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanyasiraju, IIT Madras,	Dr. A. Govindarajan, SRMIST
maheshwaranv@yahoo.com	sryedida@iitm.ac.in	Dr. V. Srinivasan, SRMIST
	Prof. B. V. Rathish Kumar, bvrk@iitk.ac.in	Dr. P. Godhandaraman, SRMIST Dr. V. Suvitha, SRMIST

Со	urse Code	Number Theory			Course Category					E	Discipline Specific Elective Course					ve	L 7 5	ГР 10	C 6				
Pr requ Cou	re- lisite Nil rses		Co- requisite Courses	Nil			Pr (	ogres Cours	sive es	Nil													
Cours Depa	e Offering rtment	Mathematics	3		Data Book / Codes/Standards																		
Cours Ration	e Learning nale (CLR):	The purpose	e of learning thi	s cour	se is to:			Learr	ning				Pro	grar	n Le	arnir	ng O	utco	mes	; (PL	0)		
CLR- 1 :	Introduce div	isibility conditions in	detail and the	prime	numbers	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 : CLR-	Employ congruences and Euler's function																						
3 : CLR- 4 ·	<ul> <li>Introduce the concept of quadratic residues arithmetic functions</li> <li>Introduce the arithmetic functions</li> </ul>							(				lich			bility								
CLR- 5 :	Understand t	he role of sum of so	uares			(Bloom	ency (%	nent (%	dge		pment	, Resea	age	6	ustaina		n Work		nance	þ			
CLR- 6 :	Address the	concept of Fermat's	last theorem			Thinking	d Proficie	d Attainn	c Knowle	Analysis	& Develo	, Design	Tool Use	& Culture	nent & S		al & Tear	nication	Agt. & Fi	g Learnir			
Cours Outco	e Learning mes (CLO):	At the end of this	s course, learne	rs will	be able to:	Level of	Expecte	Expecte	Scientifi	Problem	Design 8	Analysis	Modem	Society -	Environr	Ethics	Individua	Commui	Project N	Life Lon	PSO - 1	PSO - 2	PSO - 3
CLO- 1:	Gain an insig	ht on elementary nu	umber theory co	oncept	S	2	70	65	н	-	-	н	-	-	-	-	-	-	-	-	-	-	-
CLO- 2 :	Be familiar w	ith prime numbers a	and congruence	)		2	80	70	н	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO- 3 :	O- Understanding Euler function and applications						75	60	-	н	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 4 :	LO- Analyse thoroughly the arithmetic functions					2	70	70	н	-	-	н	-	-	-	-	-	-	-	-	-	-	-
CLO- 5 :	Classify the r	ole of sum of two so	quares and four	squa	res	2	80	70	-	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 6 :	CLO- Gain an insight of Fermat's last theorem					2	75	65	-	-	Н	Н	-	-	-	-	-	-	-	-	-	_	-

D	uration (hour)	18	18	18	18	18
C 1	SLO-1	Introduction- Divisors	Basic properties of congruences	Quadratic residues	Introduction of Riemann function	Sum of squares
3-1	SLO-2	Properties: (i) If a b and b c then a c,	Modular arithmetic	Group of quadratic residues	Riemann zeta function	Sum of two squares
<u> </u>	SLO-1	(ii) if a∣b and c∣d then ac∣bd,	The arithmetic Zp	Legendre symbol	Convergence	Pigeonhole principle
3-2	SLO-2	(iii)if m≠0, then a b if and only if ma mb,	Carmichael numbers	Properties of Legendre symbol	Application to prime numbers	Thue's lemma
0.0	SLO-1	(iv)if d∣and a≠0 then  d ≤ a	Carl friedrich gauss	Evaluation of (-1/p) and (2/p)	Functional equation of Riemann function	Fermat theorem
5-3	SLO-2	Bizout's identity	Polynomial congruences modulo p	The Gaussian integers		
C 1	SLO-1	Least common multiples	Lagrange's theorem	Quadratic reciprocity	Evaluating ζ(2)	Sum of three square
3-4	SLO-2	Linear equation	Linear congruences	Euler's criterion	Evaluating ζ(2k)	Euler theorem
0.5	SLO-1	Diophantine equation	Chinese remainder theorem	Quadratic congruence	Dirichlet series	Lagrange theorem
5-5	SLO-2	Prime numbers	Application of Chinese remainder theorem	Quadratic residue with prime power moduli	Euler products	Sums of four square
S-6	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0-0	SLO-2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0.7	SLO-1	Prime power factorisations	Simultaneous linear congruence	Quadratic residue with arbitrary moduli	Complex variables	Digression on quaternions
5-1	SLO-2	Distribution of primes	Simultaneous non-linear congruence	Arithmetic of function	Hurwitz zeta function	Minkowski's theorem
<b>c</b> 0	SLO-1	Pierre de Fermat	Binary representations of integers	Definition of examples	Integral representation for the Hurwitz zeta function	Fermat's last theorem
3-0	SLO-2	Fermat's little theorem	Decimal representations of integers	Multiplicative functions	A contour integral representation for the Hurwitz zeta function	Pythagoras's theorem
S-9	SLO-1	pseudoprimes	Residue classes	Qn  is multiplicative function	The analytic continuation of the Hurwitz zeta function	Pythagorean triples

	SLO-2	Wilson's theorem	Complete residue systems	Divisor function are multiplicative	Hurwitz formula	The classification of Pythagorean triples
S-	SLO-1	Fermat-kraitchik factorization method	Reduced residue systems	Perfect numbers	Approximation of ζ(s,a) by finite sums	Isosceles triangles
10	SLO-2	Euler's phi-function	Euler-fermat theorem	Example of Perfect numbers	Bernoulli numbers	irrationality
S-	SLO-1	Euler's theorem	Solving congruence mod (p <sup>e</sup> )	The Mobius inversion formula	Properties of Bernoulli numbers	Fermat
11	SLO-2	Some properties of the phi-function	The principal of cross- classification	Application of Mobius inversion formula	Bernoulli polynomials	The case n=4
S-	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
12	SLO-2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-	SLO-1	Goldbach conjecture	Groups and subgroups	Mobius function	Inequalities for   ζ(s,a)	Odd prime exponents
13	SLO-2	Mersenne primes	Elementary properties of groups	Properties of Mobius function	Inequalities for   L(s, x)	Lame
S-	SLO-1	Primality testing	The group Un	The Dirichlet characters	Inequalities for   1/ζ(s)	kummer
14	SLO-2	factorisations	Primitive roots	Real value Dirichlet characters	Inequalities for $ \zeta'(s)/\zeta(s) $	Introduction of partitions
S-	SLO-1	Division algorithm	The Group U <sub>pe,</sub> p is an odd prime	Primitive Dirichlet characters	Zero's free regions for $\zeta(s)$	Goldbach conjecture
15	SLO-2	Special divisibility test	The group U <sub>2</sub> e	Dirichlet product	Upper bound for  ζ(s)	Representation by squares
S-	SLO-1	Euclidean algorithm	The existence of primitive roots	Properties of Dirichlet products	Upper bound for  ζ'(s)	Warming's problem
16	SLO-2	Greatest common divisor	Applications of primitive roots	Dirichlet inverse function	Non-vanishing of $\zeta(s)$ on the line $\sigma=1$	Geometric representation of partitions
c	SLO-1	Sieve of eratesthenes	The algebraic structure of Un	The partial sums of Dirichlet product	Prime number theorem	Generating functions for partitions
17	SLO-2	Application to the divisor function	The universal exponent	Identity function for the partial sum of Dirichlet product	Proof of prime number theorem	Euler's pentagonal-number theorem
S-	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
18	SLO-2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

Learning Resources	1. 2.	David M. Burton (2007). Elementary Number Theory (7 <sup>th</sup> edition). McGraw-Hill. Gareth A. Jones & J. Mary Jones (2005). Elementary Number Theory. Springer.	<ol> <li>T.M. Apostol, Introduction to Analytic Number theory, Springer Valley, 1976.</li> <li>Neville Robbins (2007). Beginning Number Theory (2<sup>nd</sup> edition). Narosa.</li> </ol>

Learning	g Assessment										
	Disamia		Continu	uous Lea	arning As	sessmer	nt (50% we	eightage)		Final Examination (	0% weightage)
	BIOOM'S	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#		o /o weightage)
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Lovol 1	Remember	10%		30%		30%		30%		30%	
Level 1	Understand	40 /0	-	50 /0	-	30 /0	-	50%	-	50 %	-
Lovel 2	Apply	10%		10%		10%		10%		40%	
LEVEIZ	Analyze	40 %	-	40 %	-	40 /0	-	40 /0	-	40 /6	-
Loval 2	Evaluate	200/		200/		200/		200/		200/	
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30 %	-
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	)

E.

Course Designers								
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts						
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanyasiraju, IIT Madras,	Dr. A. Govindarajan, SRMIST						
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	Prof B V Pathich Kumar IIT Kanpur hyrk@iitk.ac.in	Dr. Bapuji Pullepu, SRMIST						
		Mr. U. Rengarasu, SRMIST						

Course		Course	(	OPERATIONS	RESEARCH	Course			L	Т	Ρ	С
Code	UMA20D02T	Name				Category	Е	Discipline Specific Elective Course	5	1	0	6
6				<u>^</u>					1			

Pr requ Cou	Pre- uisite Nil requisite Nil urses Correguisite Nil							Pro C	ogres Cours	sive es	Nil													
Cours Depar	e Offering tment	9	Mathematics		1	Data Book / Codes/Standards																		
Cours Ratior	e Leamin nale (CLR	lg :):	The purpose o	f learning thi	s course	e is to:			Learr	ning				Pro	ograi	m Le	arni	ng C	outco	mes	; (PL	.0)		
CLR- 1 :	To under	stand the	e concepts of linea	ar programm	ing prob	lem	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	To learn	the conc	cepts of transporta	ation and ass	signment	t problem																		
CLR- 3 :	To understand the concepts of queuing theory																							
CLR- 4 :	To learn the basic concepts of game theory												ch			ility								
CLR- 5 :	To under	To understand the scheduling problems						cy (%)	nt (%)	ge		nent	kesean	a)		stainab		Work		nce				
CLR- 6 :	To provi	de the kr	nowledge of optim	ization techr	niques ar	nd approaches.	Iking (E	oficien	tainme	owled	alysis	velopn	sign, F	l Usage	ulture	t & Sus		Team \	lion	& Fina	arning			
							Ц.	d Pr	d At	с К	۱An	å De	, De	Too	& C	nen		al &	nicat	Mgt.	g Le			~
Cours Outco	e Learnin mes (CLC	ng D): A	t the end of this co	ourse, learne	ers will be	e able to:	Level of	Expecte	Expecte	Scientifi	Problem	Design	Analysis	Modem	Society	Environ	Ethics	Individua	Commu	Project I	Life Lon	PSO - 1	PSO - 2	PSO - 3
CLO- 1 :	Explain tl	he linear	programming pro	blem and its	properti	es	3	85	80	Н	Н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO- 2 :	Explain tl	he conce	epts of transporta	tion and Assi	ignment	problem	3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO- 3 :	O- Describe several facts on queuing theory						3	85	80	Н	Н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO- 4 :	CLO- Relate the different types of game theory						3	85	80	Н	Н		М	-	-	-	-	М	L	-	Н	-	-	-
CLO- 5 :	CLO- 5 : Describe the different types of scheduling problems						3	85	80	Μ	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- 6 :	CLO- Explain the fundamental concepts in linear programming problem and its 6 : applications.					3	85	80	М	Н	-	-	-	-	-	-	М	-	-	Η	-	-	-	

			8		8	
Dura (ho	ation ur)	18	18	18	18	18
C 1	SLO- 1	Linear programming problem –Definition.	Transportation model- Introduction	Introduction to queuing models	Game theory- Introduction	Introduction -Network scheduling
5-1	SLO- 2	linear programming problem-assumptions	Mathematical formulation	Queuing theory	Two person zero sum games	Network models
6.0	SLO- 1	Formulation of linear programming problem	North west corner rule	Queuing system	Main characteristics	Construction of Networks
5-2	SLO- 2	Mathematical formulation	problems	Characteristics of Queuing system	Saddle point	Network and basic components
	SLO- 1	Mathematical formulation Examples	Practice Problems	Classifications of queues	Maximin-Minimax Principle	Rules of Network construction
S-3	SLO- 2	Mathematical formulation Examples	Vogels approximation method	Poisson arrivals and exponential service times	Saddle point and value of the game	Time calculation in Networks
S 1	SLO- 1	Graphical Method Introduction	problems	single server model	The Maxmini Principle- problems	Shortest route problem
5-4	SLO- 2	Graphical Method problems	More problems	(M/M/1): (∞/FIFO)- The Maxmini Principle- Introduction problems.		Problems based on Shortest route
0.5	SLO- 1	Graphical Method problems	phical Method MODI method-Algorithm		The Maxmini Principle– problems	Maximum flow model
5-5	SLO- 2	Graphical Method problems	Stepping stone method	Problems in (M/M/1): (∞/FIFO)	Minimax principle	Network scheduling by CPM
0.0	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0.7	SLO- 1	Types of solution	Unbalanced transportation problem.	Practice Problems	Minimax principle – problems	CPM Procedure
5-1	SLO- 2	Basic and non basic variables	Problems	Problems in (M/M/1): (∞/FIFO)	Minimax principle – problems	Network scheduling by PERT
<u> </u>	SLO- 1	Slack variables	Maximization case in Transportation problem	(M/M/1): (N/FIFO) Introduction	Mixed Strategies, without saddle point	PERT procedure
5-0	SLO- 2	Procedure of simplex method	Problems	Problems in (M/M/1): (N/FIFO)	Problems based on Mixed Strategies	Assumptions in PERT

	SLO- 1	simplex method Problems	Practice Problems	Practice Problems	Problems based on Mixed Strategies	Practice Problems
S-9	SLO- 2	simplex method Problems	Assignment problem— mathematical formulation	Problems in (M/M/1): (N/FIFO)	2 x 2 rectangular Games introduction	Difference between CPM and PERT
S-10	SLO- 1	simplex method Problems	Assignment algorithm	Problems in (M/M/1): (N/FIFO)	Solution of 2 x 2 rectangular Games	CPM-PERT calculations
	SLO- 2	Artificial variable techniques	problems	Multiple server model	Solution of 2 x 2 rectangular Games	CPM-PERT calculations
C 11	SLO- 1	Big M method - Introduction	problems	(M/M/C): (∞/FIFO) Introduction	Domination Property	CPM-PERT calculations
5-11	SLO- 2	Big M method problems	Unbalanced Assignment Models	Characteristics of (M/M/C): (∞/FIFO)	Domination Property— General Rule	CPM-PERT calculations
0.40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Big M method problems	problems	Problems in . (M/M/C): (∞/FIFO)	solving game problem using dominance property	CPM-PERT calculations
	SLO- 2	Duality in LPP	Practice Problems	Problems in . (M/M/C): (∞/FIFO)	solving game problem using dominance property	Cost Analysis
	SLO- 1	Formulation of dual problems	Hungarian method	Problems in . (M/M/C): (∞/FIFO)	solving game problem using dominance property	Crashing
S-14	SLO- 2	Primal-dual relationships	Algorithm	(M/M/C): (N/FIFO) Introduction	(2 x n) and (m x 2) - graphical method	Procedure for least cost schedule
0.45	SLO- 1	Problem solving using duality	Problems based on Hungarian method	Characteristics of (M/M/C): (N/FIFO)	Solving problem graphically	Examples
5-15	SLO- 2	More problems	Practice Problems	Problems in (M/M/C): (N/FIFO)	More problems	More problems
0.40	SLO- 1	Dual Simplex method	Travelling salesman problem	Problems in (M/M/C): (N/FIFO)	Solving problem graphically	Scheduling and crashing of network
5-10	SLO- 2	Dual Simplex method Algorithm	Algorithm	Problems in (M/M/C): (N/FIFO)	Replacement Problems.	Practice problems
0.47	SLO- 1	Solve LPP using dual simplex method	Problem in travelling salesman	Problems in (M/M/C): (N/FIFO)	problems	project scheduling with limited sources
5-17	SLO- 2	More problems	More problems	Applications	Practice problems	Practice problems
0.46	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

			-	
	1.	Kandiswarup, P. K. Gupta, Man Mohan, Operations	5.	H.A. Taha, Operations Research, An Introduction, PHI, 2008.
		Research, S. Chand & Sons Education Publications, New	6.	H.M. Wagner, Principles of Operations Research, PHI, Delhi,
		Delhi, 12th Revised edition,2004.		1982.
	2.	Prof.V.Sundaresan, K.S.Ganapathy Subramanian,	7.	J.C. Pant, Introduction to Optimisation: Operations Research, Jain
		K.Ganesan, Resource Management Techniques,		Brothers, Delhi, 2008.
Learning		A.R.Publications, 2012.	8.	Hitler Libermann Operations Research: McGraw Hill Pub. 2009.
Resources	3.	Prem Kumar Gupta D. S. Hira, Operations Research, 5th		
		Edition, S. Chand & Company Ltd., Ram Nagar, New Delhi,		
		1998.		
	4.	S.Dharani Venkata Krishnan, Operations Research		
		Principles and Problems, Keert Publishing House PVT Ltd,		
		2005.		

Learnin	g Assessment												
			Contin	uous Lea	arning As	sessmer	Final Examination (E0% weighters)						
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA – 4 (10%)#		Final Examination (50% weightage)			
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice		
Lovel 1	Remember	400/		200/		200/		200/		200/			
Level I	Understand	40 %	-	30%	-	30%	-	30%	-	30 %	-		
Lovel 2	Apply	400/		100/		100/		100/		100/			
Level 2	Analyze	40 %	-	40%	-	40%	-	40%	-	40%	-		
Lovel 2	Evaluate	200/		200/		200/		200/		200/			
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30 %	-		
	Total		0 %	10	0 %	10	0 %	1	00 %	100 %	0		

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanvasiraju, IIT Madras.	Dr. A. Govindarajan, SRMIST
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	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Mrs. V. Vidya, SRMIST

Cours Code	e UMA20D031	e UMA20D03T Course COMBINATORICS				ORICS	(	Cour Categ	rse Jory	E		Disc	iplin	e Sp	becif	ic El	ectiv	/e C	ours	e	L 5	T 1	P 0	C 6
Pro requi Cour	e- isite Nil ises			Co- requisite Courses	Nil			Pro C	ogres Cours	sive es	Nil													
Cours Depar	e Offering tment	Math	ematics			Data Book / Codes/Standards																		
Cours Ration	e Learning ale (CLR):	The	purpose o	f learning th	is course	e is to:			Learr	ning				Pro	grar	n Le	arni	ng C	)utcc	mes	s (PL	.0)		
CLR- 1:	To learn about	recurrence	e relation				1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 : CLR- 3 :	LR- To know about permutation LR- To understand Assignment problems																							
CLR- 4 : CLR-	LR- To improve the knowledge in Fibonacci relation				(u	()	()				arch			ability										
5 : CLR- 6 :	To relate the co	ncepts of	relations	exclusion p	nncipie		hinking (Bloor	Proficiency (%	Attainment (%	Knowledge	vnalysis	Development	<b>Jesign</b> , Rese	ool Usage	Culture	ent & Sustaine		& Team Work	cation	jt. & Finance	Learning			
Cours Outco	e Learning mes (CLO):	At the en	d of this co	ourse, learne	ers will b	e able to:	-evel of T	Expected	Expected	Scientific	Problem A	Design &	Analysis, I	Modem To	Society &	Environme	Ethics	Individual	Communi	Project Mę	-ife Long	- SO - 1	-SO - 2	- SO - 3
CLO- 1:	To know about	recurrenc	e relation				3	85	80	н	Н	L	-	-	-	-	-	М	L	-	н	-	-	-
CLO- 2 :	- To apply the concepts of permutation			3	85	80	М	Н	-	М	М	-	-	-	М	-	-	н	-	-	-			
CLO- 3 :	L To familiar with Assignment problems			3	85	80	н	Н	-		-	-	-	-	М	-	-	н	-	-	-			
CLO- 4 :	D <sup>-</sup> To understand Fibonacci relation			3	85	80	Н	н	Н	М	-	-	-	-	М	L	-	Н	-	-	-			
CLO- 5 :	D- To improve the knowledge in inclusion and exclusion principle			inciple	3	85	80	М	н	L	-	-	-	-	-	М	-	-	Н	-	-	-		
CLO- 6 :	To apply the fundamental concepts of combinatorics				3	85	80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-		

Duratio	on (hour)	18	18	18	18	18
	SLO-1	The Rule of Sum	Generalized Permutations	Generating Functions-An introduction	Recurrence relation-An introduction	An Introduction of group theory in Combinatorics
S-1	SLO-2	Problems by using the rule of sum	Problems in Generalized Permutation	Ordinary Generating Functions	Recurrence relation definition and examples	An Introduction of group theory in Combinatorics
0.0	SLO-1	Extension of Sum rule	Generalized Combination	Problems in Ordinary Generating Functions	The first order recurrence relation-An introduction	The Burnside-Frobenius Theorem
5-2	SLO-2	Problems by using the extension of sum rule	Problems in Generalized Combination	The reciprocal of the Generating Functions	Problems in recurrence relation	Problems using the Burnside- Frobenius Theorem
	SLO-1	The Rule of Product	Sequences and selections	Problems in reciprocal of the Generating Functions	Problems in recurrence relation	The Burnside-Frobenius Theorem with weights
S-3	SLO-2	Problems using the Rule of Product	Duality Principle of Distribution	Uniqueness of Base-b representation in Generating Functions	The second order linear homogenous recurrence relation with constant coefficients-An introduction	Permutation groups
6.4	SLO-1	Extension of Product rule	Problems in Sequences and selections	Partition of Integers	The second order linear homogenous recurrence relation with constant coefficients-Problems with distinct real roots	Permutation groups and their cycle indices
5-4	SLO-2	Problems by using the extension of Product rule	The Inclusion- Exclusion Principle	Partition of Integers in Generating Functions	The second order linear homogenous recurrence relation with constant coefficients-Problems with distinct real roots	Isomorphic- problems
0.5	SLO-1	The rule of sum and product	Derangements and Other Constrained Arrangements	Problems in Partition of Integers	The second order linear homogenous recurrence relation with constant coefficients-Problems with distinct real roots	Cyclic and abelian problems
5-0	SLO-2	More problems	Combinatorial Number Theory	Problems in Partition of Integers in Generating Functions	The second order linear homogenous recurrence relation with constant coefficients-Problems with complex roots	Characterization theorem for cyclic group-problems
S-6	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

	SLO-2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0.7	SLO-1	Permutations	Mobius function	Self-conjugate - definition	The second order linear homogenous recurrence relation with constant coefficients-Problems with complex roots	Permutation groups and their cycle indices
3-1	SLO-2	Problems by using Permutations	Generalized Inclusion- Exclusion Principle	Problems in Self- conjugate	The second order linear homogenous recurrence relation with constant coefficients-Problems with repeated real roots	Cauchy's formula-problems
S-8	SLO-1	Permutations with repetition	Problems in Generalized Inclusion- Exclusion Principle	Euler's Theorem	The second order linear homogenous recurrence relation with constant coefficients-Problems with repeated real roots	Geometric duals-cube regular octahedron and regular tetrahedron
	SLO-2	Circular Permutation	The Permanent of a Matrix	Problems using Euler's Theorem	The non-homogenous recurrence relation-An introduction	Cayley's theorem
<u> </u>	SLO-1	Combinations	Problems in Permanent of a Matrix	Euler's first identity	The non-homogenous recurrence relation–problems	Regular icosahedrons
3-3	SLO-2	Problems by using Combinations	Rook Polynomials	Problems using Euler's first identity	Towers of Hanoi –An introduction	Definition of type and weight
S-10	SLO-1	Combinations: The Binomial Theorem	Expansion formula for Rook Polynomials	Euler's second identity	Towers of Hanoi related with recurrence relation-problem	Problems to find type and weight
	SLO-2	Problems by using Binomial Theorem	Problems by using Rook Polynomials	Problems using Euler's second identity	Recurrence relation related with mathematics of finance	Cycle index
C 11	SLO-1	Combination with repetition	Hit Polynomials	Exponential Generating Functions	More problems in the non- homogenous recurrence relation	Circular or cyclic symmetries
3-11	SLO-2	Combination with repetition	Problems by using Hit Polynomials	Problems in Exponential Generating Functions	The method of generating functions- An introduction	Dihedral symmetries
0.40	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	The method of generating functions- Problems	Tutorial Session
5-12	SLO-2	Tutorial Session	Tutorial Session	Tutorial Session	The method of generating functions- Problems	Tutorial Session
S-13	SLO-1	Pascal's Identity	Systems of Distinct Representatives (SDR) and Coverings in graphs	Maclaurin series expansions of exponential function	More problems in the method of generating functions	Poliya's enumeration theorems- An introduction
	SLO-2	Problems by using Pascal's Identity	Rado's Theorem	Dobinski's Equality	Tutorial Session	Poliya's first enumeration theorems
	SLO-1	Convolution rule or Vandermonde identity	Konig-Egervary Theorem	Problems using Dobinski's Equality	Tutorial Session	Problems using Poliya's first enumeration
S-14	SLO-2	Problems by using Convolution rule or Vandermonde identity	Konig's Theorem	Bernoulli numbers- An introduction	The special kind of non linear recurrence relations-An introduction	Poliya's second enumeration theorems
Q 15	SLO-1	Newton's identity	Sperner's Theorem	Bernoulli numbers- Problems	Problems in the special kind of non linear recurrence relations	Problems using Poliya's second enumeration
0-10	SLO-2	Problems by using Newton's identity	Types in Sperner's Theorem	Bernoulli polynomial	Problems in the special kind of non linear recurrence relations	More Problems
S 16	SLO-1	Pigeonhole Principle	Symmetric Chain Decomposition	Problems in Bernoulli polynomial	More problems in the special kind of non linear recurrence relations	Fermat's little theorem
3-10	SLO-2	Problems based on Pigeonhole Principle	Partially Ordered sets	The summation operator	Historical review of the recurrence relation	Problems using Fermat's little theorem
C 17	SLO-1	Generalisation of the Pigeonhole Principle	Dilworth's Theorem	The summation operator- Problems	Summary and Historical review of the recurrence relation	Benzene ring
0-11	SLO-2	More Problems	Problems in Dilworth's Theorem	More problems	More summary in the review of the recurrence relation	Problems in Benzene ring
C 10	SLO-1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-10	SLO-2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

	1. Jan Anderson, A First Course in Combinatorial Mathematics, Oxford	3. V.K.Balakrishnan, Combinatorics, Schuam Series, 1996.
Learning Resources	Applied Mathematics and Computing Science Series, UK, 2013.	4. Russell Merris, Combinatorics, John Wiley & Sons, 2003.
I Coources	2. R.P.Grimaldi, B.V.Ramana, Discrete and Combinatorial Mathematics-An	
	Applied Introduction, 5th Edition, Pearson Education, 2010	

Learning	g Assessment											
	Discusto		Contin	uous Lea	arning Ass	sessmer	Final Examination (E0% weightage)					
	BIOOM'S	CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#		Final Examination (50% weightage)		
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	
Loval 1	Remember	400/		200/		200/		200/		200/		
Level I	Understand	40%	-	30%	-	30%	-	30%	-	30%	-	
Lovel 2	Apply	10%		10%		10%		10%		10%		
Level Z	Analyze	40 /0	-	40 /0	-	40 /0	-	40 /0	-	40 %	-	
	Evaluate	200%		30%		30%		30%		30%		
Level 3	Create	20 /0	-	30 /0	-	50%	-	50%	-	50 %	-	
	Total	10	0 %	10	0 %	10	0 %	10	00 %	100 %	0	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanvasiraiu, IIT Madras.	Dr. A. Govindarajan, SRMIST
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Course		Course	All's d Dhaseler	Course	0	Conorio Electivo Course	L	Т	Ρ	С
Code	UFIZUAUIJ	Name	Allied Physics	Category	G	Generic Elective Course	4	0	4	6

Pre requis Cours	e- Co- isite Nil requisite Nil rses Courses								Pro C	ogres Cours	sive es	Nil																
Course Depart	Offering ment		Ρ	hysics and N	Vanot	echnolo	gу	D C	)ata Book / Codes/Stand	lards		Nil																
Course Rationa	Learning	):	The p	urpose of lea	arning	g this cou	urse is t	to:			L	earni	ng				Pro	ogra	m Le	earni	ing C	Dutco	ome	s (Pl	.0)			
CLR- 1:	Underst	and th	e fund	amentals of	physi	ics					1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2:	- Evaluate and learn the structural, optical, nuclear and electronic propertie of solids							perties																				
CLR- 3:	R- Emphasize the significance of green technology and its applications																									1		
CLR- 4:	CLR- Gain comprehensive knowledge and sound understanding of fundamenta 4: of light and material properties							nentals																		1		
CLR- 5:	Recogni	ze hov s in th	w and eir ma	when physic ior	cs me	thods ar	nd princ	ciple	es can help a	address	Ê	(%	(%)	je	S	olines			dge									1
CLR- 6:	Develop	skills	on pra	ictical, analy	/tical p	problem	solving	g in p	physics		g (Bloo	ency (°	ment (%	owledo	concept	d Disci	vledge	zation	Knowle	5	et Data	lls	l Skills	Skills				
Course Learnir Outcon (CLO):	ng nes	At the	e end o	of this course	e, lea	rners wi	ll be ab	ole to	):		Level of Thinkin	Expected Profic	Expected Attain	Fundamental Kr	Application of C	Link with Relate	Procedural Knov	Skills in Special	Ability to Utilize	Skills in Modelin	Analyze, Interpr	Investigative Sk	Problem Solving	Communication	Analytical Skills	PSO - 1	PSO - 2	PSO - 3
CLO-1 :	Underst	and ar	nd solv	e problems	on fur	ndamen	tals of p	phys	sics		2	80	75	н	н	н	н	Н	н	н	н	н	н	М	Н	н	н	Н
CLO-2 :	Acquire	knowle	edge o	on materials	prope	erties					2	80	70	Н	М	М	Н	М	Н	Н	Н	М	Н	М	Н	М	М	М
CLO-3 Correlate the acquired knowledge and use it for various applications							2	75	70	Н	М	Н	Н	Н	Н	Н	М	Н	Н	Н	Н	Н	Н	Н				
CLO-4 :	Familiar	ize the	emselv	es with inter	ractior	n of light	t and m	natte	r		2	80	75	М	Н	Н	М	Н	Н	Н	Н	Н	Н	М	Н	Н	Н	Н
CLO-6 :	CLO-6 Apply physics methods and principles to solve problems in the majors.						rs.	2	80	75	Н	Н	Н	Н	Н	М	Н	Н	М	Н	М	Н	Н	Н	Н			
CLO-5 :	CLO-5 Learn magnetic, electrical and optical properties of materials						2	80	70	Н	Н	н	н	Н	М	н	Н	М	Н	М	Н	н	н	Н				

Du (I	uration hour)	24	24	24	24	24
C 1	SLO-1	Sources of conventional energy	Space lattice basis	Kinetic theory of gases	Electric charge - conservation of charge	Time period - amplitude - phase
3-1	SLO-2	Need for non - conventional energy resources	Unit Cell, lattice parameters	Basic postulates	Permittivity	Wave nature of light
6.0	SLO-1	Solar energy and solar cells and its applications	Two dimensional and three dimensional Bravais lattices	ldeal gas laws	Coulomb's law	Huygens's principle
3-2	SLO-2	calculating energy generation by a solar cell	The seven crystal systems	Numerical problem solving on Ideal gas laws	Numerical problem solving on Coulomb's law	Numerical problem solving on amplitude, phase
	SLO-1	Bio mass energy	Cubic crystal system	Van Der Waal's equation of states	Electric field	Interference
S-3	SLO-2	Generation and applications of bio mass energy	Crystal symmetry	Derivation of Van Der Waal's equation of states	Electric potential	Young's double slit experiment
C 4	SLO-1	Wind energy generation and applications	Reciprocal lattice and its importance	Pressure of an ideal gas	Gauss's law	Coherence
3-4	SLO-2	Numerical evaluation of wind energy generation	Density and atomic packing fraction	Derivation of Pressure of an ideal gas	Applications of Gauss's law	Interference from thin films
S-5 to S-8	SLO-1 SLO-2	Introduction to the Lab experimentation	Calculation of lattice cell parameters by X-ray diffraction	Determination of specific heat capacity of the liquid by Newtons's law of cooling	Calibration of Voltmeter using potentiometer	Determination of dispersive power of a prism using spectrometer
<u> </u>	SLO-1	Nuclear energy - Atomic structure	Numerical on Density and atomic packing fraction	Laws of thermodynamics	Numerical problem solving on Gauss's law	Michelson's interferometer
5-9	SLO-2	Alpha, beta and gamma radiation	Crystal directions and planes	Problem solving on laws of Thermodynamics	Conductors and dielectrics	Diffraction - Wave theory of light
S-	SLO-1	Law of radioactive decay	Introduction to Miller indices	Entropy	Electric Current	Numerical problem on interference
10	SLO-2	Example problems in radioactivity	Numerical on Miller indices	Calculating numerical on entropy change	Problem on dielectrics and conductors	Light and Optics
S-	SLO-1	Decay constant	Interplanar distance	Change of entropy in reversible and irreversible processes	Ohm's law	Fermat's principle
	SLO-2	Half-life and mean life	Numerical on interplanar distance	Change of entropy in irreversible processes	Magnetic induction	Laws of reflection and refraction

c	SLO-1	Nuclear energy	Hexagonal closely packed (HCP) structure	Low temperature	Permeability and susceptibility	Total internal reflection
12	SLO-2	Applications of nuclear energy	Derivation of HCP atomic packing fraction	Joule - Kelvin effect- introduction	Numerical problem solving on Permeability and susceptibility	Illustrations of total internal reflection
S- 13- S16	SLO-1 SLO-2	Study of the I-V Characteristic of a Solar Cell	Dielectric constant Measurement	Determination of thermal conductivity of a bad conductor using Lee's disc method	Calibration of Ammeter using potentiometer	Study of attenuation and propagation characteristics of optical fiber cable
S-	SLO-1	Mass defect and binding energy	Numerical problem solving on HCP structure	J-K effect- theory	Magnetic field due to a current carrying conductor- Biot-Savart's law	Problem solving on total internal reflection
17	SLO-2	Solving numerical based on binding energy and mass defect.	Diamond crystal structure	Applications of J-K effect	Numerical problem solving on Biot-Savart's law	Mirrors and lenses
c	SLO-1	Fission reaction	Derivation of APF for diamond structure	Liquefaction of gases	Ampere's circuital law	Lens makers formula
18	SLO-2	Evaluating nuclear energy generation by fission reaction	Numerical problem solving on diamond structure	Linde's process	Faraday's law	Problem solving on Lens makers formula
S-	SLO-1	Fusion reaction	X-ray diffraction	Nitrogen gas liquefaction	Basic Electronics	Defects of images
19	SLO-2	Fusion energy cycles	Problem solving on X-ray diffraction	H, He gas liquefaction	P and N type semiconductors	Coma distortion
S-	SLO-1	Biological effects of radiation	Single crystal diffraction	Adiabatic demagnetization- introduction	Junction Diode	Spherical aberration in lenses
20	SLO-2	Numerical problems involving Nuclear energy	powder diffraction	Working principle of adiabatic demagnetization-	Characteristics of Junction Diode	Chromatic aberration in lenses
S- 21 -	SLO-1	Hall effect- Hall coefficient determination	Revision class for experiments	Determination of specific heat capacity of the liquid by	Band gap determination using Post Office Box –	Revision class for experiments
24	3LU-2				opecific resistance	

Learning Resources 2.

1.

 Modern Physics, Murugeshan and K. Sivaprasath, (S. Chand
 3.
 Heat and Thermoor

 publications, revised edition, 2015).
 R.H., (Tata McGra

 Fundamentals of Physics, Resnick R. and Halliday D., (Wiley Publication, 8th Edition, 2011)
 Allied Physics I, S

Heat and Thermodynamics, Zemansky M. W. and Ditlman R.H., (Tata McGraw Hill, 2011) Allied Physics I, Sundaravelusamy A., (Priya Publications,

Learning	g Assessment										
			Contin	uous Lea	arning Ass	sessmer	nt (50% we	eightage	)	Final Examination (	E0% weightege)
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#		50% weightage)
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Lovel 1	Remember	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Level 1	Understand	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
	Apply	10%	40%	10%	10%	10%	10%	10%	10%	10%	10%
Level 2	Analyze	40 /0	40 %	40 /0	40 /0	40 /0	40 /0	40 /0	40 /0	40 /0	40 %
Loval 3	Evaluate	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Level 3	Create	30 %	30 %	30 /0	30 %	50%	30 %	50 /0	30 %	50 %	50 %
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	6

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. R Seshadri, Titan Company Limited, seshadri@titan.co.in	Prof. C Vijayan, IIT Madras, cvijayan@iitm.ac.in	Mr. Sandeep K. Lakhera, SRMIST
Dr. N Vijayan, NPL, nvijayan @nplindia.org	Prof. S Balakumar, University of Madras, balakumar@unom.ac.in	Dr. Gunasekran, SRMIST

Course Code	UMA20S0	MA20S01L Course C Programming						Cou Cate	irse gory	S	Skill Enhancement Course								L 0	T 0	P 4	C 2		
Pre- requisi Course	re- isite Nil requisite Nil rses Courses Data Book /							F	Progr Cou	essiv Irses	e Ni	il												
Course Departm	e Offering Data Book / Codes/Standard																							
Course Rational	Course Learning Rationale (CLR): The purpose of learning this course is to:								Lear	ning				Pro	grar	n Le	arniı	ng O	utco	mes	(PL	0)		
CLR-1 :	To underst	and the ba	sics of C lan	guage			1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2	To relate th	e concepts	s of operato	ſS																				
CLR-3	To underst	and concep	ots of array																					
CLR-4	To learn the concepts of arguments												۲			ity								
CLR-5	To learn the concepts of create file						(mool	y (%)	ıt (%)	e		ent	esearcl			ainabili		Vork		JCe				
CLR-6 :	To relate the concepts of pointers					Iking (B	oficienc	ainmen	owledg	alysis	velopm	sign, Rŧ	Usage	ulture	: & Sust		Team V	ion	& Finar	arning				

			금		¥	×	An	Õ	ð	ğ	0	Jer		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>.</u>	lgt	Ľ	'		
Course Outcon	Learning nes (CLO):	At the end of this course, learners will be able to:	Level of .	Expected	Expected	Scientific	Problem	Design &	Analysis,	Modem 7	Society &	Environm	Ethics	Individua	Commun	Project N	Life Long	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify situa useful	2	75	60	н	Н	Н	-	-	-		-	-	-	-	-	-	-	-	
CLO-2 :	Given a com involved.	2	80	70	-	Н	-	Η	-	-		-	-	-	-	-	-	-	-	
CLO-3 :	CLO-3 Approach the programming tasks using techniques learned and write pseudo-code.						-	-		-	-		-	-	-	-	-	-	-	-
CLO-4 :	Choose the r the problem	ight data representation formats based on the requirements of	2	70	70	н	-	н	Н	Н	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Use the com and choose t	parisons and limitations of the various programming constructs the right one for the task in hand	2	80	70	-	Н	-	Η	-	-	-	-	-	-	-	-	-	-	-
CLO-6	2	75	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Durati	on (hour)	Module-I (12)	Module-II (12)	Module- III (12)	Module- IV (12)	Module- V (12)
S-1	SLO-1	Fundamentals of C programming	Conditional Control statement	Program for one dimensional array.	Program for arguments with return value.	Program to create file
s-4	SLO-2	Fundamentals of C Programming	Conditional Control statement	Program for one dimensional array.	Program for arguments with return value.	Program to create file
S-5	SLO-1	Basic Exercises in C	Unconditional Control Program for two statement dimensional array.		Program for no arguments with return value.	Program for Structure
to S-8	SLO-2	Basic Exercises in C	Unconditional Control statement	Program for two dimensional array.	Program for no arguments with return value.	Program for Structure
S-9	SLO-1	Operators	Loop constructs	Program for multi- dimensional array.	Program for no arguments with return value.	Pointer
S-12	SLO-2	Operators	Loop constructs	Program for multi- dimensional array.	Program for no arguments with return value.	Pointer

Learning Resources	1. 2. 3	E. Balagurusamy, Programming in ANSI C, 6e, Mc Graw-Hill Pvt Ltd, New Delhi. Brian W. Kemighan, Dennis M. Ritchie, C Programming Language, Second Edition, Prentice-Hall Publication-2012 Byron Gotteried Programming with C. Third edition. Tata Mc Graw-Hill Pvt	4. 5.	Al Kelley, Ira Pohl, A Book on C, Addison Wesley Longman, Inc. Gary J. Bronson, ANSI C Programming, Cengage Learning India Private Ltd, New Delhi.
	3.	Ltd.		

Learning	g Assessment										
			Continu	uous Lea	arning As	sessmer	nt (50% we	eightage	)	Final Examination (	EQQ( weighters)
	Bloom's	CLA –	· 1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (	50% weightage)
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Lovel 1	Remember		40%		30%		30%		30%		30%
Level I	Understand	-	40 /0		30 %	-	30 %	-	30 /6	-	50 %
Lovel 2	Apply		40%		10%		40%		10%		40%
Level 2	Analyze	-	40 %		40 /0	-	40 /0	-	40 /0	-	40 %
Lovel 3	Evaluate		20%		30%		30%		30%		30%
Level 3	Create	-	2070		30 %	-	30 %	-	30 %	-	50 %
	Total	10	00 %	10	0 %	10	0 %	1(	00 %	100 %	6

Course Designers		
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	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. M. Suresh, SRMIST

Course		Course			Course				L	Τ	Ρ	С
Code	UMA20S02L	Name	Java	Programming	Catego	y	S	Skill Enhancement Course	0	0	4	2
L		1			1					1		
Pre-			Co-		Dee							

Pre- requisite Courses	Nil		requisite Courses	Nil		Progressive Courses	Nil
Course Offer Department	ring	Mathematics			Data Book / Codes/Standards		

Ratio	Rationale (CLR): The purpose of learning this course is to:					Lean	ning				Pro	grar	n Le	arni	ng C	utco	omes	s (PL	.0)		
CLR-														1	1		1				1
1:	To understand	the b	asics of Java language	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	To relate the co	ncep	ts of operators																		
CLR- 3 :	To understand	conce	epts of statements																		
CLR- 4 :	To learn the co	ncept	s of array							ų			lity								
CLR- 5 :	R- To relate the concepts of inheritance R- To understand concepts of class and object					nt (%)	e		lent	esearc			tainabi		Vork		DCe				
CLR- 6 :	LR- To understand concepts of class and object				oficienc	ainmer	owled	lysis	velopm	sign, R	Usage	lture	& Sus		∫eam	ion	& Final	arning			
				Thin	J Pro	d Att	, Кп	Ana	De	De	[00]	s cu	nent		I & ]	licat	∕lgt.	J Le			
Cours Outco	Course Learning Dutcomes (CLO): At the end of this course, learners will be able to:				Expected	Expected	Scientific	Problem	Design 8	Analysis	Modern <sup>-</sup>	Society 8	Environn	Ethics	Individua	Commur	Project N	Life Lonç	PSO - 1	PSO - 2	PSO – 3
CLO- 1 :	LO- Identify situations where computational methods and computers would be useful					60	Н	-	Н	-	Η	-	-	-	-	-	-	-	-	-	-
CLO- 2 :	O- Given a computational problem, identify and abstract the programming task involved.				80	70	М	Н	-	-		-	-	-	-	-	-	-	-	-	-
CLO- 3 :	<ul> <li>O- Approach the programming tasks using techniques learned and write pseudo code.</li> </ul>				70	65	Н	Н	-	Н	Н	Н	-	-	-	-	-	-	-	-	-
CLO- 4 :	<ul> <li>Choose the right data representation formats based on the requirements of the problem</li> </ul>			2	70	70	н	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-
CLO- 5 :	Use the compa and choose the	rison: right	s and limitations of the various programming constructs one for the task in hand	2	80	70	М	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 6 :	Write the progra and run it.	am oi	n a computer, edit, compile, debug, correct, recompile	2	75	70	М	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Durati	on (hour)	Module-I (12)	Module-II (12)	Module- III (12)	Module- IV (12)	Module- V (12)
S-1	SLO-1	Fundamentals of OOPS	Constant, variable and data types	Decision making and branching	string	Using a package
S-4	SLO-2	Fundamentals of OOPS	als of OOPS Constant, variable and data Decisio types branchi		string	Using a package
S-5	SLO-1	Basic Exercises in Java	Operators and Expression	Class objects and methods	vector	Hiding class
S-8	SLO-2	Basic Exercises in Java	Operators and Expression	Class objects and methods	vector	Hiding class
S-9	SLO-1	Overview of Java Programming	Decision making and looping	Arrays	Multiple inheritance	Draw line, rectangle, arcs, ellipse, polygons, Bar chart.
о S-12	SLO-2	Overview of Java Programming	Decision making and looping	Arrays	Multiple inheritance	Draw line, rectangle, arcs, ellipse, polygons, Bar chart.

	1.	Java How to Progam, Paul Deitel, Harvey Deitel, 8e, PHI Learning		
		Pvt, New Delhi-01.	4.	Beginning Java SE6 Ga
Learning	2.	Core Java, Cay S. Horstmann, Gary Cornell, Vol-1, Sun		3e, Printed by Course T
Resources		Microsystems Press, Peason Education Asia.	5.	Programming with Java
	3.	Design Patterns in Java, Steven John Metsker, William C. Wake,		New Delhi.
		7e, Published by Dorling Kindersley.		

Beginning Java SE6 Game Programming, Jonanthan	s, Harbour,
3e, Printed by Course Technology, USA.	

Programming with Java, E. Balagurusamy, 4e, Mc Graw-Hill Pvt Ltd, New Delhi.

Learning	g Assessment														
	Discusto		Continu	uous Lea	arning Ass	sessmer	nt (50% we	eightage		Final Examination //	50% waightaga)				
	BIOOM'S	CLA –	1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA –	4 (10%)#	i mai Examination (50 % weightage)					
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Loval 1	Remember		400/		200/		200/		200/		200/				
Lever	Understand	-	40%		30%	-	30%	-	30%	-	30%				
	Apply		400/		40%	40%			40%		409/				
Level Z	Analyze	-	40 %		40%	-	40 %	-	40%	-	40%				
	Evaluate		200/		200/		200/		200/		200/				
Level 3	Create	-	2070		30%	-	30%	-	30%	-	30 %				
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	0				

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanyasiraju, IIT Madras,	Dr. A. Govindarajan, SRMIST
maheshwaranv@yahoo.com	sryedida@iitm.ac.in	Dr. N. Parvathi, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. M. Suresh, SRMIST

Course Code	ourse UMA20S03L Course Name Scientific Documentation and Statistical To						Tools	(	Cou Cate	irse aorv	S			Skil	l Enl	hanc	eme	ent C	Cours	se		L	T 0	P 4	C 2
Pre- requisi	ite Nil			Co requi	- site	Nil			Pr	ogres	ssive ses	Nil												, T	2
Course Departn	Offering nent	Ν	lathematics	Cour	303	Data Book / Codes/Standa	ards																		
Course Rationa	Learning le (CLR):	7	he purpose	of learnir	ng thi	is course is to:				Lear	ning	]			Pro	ograi	m Le	arni	ng C	Outco	mes	s (PL	.0)		
CLR-1 :	Understar writing.	nding the	atex prograr	m, constr	uct a	pply them for the repor	t	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Apply the with math	specific p ematical s	ackages in t symbols	he latex	progr	am to create a docume	ent																		
CLR-3 :	Applying t beamer p	he bibliog	raphy conce n	epts to cre	eate a	a bib file, journal paper	3																		
CLR-4	Understar	nding the	GNU plotting	g concept	ts and	d construct a graph		(m	(%	(%			Ŧ	earch			hability		¥		0				
CLR-5	<sup>.R-5</sup> Apply the PSPP concepts to construct the statistical report						g (Bloc	iency (	ment (	ledge	<u>.s</u>	opmen	٦, Rese	age	e	Sustair		am Woi		inance	ing				
CLR-6 :	LR-6 Create insights to the concepts and prepare a dissertation.						Thinkin	I Profic	l Attain	Know	Analys	Level	Design	Fool Us	& Cultur	nent &		l & Tea	lication	1gt. & F	j Learn				
Course Outcom	Course Learning Dutcomes (CLO): At the end of this course, learners will be able to:						Level of	Expected	Expected	Scientific	Problem	Design 8	Analysis	Modem .	Society &	Environn	Ethics	Individua	Commur	Project N	Life Lon	PSO - 1	PSO - 2	PSO – 3	
CLO-1 :	Apply the writing.	concept o	of Latex, to c	reate a ty	/pese	etting program for repor	rt	2	80	95	М	-	Η		Η	-	-	-	-	Η	-	Η	-	-	Н
CLO-2 :	Apply the mathemat	concept o tical symb	of Latex, to c ols	reate a p	rogra	am for a document with		2	80	80	н	-	Н	Н	Н	-	-	-	-	Н	-	Н	-	-	Н
CLO-3 :	Apply the article and	concept o beamer	of Latex, to c presentation	reate a ty I	/pese	etting for a project report	rt,	2	80	80	н	Н	Н	Н	Н	-	-	-	Н	Н	-	Н	Н	-	-
CLO-4 :	Apply the functions	concept o	of GNU Plot,	to plot a	grapl	h for the mathematical		2	80	80	Н	Н	Н	Н	Η	-	-	-	-	Η	-	Н	-	-	Н
CLO-5 :	CLO-5 Apply Hypothesis testing, Descriptive statistics to analyze and prepare a report for the given data.					re a	2	80	80	Н	Н	Н	Н	Н	-	-	-	Н	Н	-	н	-	-	Н	
CLO-6 :	CLO-6 Apply the concepts to generate a latex document with the images from gnu plot and PSPP					om gnu	2	80	80	Н	Н	Η	Н	Η	-	-	-	Η	Η	-	Н	-	-	Η	
Duratio	Duration (hour) Module-I (12) Module- II (12)						Mod	ule-	III (12	2)			Мос	lule-	IV (	12)			Ν	/lodu	ıle- \	/ (12	?)		
S-1 to 4	SLO-1	Basic co Introduc structure Preambl	mmands in I ion Program , Document e, Packages	Latex: n class,	In lir math syml	ne math mode, Display h mode, Mathematical bols	Progra docum bibliog	amm nent Iraph	ing c to cr iy wi	on Lat eate th .bil	tex a b file		Basi	cs o	f Gn	uplo	t		PSF Pre	PP a para	n int tion	rodu of D	ictior ata f	n: iiles,	
	SLO-2	Program documer using re	ming on Lat to prepare port docume	tex a letter nt class	Prog docu math	gramming on Latex ument with hematical equations.	Progra docum Projec	amm nent i st rev	ing c to cr iew	eate 1.	ex a								Dati Trai	a sci nsfoi	rmati	ing a ion	IND		
	SLO-1	Program	ming on Late	ex e a	Proc	aramming on Latex	Type s examp	settin ble, tl	g th heor	e defi em, c	initio coroll	n, ary,													

5-1 to 4	SLO-2	Programming on Latex document to prepare a letter using report document class	Programming on Latex document with mathematical equations.	Programming on latex document to create a Project review 1.		Data screening and Transformation				
S-5 to 8	SLO-1	Programming on Latex document to prepare a bullets and numbering list	Programming on Latex document to create a	Type setting the definition, example, theorem, corollary, proof, Bibliography,	Working with data in	Hypothesis Testing				
	SLO-2	Programming on Latex document to prepare a table, multi column tables	question paper	Programming on Latex to create a template for the journal paper.	Gnuplot - Plotting styles					
S-9 to 12	SLO-1	Programming on Latex	Programming on latex	Programming on latex to	Decorations - Three dimensional plots -	Descriptives, Frequencies, Graph, Correlation mean				
0 0 10 12	SLO-2	the images	choice question paper.	presentation	Using color for data representation	median, rank, Regression				
	1. H. Kopkaand P.W. Daly, A Guide to LaTeX, Third Edition, Addison –									
Looming	2 Dhill	y, London, 1999. Inn K. Janart, Chunlat in Action	······································	4. Lee Phillips, gnu	plot Cookbook, Packt Pub	n to Statistical Analysia				
Descuree	Z. FIIII	ion Manning Publications 20	i. Onderstanding Data with t	Christenber D. Helt	or II Edition CreativeMin	de Broos Croup 2017				
Resources	3 The	mas Williams and Colin Kell	iu. av. Chunlat 5.0 Reference	Manual Manual		ius Piess Gloup, 2017.				
	Samur	ai Media Limited 2014	ey, Onuplot 3.0 Relefence	ivialiual.						
	Gamu	ui moulu Linnou, 2014.								

Learnin	g Assessment														
	<b>_</b>		Contin	uous Lea	arning Ass	sessmer	nt (50% we	ightage)	)	Final Francisation (	FOO(				
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (50 % weightage)					
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Loval 1	Remember		400/		200/		200/		200/		200/				
Level 1 U	Understand	-	40%		30%	-	30%	-	30%	-	30%				
Lovel 2	Apply		40%		40%		400/		40%		40%				
Level 2	Analyze	-	40%		40%	-	40%	-	40%	-	40%				
Lovel 2	Evaluate		200/		200/		200/		200/		200/				
Level 3 Cre	Create	-	20%		30%	-	30%	-	30%	-	30%				
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	6				

Course Designers		
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Mr. V. Maheshwaran, Cognizant Technology Solutions maheshwaranv@yahoo.com	Prof. Y.V.S.S. Sanyasiraju, IIT Madras, sryedida@iitm.ac.in	Dr. A. Govindarajan, SRMIST Dr. V. Srinivasan, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. M. Radhakrishnan, SRMIST Dr. Rajeev Sukumaran, SRMIST

Course	1100205041	Course		Course	c	Skill Enhancement Course	L	Т	Ρ	С	;
Code	UIVIA20304L	Name	FTHON FROGRAMMING	Category	3	Skill Enhancement Course	0	0	4	2	

Pr requ Cou	e- iisite Nil rses				re C	Co- equisite Courses	Nil			Pro	ogres Cours	sive es	Nil													
Cours Depa	e Offering rtment			М	athem	matics		Data Book / Codes/Standards		Nil																
Cours Ration (CLR)	e Learning nale ):	T	The p	ourpose of le	arning	g this cou	urse is to	):	L	earni	ng				Pro	grar	n Le	arni	ng C	Outco	omes	s (PL	.0)			
CLR- 1:	Understand computatior	iding the python language construct and apply them for scientif on			them for scientific	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
CLR- 2 :	Apply pytho	on vector ,list and plot concept to solve curve fitting			fitting																					
CLR- 3 :	Applying Die	tiona	ary co	oncept to m	odel	Polynom	nials																			1
CLR- 4 :	Create insig with python	nts to	o diff	erence equa	ation b	based sys	stem mo	del and solving them	(m	(%	(%)	æ			arch			ability		×						
CLR- 5 :	Analyze Mo	ite C	Carlo	Simulation f	for cor	mputing l	Probabil	ities	(Bloo	ency (	nent (9	wledge		pment	, Rese	age	0	ustain		n Wor		nance	бL			1
CLR- 6 :	Create insig matplotlib to	nts to solv	o the ve sc	concepts ar ientific prob	nd pro lem	ogrammir	ng of So	iPy, numpy,	f Thinking	ed Proficie	ed Attainn	ering Kno	n Analysis	& Develo	s, Design	Tool Use	& Culture	ment & S		al & Tear	inication	Mgt. & Fi	ng Learnir			~
Cours Outco	e Learning mes (CLO):	A	At the	end of this	cours	se, learne	ers will b	e able to:	Level o	Expecte	Expecte	Engine	Probler	Design	Analysi	Moderr	Society	Enviror	Ethics	Individu	Commu	Project	Life Lor	PSO - `	PSO - 2	PSO - 3
CLO- 1:	Apply pytho	n lar	ngua	ge construct	t to co	ompute f	ormula a	ind scientific problem	2	80	70	Н	н	-	-	-	-	-	-	-	-	-	-	-	-	Н
CLO- 2 :	Analyze Ma solving	hem	natical Models system using f Difference Equations and			e Equations and	2	85	75	Н	н	-	-	-	-	-	-	-	-	-	-	-	-	Н		
CLO- 3 :	Apply time s by python	ne sequence concept for generation and processing of audio signant n				ssing of audio signal	2	75	70	Н	-	-	Н	-	-	-	-	-	-	-	-	Н	-	-		
CLO- 4 :	Apply pytho	thon language construct to solve Polynomials				2	85	80	Н	Н	-	-	-	-			-	1	-	1	-	-	Η			
CLO- 5 :	Apply pytho Simulation ,	python language construct to compute probability by Monte Carlo ation ,game design and dynamic random motion creation			/ by Monte Carlo reation	2	85	75	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-	Н			
CLO- 6 :	Apply SciPy analysis , So processing	SciPy, numpy, matplotlib to statistical analysis, correlation coefficien sis, Solving equations- Linear least squares solutions and signal ssing			correlation coefficient ons and signal	2	80	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Η			

Dı (I	iration nour)	Module-I (12)	Module-II (12)	Module-III (12)	Module-IV (12)	Module-V (12)
S-1	SLO- 1	Computing with Formulas- Using a Program as a Calculator	Vectors, Mathematical Operations on Vectors, Vector Arithmetics and Vector Function	Reading Data from File- Line by Line, Reading a Mixture of Text and Numbers	Drawing Random Numbers- Uniformly Distributed Random Numbers	SciPy, numpy, matplotlib
	SLO- 2	Using Variables, Formatting Text and Numbers	Arrays in Python Programs- Using Lists for Collecting Function Data	Making Dictionaries	Computing the Mean and Standard Deviation	Basic array methods in numpy, Changing the shape of an array
	SLO- 1	Celsius-Fahrenheit Conversion,	Curve Plotting-The SciTools and Easyviz Packages	Dictionary Operations	The Gaussian or Normal Distribution- Drawing a Random Element from a List	Maximum and minimum values
S-2	SLO- 2	Evaluating Standard Mathematical Functions, Type Conversion	Plotting a Single Curve, Decorating the Plot, Plotting Multiple Curves, Controlling Line Styles	Polynomials as Dictionaries, File Data in Dictionaries, File Data in Nested Dictionaries	Drawing random interger	Reading and writing an array to a fle
0	SLO- 1	Lab 1:programming on formula and Standard		Lab 7: reading student marks file into a dictionary		
3-4	SLO- 2	Evaluate a Gaussian function, Compute the air resistance on a football	Lab 4: Curve Plotting	data with the student name as key and computing the average grades	Lab 10: real card games	and data analysis
0.5	SLO- 1	Complex Numbers, Complex Arithmetic's in Python	Numerical Python Arrays manipulations	Strings- Common Operations on Strings	Computing Probabilities- Principles of Monte Carlo Simulation	Statistical methods in numpy
3-0	SLO- 2	Input Data-Reading Keyboard Input-Reading from the Command Line	Higher-Dimensional Arrays- Two-Dimensional Numerical Python Arrays	Reading Coordinates	Throwing Dice, Rolling Two Dice game	Statistical methods in numpy
	SLO- 1	Making Modules, Collecting Functions in a Module File	Matrix Objects	Reading Data from Web Pages- About Web Pages	Drawing Balls from a Hat	Histograms
S-6	SLO- 2	Using Modules	Mathematical Models Based on Difference Equations- Interest Rates	Access Web Pages in Programs- Reading Pure Text Files,	Simple Games- Guessing a Number	Solving equations- Linear least squares solutions- Beer- Lambert Law
S 7-8	SLO- 1 SLO- 2	Lab 2: program on Making Modules and using them	Lab 5: Animating a Function- temperature on earth	Lab 8:reading web temperature text file into Dictionaries and computing average Temperature	Lab 11: Simple Games	Lab 14: the correlation coefficient between pressure and temperature

	SLO- 1	while loops and for loops	the Factorial as a Difference Equation	Extracting Data from an HTML Page	Random Walk in One Space Dimension	One-Dimensional Fast Fourier Transforms
S-9	SLO- 2	Lists and list manipulation	Growth of a Population, Payback of a Loan, Making a Living from a Fortune	Writing a Table to File, Reading and Writing Spreadsheet Files	Basic Implementation, visualization and Computing Statistics of the Particle Positions	Matplotlib basics- Plotting on a single axes object, scatter plot, Bar charts and pie charts
S-	SLO- 1	Loops with List Indices, Nested Lists	Logistic Growth, Programming with Sound Writing Sound to File, Reading Sound from File,	Representing a Function as a Class and manipulation	Random Walk in Two Space Dimensions	Choosing the Length of the DFT
10	SLO- 2	Tuples, Functions, Lambda Functions, If Tests	Playing Many Notes	Bank Accounts as class, A Class for Solving ODEs	Basic Implementation, visualization and Computing Statistics of the Particle Positions	Filters in Signal Processing
S 11 12	SLO- 1 SLO- 2	Lab 3: Programming on list and loops	Lab 6: Sound generated by formula and difference equation	Lab 9: Programming on class	Lab 12: Random Walk in One Space Dimension or Two Space Dimensions	Lab 15: Numpy signal processing

3.

Learning Resources

1.

Hans Petter Langtangen," A Primer on Scientific Programming with Python", Springer, 2000. Christian Hill, "Learning Scientific Programming with Python", Cambridge University Press, 2015. 2.

Juan Nunez-Iglesias, Stéfan van der Walt, and Harriet Dashnow Elegant SciPy Te Art of Scientific Python, O'Reilly Media, 2017.

Learnin	earning Assessment										
			Contin	uous Lea	arning As	sessmer	nt (50% we	eightage	)	Final Francis ation (	EOO/
	Bloom's	CLA –	· 1 (10%)	CLA -	2 (10%)	CLA -	3 (20%)	CLA –	4 (10%)#	Final Examination (	50% weightage)
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
	Remember		400/		200/		200/		200/		200/
Lever	Understand	-	40%		30%	-	30%	-	30%	-	30%
	Apply		40%		40%		40%		10%		40%
LEVEIZ	Analyze	-	40 %		40 %	-	40 /0	-	40 /0	-	40 /0
	Evaluate		20%		30%		30%		30%		30%
Level 3	Create	-	20 /0		30 %	-	50%	-	30 %	-	50 %
	Total	10	)0 %	10	0 %	10	0 %	1(	00 %	100 %	6

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanvasiraiu, IIT Madras.	Dr. A. Govindarajan, SRMIST
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	Prof P. V. Pathish Kumar, IIT Kanpur, hvrk@iitk as in	Dr. M. Radhakrishnan, SRMIST
		Dr. Rajeev Sukumaran, SRMIST

Course		Course					L	Τ	Ρ	С
Code	UJK20301T	Name	Universal Human Values	Course Category	JK	Life Skill Course	2	0	0	2

Pre-re	quisite Courses	Nil	Co-requisite Courses	Nil		Pro	ogres	sive	e Co	urse	s	Nil										
Course Departm	Offering ient	Engl	lish	Data Book / Codes/Standards								1	٨	lil								
Course	Learning Rational	le (CLR	:): The purpose of learning	ng this course is to:			Learr	ning	] [			Proç	gram	n Lea	arni	ng C	Outc	ome	s (P	LO)		
CLR-1 :	To generate in stu issues such as ge Nation and genera	idents a ender m al huma	a sensitivity to current region arginalization Eco sensitivity nness	al and national r, vision for the	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	An expanded con developed	sciousr	ness with a mind to accommo	odate all is																		
CLR-3 : CLR-4 :	To create commu	ept all a nity cor	nd to co- exist is initiated inectivity and interdependen	ce	(m	(%	(%	ge	lts	iplines	6		ledge									1
CLR-5 :	To instill intrinsic I individuals and co	ink betv mmuni	veen freedom and responsib ties	pility for both	g (Bloc	iency (	ment ('	nowled	Concep	d Disc	wledge	ization	Know	g	et Data	ills	g Skills	Skills				
CLR-6 :	Make them learn	the bas	ic nature of human beings		hinkin	Profici	Attain	ntal Kr	n of C	Relate	al Kno	pecial	Jtilize	lodelir	nterpr	ive Sk	Solving	cation	Skills			1
Course (CLO):	Learning Outcom	es	At the end of this course, I to:	earners will be able	Level of T	Expected	Expected	Fundame	Applicatio	Link with I	Procedura	Skills in S	Ability to l	Skills in M	Analyze, I	Investigat	Problem S	Communi	Analytical	PSO -1	PSO -2	PSO-3
CLO-1 :	Become sensitive religion recognizir	toward ng the u	l every living life and be abl miversal values	e to respect every	2	75	60	Н	Н	Н	Н	-	-	-	Н	Н	Н	Н	Н	-	-	-
CLO-2 :	Every way of life a and will be able a	and cult pprecia	ure will kindle the curiosity in te the beauty in it	n them to know them	2	80	70	Н	н	Н	Н	-	-	-	Н	Н	Н	Н	Н	-	-	-
CLO-3 :	The presumptuou	s or pre	ejudiced mentality will be over	ercome by them	2	70	65	Н	Н	Н	Н		-	-	-	-	-	-	-	-	-	-
CLO-4 :	Critical thinking ar thinking for them	nd acco	mmodative nature will becom	me so natural way of	2	70	70	Н	Н	Н	Н	Н	-	-	-	-	-	Н	-	-	-	-
CLO-5 :	They will become	aware	of the social inequalities and	l justice	2	80	70	Н	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	Will be able to explore their own emotions, hopes & fear and be able to describe them verbally			ear and be able to	2	75	70	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н

Du (I	ration hour)	06	06	06	06	06
S-1	SLO-1	What is love? Forms of love. For self, parents, family, friends, spouse, community, nation, humanity and other beings, both for living and non living	Love compassion empathy sympathy and non violence	Narratives and anecdotes from history, literature including local folklore	What will learners lose if they don't practice love and compassion?	Sharing learners' individual and/ or group experiences
	SLO-2	Love and Compassion inter relatedness	Individuals who are remembered in history for practicing compassion and love	Practicing Love and Compassion: what will they gain if they practice compassion?	Simulated situations	Case studies
S-2	SLO-1	What is Truth ?	Universal truth, truth as value, as fact,	Veracity, sincerity, honesty among others	Individuals who are remembered in the history who have practiced these values	Practicing truths
	SLO-2	: what will they gain if they practice truth	What will learners lose if they don't practice truth?	Sharing learners' individual and/ or group experiences	Simulated situations	Case studies
S-3	SLO-1	What is non violence – its need, love compassion,	empathy sympathy for others as pre- requisites for non- violence	Ahimsa as non violence and non killing	Individuals and their organizations which are known for their commitment for non violence	Narratives and anecdotes about non violence from history and literature including local folklore
	SLO-2	Practicing non violence	What will they gain if they practice non violence	What will learners lose if they don't practice non violence?	Simulated situations	Case studies
S-4	SL0-1	What is righteousness ?	Righteousness and Dharma	Righteousness and priority	Individuals who are remembered in the history who have practicing righteousness.	Narratives and anecdotes about Righteousness from history and literature including local folklore
	SLO-2	Practicing Righteousness	: Sharing learners' individual and/ or group experiences	what will learners lose if they don't practice Righteousness	Simulated situations	Case studies

S-5	SLO-1	What is peace?	Need of peace in Relation with harmony and balance	Narratives and anecdotes about peace from history and literature including local folklore	Individuals who are remembered in the history who have practicing peace	Practicing peace
	SLO-2	What will they gain if they practice peace	what will learners lose if they don't practice peace	Sharing learners' individual and/ or group experiences	Simulated situations	Case studies
S-6	SLO-1	What is service and renunciation	Forms of service , & renunciation Individuals who have recommended service in history	Practicing service and renunciation	Narratives and anecdotes about Service & renunciation from history and literature including local folklore	Individuals who are remembered in the history who have practicing renunciation
	SLO-2	Sharing learners' individual and/ or group experiences on renunciation	Sharing learners' individual and/ or group experiences on service	what will learners lose or gain if they do/don't practice Renunciation and service	Simulated situations	Case studies

Learning
Resources

 Theory:
 1. "Universal Human Values: Text Book"- Compiled and Edited by the Faculty of Science and Humanites, SRMIST, 2020.

Learning As	sessment									
				Continuous	Learning Ass	essment (100%	% weightage)			
Level	Bloom's Level of Thinking	CLA –	1 (20%)	CLA –	2 (20%)	CLA –	3 (30%)	CLA – 4 (30%) #		
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	
Loval 1	Remember	400/		400/		409/		400/		
Level I	Understand	40%	-	40%	-	40%	-	40%	-	
	Apply	400/		400/		409/		400/		
Level 2	Analyze	40%	-	40%	-	40%	-	40%	-	
	Evaluate	200/		200/		200/		200/		
Level 3	Create	20%	-	20%	-	20%	-	20%	-	
	Total	10	0 %	100	) %	10	0 %	10	0 %	

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
	1. Prof. Daniel David, Prof & Head, Department of English, MCC, Chennai	1. Dr. Shanthichitra, Associate Professor, & Head, Department of English, FSH,SRMIST
		2. Dr K B Geetha, Assistant Professor, Department of English, FSH, SRMIST

Cours	se UMA20401T		1T Course		DISCRETE MATHEMATICS			Course		С	Professional Core Course								L	T	Р	С		
Code	e		Name				C	ateg	gory					5	1	0	6							
Pre- requisite Nil requisite Nil Courses Courses							Pro	ogres Cours	sive es	s Nil														
Course Offering Department         Mathematics         Data Book / Codes/Standards																								
Course Learning Rationale (CLR): The purpose of learning this course is to:								Learr	ning Program Learning Outcomes (PLO)															
CLR- 1:	To learn ab	out lo	ogic, cor	nnectives a	nd to unders	stand inference theory	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-       To gain knowledge about set theory, relations, types of relation, functions         2 :       and its properties.         CLR-       To know about Recurrence relations, Generating functions         3 :       CLR-         CLR-       To study about combination, permutation, Inclusion and exclusion and         4 :       Piracophole principle												ų			lity									
CLR- 5 : CLR- 6 : To know about Languages and Automata						inking (Bloom)	roficiency (%)	ttainment (%)	knowledge	ıalysis	evelopment	esign, Researc	ol Usage	Culture	nt & Sustainabi		Team Work	ation	: & Finance	earning				
Course Learning Outcomes (CLO): At the end of this course, learners will be able to:					Level of Th	Expected F	Expected A	Scientific P	Problem Ar	Design & D	Analysis, D	Modem To	Society & C	Environmei	Ethics	Individual 8	Communic	Project Mg	Life Long L	PSO - 1	PSO - 2	PSO – 3		
CLO- 1:	Symbolize to predicate ca	ne st Iculu	atemen is	t problems	in propositio	onal calculus and also in	3	85	80	Н	Н	L	-	1	1	-	-	М	L	-	Н	-	-	-
CLO- 2 :	CLO- Identify the type of relations, construct Hasse diagram, solve problems in 2: functions						3	85	80	М	н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO- 3 :	CLO- Solve both homogeneous and non-homogeneous recurrence relations using 3 : particular solution and generating functions						3	85	80	Н	н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO- 4 :	CLO- Discuss group, example, properties, cyclic groups, abelian groups, cosets, 4 : Lagrange's theorem, group homomorphism, isomorphism, Normal subgroups						3	85	80	Н	Н	Н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO- 5 :	CLO- 5 : To know about Boolean Algebra						3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- 6 :	CLO- 6 : To know about Languages and Automata						3	85	80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-

Duration		18	18	18	18	18		
	SLO- 1	Introduction to Propositions	Introduction to Laws of Set Theory	Introduction to Recurrence relations	Introduction to Combinatorics	Introduction to Boolean algebra		
5-1	SLO- 2	Types of proposition	Solving Problems using Analytical proof	Examples of recurrence relations	Combination	Introduction to Boolean algebra		
S-2	SLO- 1	Introduction to connectives	Solving Problems using	Homogeneous and non homogeneous recurrence relations	Permutation	Properties of Boolean algebra		
	SLO- 2	Types of connectives and truth. Concept of tautologies and contradiction	Introduction to Min Set, Max set and duality	Order or degree of homogeneous and non homogeneous recurrence relations	Problems on combination	Properties of Boolean algebra		
S-3	SLO- 1	Truth table for compound statements	Concepts of min set forming a partition of a set or not	Solution of homogeneous recurrence relations	Problems on permutation	Properties of Boolean algebra		
	SLO- 2	Introduction to Laws of logic,, equivalences, duality	Introduction to relation, types of relation	Solution of homogeneous recurrence relations	Problems on combination and permutation	Properties of Boolean algebra		
S-4	SLO- 1	Truth table approach for solving equivalences	Problems to show the relation is an equivalence relation	Solution of non- homogeneous recurrence relations using particular solution	Problems on combination and permutation	Problems on Boolean algebra		
	SLO- 2	Solving equivalence problems using laws of logic	Problems to show the relation is an equivalence relation	Solution of non- homogeneous recurrence relations using particular solution	Problems on combination and permutation	Properties on Boolean algebra		
S-5	SLO- 1	Introduction to inference theory	Graphical representation of relations	Solution of non- homogeneous recurrence relations using particular solution	Problems on combination and permutation	Introduction to Grammar Languages		
	SLO- 2	Implications	Construction of Hasse Diagram for a POSET	Solution of non- homogeneous recurrence relations using particular solution	Problems on combination and permutation	Introduction to grammar Languages		
S-6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session		

	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session			
0.7	SLO- 1	Procedure to solve implications using Direct method	Composition of relations	Solution of non- homogeneous recurrence relations using particular solution	Principle of inclusion and exclusion	Problems on L(G)			
5-7	SLO- 2	Solving implications using Direct Method	Matrix representation of relations	Solution of non- homogeneous recurrence relations using particular solution	Proof of principle of inclusion and exclusion	Problems on L(G)			
S-8 S-9	SLO- 1	Procedure to solve implications using Indirect method	Operation on matrices of two or more relations	Solution of non- homogeneous recurrence relations using particular solution	Problems on inclusion and exclusion	Problems on L(G)			
	SLO- 2	Solving implications using Indirect Method	Closure operation on relations - Reflexive and symmetric closure on relations	Solution of non- homogeneous recurrence relations using particular solution	Problems on inclusion and exclusion	Problems on L(G)			
	SLO- 1	Procedure to solve implications using conditional proof method	Transitive closure on relation using Warshall's Algorithm	Formation of recurrence relations from sequence	Problems on inclusion and exclusion	Introduction to FSM			
	SLO- 2	Solving implications using conditional proof method	Transitive closure on relation using Warshall's Algorithm	Formation of recurrence relations from sequence	Principle of Mathematical Induction	Introduction to FSM			
S-10	SLO- 1	Procedure to solve implications using inconsistent	Introduction to Functions	Introduction to generating function	Problems on Mathematical induction	Problems on FSM			
	SLO- 2	Solving implications	Examples to check whether the relation is a function	Introduction to generating	Problems on Mathematical induction	Problems on FSM			
	SLO- 1	Introduction to Predicate Calculus.	Types of functions. Verifying whether function is bijective or not	Generating function for standard sequences	Problems on Mathematical induction	Introduction to FSA			
5-11	SLO- 2	Introduction to types of quantifiers- Universal and Existential	Special types of functions with examples.	Generating function for standard sequences	Problems on Mathematical induction	Introduction to FSA			
	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session			
S-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session			
S-13	SLO- 1	Introduction to types of variables - Free and Bound	Composition of functions	Solution of homogeneous recurrence relations using generating functions	Pigeon hole principle	Problems on FSA			
	SLO- 2	Implications with relevant to predicate Calculus	Composition of functions is associative	Solution of homogeneous recurrence relations using generating functions	Problems using Pigeon hole principle	Problems on FSA			
	SLO- 1	Implications with relevant to predicate Calculus	Solving problems under composition of functions	Solution of non- homogeneous recurrence relations using generating functions	Generalized Pigeon hole principle	Problems on FSA			
S-14	SLO- 2	Conditions for applying quantifiers.	Derivation of :If f: $A \rightarrow B$ , g: $B \rightarrow C$ are 1-1 and onto functions, then $g \bullet f : A \rightarrow C$ is 1-1 and onto	Solution of non- homogeneous recurrence relations using generating functions	Problems using Generalized Pigeon hole principle	Problems on FSA			
S-15	SLO- 1 Direct Method		Introduction to invertible functions.	Solution of non- homogeneous recurrence relations using generating functions	Problems using Generalized Pigeon hole principle	Recognition of regular languages			
	SLO- 2	Solving implications in predicate calculus using Direct Method	Derivation of The inverse of a function f, if exists, is unique	Solution of non- homogeneous recurrence relations using generating functions	Problems using Generalized Pigeon hole principle	Recognition of regular languages			
S-16	SLO- 1	Solving implications using Indirect Method	Iving implications ing Indirect Method function f: A		Problems using Generalized Pigeon hole principle	Recognition of regular languages			
	SLO- 2	Solving implications using Indirect Method	Derivation of If f: $A \rightarrow B$ , g: $B \rightarrow C$ are invertible functions, then g • f : $A \rightarrow C$ is also invertible and (g • f) <sup>-1</sup> = f <sup>-1</sup> • g -1	Solution of non- homogeneous recurrence relations using generating functions	Problems using Generalized Pigeon hole principle	Recognition of regular languages			
S-17	SLO- 1	Solving implications using conditional proof method	Solving problems under invertible function	Applications of Recurrence relations- Tower of Hanoi problem	Problems using Generalized Pigeon hole principle	Problems on Automata			
S-18     SLO- 1 SLO- 2     Tutorial Session     Tutorial Session     Tutorial Session       Tutorial Session     Tutorial Session     Tutorial Session		SLO- 2	Solving implications using conditional proof	Solving problems under invertible function	Applications of Recurrence relations-	Problems using Generalized Pigeon hole principle	Problems on Automata		
---	------	-----------	--	---	--	---	----------------------		
S-18     SLO- 1     Tutorial Session     Tutorial Session     Tutorial Session       S-18     SLO- 2     Tutorial Session     Tutorial Session     Tutorial Session		_	method		Tower of Hanoi problem				
S-10 SLO- 2 Tutorial Session Tutorial Session Tutorial Session Tutorial Session Tutorial Session	C 10	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session		
	3-10	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session		

	1. Alan Doerr and Kenneth LevAsseur, Apllied Discrete Structures for	
	Computer Science, Galgotia Publications (P) Ltd, 1992.	
Learning	2. Tremblay J. P. and Manohar R., Discrete Mathematical Structures with	3. Kolmon and Busby, Discrete Mathematical Structures for Computer
Resources	applications to Computer Science, Tata Major Core Graw Hill Publishing	Science, Prentice Hall, 3rd edition, 1997.
	Co.,35 <sup>th</sup> edition, 2008.	

Learning Assessment														
	Continuous Learning Assessment (50% weightage)													
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#					
	Level of Thinking	Theory	Practice											
	Remember	400/		200/		200/		200/		200/				
Level	Understand	40 %	-	30%	-	30%	-	30%	-	30%	-			
Lovel 2	Apply	10%		10%	_	40%		10%		10%				
Level 2	Analyze	40 /0	-	40 /0	-		-	40%	-	40 /0	-			
Loval 3	Evaluate	20%		30%		30%		30%		30%				
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30%	-			
Total 100 % 100 % 100 % 100 % 100 %														

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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Course Code	UMA20D041	A20D04T Course FUZZY MATHEMATICS								E		Disc	ciplin	ie Sj	pecif	ic El	ectiv	/e C	ours	е	L 5	T 1	P 0	C 6
Pre- requis Cours	ite Nil es			Pro C	ogres Cours	ssive ses	Nil																	
Course Departr	Course Offering Department         Mathematics         Data Book / Codes/Standards																							
Course Rationa	Learning le (CLR):	The	purpose o	f learning th	is course	is to:			Lean	ning				Pro	grar	n Le	arni	ng O	utco	mes	; (PL	0)		
CLR- 1:	o know the ba	sic definit	ions of fuz	zy set theor	у		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2: CLR- 3:	o learn the ari	thmetic or to apply t	perations in	nvolved in fu	ızzy sets ns																			
CLR- 4 :	o know the co	ncepts of	fuzzy relat	ions and fuz	zzy logic								ch			ility								
CLR- 5:	o learnt the fu	ndamenta	als of Fuzzy	y Algebra			Bloom	cy (%)	ent (%)	ge		nent	Resear	e		stainab		Work		ance				
СLR- 6:	o be aware of	the applic	cations of F	uzzy sets			hinking (	Proficien	Attainme	Knowled	vnalysis	Developr	Design, F	ool Usag	Culture	ent & Sue		& Team	cation	gt. & Fina	Learning	]		
Course Outcom	Learning les (CLO): At the end of this course, learners will be able to:							Expected	Expected	Scientific	Problem A	Design &	Analysis, I	Modem To	Society &	Environme	Ethics	Individual	Communi	Project M(	Life Long	PSO - 1	PSO - 2	PSO – 3
CLO- 1:	Get exposed to	cposed to fuzzy sets, fuzzy subsets and their properties								н	н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO- V 2 : e	Vill be capable ffectively	enough t	o use the a	arithmetic op	perations	involved in fuzzy sets	3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO- 3 :	To have a better understanding of fuzzy logic							85	80	Н	Н	-		-	-	-	-	М	-	-	Н	-	-	-
СLО- 4 :	o be familiar v	vith fuzzy	relations a	nd to do pro	blems ba	ased on it	3	85	80	Н	Н		М	-	-	-	-	М	L	-	Η	-	-	-
CLO- 5 : T	o be familiar v	vith the fu	ndamental	s of fuzzy al	gebra		3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
СLО- 6 :	D- To be aware of the applications of fuzzy sets						3	85	80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO- 1	Introduction to fuzzy sets	Algebraic product of two fuzzy subsets	Introduction to fuzzy relations	Introduction to some more connectives exclusive OR, NAND, NOR	Definition of invariant subgroups
	SLO- 2	Basic definitions of fuzzy sets	Problems	Definition of a binary relation	Examples related to it.	Example of invariant fuzzy subgroups
6.2	SLO- 1	Examples of fuzzy sets	Problems	Examples based on fuzzy relation	Brief introduction on two- state devices	Example of invariant fuzzy subgroups
3-2	SLO- 2	Examples of fuzzy sets	Problems	Examples on fuzzy binary relation	Real life examples	Proofs of propositions on invariant fuzzy subgroups
S-3	SLO- 1	Definition of fuzzy subsets	Algebraic sum of two fuzzy subsets	Introduction to union, intersection of fuzzy relations	Introduction to fuzzy logic	Proofs of propositions on invariant fuzzy subgroups
	SLO- 2	Examples of fuzzy subsets	Problems	Examples based on it.	Comparing classical logic and fuzzy logic	Proofs of propositions on invariant fuzzy subgroups
S-4	SLO- 1	Definition of partially ordered sets	Problems	Definition of algebraic sum and algebraic product of fuzzy relations.	Introducing logical connectives in fuzzy logic	Proofs of propositions on invariant fuzzy subgroups
	SLO- 2	Examples based on it	Properties of fuzzy subsets	Relevant Examples	Approximate reasoning of fuzzy logic	Proofs of propositions on invariant fuzzy subgroups
S-5	SLO- 1	Types of fuzzy sets	Proofs of properties	Some more examples	Concept of fuzzy tautologies, equivalence and contradiction	Proofs of propositions on invariant fuzzy subgroups
	SLO- 2	Examples of fuzzy sets	Proofs of properties	Some more examples	Relevant examples	Proofs of propositions on invariant fuzzy subgroups
0.6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-7	SLO- 1	Definition of a poset and lattices	Definition of fuzzy subset function	Introduction to composition and complement of fuzzy relations	Introduction to fuzzy subgroupoids	Definition of fuzzy quotient group

	SLO- 2	Examples based on it	Illustration based on it	Relevant examples	Theorems on subgroupoids	Example
6 8	SLO- 1	Introduction to Boolean Algebra	Theorems on fuzzy set functions	Similarity relation	Theorems on subgroupoids	Proofs of propositions on fuzzy quotient group
5-0	SLO- 2	Identities based on it	Theorems	Example explaining similarity relation.	Introduction to lattice of fuzzy subgroupoids	Proofs of propositions on fuzzy quotient group
S-9	SLO- 1	Definition of L-fuzzy sets	Theorems and their proofs	Introduction to fuzzy preorder relation and fuzzy partial order relation	Theorems on lattice of fuzzy subgroupoids	Proofs of propositions on fuzzy quotient group
	SLO- 2	Examples	Theorems and their proofs	Examples relating to it	Theorems on lattice of fuzzy subgroupoids	Proofs of propositions on fuzzy quotient group
S-10	SLO- 1	Visual representation of a fuzzy subset	Cartesian product of fuzzy subsets	Introduction to classical logic	Definition of homomorphic image of a subgroupoid	Proofs of propositions on fuzzy quotient group
	SLO- 2	Operations on fuzzy subsets	Cartesian product of fuzzy subsets	Discussion of statements and sentences	Pre-image of a subgroupoid	Proofs of propositions on fuzzy quotient group
S 11	SLO- 1	Problems based on operations	Vector sum of fuzzy subsets	Introduction	Property based on it	Proofs of propositions on fuzzy quotient group
3-11	SLO- 2	Problems	Scalar multiplication of fuzzy subsets	Different types of connectives	Property based on it	Proofs of propositions on fuzzy quotient group
S-12	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Definition of level set	Propositions based on it	Examples and problems related to connectives.	Proofs of proposition of homomorphic image of a fuzzy subgroupoid	Definition of fuzzy subrings
	SLO- 2	More on level sets	Propositions and their proofs	Some more examples	Proofs of propositions	Examples
S-14	SLO- 1	Properties of fuzzy subsets of a set	Propositions and their proofs	Discussion of propositional laws relating to logical connectives	Definition of fuzzy subgroups	Proofs of propositions on fuzzy subrings
	SLO- 2	Some more properties	Propositions and their proofs	Definition of a tautology	Theorems involving fuzzy subgroups	Proofs of propositions on fuzzy subrings
S 15	SLO- 1	Proofs of properties	Propositions and their proofs	Examples	Theorems on fuzzy subgroups	Proofs of propositions on fuzzy subrings
3-13	SLO- 2	Proofs of properties	Propositions and their proofs	Examples for dual of two connectives	Theorems on fuzzy subgroups	Proofs of propositions on fuzzy subrings
S-16	SLO- 1	Problems	Propositions and their proofs	Introducing functionally complete set of connectives	Theorems on fuzzy subgroups	Proofs of propositions on fuzzy subrings
	SLO- 2	Problems	Propositions and their proofs	Examples	Theorems on fuzzy subgroups	Proofs of propositions on fuzzy subrings
C 17	SLO- 1	Problems	Propositions and their proofs	Examples	Theorems on fuzzy subgroups	Proofs of propositions on fuzzy subrings
3-17	SLO- 2	Problems	Propositions and their proofs	Some more examples on connectives	Theorems on fuzzy subgroups	Proofs of propositions on fuzzy subrings
C 40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
2-10	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

Learning 2. Resources 3. S. Nanda and N.R. Das, Fuzzy Mathematical Concepts,Narosa Publishing House, New Delhi, 2010. M. Ganesh, Introduction to Fuzzy Sets and Fuzzy Logic, Prentice Hall of India Pvt. Ltd, 2006. John.N.Mordeson and Premchand S.Nair, Fuzyy Mathematics, Spring verlong, 2001. George J.Klir / Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and A : Theory and Applications, Pretice Hall of India, 1995 H.J.Zimmermann, Fuzzy Set Theory and its Applications, Allied publishers Ltd, New Delhi, 2001.

Learnin	earning Assessment														
	<b>.</b>		Contin	uous Lea	arning As	sessmer	nt (50% we		Final Examination (50% waightage)						
	Bloom's	CLA –	· 1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50 % weightage)					
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Level 4	Remember	400/		200/		200/		200/		200/					
Level I	Understand	40%	-	30%	-	30%	-	30%	-	30%	-				
Lovel 2	Apply	400/		100/		100/		100/		400/					
Level Z	Analyze	40 %	-	40%	-	40%	-	40 %	-	40%	-				
Level 3	Evaluate	20%	-	30%	-	30%	-	30%	-	30%	-				

-		I	1	1		1			
Create									
Total	10	0 %	10	0 %	10	0 %	10	0 %	100 %

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Mrs Melita Vinoliah, SRMIST

Course Code	UMA20D05	PARTIAL DIFFERENTIAL ATIONS	(	Cou Cate	rse gory	E		Disc	ciplin	ie Sj	pecif	ic El	ectiv	/e Ci	ours	e	L 5	T 1	P 0	C 6			
Pre-ree Cou	quisite rses		Pr	ogres Cours	sive es	Nil																	
Course Departr																							
Course Rationa			Learr	ning				Pro	grar	n Le	arni	ng O	utco	omes	; (PL	0)							
CLR-1 :	To understan	d PDEs ar	nd will be a	able to study abo	out its properties	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	To relate the	concepts of	of parabola	a, elliptic, and h	yperbola																		
CLR-3 :	Address cond	epts relate	ed to heat	equations																			
CLR-4 :	To understan	d concept	s of heat a	and wave equati	ons							h			lity								
CLR-5 :	To learn the o	concepts o	of Laplace	transform and p	roperties.	loom)	(%) X:	rt (%)	ge		nent	esearc			tainabi		Vork		nce				
CLR-6 :	To relate the	concepts o	of dimensi	on of a Fourier t	ansform to PDEs	king (E	oficienc	ainmer	iowled	Ilysis	velopn	sign, R	Usage	ilture	& Sus		Team ∖	ion	& Final	arning			
						f Thin	ed Pro	ed Att	ic Kn	n Ana	& De	s, De	Tool	& Cu	ment		lal & -	Inicat	Mgt.	lg Le			<i>с</i>
Course Outcom	Learning nes (CLO):	At the end	d of this co	ourse, learners w	ill be able to:	Level o	Expecte	Expecte	Scientif	Probler	Design	Analysi	Moderr	Society	Enviror	Ethics	Individu	Comm	Project	Life Lor	OS4	PSO-2	PSO-
CLO-1 :	Recognize th	e mathem	atical idea	as of PDEs		3	85	80	н	н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO-2 :	Link the fund	amental co	oncepts of	PDEs		3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO-3 :	Explain the si	Es	3	85	80	н	Н	-		-	-	-	-	М	-	-	Н	-	-	-			
CLO-4 :	Analyze cons	equences	of Laplace	e Transform		3	85	80	Н	Н	Н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO-5 :	Learn about	structure o	f Laplace I	between ODE ar	nd PDEs	3	85	80	М	н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO-6 :	LO-6 Know the fundamental concepts in PDEs such as heat, wave, Laplace ar Fourier transform.							80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-

Duration (hour)		Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module-V (18)
6.1	SLO- 1	Formation of partial differential equation by eliminating arbitrary constants	Classification of PDEs	Introduction to heat equation	Introduction to Laplace transform	Introduction to Fourier transform methods
5-1	SLO- 2	Formation of partial differential equation by eliminating arbitrary constants	Classification of PDEs	Solution of one dimensional heat equation	Introduction to Laplace transform	Fourier Integral Representations
6.0	SLO- 1	Formation of partial differential equation by eliminating arbitrary functions	Types of PDEs	Solution of one dimensional heat equation	Transform of Some Elementary Functions	Fourier Integral Representations
5-2	SLO- 2	Formation of partial differential equation by eliminating arbitrary functions	Types of PDEs	Boundary conditions	Transform of Some Elementary Functions	Fourier Integral Theorem
6.2	SLO- 1	Solution of standard types of first order equations	General formula for all types of PDEs	One dimensional heat equation and its possible solutions	Properties of Laplace Transform	Fourier Integral Theorem
5-3	SLO- 2	Solution of standard types of first order equations	General formula for all types of PDEs	One dimensional heat equation and its possible solutions	Properties of Laplace Transform	Sine and Cosine Integral Representations
64	SLO- 1	Introduction to Cauchy Problems	General formula for all types of PDEs	Steady state conditions and zero boundary conditions- related problems	Transform of a Periodic Function	Sine and Cosine Integral Representations
3-4	SLO- 2	Cauchy Problems	Parabolic type	Steady state conditions and zero boundary conditions- related problems	Transform of a Periodic Function	Fourier Transform Pairs
S-5	SLO- 1	Solving Types Non- Linear PDE	Parabolic type	Steady state conditions and Non- zero boundary	Transform of Error Function	Fourier Transform Pairs

				conditions related		
		Solvina Types Non-		Steady state	Transform of Error Function	
	SLO-	Linear PDE	Dearballs (and another sec	conditions and Non-		
	2		Parabolic type problems	zero boundary conditions related		I ransform of Elementary Functions
				problems		
S-6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
	SLO-	Type 1 F(p,q)=0	Elliptic type	Solving one	Transform of Bessel's	Transform of Elementary Eurotiana
0.7	1			equation	FUNCTION	Transion of Elementary Functions
3-1	SLO-	Type 1 F(p,q)=0	Elliptic type	Solving one	Transform of Bessel's	Properties of Fourier Trasnform
	2			equation	Function	
	SLO-	Type 2 F(x,p,q) =0;	Elliptic type problems	Method of	Transform of Dirac Delta	
	1			separation of variables	Function	Properties of Fourier Transform
S-8	SLO-	Type 2 F(x,p,q) =0	Elliptic type problems	Method of	Transform of Dirac Delta	Convolution Theorem (Faltung
	2			separation of variables	Function	Theorem)
	90	Type 3 F(y,p,q) =0;	Hyperbolic type	One dimensional	Inverse Transform	Convolution Theorem (Faltung
	1			Wave Equation and		Theorem)
S-9	0.0	Type 3 F(y,p,q) =0;		One dimensional	Inverse Transform	Parseval's Relation
	2 SLO-		Hyperbolic type problems	Wave Equation and		
		Type 4 F(z.p.g) =0	Hyperbolic type problems	Its possible solutions	Convolution Theorem	
	SLO-		Alson Alson and	value Problems with	(Faltung Theorem)	Parseval's Relation
S-10	1			zero velocity – related problems		
		Type 4 F(z,p,q) =0	Solving homogeneous PDEs	Initial and Boundary	Convolution Theorem	
	SLO- 2			value Problems with zero velocity –	(Faltung Theorem)	Transform of Dirac Delta Function
	_			related problems		
		Type 5 F(x,p) =F(y,q);	Basic definition of	Initial and Boundary	Transform of Unit Step	Transform of Dirac Delta Function
	SLO-		nomogeneous i BEs	Nonzero		
				velocityrelated		
S-11		Type 5 F(x,p) =F(y,q);	Basic definition of	Initial and Boundary	Transform of Unit Step	Multiple Fourier Transforms
	SLO-		homogeneous PDEs	value Problems with	Function	
	2			velocityrelated		
	910	Tutorial Sossion	Tutorial Soccion	problems	Tutorial Socion	Tutorial Soccion
C 12	1					
0-12	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0.40	SLO-	Type 6 Clauirts	Basic property for	D-Alembert's solution	Complex Inversion Formula	Multiple Fourier Transforms
5-13	I SLO-	Equations Type 6 Clauirts	Basic property for	D-Alembert's solution	(Mellin-Fourier Integral) Complex Inversion Formula	
	2	Equations	complementary function	of heat equations	(Mellin-Fourier Integral)	Finite Fourier Transforms
	SLO- 1	Solve problems Type 1	Basic property for particular integral	D-Alembert's solution of heat equations	Solution of Partial Differential Equations	Finite Fourier Transforms
S-14	SI O-	Solve problems Type 2	Basic property for particular	D-Alembert's	Solution of Partial	
	2		integral	solution of wave	Differential Equations	Finite Sine Transform
	SLO-	Solve problems Type 3	Solving Non- homogeneous	D-Alembert's solution	Solution of Diffusion	Finite Sine Transform
S-15	1		linear PDEs.	of wave equations	Equation	
	2 2	Solve problems Type 4	homogeneous PDEs	D-Alembert's solution	Equation	Finite Cosine Transform
0.16	SLO- 1	Solve problems Type 5	Basic property for complementary function	D-Alembert's solution	Miscellaneous Examples	Solution of Laplace Equation
3-10	SLO- 2	Solve problems Type 6	Basic property for particular integral	D-Alembert's solution	Miscellaneous Examples	Solution of Laplace Equation
0.1-	SLO- 1	Applications of basic PDEs	Applications of homogeneous PDEs	Applications of heat equations	Applications of Laplace transforms	Applications of Fourier transform methods
S-17	SLO- 2	Applications of basic PDEs	Applications of Non- homogeneous PDEs	Applications of wave equations	Applications of Laplace transforms	Applications of Fourier transform methods
S-18	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5.0	1					

	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
Learning Resourc	1. 2. ses 3.	T.Amarnath, An Eleme Narosa Publications, 1 Sankara Rao, Introduc Hall. I. P. Stavroulakis and introduction with ma Singapore, 1999.	entary Course in Partial Differe Ist Edition. ction to Partial Differential Equ S. A.Tersian, Partial differentia thematica and maple, worl	ntial Equations, 4. lations, Printice 5. ll equations- an d - Scientific, 6.	I. N. Sneddon, Elements McGraw-Hill, 1998. L. C. Evans, Partial Differ Mathematical Society, 20 W. E. Williams, Partial dif Oxford, 1980	of Partial Differential Equations, ential Equations, American 10. ferential equations, Clarendon Press,

Learnin	Learning Assessment													
	<b>.</b>		Contin	uous Lea	arning As	sessmer	)	Final Examination (50%) weighters)						
	Bloom's	CLA –	· 1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50 % weightage)				
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice			
Loval 1	Remember	400/		200/		200/		200/		200/				
Level I	Understand	40%	-	30%	-	30%	-	30%	-	30%	-			
Lovel 2	Apply	40%		10%		10%		10%		10%				
Level 2	Analyze	40 %	-	40%	-	40%	-	40%	-	40 %	-			
Loval 3	Evaluate	20%		30%		30%		30%		30%				
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30%	-			
Total         100 %         100 %         100 %         100 %														

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Course Code	UMA20D06T	. Course Name		A	STRON	DMY	(	Cou Cate	irse gory	E		Discipline Specific Elective Course						L 5	T 1	P 0	C 6			
Pre- requis Cours	- lite Nil lies			Pr (	ogres Cours	ssive ses	Nil																	
Course Departr	Offering ment	Math	ematics			Data Book / Codes/Standards																		
Course Rationa	Learning ale (CLR):	The	purpose o	f learning thi	is course	is to:			Lear	ning				Pro	grar	n Le	arni	ng C	)utco	mes	۶ (PL	.0)		
CLR-1 :	To understanc properties	l Celestia	l Mechanic	s and will be	e able to	study about its	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	To relate the c	concepts o	of Spherica	al Astronomy	/																			
CLR-3	Address conce	epts relate	ed to Photo	ometric Con	cepts and	d Magnitudes	1																	
CLR-4	To understand	l concepts	s of Radia	tion Mechar	nisms								_			ty								
CLR-5	To learn the c	oncepts o	f The Sola	r System an	id proper	ties.	(moo	(%)	(%):	0		ent	search			ainabili		ork		e				
CLR-6 :	To relate the c	concepts of	of dimensio	on of a Sphe	erical Astr	ronomy	inking (BI	Proficiency	Attainment		nalysis	evelopme	lesign, Re	ol Usage	Culture	nt & Susta		k Team W	ation	t. & Finan	earning			
Course Outcorr	Learning nes (CLO):	At the end	d of this co	urse, learne	rs will be	able to:	Level of Th	Expected F	Expected A	Scientific 1	Problem A	Design & D	Analysis, D	Modem To	Society & (	Environme	Ethics	Individual 8	Communic	Project Mg	Life Long L	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Recognize the	mathema	atical idea	is of Astrono	omy		3	85	80	н	н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO-2	Link the funda	mental co	oncepts of	Astronomy			3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO-3	Explain the significance of the classification of Astronomy						3	85	80	н	н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO-4 Analyze consequences of Spherical Astronomy							3	85	80	н	н	Н	М	-	-	-	-	М	1	-	Н	-	-	-
CLO-5	Learn about st Magnitudes	tructure of	f Astronom	ny between F	Photomet	tric Concepts and	3	85	80	М	н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO-6 Know the fundamental concepts in Astronomy such as Solar System a properties.							3	85	80	М	н	-	-	-	-	-	-	М	-	-	н	-	-	-

Dura (ho	ation ur)	Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module-V (18)
C 1	SLO- 1	Introduction to Celestial Mechanics	Introduction to Spherical Astronomy	Introduction to Photometric Concepts and Magnitudes	Introduction to Radiation Mechanisms	Introduction to The Solar System
5-1	SLO- 2	Introduction to Celestial Mechanics	Spherical Trigonometry	Introduction to Photometric Concepts and Magnitudes	Introduction to Radiation Mechanisms	Introduction to The Solar System
<u> </u>	SLO- 1	Equations of Motion	Spherical Trigonometry	Intensity	Radiation of Atoms	Planetary Configurations
5-2	SLO- 2	Equations of Motion	The Earth	Intensity	Radiation of Atoms	Planetary Configurations
0.2	SLO- 1	Solution of the Equation of Motion	The Earth	Flux Density	Molecules	Orbit of the Earth
5-3	SLO- 2	Solution of the Equation of Motion	The Celestial Sphere	Flux Density	Molecules	Orbit of the Earth
<u> </u>	SLO- 1	Equation of the Orbit and Kepler's First Law	The Celestial Sphere	Luminosity	The Hydrogen Atom	Visibility of the Sun
5-4	SLO- 2	Equation of the Orbit and Kepler's First Law	The Horizontal System	Luminosity	The Hydrogen Atom	Visibility of the Sun
0.5	SLO- 1	Orbital Elements	The Horizontal System	Apparent Magnitudes	Line Profiles	The Orbit of theMoon
5-5	SLO- 2	Orbital Elements	The Equatorial System	Apparent Magnitudes	Line Profiles	The Orbit of theMoon
0.0	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0.7	SLO- 1	Kepler's Second Law	The Equatorial System	Magnitude Systems	Quantum Numbers	Eclipses
5-1	SLO- 2	Kepler's Second Law	Rising and Setting Times	Magnitude Systems	Quantum Numbers	Eclipses

	SLO- 1	Kepler's Third Law	Rising and Setting Times	Absolute Magnitudes	Selection Rules	Occultations
5-8	SLO- 2	Kepler's Third Law	The Ecliptic System	Absolute Magnitudes	Selection Rules	Occultations
	SLO- 1	Systems of Several Bodies	The Ecliptic System	Extinction	Population Numbers	The Structure
S-9	SLO- 2	Systems of Several Bodies	The Galactic Coordinates	Extinction	Population Numbers	The Structure
S-10	SLO- 1	Orbit Determination	The Galactic Coordinates	Optical Thickness	Molecular Spectra	Surfaces of Planets
	SLO- 2	Orbit Determination	Perturbations of Coordinates	Optical Thickness	Molecular Spectra	Surfaces of Planets
0.44	SLO- 1	Position in the Orbit	Perturbations of Coordinates	Examples	Continuous Spectra	Atmospheres
5-11	SLO- 2	Position in the Orbit	Perturbations of Coordinates	Examples	Continuous Spectra	Atmospheres
0.10	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Escape Velocity	Positional Astronomy	Intensity Photometric Concepts	Blackbody Radiation	Magnetospheres
-	SLO- 2	Escape Velocity	Positional Astronomy	Intensity Photometric Concepts	Blackbody Radiation	Magnetospheres
0.44	SLO- 1	Virial Theorem	Constellations	Flux Density Photometric Concepts	Temperatures	Albedos
S-14	SLO- 2	Virial Theorem	Constellations	Flux Density Photometric Concepts	Temperatures	Albedos
	SLO- 1	The Jeans Limit	Star Catalogues and Maps	Luminosity Photometric Concepts	Other Radiation Mechanisms	Photometry
S-15	SLO- 2	The Jeans Limit	Star Catalogues and Maps	Luminosity Photometric Concepts	Other Radiation Mechanisms	Photometry
S-16	SLO- 1	Examples	Calendars	Extinction Photometric Concepts	Radiative Transfer	Polarimetry
	SLO- 2	Examples	Examples	Extinction Photometric Concept	Radiative Transfer	Polarimetry
0.47	SLO- 1	Applications of Celestial Mechanics	Applications of Spherical Trigonometry	Applications of Photometric Concepts and Magnitudes	Applications of Radiation Mechanisms	Applications of The Solar System
5-17	SLO- 2	Applications of Celestial Mechanics	Applications of Spherical Trigonometry	Applications of Photometric Concepts and Magnitudes	Applications of Radiation Mechanisms	Applications of The Solar System
	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

1. Learning Resources 2.

Hannu Karttunen, Fundamental Astronomy, Content Technologies Publications, 2013. V.Thiruvenkatacharya, A text book of Astronomy, Schand & Co. Pvt. Ltd., 1972.

S. Kumaravelu and Susheela Kumaravelu, Astronomy, SKV Publishers, Nagarkoil, 2004.

Learning Assessment															
	Diagonia		Continu	uous Lea	arning Ass	sessmen	it (50% we	eightage)		Final Examination (50% weightage)					
	BIOOM'S	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50 % weightage)					
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Loval 1	Remember	100/		200/		200/		200/		200/					
Lever	Understand	40%	-	30%	-	30%	-	30%	-	30%	-				
Lovel 2	Apply	100/	6 -	100/		100/		100/		100/					
Leverz	Analyze	40%	-	40%	-	40%	-	40 %	-	40%	-				
Loval 2	Evaluate	200/		200/		200/		200/		200/					
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30%	-				
	Total	100 % 100 % 100 % 100 %							6						

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanvasiraiu, IIT Madras.	Dr. A. Govindarajan, SRMIST
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	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. S. Balamuralitharan, SRMIST

Course		Course		Course	-		L	Т	Ρ	С
Code	UCY20A03J	Name	ALLIED CHEMISTRY	Category	G	Generic Elective	4	0	4	6

Pr requ	Pre- requisite N/L Co-requisite Courses						site <sub>N/L</sub> Pro							ogres ours	sive es	e <sub>NIL</sub>							
Course Course Depart	rses e Offer tment	ing	Chemistry				Dat Coo	a Bo les/	ook / Standa	rds			NIL										
Course Rationa	e Learn ale (CL	ing The purp R): to:	ose of learning this	course is	L	earnii	ng					F	Progra	am Le	earnir	ng Ou	tcom	es (Pl	LO)				
CLR-1	Make Bondir	students unders	f Chemical	1	2	3		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
CLR-2 CLR-3 CLR-3 CLR-4 CLR-5 Course Outcon	Provid hydroc Make deterg Under Study E Learn nes (Cl	e basic knowle gen, silicon and a ware of the lents stand the basic p the concepts in ing At the en LO): be able to	dge about the ch other metals fuels, fertilizers principles of chemic electrochemistry d of this course, lea	and other cal kinetics arners will	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)		Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modem Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO- 1:	Gain organ	knowledge on ic chemistry.	the basic funda	amentals in	2	2	75		Н	Н	Н	Н	-	-	-	-	-	-	-	-	Н	-	-
CLO- 2 :	Acqui reacti	ire knowledge ons.	about hydrocarbor	n and their	2	2	80		-	-	Н	-	Н	-	-	-	-	-	-	-	Н	-	-
CLO- 3 :	Promo	ote the importance	etals.	2	2	70		Н	Н	-	-		-	-	-	-	-	-	-	-	М	-	
CLO- 4 :	CLO- Understand the facts in chemical kinetics 4: photochemistry.						70		Н	Н	-	Н	Н	Н	-	-	-	-	-	-	Н	М	-
CLO- Understand the basic concepts in industrial 5 : chemistry					2	2	80		Н	-	Н	-	Н	-	-	-	-	-	-	-	Н	-	-
CLO- 6 :	CLO- Acquire knowledge in the principles of electrochemistry					2	75		Н	-	-	-	-	-	-	-	-	-	-	-	Н	М	-

		Learning Module	Learning Module	Learning Module	Learning Module	Learning Module
			2	3	4	5
Dura (ho	ation our)	24	24	24	24	24
S-1	SLO- 1	Introduction of Hybridisation and Isomerism: Hybridisation - sp, sp <sup>2</sup> and sp <sup>3</sup>	Chemical Kinetics:Rate of reaction	Gobar gas and natural gas	Chelation	Electrochemistry: Faradays laws of
	SLO- 2	Bond length- bond angle- dipole moment	order- molecularity		Industrial applications	electrolysis
S-2	SLO- 1	inductive effect- mesomeric effect and hyperconjucation	first order rate law and simple problems	Fertilizers –NPK and mixed	Industrial Chemistry: Hardness of water – Temporary and permanent hardness	Specific conductance, equivalent conductance
	SLO- 2	Isomerism- geometrical and optical isomerism	Half-life period of first order reaction	soaps and detergents.	disadvantages of hard water	Cell constant
	SLO- 1	optical activity- asymmetry- dissymmetry	pseudo first order reaction			Arrhenius theory of electrolytic dissociation
S-3	SLO- 2	elements of symmetry- R, S notations.	zero and second order reactions	Carbonydrates, Benzene and Heterocyclic Compounds:Classification of carbohydrates	Boiler scales and sludges	Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution
S-4	SLO- 1		Estimation of FAS using	Fetimation of Zn/Ma	Estimation of K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> using decinormal solution	Determination of Molecular Weight of a
S-8	SLO- 2		standard oxalic acid		thiosulphatesolution	Polymer
	SLO- 1	Hydrocarbons: Methods of preparation of alkanes	Arrhenius and collision	Properties and uses of glucose and fructose	Softening of hard water – Zeolite process	Ostwald"s dilution law
5-9	SLO- 2	Properties - Reactions	theories	Mutarotation	demineralization process	Kohlrausch law of independent migration of ions

C 10	SLO- 1	Free radical mechanism of halogention of alkanes	Arrhenius and collision theories	Chemistry of benzene	reverse osmosis	Nemst equation	
5-10	SLO- 2	Methods of preparation of alkenes	Arrhenius and collision theories	Preparation	Purification of water for domestic use	Standard electrode	
0.11	SLO- 1	Stereochemistry of dehydrohalogenation (E1, E2, E1CB mechanism)	Industrial	Mechanism of electrophilic substitution reactions	use of Chlorine	(reduction) potential and its application to different kinds of half-	
5-11	SLO- 2	Properties of alkenes, Electrophilic and nucleophilic addition mechanisms.	gases	Mechanism of electrophilic substitution reactions	Ozone and UV light	cells.	
S-12 TO	SLO- 1	Estimation of NaOH using standard	Estimation of FAS using	Estimation of ascorbic acid	Estimation of Copper using decinormal solution of Potassium dichromate	Conductometric Titrations- II (	
S-15	SLO- 2	sodium carbonate	dichromate		solution	KCIVS AGNO3)	
S-16 TO S-20	SLO- 1 SLO- 2	Estimation of HCl using standard oxalic acid	Estimation of KMnO₄using standard potassium dichromate	Estimation of phenol / aniline	Estimation of Nickel using decinormal solution of EDTA	Potentiometric Titration (Redox Titrations)	
S-21	SLO- 1	Chemistry of Hydrogen, Silicon and Metals: Occurrence-		Heterocyclic compounds– Preparation of pyrrole and pyridine.	Phase Rule and Adsorption: Phase rule-	Electromotive force o	
0-21	SLO- 2	extraction of iron- cobalt- nickel and copper	Water gas	Propertiesofpyrrole and pyridine.	Definition of terms involved	measurement	
0.00	SLO- 1	chemical properties of iron-		Coordination Chemistry:Nomenclature and	phase diagram of H <sub>2</sub> O	Electromotive force o a cell and its measurement Nernst equation; Standard electrode (reduction) potential Nernst equation	
S-22	SLO- 2	cobalt- nickel and copper		isomerism of coordination compounds	phase diagram of Pb-Ag	(reduction) potential	
6.73	SLO- 1	atomic hydrogen and isotopes of hydrogen	producor das	EAN rule	Adsorption - Langmuir	Nernst equation	
5-25	SLO- 2	Preparation and structure of borazole		VB Theory	adsorption isotherms	kinds of half-cells	
	SLO- 1	Preparation and structure of borazole		Crystal field theories of	Principles of	Application of EMF measurements in determining (i) free	
S-24	SLO- 2	SiO <sub>2</sub> , SiC and SiCl₄	LPG gas	octahedral, tetrahedral and square planar complexes	chromatography (Paper, TLC and column).	energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants	
Learni Resou	ng irces	<ol> <li>Theory</li> <li>R. Gopalan, Text Hyderabad, Univers</li> <li>R.T. Morrison an Chemistry, 7<sup>th</sup> editic</li> <li>B.R. Puri, L.R. Sha Chemistry, 35<sup>th</sup> editi 2013.</li> </ol>	t Book of Inorganic Chemis sities Press, (India), 2012. d R.N. Boyd, S. K. Bhatta on, Pearson India, 2011. arma and M.S. Pathania, Prind tion, New Delhi ShobanLalNag	stry, 2 <sup>nd</sup> edition, charjee, Organic ciples of Physical in Chand and Co, Practicals V.Venkat <i>Principles</i> and Sons B.S. Furr <i>Vogel's</i> edition, P	s eswaran, R.Veeraswamy, A s of Practical Chemistry, 2 <sup>n</sup> s, 1997. iiss, A.J. Hannaford, P.W. ( Text Book of Practical O. earson Education, 2005.	A.R.Kulandaivelu, <i>Basic</i> <sup>d</sup> edition, Sultan Chand G. Smith, A.R. Tatchell, <i>rganic Chemistry</i> , 5 <sup>th</sup>	

Learnin	g Assessment										
	Discusto		Continu	uous Lea	arning As	sessmer	Final Examination (50% weightage)				
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA –	3 (20%)	CLA –	CLA – 4 (10%)#		50% weightage)
	Remember	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	200/	150/	150/	150/	150/	150/	150/	150/	150/	150/
	Understand	20% 15%		15%	15%	15%	15%	15%	15%	15%	1376
Lovel 2	Apply	20%	20%	20%	20%	200%	20%	20%	20%	20%	20%
Level 2	Analyze	20 /0	2070	2070	2070	20 /0	20 /0	2070	20 /0	2070	2070
Lovel 3	Evaluate	10%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Level 3	Create	10 %	1576	15%	15%	15%	15%	15%	15%	1076	1376
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	0

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. SudarshanMahapatra, EncubeEthicals Pvt. Ltd,sudarshan.m@encubeethicals.com	1. Prof. G. Sekar, IIT Madras, gsekar@iitm.ac.in	1. Dr. S. Rajeswari, SRMIST
2. Dr. ShanmukhaprasadGopi, Dr. Reddy' s Laboratories, shanmukhaprasadg@drreddys.com	2. Prof. Vivek Polshettiwar, TIFR Mumbai, vivekpol@tifr.res.in	2. Dr. T.Pushpa Malini, SRMIST

Course Code	UMI20S01	L Course Name	My India Project	Course Category	S	Skill Enhancement course	L 0	т 0	P 0	C 1
Pre-requisite Courses	Nil	Co-requisit Courses	e Nil	Progressi Courses	ve	Nil				
Course Offeri Department	ng	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

Course Name

Mathematical Software- MATLAB

Course Category S

Skill Enhancement course

L T P C 0 0 4 2

Pre- requisite Courses	Nil		Co- requisite Courses	Nil			Progressiv Courses	e <sub>Nil</sub>
Course Offe Department	ering	Mathematics			Data Book / Codes/Standards			
Course Lear	rning		rning this co	ursa is ta	<b>)</b> .	دم ا	rning	Program Learning Outcomes (PLO)

Rationa	ale (CLR):	i ne purpose of learning this course is to:		earn	ng				Pro	gra	m Le	arni	ng C	JUICO	omes	s (PL	.0)			
CLR-1 :	Exploit the nun MATLAB	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
CLR-2 :	Employ various																			
CLR-3 :	Address the co	ncepts related to numerical techniques																		
CLR-4 :	Gain the know	edge on how to use MATLAB for scientific computations	(mo	(%)	(%)	lge	ots	siplines	Ð	_	ledge		a							
CLR-5 :	Identify the me	g (Blo	iency	ment (	nowled	Concep	ed Disc	wledge	lizatior	Know	бL	ret Dat	kills	g Skills	I Skills					
CLR-6 :	Utilize the basi problems and i	Thinkin	I Profic	l Attain	ental K	on of (	Relate	ral Kno	Specia	Utilize	Modelii	Interp	tive S	Solvin	iicatior	II Skills				
Course Outcom	Learning nes (CLO):	At the end of this course, learners will be able to:	Level of <sup>-</sup>	Expectec	Expectec	Fundame	Applicatio	Link with	Procedui	Skills in 9	Ability to	Skills in I	Analyze,	Investiga	Problem	Commun	Analytica	PSO -1	PSO-2	PSO-3
CLO-1 :	Remembering	the knowledge of numerical methods by adopting MATLAB	2	75	60	н	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Perceive the in problems	nportance of MATLAB and its usage to solve mathematical	2	80	70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Understand the	e concept of various numerical techniques	2	70	65	н	-	-		-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Basic computa	2	70	70	н	-	Н	Η	Η	-	-	-	-	-	-	-	-	-	-	
CLO-5 :	Understand the	2	80	70	-	Н	-	Η	-	-	-	-	-	-	-	-	-	-	-	
CLO-6 :	Utilize concept level of percep	2	75	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Durat	ion (hour)	12	12	12	12	12
S-1	SLO-1	Basic Exercises in MATLAB	Solution of algebraic and transcendental equations: Bisection method	Solution of Linear Equations- direct methods: Matrix inversion method	Least squares line and curve fitting	Solution of Ordinary Differential Equations using built-in ODE solver
S-4	SLO-2	Basic Exercises in MATLAB	Solution of algebraic and transcendental equations: Bisection method	Solution of Linear Equations- direct methods: Matrix inversion method.	Least squares line and curve fitting	Solution of Ordinary Differential Equations using built-in ODE solver
S-5	SLO-1	Using MATLAB as a calculator- Creating vectors and Matrices	Solution of algebraic and transcendental equations: Regula-Falsi method	Solution of Linear Equations- direct methods: Gaussian Elimination method	Interpolation	Solution of Ordinary Differential Equations using Euler and R-K Methods
S-8	SLO-2	Using MATLAB as a calculator- Creating vectors and Matrices	Solution of algebraic and transcendental equations: Regula-Falsi method	Solution of Linear Equations- direct methods: Gaussian Elimination method.	Interpolation	Solution of Ordinary Differential Equations using Euler and R-K Methods
S-9	SLO-1	Generating Fibonacci Sequence using if- condition, for loop and while loop	Solution of algebraic and transcendental equations: Newton Raphson methods.	Solution of Linear Equations- direct methods: Gauss-Seidel method.	Constructing and plotting given polynomials and functions	Comparison of Euler, R-K Method and built-in ode solver
S-12	SLO-2	Generating Fibonacci Sequence using if- condition, for loop and while loop	Solution of algebraic and transcendental equations: Newton Raphson methods.	Solution of Linear Equations- direct methods: Gauss-Seidel method	Constructing and plotting given polynomials and functions	Comparison of Euler, R-K Method and built-in ode solver

Learning Resources	1. 2.	Tobin A. Driscoll, Learning MATLAB, Society for Industrial and Applied Mathematics (SIAM), 1969. Andrew Knight, Basics of MATLAB and Beyond, CHAPMAN & HALL/CRC, 2000.	3.	Brian R. Hunt Ronald L. Lipsman Jonathan M. Rosenberg with Kevin R. Coombes, John E. Osborn, and Garrett J. Stuck, A Guide to MATLAB for Beginners and Experienced Users, Cambridge University Press, 2001.
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Learning Assessment												
	Bloom's Level of Thinking		Continu	uous Lea	arning As	sessmer	Final Examination (	E0% waightaga)				
		CLA – 1 (10%) C			2 (10%)	CLA –	CLA – 3 (20%)		4 (10%)#	Final Examination (50% weightage)		
	Level of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	
Loval 1	Remember			400/	1	200/	_	30%		200/		200/
Levei i	Understand	-	40%		30%	-	30%	-	30%	-	30%	
Level 2	Apply		400/	1	40%		400/		40%		409/	
	Analyze	-	40%		40%	-	40%	-	40%	-	40%	

Level 3	Evaluate		20%		30%	-	30%		30%	_	200/
	Create	-	20 /0			-		-	30%	-	30%
	Total	10	0 %	10	0 %	10	0 %	10	00 %	100 %	6

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanvasiraju, IIT Madras.	Dr. A. Govindarajan, SRMIST
maheshwaranv@yahoo.com	sryedida@iitm.ac.in	Dr. V. Srinivasan, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. S. Athithan, SRMIST

Course Name

Mathematical Software-SCILAB

Course Category S

Skill Enhancement Course

L T P C 0 0 4 2

Pre- requisite Courses	Nil		Co- requisite Courses	Nil			Progressive Courses	Nil
Course Offe Department	ering	Mathematics			Data Book / Codes/Standards			
Course Lea	ming	The second second				]		

Rationa	ile (CLR):	The purpose of learning this course is to:	L	Learning Program Learning Outcomes (PLO)																
CLR-1 :	Exploit the nun Scilab	nerical manipulation towards scientific advancement using	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Employ various	s numerical methods in Scilab																		
CLR-3 :	Address the co	ncepts related to numerical techniques						les			ge									
CLR-4 :	Gain the know	edge on how to use Scilab for scientific computations	3loom)	cy (%)	nt (%)	/ledge	cepts	liscipli	dge	ion	lowled		Data		kills	ills				
CLR-5 :	Identify the me	thodology for applying computational methods in Scilab	king (E	oficiend	ainmei	l Know	of Con	ated D	nowle	cializat	ize Kn	eling	spret [	Skills	ving Sł	ion Sk	cills			
CLR-6 :	Utilize the basi problems and i	c mathematical principles applied in various scientific dentify appropriate solutions using Scilab	of Thin	ted Pro	ted Att	imenta	ation c	rith Rel	dural k	in Spe	to Util	in Mod	ze, Inte	igative	em Sol	nunicat	ical Sk	1	) -2	~
Course Outcom	Learning les (CLO):	At the end of this course, learners will be able to:	Level	Expec	Expec	Funda	Applic	Link v	Proce	Skills	Ability	Skills	Analy:	Invest	Proble	Comr	Analyt	- OS	PSC	PSO-S
CLO-1 :	Remembering	the knowledge of numerical methods by adopting Scilab	2	75	60	н	н	н	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Perceive the in problems	portance of Scilab and its usage to solve mathematical	2	80	70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Understand the	e concept of various numerical techniques	2	70	65	н	-	-		-	-	-	-	-	-	-	-	1	-	-
CLO-4 :	Basic computa	tions using the functions and variables of Scilab	2	70	70	н	-	Н	Η	Η	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Understand the	2	80	70	-	н	-	Н	-	-	-	-	-	-	-	-	-	-	-	
CLO-6 :	Utilize concept level of percep	s in mathematics for scientific advancements based on the tion	2	75	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Durat	ion (hour)	12	12	12	12	12
S-1	SLO-1	Basic Exercises in Scilab	Solution of algebraic and transcendental equations: Bisection method	Solution of Linear Equations-direct methods: Matrix inversion method	Least squares line and curve fitting	Solution of Ordinary Differential Equations using built-in ODE solver
s-4	SLO-2	Basic Exercises in Scilab	Solution of algebraic and transcendental equations: Bisection method	Solution of Linear Equations-direct methods: Matrix inversion method.	Least squares line and curve fitting	Solution of Ordinary Differential Equations using built-in ODE solver
S-5	SLO-1	Using Scilab as a calculator- Creating vectors and Matrices	Solution of algebraic and transcendental equations: Regula-Falsi method	Solution of Linear Equations-direct methods: Gaussian Elimination method	Interpolation	Solution of Ordinary Differential Equations using Euler and R-K Methods
S-8	SLO-2	Using Scilab as a calculator- Creating vectors and Matrices	Solution of algebraic and transcendental equations: Regula-Falsi method	Solution of Linear Equations-direct methods: Gaussian Elimination method.	Interpolation	Solution of Ordinary Differential Equations using Euler and R-K Methods
S-9	SLO-1	Generating Fibonacci Sequence using if- condition, for loop and while loop	Solution of algebraic and transcendental equations: Newton Raphson methods.	Solution of Linear Equations-direct methods: Gauss-Seidel method.	Constructing and plotting given polynomials and functions	Comparison of Euler, R-K Method and built-in ode solver
S-12	SLO-2	Generating Fibonacci Sequence using if- condition, for loop and while loop	Solution of algebraic and transcendental equations: Newton Raphson methods.	Solution of Linear Equations-direct methods: Gauss-Seidel method	Constructing and plotting given polynomials and functions	Comparison of Euler, R-K Method and built-in ode solver

Learning Resources	1. 2. 3.	Eike Rietsch, An Introduction to Scilab from a Matlab User's Point of View Version 2.6-1.0, 2001, 2002. Nino Boccara - Modeling and Simulation in Scilab_Scicos with ScicosLab 4.4-Springer (2005) (Graduate Texts in Contemporary Physics) Hema Ramachandran, Achuthsankar S. Nair, SCILAB (A free Software to MATLAB), S. Chand & Company Ltd., First Edition, 2012.	<ol> <li>Steven C.Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata Major Core Graw Hill Publishing Company Ltd., 2007.</li> <li>Karan Arora, Kush Garg and Santosh Kumar, Scilab Textbook Companion for Higher Engineering Mathematics by B. S. Grewal, 2016.</li> </ol>
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	Learning	g Assessment															
		Diasmis		Contin	uous Lea	arning As	sessmer	nt (50% we	eightage)		Final Examination (	50% woightaga)					
		Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (50 % weightage)						
		Lover of finning	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice					
I	Level 1	Remember	-	40%		30%	-	30%	-	30%	-	30%					

	Understand										
	Apply		100/		100/		400/		100/		400/
Level 2	Analyze	-	40%		40%	-	40%	-	40%	-	40%
Loval 2	Evaluate		200/		200/		200/		200/		200/
Level 3	Create	-	20%		30%	-	30%	-	30%	-	30%
	Total	10	0 %	10	0 %	10	0 %	10	00 %	100 %	6

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof. Y.V.S.S. Sanyasiraju, IIT Madras,	Dr. A. Govindarajan, SRMIST
maheshwaranv@yahoo.com	sryedida@iitm.ac.in	Dr. V. Srinivasan, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. S. Athithan, SRMIST

Course		Course		Course	Jeevan		L	Т	Ρ	С
Code	UJK20401T	Name	Professional Skills	Category	Kaushal- JK	Life Skill Course	2	0	0	2

Pre- requisite Courses	Nil	Co- requisite Courses	Nil		Progressive Courses	Nil
Course Of Departme	ffering nt	Career Development	Centre	Data Book / Codes/Standards	-	

Cours Ratio	se Learning nale (CLR):	The purpose of learning this course is to:	Le	arni	ing				Pro	gran	n Le	arni	ng C	Dutc	ome	s (P				
CLR- 1:	expose student	s to the requirements of job market	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	develop resum	e building practice																		
CLR- 3 :	increase efficie	ncy in speaking during group discussions																		1
CLR- 4 :	prepare studen	ts for job interviews	ε	(%	(9)	e	s	olines			edge									
CLR- 5 :	instill confidenc	e in students and develop skills necessary to face audience	g (Bloo	ency ( <sup>c</sup>	nent (%	owledg	oncept	d Discip	vledge	zation	Knowle	6	et Data	lls	Skills	Skills			navior	bu
CLR- 6 :	develop speaki	ng and presentation skills in students	hinking	Profici	Attainr	ntal Kn	n of C	Related	al Knov	peciali	Jtilize	lodelinę	nterpre	ive Ski	Solving	cation	Skills		nal Beh	Leamin
			of T	ted	ted	me	atio	ith I	qura	n S	to (	ΝN	ze, l	igat	m S	ini	ical	kills	sio	bug
Cours Outco	se Learning omes (CLO):	At the end of this course, learners will be able to:	Level	Expec	Expec	Funda	Applic	Link v	Proce	Skills i	Ability	Skills i	Analyz	Invest	Proble	Comr	Analyt	ICT SI	Profes	Life Lo
CLO- 1:	understand the	importance of resume preparation and build resume	3	80	70	М	М	L	L	М	Η		1	-	М	Н	L	Н	Н	Η
CLO- 2 :	acquire group o	liscussion skills	3	85	75	М	М	L	L	М	Η	-	-	-	М	Н	L	Н	Н	Η
CLO- 3 :	face interviews	confidently	3	85	80	М	М	L	L	М	Η	-	-	-	М	Н	L	Н	Н	Η
CLO- 4 :	Ask appropriate	questions during an interview	3	85	80	М	М	L	L	М	Η	-	-	-	М	Η	L	Н	Η	Η
CLO- 5 :	understand va projects	rious types of presentation and use presentation skills in	3	85	80	М	М	L	L	М	Η	-	-	-	М	Η	L	Η	Η	Η
CLO- 6 :	build confidenc	fidence during any presentation 3 85 80 M M L L M H M H L I						Н	Н	Η										

[	)uration (hour)	6	6	6	6	6
	SLO- 1	Introduction of resume and its importance	Meaning and methods of group discussion	Meaning and types of interview (face to face, telephonic, video)	Types - Informative, Instructional, Arousing, Persuasive, Decision-making	PowerPoint presentation– body language and stage etiquettes
S	1 SLO- 2	Difference between a CV, Resume and Bio Data	Procedure of group discussion	Dress code, background research	Structure of a presentation – Introduction of the event, Introducing the speaker, vote of thanks	PowerPoint presentation– body language and stage etiquettes
s	SLO- 1	Essential components of a good resume, common errors people make while preparing a resume	Group discussion – simulation	STAR Technique (situation, task, approach and response) for facing an interview	Working with audience – ice- breaking, Creating a 'Plan B',	PowerPoint presentation– practice session
	SLO- 2	Resume building format	Group discussion – common errors	Interview procedure (opening, listening skills, closure, asking questions)	Getting the audience in the mood, working with emotions,	PowerPoint presentation– practice session
	SLO- 1	Resume building using templates	Group discussion – types – Topic based	Important questions generally asked in an interview	Improvisation and unprepared presentations, man-woman view, feedback – appreciation and critique	PowerPoint presentation– practice session
3	SLO- 2	Resume building using templates	Group discussion – types – Case study based	Important questions generally asked in an interview	Improvisation and unprepared presentations, man-woman view, feedback – appreciation and critique	PowerPoint presentation– practice session
•	SLO- 1	Resume building activity	Group discussion – practice session- Topic based	Mock interview – face to face	Power point presentation, skit, drama, dance, mime, short films and documentary – Dos and Don'ts	PowerPoint presentation– practice session
3	SLO- 2	Resume building activity - Feedback	Group discussion - Feedback	Mock interview- Feedback	Power point presentation, skit, drama, dance, mime, short films and documentary – Dos and Don'ts	PowerPoint presentation– practice session
s	5 SLO- 1	Video resume – Tips and tricks	Group discussion – practice session- Topic based	Mock interview - face to face	PowerPoint presentation – content preparation	PowerPoint presentation– practice session

	SLO- 2	Video resur Don'ts	ne – Do's and	Group discussion - Feedback	Mock intervi	ew - Feedback	PowerPoint presentation– logical arrangement of content	PowerPoint presentation- practice session
5.6	SLO- 1	Video resurr	ne – Templates	Group discussion – practice session- Case study based	Mock intervi	ew - face to face	PowerPoint presentation– using internet source, citations, bibliography	PowerPoint presentation- practice session
3-0	SLO- 2	Video resurr	ne – Templates	Group discussion - Feedback	Mock intervi	ew- Feedback	PowerPoint presentation– using internet source, citations, bibliography	PowerPoint presentation– practice session
		1.	Scott Bennett,	The Elements of Resume Style	: Essential			
			Rules for Writin	g Resumes and Cover Letters	That Work,	4. Paul Newton,	; e-book	
1.00	rnina		AMACOM, 201	4		5.Eric Garner, A	A-Z of Presentation, Eric Garne	er and Ventus Publishing ApS,
Red	niiny	2.	David John, Tri	cks and Techniques of Group I	Discussions,	2012, bookboon	.com	
	Jour 000	, 	Arihant, 2012					
		3.	Singh O.P., Art	of Effective Communication in	Group			
		Discussion a		Interview, S Chand & Compar	ny, 2014			

## Learning Assessment

			Continuous Learning Assessment (100% weightage)									
Level	Bloom's Level of Thinking	CLA-1 (20%)	CLA-2 (20%)	CLA-3 (30%)#	CLA-4 (30%) ##							
		Theory	Theory	Theory	Theory							
Loval 1	Remember	100/	109/	200/	150/							
Level 1	Understand	10%	10%	30%	13%							
1	Apply	500/	F.00/	400/	500/							
Level 2	Analyze	50%	50%	40%	50%							
Laural D	Evaluate	400/	400/	200/	250/							
Level 3	Create	40%	40%	30%	30%							
	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
		1. Mr Priyanand, Assistant Professor, CDC, E&T, SRMIST
1. Ajay Zener, Director, Career Launcher	-	2. MS Sindhu Thomas, Head in charge, CDC, FSH, SRMIST
		3. Ms Mahalakshmi, Assistant Professor, CDC, FSH, SRMIST

Cours	e	4 - (	Course		A1				Cou	irse	~			D	<b>.</b>				_	_		L	T	Ρ	С
Code	UMA2050	11	Name		Alge	ebraic Sti	ructures	(	Cate	gory	C	Professional Core Course 5			1	0	6								
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Pre	)-				Co-	N CI			Pr	ogres	sive	N I I													
Cour	site inii ses				Courses	INII				Cours	es	INII													
Course	e Offering		Math	omatics		1	Data Book /																		
Depar	tment		Maun	ematics			Codes/Standards																		
Course	e Learning						• :					1 1			_										
Ration	ale (CLR):		The	purpose o	f learning th	is course	is to:			Learr	ning				Pro	grar	n Le	arni	ng C	)utcc	mes	s (PL	0)		
									1															<u> </u>	
0LR- 1:	To understar	d gro	oups an	d will be a	ble to study	about its	properties.	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	To understar	d the	e conce	ots of cose	ets, normal s	subgroup	s, and factor groups.																		
CLR- 3 :	R- To relate the concepts of homomorphism, isomorphism and automorphism.																								
CLR- 4 :	To understar	d coi	ncepts o	of Ring an	d ideals									Ч			ity								
CLR- 5 :	To learn the	conce	epts of f	ield and ir	ntegral doma	ain.		(mool	y (%)	t (%)	Ð		ent	esearc			ainabil		Vork		ce				
CLR- 6 :	Learn in deta	il abo	out poly	nomial ring	gs.			ting (B	ficienc	inmen	wledg	ysis	elopm	ign, Re	Jsage	ture	& Sust		eam V	u	Finar	rning			
								hin	P0 P	Atta	Кло	Anal	Dev	Des	00	S	ente		&Τ	catio	gt. 8	Lea			
Course	e Learning	At	the end	d of this co	ourse, learne	ers will be	e able to:	'el of T	pected	pected	entific	blem /	sign &	alysis,	dem T	ciety &	/ironm	ics	ividual	nmun	ject M	: Long	0 - 1	0 - 2	0 - 3
Oulco	nes (CLO).							Le	Щ	Ш	Sci	Рис	Ğ	An	Mo	So	БШ	문 표	pul	S	Б	Life	PS	PS	PS
CLO- 1:	Recognize th	e ma	athemati	ical object	s called gro	oups		3	85	80	Н	Н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO- 2 :	Link the fund	amer	ntal con	cepts of g	roups			3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO- 3 :	<ul> <li>Explain the significance of the notions of cosets, normal subgroups and facto groups</li> </ul>				3	85	80	Н	Н	-		-	-	-	-	М	-	-	Н	-	-	-			
CLO-	Analyze consequences of Lagrange's theorem				3	85	80	Н	н	Н	М	-	-	-	-	М		-	Н	-	-	-			

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 Analyze consequences of Lagrange's infectent
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 CLO Learn about structure preserving maps between groups and their
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 consequences
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 CLO Apply the fundamental concepts in ring theory such as ideals, quotient rings, 3
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 6 :
 integral domains and fields.
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Duro	tion					
(ho	ur)	18	18	18	18	18
C 1	SLO- 1	Group-Definition, examples.	Normal subgroups	Ring-Definition, examples.	Ideals-Definition, examples	Quotient rings-Definition, examples
3-1	SLO- 2	Group-Simple Properties.	Properties and problems based on normal subgroup	Ring-Simple Properties.	Ideals-Simple Properties.	Properties of quotient rings
S-2	SLO- 1	Properties based on Group.	Properties of cosets based on normal subgroup	Theorems and problems based on Ring.	Problems on ideals	Prime ideals, Principal ideals
	SLO- 2	Order of a Group	Properties of cosets based on normal subgroup	Special classes of rings	Theorems on ideals	Maximal ideals
	SLO- 1	Order of an element in a group	Simple groups	Homomorphism of rings	More theorems based on ideals.	Theorems based on prime ideals
S-3	SLO- 2	Theorems based on group	Properties based on simple groups	Theorems based on homomorphism of rings.	Sum of two ideals	Theorems based on principal ideals
C 4	SLO- 1	Subgroups	Quotient group	Quotient Ring- Definition, examples.	Product of two ideals	Theorems based on maximal ideals
3-4	SLO- 2	Properties of subgroups	Properties and problems based on Quotient group	Quotient Ring-Simple Properties.	Examples for left ideal but not a right ideal	Theorems based on maximal ideals
С Б	SLO- 1	Cyclic groups	Cauchy's theorem for finite abelian groups	Commutative rings	Examples for right ideal but not a left ideal	Relation between integral domain and field
3-3	SLO- 2	Properties of cyclic groups	Cauchy's theorem for finite abelian groups	Examples for commutative rings	Homomorphism of rings.	Relation between integral domain and field
S 6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
C 7	SLO- 1	Generators of a cyclic group	Centralizer of a group	Zero divisors	Properties of homomorphism of a ring	Euclidean rings
3-1	SLO- 2	Number of generators of a cyclic groups	Normalizer of a group	Examples of zero divisors.	More theorems based on homomorphism of rings	Properties of Euclidean rings
	SLO- 1	Cosets	Centre of a group	Integral domain	More theorems based on homomorphism of rings	Wilson theorem
S-8	SLO- 2	Partitioning of a group by Cosets	Properties for centralizer, Normalizer and centre of a group	Properties of integral domain	Isomorphism of rings	Fermat's theorem

[			<b>T-</b>		I · ·					
	SLO- 1	Lagrange's theorem	Product of two subgroups	Division ring	Theorems based on isomorphism of rings	Polynomial rings				
S-9	SLO- 2	Euler's phi function	Classification of subgroups of cyclic groups	Examples of division ring	Fundamental theorem of ring homomorphism	Properties of polynomial rings				
S-10	SLO- 1	Euler's theorem	Cycle notation for permutations	Field	First theorem of isomorphism	The division algorithm				
	SLO- 2	Euler's theorem	Properties of permutations	Field-simple properties	Embedding of rings	Problems based on division algorithm				
C 11	SLO- 1	Fermat's theorem	Even and odd permutations	Theorems based on field	Embedding of a ring into a ring with unity	Polynomial rings over rational field				
5-11	SLO- 2	Fermat's little theorem	Even and odd permutations	Theorems based on integral domain	Embedding of a ring into a ring with unity	Polynomial rings over rational field				
0.40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session				
S-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session				
S-13	SLO- 1	Practice problems for groups	Alternating groups	Subrings	Endomorphism of a rings	Gauss Lemma				
	SLO- 2	Practice problems for groups	Problems for alternating groups	Sum of two subrings	Embedding of a ring into a ring endomorphism	Eisenstein's criterion				
	SLO- 1	Practice problems for subgroups	Cayley's theorem	Theorems and problems based on subrings.	Practice problems for ideals	Problems based on Eisenstein's criterion				
S-14	SLO- 2	Practice problems for subgroups	Applications of Cayley's theorem	Centre of the ring	Practice problems for homomorphism of ideals	Euclidean Domain				
0.45	SLO- 1	Practice problems for cyclic groups	Group homomorphisms	Centre of a guaternion ring	Practice problems for homomorphism of ideals	Theorems based on Euclidean domain				
5-15	SLO- 2	Practice problems for cyclic groups	Properties of homomorphism	Characteristic of a ring	Comaximal ideals	Prime and irreducible elements				
S-16	SLO- 1	Permutation group	Group isomorphisms	Properties of characteristic of a ring	Properties of comaximal ideals	Principal ideal domain				
	SLO- 2	Problems for groups	Properties of isomorphisms	Symmetry Group- Simple Properties.	More on ideals	Theorem based on principal ideal domain				
C 17	SLO- 1	Quaternion groups.	First isomorphism theorems for groups	Product of two rings	More on ideals	Unique Factorization domain				
3-17	SLO- 2	Problems for quaternion groups	Second isomorphism theorems for groups	Product of two rings	More on ideals	Theorem based on unique factorization domain				
C 10	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session				
9-10	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session				

Learning Resources	1. 2. 3. 4.	I. N. Herstein (2006). Topics in Algebra (2nd edition). Wiley India. John B. Fraleigh (2007). A First Course in Abstract Algebra (7th edition). Pearson. Joseph A. Gallian (2017). Contemporary Abstract Algebra (9th edition). Cengage. N. S. Gopalakrishnan (1986). University Algebra, New Age	<ol> <li>P. B. Bhattacharya, S. K. Jain &amp; S. R. Nagpaul (2003). Basic Abstract Algebra (2<sup>nd</sup> edition). Cambridge University Press.</li> <li>David S. Dummit &amp; Richard M. Foote (2008). Abstract Algebra (2nd edition). Wiley.</li> <li>Thomas W. Hungerford (2004). Algebra (8th edition). Springer.</li> <li>Serge Lang (2002). Algebra (3rd edition). Springer-Verlag.</li> </ol>
		International Publishers.	

Learning	Learning Assessment														
	- ·		Contin	uous Lea	arning Ass	sessmer	nt (50% we	eightage		Final Examination (50% weightage)					
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50% weightage)					
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
	Remember	400/		200/		200/		200/		200/					
Level I	Understand	40% -		30%	-	30%	-	30%	-	30 %	-				
Lovel 2	Apply	10%		40%	_	40%	-	40%	-	40%					
Level Z	Analyze	40 /0	-	40 /0	-	40 /0	-	40 %	-	40 /0	-				
	Evaluate	200/		200/		200/		200/		200/					
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30 %	-				
	Total	10	0 %	10	0 %	10	0 %	100 %		100 %	0				

Course Designers				
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts		
Mr. V. Maheshwaran, Cognizant Technology Solutions maheshwaranv@yahoo.com	Prof. Y.V.S.S. Sanyasiraju, IIT Madras, sryedida@iitm.ac.in	Dr. A. Govindarajan, SRMIST Dr. K. Ganesan, SRMIST		
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. R. Perumal, SRMIST Dr. R. Arulprakasam, SRMIST		

Cours	se Code	UN	IA20502T	Course Na	me	Real Analysis			Сс	urse	Cat	egor	у	с	Pro	ofes	siona	al Co	ore C	Cours	se	L 1 5 1	Р 0	C 6
Pre- requisi Cours	ite Nil es			Co- requisite Courses	Nil			Pr (	ogres Cours	sive es	Nil													
Course Departn	Offering nent		Mathematics			Data Book / Codes/Standards																		
Course Rationa	Leaming le (CLR):		The purpose of	of learning thi	s cours	e is to:			Learr	ning				Pro	gran	n Le	arnir	ng O	utco	mes	; (PL	0)		
CLR-1 :	Exploit vari	ous nu er syste	umber systems i em	in detail and	establis	h the importance of	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Employ va	rious te	echniques for a	detail analysi	is of rea	al number system																		
CLR-3 :	Introduce t	he con	cept of metric s	pace and the	norm																			
CLR-4 :	Understand the role of continuous functions				ε	(%	(%				arch			ability		k								
CLR-5 :	Address th	e conc	ept of derivative	es			(Bloo	ency (	nent ( <sup>c</sup>	adge		pment	, Rese	age	-	ustain		n Wor		nance	þ			
CLR-6 :	Introduce i	ntegrat	tion in real numl	ber system			Thinking	d Profici	d Attainr	c Knowle	Analysi	& Develo	, Design	Tool Use	& Culture	nent & S		al & Teai	nication	dgt. & Fi	g Learnii			
Course Outcom	Learning es (CLO):	At t	he end of this c	ourse, learne	rs will b	be able to:	Level of	Expecte	Expecte	Scientifi	Problem	Design 8	Analysis	Modem	Society .	Environr	Ethics	Individua	Commui	Project N	Life Lon	PSO - 1	PSO - 2	PSO - 3
CLO-1 :	Gain an ins	sight or	n real and comp	lex fields			2	70	65	Н	-	-	Н	-	-			1	1	-	-	-	-	-
CLO-2	Be familiar	with m	netric spaces an	d various kin	ds		2	80	70	н	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO-3	Define som	ne topo	ologies				2	75	60	-	Н	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Classify the	e role c	of continuous fu	nctions and ι	Iniform	y continuous functions	2	70	70	Н	-	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Apply the c	lerivati	ves in Taylor se	eries expansio	on of va	arious functions	2	80	70	-	н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	Characteriz	ze thos	e functions whi	ch are Reima	ann-Stie	eltjes inegrable	2	75	65	-	-	Н	Н	-	-	-	-	-	-	-	-	-	-	-

Du (h	ration our)	18	18	18	18	18		
	SLO- 1	Introduction- Review of N, W, Z, Q number systems	Function – definition; types	Limit of a function	Definition of derivatives	Higher order derivatives		
S-1	SLO- 2	Illustration of irrationals not belonging to Q	Injective, surjective and bijective functions – examples	Uniqueness of limit of function in a metric space	Derivatives of elementary functions	Leibniz formula		
<u> </u>	SLO- 1	Solution for p²-2=0 does not exist in Q	Finite and infinite sets	Algebra of limits of function	Differentiability leads to continuity	Taylor's theorem		
5-2	SLO- 2	Illustration for p <sup>2</sup> -5=0.	Examples and basic results	Examples of algebra of limits of function	Example and counterexample	Taylor's expansion of some functions		
6.2	SLO- 1	Ordered set; Cartesian product of sets	Countable and uncountable sets	Continuous function	Sum of differentiable functions is differentiable	Problems based on higher order derivatives		
5-5	SLO- 2	Law of trichotomy and illustration	Every infinite subset of countable set is countable	Continuity of elementary functions	Illustrating with examples and counterexamples	Solution to problems		
	SLO- 1	Bounded above and bounded below	Basic set operations	Composition of continuous functions	Product rule – proof and example	Differentiation of vector- valued functions		
S-4	SLO- 2	Determining upper and lower bound for R and secondary level sets	Illustrations	Illustration with examples	Quotient rule – proof and example	Illustration with examples		
S-5	SLO- 1	Least upper and greatest lower bounds	Countable union of countable sets is countable	Characterization for continuous functions	Chain rule	Consequence of mean value theorem in vector valued functions		
	SLO- 2	Determining LUB and GLB for subsets of R	Proof and consequences	Illustration with examples	Application of chain rule	Proof		
56	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session		
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session		
c 7	SLO- 1	LUB property of R	Q is countable	Algebra of continuous functions	Local maxima and local minima	Partition of an interval		
3-1	SLO- 2	Application of LUB property	Set of infinite binary sequences is uncountable	Illustration of algebra of continuous functions	Illustrating examples	Example and properties		
<b>C</b> 0	SLO- 1	Binary operation on a nonempty set	Metric space – definition	Continuous function on Euclidean space R <sup>k</sup>	First derivative test	Riemann integral of a function over an interval		
3-0	SLO- 2	LO- (F,+) and (F,*) are abelian Examples- discrete metric groups and usual metric		Algebra of continuous function on R <sup>k</sup>	Proof and critical or stationary points	Definition – upper and lower Riemann integrals		

S-9	SLO- 1	Field – ordered field	Open ball, closed ball, convex set; open and closed set, limit point, perfect and dense set, closure of set	Bounded function	Second derivative test	Function f is Riemann integrable
	SLO-	Q and R are fields	Examples and proof of balls	Example and	Proof and application for	Examples and
S-	SLO- 1	Properties of ordered field	Every neighbourhood is open; every neighbourhood of a limit point contains infinitely many points of the set	Continuity and compactness	Generalized mean value theorem	Riemannn Stieltjes integral
10	SLO- 2	Some basic proofs on properties of ordered field	et is open iff its pomplement is closed; union nd intersection of open and osed sets Continuous image of a compact set is compact Proof		Proof and illustration	Definition, examples
S-	SLO- 1	Archimedian property of R	Open relative and some basic theorems	Upper and lower bounds of continuous function on a compact set	Lagrange's Mean value theorem	Riemann integral is special case of Riemann-Stieltjes integral
11	SLO- 2	Application of Archimedian property	Open cover, subcover, finite subcover, compact set	Supremum and infimum of continuous function on a compact set	Proof	Illustrative examples
S-	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
	SLO- 1	Q is dense in R	K is compact relative to X iff it compact relative to any compact subset of X.	Uniformly continuous function	Application to Mean value theorem	Refinement, Common refinement
S- 13	SLO- 2	Z is not dense in R	Compact subsets of metric space are closed; closed subset of compact set is closed; some results on intervals	Continuous function on a compact set is uniformly continuous	Problems based on Mean value theorem	The sup and inf values increase on a refinement - Proof and consequences
S-	SLO- 1	Existence of unique n <sup>th</sup> root of positive real number	K-cell	Continuous image of connected set is connected	Differentiability	Necessary and sufficient condition for a function to be Reimann-Stieltjes inegrable
14	SLO- 2	Proof and illustration	Every k-cell is compact	Intermediate value theorem	Illustrating examples	Proof
S-	SLO- 1	Extended R; Complex field	Heine-Borel theorem	Discontinuity of a function	Monotonicity	Consequences of the above characterization result
15	SLO- 2	Properties	Equivalence statements	Kind of discontinuities – examples	Illustrating examples	Examples and counterexamples
S-	SLO- 1	Schwarz inequality	Weierstrass Theorem	Monotonic functions - Monotonic functions have no second kind of discontinuities	Intermediate value theorem for derivatives	Continuous function on an interval is always Riemann Stieltjes integrable
10	SLO- 2	Normalization technique and proof of Schwarz inequality	Every nonempty perfect set in R <sup>k</sup> is uncountable	Monotonic functions have atmost countable discontinuities	Proof and consequences	The condition on a monotonic function to be Riemann Stieltjes integrable
S- 17	SLO- 1	Euclidean space	Cantor set	Infinite limits and limits at infinity	L'Hospital rule	If f is Riemann Stieltjes integrable and g is continuous, then their composition is Riemann Stieltjes integrable.
	SLO- 2	Some basic results	Connected Set – every interval in R is connected	Illustrating examples	Proof and application	Proof
S-	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

	1.	Walter Rudin, Principles of Mathematical Analysis, 3rd Edition, McGraw-	4.	Sterling K.Berberian, Fundamentals of Real Analysis,					
		Hill Publications, Singapore, Reprint 2012.		Springer India Pvt. Ltd., 2013.					
Looming	2.	Tom M. Apostol, Mathematical Analysis, 2nd edition, Pearson, Narosa	5.	Royden, H.L., Real Analysis, The Macmillan Company,					
Resources		Publishing House, New Delhi, 2002.		New York, 2001.					
	3.	Richard R. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing	6.	R. G. Bartle, D.R. Sherbert, Introduction to Real					
		Co, Pvt. Ltd., New Delhi, 1970.		Analysis, 4e, John Wiley & Sons, 2011.					

Learning	Learning Assessment															
	<b>.</b>		Contin	uous Lea	arning As	sessmen	it (50% we	eightage	)	Final Examination (50% weightage)						
	BIOOM'S	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (50% weightage)						
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice					
Lovel 1	Remember	400/		200/	-	2001		200/		200/						
Level I	Understand	40%	-	30%		30%	-	30%	-	30%	-					

Level 2	Apply	400/		100/		400/		400/		40%	
	Analyze	40%	-	40%	-	40%	-	40 %	-	40%	-
Loval 2	Evaluate	200/		200/		200/		200/		200/	
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30%	-
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	6

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions maheshwaranv@yahoo.com	Prof. Y.V.S.S. Sanyasiraju, IIT Madras, sryedida@iitm.ac.in	Dr. A. Govindarajan, SRMIST Dr. K. Ganesan, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. V. Subburayan, SRMIST Dr. A. Anuradha, SRMIST

Cour	Course Code UMA20D07T Course Name Graph Theorem					Graph Theory			Сс	ourse	Cat	egor	у	E	Dis	scipli	ne S C	Speci ours	ific E e	lecti	ve	L 7 5	ГР 10	C 6
Pre- requis Cours	ite Nil es			Co- requisite Courses	Nil			Pi	ogres Cours	ssive ses	Nil													
Course Departr	Offering nent		Mathematics			Data Book / Codes/Standards																		
Course Rationa	Course Learning Rationale (CLR): The purpose of learning this course is to:									ning				Pro	ograr	n Le	arnii	ng O	utco	mes	; (PL	.0)		
CLR-1 :	To introduc	e the s	tudents to the I	peautiful and	elegan	t theory of graphs	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 : CLR-3 : CLR-4	To equip th techniques To underst application To underst	that mathe that mathe and the s in solve and the	ents with proble ay be used to s concepts of E ving real life pro- concept of col	em solving, cr solve a host o ulerian and H oblems ouring in grag	itical, ti f proble amiltor ohs	hinking and algorithm ems in other fields nian graphs and their							ch			ility								
: CLR-5 : CLR-6 :	To address To enable problems in	the plathe stuc	anarity of graph lents to apply g fields.	graph theoreti	cal tec	hniques to solve	Thinking (Bloom)	d Proficiency (%)	d Attainment (%)	c Knowledge	n Analysis	& Development	s, Design, Resear	Tool Usage	& Culture	ment & Sustainab		al & Team Work	nication	Mgt. & Finance	ig Learning			~
Course Outcom	Learning les (CLO):	At th	e end of this c	ourse, learne	rs will I	be able to:	Level of	Expecte	Expecte	Scientif	Problen	Design	Analysi	Modem	Society	Environ	Ethics	Individu	Commu	Project	Life Lor	PSO - 1	PSO - 2	PSO -
CLO-1 :	Gain an in parameters	sight o	n the interesti	ng filed of g	raph tl	neory and its essentia	2	70	65	н	-	-	н	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Analyze the concept of connectivity and cycles								70	Н	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	-3 Be thorough with trees and spanning trees							75	60	-	Н	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Know the i	nportar	nce of Eulerian	and Hamiltor	nian gr	aphs	2	70	70	Н	-	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Understand	d the co	ncept of plana	rity and its ap	plicatio	ons	2	80	70	-	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	D <sup>-6</sup> Be familiar with colouring of graphs and its criticality						2	75	65	-	-	Н	Н	-	-	-	-	-	-	-	-	-	-	-

Du (h	ration nour)	18	18	18	18	18
C 1	SLO- 1	Introduction to the subject	Matrix representation of graphs	Connected graph	Eulerian and Hamiltonian graphs	Planar and plane graphs
5-1	SLO- 2	Application of Graph Theory in other fields	Need for matrix representation	Illustrating examples and counterexamples	Illustrating examples and counterexamples	Illustrating examples, application
S-2	SLO- 1	Preliminary definition of graph and its types	Adjacency matrix	Connected components of a graph	Graph with minimum degree atleast 2 is always cyclic	K₅ is non-planar
0-2	SLO- 2	Illustration with examples	Examples, properties	Bounds on degree of graph to be connected	Consequence of the above result	Proof by illustration
6.3	SLO- 1	Minimum and maximum degree of a graph, regular graph	Incidence matrix	Characterization result for connected graphs with respect to vertex partition	Equivalent conditions for a connected graph to be eulerian	Faces of a plane graph
3-3	SLO- 2	Handshaking lemma – proof and consequences	Examples, properties	Characterization result for connected graphs with respect to vertex partition	Proof and consequences	Stereographic projection – proof and consequences
C 1	SLO- 1	Subgraph – different types	Binary operations on graphs – union, sum	Result on connectedness of a graph and its complement	Illustration of Konigsberg Bridge Problem	Fary's theorem – statement only
3-4	SLO- 2	Illustrating examples	Illustration	Nordhaus-Gaddum type results on connectedness	Results based on existence of open trails in a graph	Polyhedral graph - properties
S-5	SLO- 1	The size of a triangle-free graph of order p is atmost [p <sup>2</sup> /4].	Binary operations on graphs – product, composition	Characterization result for bipartite graphs	Arbitrarily traversable graph	Euler's polyhedron formula
	SLO- 2	Proof and consequences	Illustration	Characterization result for bipartite graphs	Fleury's algorithm	Illustration of Euler's polyhedron formula
S-6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
с 7	SLO- 1	Isomorphism	Result on order and size of graph operations	Cutpoint, bridge	Every Hamiltonian graph is 2-connected	Consequences of Euler's polyhedron formula
3-1	SLO- 2	Examples and counterexamples	Illustrating proof and consequences	Illustrating examples	Necessary condition for a graph to be Hamiltonian	Maximal planar graph, Triangulated graph
S-8	SLO- 1	Properties of isomorphism and some basic results	Degree sequence, graphic sequence	Equivalent statements for a vertex to be cutpoint of a graph	Converse of the above result is not true	Homeomorphic graphs

	SLO- 2	Proof	Examples	Results based on the above theorem	Dirac's theorem	Properties; Kuratowski's theorem;
<u> </u>	SLO- 1	Automorphism group of a graph	Problems on graphic sequence	Equivalent statements for a line to be bridge of a graph	Closure of a graph	Contractible graph, dual of a planar graph
5-9	SLO- 2	Illustration	Solution to problems	Consequences	Closure is a well defined property	Illustration and properties
S-	SLO- 1	Self complementary graph- definition, example and counterexample	Characterization of a graphic sequence	Characterization for a line to be a bridge in a graph	G is Hamiltonian ifff its closure is Hamiltonian	Chromatic number, n- colourable graph
10	SLO- 2	Results on self- complementary graphs	Suffiencient condition is not necessary	Existence of non-cutpoints in a graph	Chavatal's theorem	Determination of chromatic number for some known graph families
S-	SLO- 1	Covering number, independence number	Algorithm to determine a graphic sequence	Block – definition	Petersen graph is nonhamiltonian	Equivalent conditions for a graph to be 2-colourable
11	SLO- 2	Illustrating Examples	Explanation with example	Examples and counterexamples	Petersen graph is nonhamiltonian	Illustration of the above conditions
S-	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-	SLO- 1	Result on sum of independence and covering numbers	Necessary condition for a partition to be graphic	Equivalent conditions for a graph to be a block	Trees	k-critical graph; bounds on minimum degree of a k- critical graph
13	SLO- 2	Result on sum of independence and covering numbers	Proof and consequences	Illustration of the above conditions	Construction of all trees with the same order	Consequences of the above result
	SLO- 1	α' + β' = p	Walk, trail, path, cycle	Connectivity and line- connectivity of graphs	Equivalent conditions for a graph to be a tree	χ ≤ Δ+1
S- 14	SLO- 2	Proof and consequences	Examples	Determination of connectivity and line-connectivity for some known graph families	Proof and consequences	Bounds on chromatic number of graph with respect to minimum degree of its induced subgraphs
	SLO- 1	Intersection graph	Any walk will contain a path	$k \leq \lambda \leq \delta$	Every connected graph has a spanning tree	Uniquely colourable graph
S- 15	SLO- 2	Every graph is an intersection graph	Converse is not true in general	Proof by case studies	Adding an edge of graph which is not in its spanning tree T yields a unique cycle in it	Conditions for a graph to be uniquely colourable
S-	SLO- 1	Line graph	Graph will always contain a path of length equal to its minimum degree	n-connected and n-line connected graphs	Centre of a tree, Eccentricity, radius, diameter	Every uniquely n-colourable graph is (n-1)-connected
10	SLO- 2	Basic results	Proof	Illustrating examples	Examples	Edge colouring, edge chromatic number
S-	SLO- 1	Theorems of Whitney and Beineke	An odd length closed walk will always contain an odd cycle	Bound on size of a k- connected graph	Existence of centre in any tree	Vizing's theorem – statement only
17	SLO- 2	Consequences	An odd length closed walk will always contain an odd cycle	Nonexistence of a 3- connected graph with size 7	Illustrating examples with one and two centres	Edge chromatic number for complete graphs
S-	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
		1. S. Arumugam, S.	Ramachandran, Invitation to	Graph Theory, Scitech 7.	Arthur Benjamin, Gary (	Chartrand, Ping Zhang, The

	1.	S. Arumugam, S. Ramachandran, Invitation to Graph Theory, Scitech	7.	Arthur Benjamin, Gary Chartrand, Ping Zhang, The
		Publications (India) Pvt Ltd., 2006.		Fascinating World of Graph Theory, Princeton
	2.	Jonathan L. Gross, Jay Yellen, Mark Anderson, Graph Theory and Its		University Press, 2015.
Learning		Applications, 3e, Chapman and Hall (CRC Press), 2018.	8.	S. A. Choudham, A First Course in Graph Theory,
Resources	3.	Gary Chartrand, Introductory Graph Theory, Dover Publications Inc. New		Macmillan India Ltd, 2000.
		York, 1977.	9.	J. A. Bondy and U. S. R. Murthy, Graph Theory with
	4.	Robin J. Wilson, Introduction to Graph Theory, Fourth Edition, Pearson,		Applications, Macmillon, 2008.
		2009.		

Learnin	_earning Assessment														
			Contin	uous Lea	arning As	sessmer	nt (50% we	eightage	)	Final Examination /	EQQ( weightere)				
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (50% weightage)					
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
Loval 1	Remember	400/		200/		200/		200/		200/					
Level I	Understand	40%	-	30%	-	30%	-	30%	-	30%	-				
Lovel 2	Apply	10%		40%	_	40%	_	10%		40%					
Level Z	Analyze	40 %	-	40%	-	40%	-	40%	-	40%	-				
Lovel 3	Evaluate	20%		30%	-	30%		30%		30%					
Level 3	Create	20 /0	-			30 /0	-	30 /0	-	50 /6	-				

	Total	100 %	100 %	100 %	100 %	100 %
L						

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions maheshwaranv@yahoo.com	Prof. Y.V.S.S. Sanyasiraju, IIT Madras, sryedida@iitm.ac.in	Dr. A. Govindarajan, SRMIST Dr. K. Ganesan, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Mrs. T. Karthy, SRMIST Dr. A. Anuradha, SRMIST

Course		Course		SEQUE	ICES AND SERIES		Cour	rse	F		Disc	inline	e Sr	ecif	ic Fl	ectiv	/e Ci	ours	e	L	Т	Ρ	С
Code		Name		OLQOL!		C	Categ	gory	-		Dioc	"Piirt	5 0 0			000	0.0	ouro	•	5	1	0	6
Pre- requis Cours	- site Nil			Co- requisite Courses	Nil		Pro	ogres Cours	sive es	Nil													
Course Departr	Course Offering Data Book / Department Mathematics Dodes/Standards																						
Course Rationa			Learr	ning				Pro	gran	n Le	arnii	ng O	utco	mes	; (PL	0)							
CLR- 1:	o learn about	Converge	ence of seq	uences		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	o gain knowle	edge abou	it converge	ence of serie	s																		
CLR- 3 :	o know about	tests of co	onvergenc	e of infinite r	eal series																		
CLR- 4:	o study about	Alternativ	e series			_	_					ch			oility								
СLR- 5: Т	o learn about	Binomial <sup>-</sup>	Theorem, I	Exponential	and Logarithmic series	Bloom	cy (%)	nt (%)	ge		nent	kesear	an an		stainab		Work		nce				I
CLR- T 6 : s	o know about eries	Summatio	on of series	s, Successiv	e difference and recurring	I) guiyu	oficien	tainme	nowled	alysis	svelopn	sign, F	I Usage	ulture	t & Sus		Team	tion	& Fina	arning			
Course Outcom	Learning nes (CLO):	At the en	d of this co	ourse, learne	rs will be able to:	Level of Thir	Expected Pr	Expected At	Scientific Kr	Problem Ana	Design & De	Analysis, De	Modem Too	Society & Cu	Environmen	Ethics	Individual &	Communica:	Project Mgt.	Life Long Le	PSO - 1	PSO - 2	PSO – 3
CLO- 1:	Solve problems	s on conve	ergence of	sequences		3	85	80	н	н	L	-	-	-	-	-	М	L	-	н	-	-	-
CLO- 2 :	Solve problems	s on conve	ergence of	series		3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO- 3 : S	LO- Solve problems on convergence of alternative series							80	Н	Н	-		-	-	-	-	М	-	-	Η	-	-	-
CLO- 4 :	Gain knowledg	e about Bi	inomial Th	eorem, Expo	pnential and Logarithmic series	3	85	80	Н	Н	Н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO- 5 :	o know about	Summatio	on of series	6		3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO- T 6 : s	D- To know about Summation of series, Successive difference and recurring series						85	80	М	Н	-	-	-	-	-	-	М	-	-	Н	-	-	-

Dura (ho	tion ur)	Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module-V (18)
C 1	SLO- 1	Introduction to sequences	Introduction to infinite series	Introduction to Cauchy's condensation test	Introduction to Binomial theorem	Summation of series
3-1	SLO- 2	Limits of sequences	Convergence of infinite series	Cauchy's condensation test	Binomial theorem for rational index	
	SLO- 1	Convergence of sequences	divergence of infinite series	Problems using Cauchy's condensation test	Problems on Binomial theorem	Applications of partial fractions
S-2	SLO- 2	Basic theorems in convergence of sequences	divergence of infinite series	Problems using Cauchy's condensation test	Problems on Binomial theorem	Problems on Applications of partial fractions
6.2	SLO- 1	Cauchy's principle of convergence	Oscillation of infinite series	Problems using Cauchy's condensation test	Introduction to middle term of series	Problems on Applications of partial fractions
3-3	SLO- 2	Cauchy 's sequence	Oscillation of infinite series	Problems using Cauchy's condensation test	Problems of finding middle term	Problems on Applications of partial fractions
S-4	SLO- 1	Cauchy 's first theorem on limits	Necessary condition for Convergence of infinite series	Problems using Cauchy's condensation test	Problems of finding the nth term	Problems on Applications of partial fractions
	SLO- 2	Bounded sequences	Problems using Necessary condition for Convergence series	Problems using Cauchy's condensation test	Problems of finding the nth term	Problems on Applications of partial fractions
С. F.	SLO- 1	Monotonic sequences	Convergence of Geometric series	Problems using Cauchy's condensation test	Introduction to Exponential series	Sum to the n terms of the series
3-0	SLO- 2	Basic theorems on monotonic sequences	Convergence of Geometric series	Problems using Cauchy's condensation test	Exponential series	Problems on Sum to the n terms of the series
5.6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-7	SLO- 1	Limit superior	Introduction to Comparison test	Introduction to Cauchy's root test	Problems on Exponential series	Problems on sum to the n terms of the series

	SLO- 2	Limit inferior	Comparison test	Cauchy's root test	Problems on Exponential series	Problems on Sum to the n terms of the series
S-8	SLO- 1	Problems on limit inferior and limit superior	Problems using Comparison test	Problems using Cauchy's root test	Introduction to Logarithmic series	Problems on sum to the n terms of the series
0-0	SLO- 2	Problems on limit inferior and limit superior	Problems using Comparison test	Problems using Cauchy's root test	Logarithmic series	Problems on sum to the n terms of the series
	SLO- 1	Problems on Bounded sequences	Introduction to D'Alembert's ratio test	Problems using Cauchy's root test	Problems on Logarithmic series	Introduction to Summation by difference series
S-9	SLO- 2	Problems on Bounded sequences	D'Alembert's ratio test	Problems using Cauchy's root test	Problems on Logarithmic series	Summation by difference series
S-10	SLO- 1	Problems on monotonic increasing sequences	Problems using D'Alembert's ratio test	Problems using Cauchy's root test	Introduction to summation of series	Introduction to Successive differences series
	SLO- 2	Problems on monotonic decreasing sequences	Problems using D'Alembert's ratio test	Problems using Cauchy's root test	summation of series	Problems on Summation by difference series
0.44	SLO- 1	Problems on Cauchy's sequences	Problems using D'Alembert's ratio test	Problems using Cauchy's root test	Applications of the Binomial theorem to the summation of series	Problems on Summation by difference series
5-11	SLO- 2	Problems on Cauchy's sequences	Problems using D'Alembert's ratio test	Problems using Cauchy's root test	Applications of the Binomial theorem to the summation of	Problems on Summation by difference series
0.40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Problems on convergence of sequences	Introduction to Rabbe's test	Introduction to Alternative series	Problems of Finding the sum to infinity of the series	Introduction to Recurring series
	SLO- 2	Problems on convergence of sequences	Rabbe's test	Examples of Alternative series	Problems of Finding the sum to infinity of the series	Generating function of Recurring series
0.44	SLO- 1	Problems on convergence of sequences	Problems using Rabbe's test	convergence of alternative series	Introduction to Sum of coefficients	Problems of finding the nth term of recurring series
5-14	SLO- 2	Problems on convergence of sequences	Problems using Rabbe's test	convergence theorems of alternative series	Problems on sum of coefficients	Problems of finding the nth term of recurring series
0.15	SLO- 1	Problems on convergence of sequences	Problems using Rabbe's test	Problems on convergence of alternative series	Approximate values	Problems of finding the nth term of recurring series
S-15	SLO- 2	Problems on convergence of sequences	Problems using Rabbe's test	Problems on convergence of alternative series	Finding approximate values	Problems of finding the nth term of recurring series
0.40	SLO- 1	Problems on convergence of sequences	Problems on all the above tests	Problems on convergence of alternative series	Modification of the logarithmic series	Problems of finding the nth term of recurring series
S-16	SLO- 2	Problems on convergence of sequences	Problems on all the above tests	Problems on convergence of alternative series	Problem on Modification of the logarithmic series s	Problems of finding the nth term of recurring series
0.47	SLO- 1	Problems on convergence of sequences	Problems on all the above tests	Problems on convergence of alternative series	Problem on Modification of the logarithmic series s	Problems of finding the nth term of recurring series
5-17	SLO- 2	Problems on convergence of sequences	Problems on all the above tests	Problems on convergence of alternative series	Problem on Modification of the logarithmic series s	Problems of finding the nth term of recurring series
0.40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

Learning Resources	1. 2.	T.K Manicavachagam Pillai, T. Natarajan, K.S. Ganapathy, Algebra, Volume 1, S. Viswanathan Pvt Limited, Chennai, 2004 M.K. Singal & Asha Rani Singal, A first course in real analysis, R. Chand & Co., 1999	3. Dr. S Arumugam, Sequences and series, New Gamma Publishers, 1999.
Learning A	ssessmen	t	

Learnin	y Assessment											
	Discusio		Contin	uous Lea	arning As	sessmer	)	Final Examination (	E0% weightege)			
	Bloom's Level of Thinking	CLA -	· 1 (10%)	CLA –	2 (10%)	CLA – 3 (20%)		CLA – 4 (10%)#		Final Examination (50% weightage)		
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	
Lovel 1	Remember	400/		200/		200/		200/		200/		
Level	Understand	40%	-	30%	-	30%	-	30%		30%	-	

Level 2	Apply	400/		100/		400/		400/		40%	
	Analyze	40%	-	40%	-	40%	-	4070	-	40%	-
Level 3	Evaluate	200/		200/		200/		200/		200/	
	Create	20%	-	30%	-	30%	-	30%	-	30%	-
	Total	10	0 %	10	0 %	10	0 %	1(	100 % 100 %		6

# 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		
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	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Mrs. D. Thanga Rajathi, SRMIST

Course Code	UMA20D09	20D09T Course Linear Algebra						Cou Cate	irse gory	E		Discipline Specific Elective Course           L         T         P           5         1         0				C 6								
Pre- requis Cours	Pre- luisite Nil requisite Nil urses Courses							Pr	rogres Cours	sive es	Nil													
Course Departr	Course Offering         Data Book /           Department         Codes/Standards																							
Course Learning Rationale (CLR): The purpose of learning this course is to:									Learr	ning				Pro	grar	n Le	arni	ng C	utco	mes	s (PL	0)		
CLR-1 :	Understand f and their pro	he concep perties.	ts of vecto	r spaces, su	bspaces	, bases, dimension	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2	Relate matric	ces and lin	ear transfo	rmations.																				
CLR-3	Compute eig	en values	and eigen	vectors of lir	near tran	sformations.																		
CLR-4	Learn properties of inner product spaces and determine orthogonality in												۲			ţ								
CLR-5	Realise impo form	ortance of a	adjoint of a	linear transf	formatior	and its canonical	(mool)	(%) X:	nt (%)	ge		ient	esearcl			tainabili		Vork		nce				
CLR-6 :	Learn triangu	ilar forms o	of a vector	· space			nking (B	roficienc	ttainmer	nowledo	alysis	evelopm	esign, R	ol Usage	ulture	it & Susi		Team V	ition	& Final	earning			
Course Outcom	Learning nes (CLO):	At the en	d of this co	urse, learne	rs will be	able to:	Level of Thi	Expected P	Expected A	Scientific K	Problem An	Design & De	Analysis, De	Modem Toc	Society & C	Environmer	Ethics	Individual &	Communica	Project Mgt	Life Long Le	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Know the fur dimension.	ndamental	concepts v	ector space	s, subsp	aces, bases and	3	85	80	н	н	L	-	-	-	-	-	М	L	-	н	-	-	-
CLO-2 :	Link matrices	and linea	r transform	ations.			3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO-3 :	Learn to compute eigen values and eigen vectors of linear transformations.						3	85	80	Н	н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO-4 :	<sup>4</sup> Explain the significance of inner product spaces and their properties.						3	85	80	Н	Н	Н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO-5 :	<sup>5</sup> Analyze adjoint of a linear transformation.						3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO-6 :	Understand concepts of canonical and triangular forms of a vector space.							85	80	М	н	-	-	-	-	-	-	М	-	-	Н	-	-	-

Dura (ho	ation bur)	18	18	18	18	18
<b>C</b> 1	SLO- 1	Vector space-Definition	Inner product space- Definition	Linear Transformation- Definition	Isomorphism of vector spaces	Linear operator-Definition and examples
5-1	SLO- 2	Vector space -Examples.	Inner product space- Examples	Linear Transformation- examples	Theorems based on Isomorphism	Adjoint of a Linear operator
	SLO- 1	Problems based on vector space	Inner product space- Applications	Properties of Linear Transformation	Dual space-Definition	Problems based on linear operator
S-2	SLO- 2	Elementary Properties of vector spaces.	Norm of a vector	Algebra of Linear transformation	Dual space-Examples	Unitary operators-Definitions and properties
0.2	SLO- 1	Elementary theorems of vector spaces	Properties on Norm of a vector	Product of Linear transformation	Problems on Dual space	Theorems on Unitary operators
5-5	SLO- 2	Vector subspaces- Definition, examples	Schwarz inequality	Theorems on Product of Linear transformation	Dual basis-Definitions	Normal operators-Definitions and Illustrations
54	SLO- 1	Problems based on vector subspace	Triangle inequality	Algebra of linear operator	Theorems based on dual basis	Theorems on Normal operators
3-4	SLO- 2	Problems based on vector subspace	Orthogonal vectors	Range space of linear transformation	Problems on dual basis	Hermitian forms-Definitions
S-5	SLO- 1	Elementary Properties of vector subspaces	Theorems based on Orthogonal vectors	Theorems on range space	Second dual space- Definition	Hermitian forms-Examples
	SLO- 2	Algebra of subspaces	Problems involving Orthogonal vectors	Null space of linear transformation	Second dual space- Examples	Theorems based on Hermitian forms
0.6	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
3-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
C 7	SLO- 1	Linear sum of two subspaces	Orthonormal vectors	Theorems on Null space	Theorems on second dual space	Problems inon Hermitian forms
3-1	SLO- 2	Direct sum of two subspaces	Theorems based on Orthonormal vectors	Sylverster theorem	Natural mapping	Jordan canonical form

	SLO-	Quotient space-Definition	Drobleme involving	Invertible Linear	Annihilator	Problems based on Jordon
<b>~</b> •	1	and example	Orthonormal vectors	transformation		canonical form
5-8	SLO-	Elementary Properties of	Orthogonal basis -Definition,	Theorems on	Theorems on Annihilator	Rational canonical form
	2	Quotient space	examples	transformation		
	SI O-	Internal direct sum of	Problems on Orthogonal basis	Problems on	Annihilator of an Annihilator	Trace of a matrix-Definition and
	1	vector spaces		Invertible Linear transformation		examples
S-9	90	External direct sum of	Orthogonal complement of a	Non -singular Linear	Eigen values and Eigen	Theorems based on trace
	2	vector spaces	subspace	transformation	vectors of a Linear	
	SI 0-	Linear combination of	Gram-Schmidt process for	Theorems on non-	Theorems based on Eigen	Properties of Trace
C 10	1	vectors	constructing orthonormal	singular linear	values	
3-10		Linear dependence and	Problems based on Gram-	Matrix representation	Theorems based on Eigen	Problems on trace
	SLO-	Independence of vectors	Schmidt process for	of a linear	vectors	
	2		basis	transformation		
	~ ~	Problems based on	Bessel's Inequality	Problems on Matrix	Daldana a Eireandara	Determinant of a linear
	5LU-	vectors		representation	Problems on Eigen values	dimensional vector space
S-11			o			
	SLO-	Problems based on Linear independence of	Orthogonal Expansion	Similarity of matrices	Problems on Eigen vectors	transformation
	2	vectors				
	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-12	1	<b>F</b>	<b>T</b> ( ) ( <b>D</b> )		<b>T</b> ( ) ( <b>0</b> )	<b>T</b> ( ) 10
	SLO- 2	lutorial Session	lutorial Session	lutorial Session	Tutorial Session	Tutorial Session
	SLO-	Problems based on linear	The Adjoint of a Linear	Similarity of linear	Monic polynomial	Transpose-Definition
S-13	1	independence Basis of vector space	Transformation	transformation	Cavley-Hamilton Theorem	Transpose- Examples
	2			Triangular forms		
	SLO-	Problems on basis of	Self-Adjoint Transformation-	Characteristics root-	Problems based on Cayley-	Properties of Transpose
S-14	1 SLO-	vector space Dimension of a vector	Definitions Properties of Self-Adioint	Problems Theorems based on	Hamilton Theorem	Theorems based on Transpose
	2	space	Transformation	Triangular forms	Definition and examples	
	SLO-	Dimension of subspace	Theorems on Self-Adjoint	Canonical forms	Problems based on minimal	Problems based on Transpose
S-15	SI 0-	Elementary theorems	Problems on Self-Adjoint	Theorems based on	Theorems based on	Rank and Nullity –Definitions
	2	based on the dimension	Transformation	Canonical forms	minimal polynomial	
	SI 0-	Linear Span-Definition	Congruent Operators	Nilpotent	Primary Decomposition	Rank and Nullity -Examples
	1	and examples		Transformations-	theorem	
S-16	910-	Elementary Properties of	Theorems on Congruent	Nilpotent	Diagonalization	Theorems based on Rank and
	2	Linear Span.	Operators	Transformations-		Nullity
	SLO-		Inner Product Vector Space	Basic properties	Geometric multiplicity	Invariant subspaces
S-17	1	Homomorphism Brobloms	Isomorphism Orthogonal Projections	Lommas	Algobraic multiplicity	Problems based on inveriant
	2					subspaces
	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-18	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
	2					

Learning Resources	1. 2. 3. 4. 5.	Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2003). Linear Algebra (4thedition). Prentice-Hall of India Pvt. Ltd. Kenneth Hoffman & Ray Kunze (2015). Linear Algebra (2nd edition). Prentice-Hall. I. M. Gel'fand (1989). Lectures on Linear Algebra. Dover Publications. Dr.Sudhir Kumar Pundir(2015).A competitive approach to Linear Algebra(1st Edition). CBS Publishers & Distributors Pvt. Ltd. Nathan Jacobson (2009). Basic Algebra I & II (2nd edition). Dover Publications.	6. 7. 8. 9.	Serge Lang (2005). Introduction to Linear Algebra (2nd edition). Springer India. Vivek Sahai & Vikas Bist (2013). Linear Algebra (2nd Edition). Narosa Publishing House. Gilbert Strang (2014). Linear Algebra and its Applications (2nd edition). Elsevier. I.N. Herstein, Topics in Algebra, 2nd Edition, John Wiely, NewYork, 2013.
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Learning	g Assessment											
	Bloom's		Contin	uous Lea	arning As	sessmer	)	Final Examination (50% weighters)				
	BIOOM'S	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#		Final Examination (50% weightage)		
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	
Lovel 1	Remember	10%		30%		30%		30%		30%		
Level I	Understand	40 /0	-	30 %	-	30 /0	-	50 /0	-	50 %	-	
Lovel 2	Apply	10%		10%		10%		10%		10%		
Level 2	Analyze	40%	-	40%	-	40%	-	40%	-	40%	-	

Level 3	Evaluate	200/		200/		200/		200/		200/		
	Create	20%	-	30%	-	50%	-	30%	-	50 %	-	
	Total		100 %		100 %		100 %		00 %	100 %		

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions	Prof VVSS Sanvasiraju IIT Madras	Dr. A. Govindarajan, SRMIST
<u>maneshwaranv@yanoo.com</u>	sryedida@iitm.ac.in	Prof. K. S. Ganapathy Subramanian, SRMIST
	Prof P. V. Pathich Kumar, IIT Kanpur, byrk@iitk.ac.in	Dr. R. Perumal, SRMIST
		Dr. R. Arulprakasam, SRMIST

Cou Co	Course Code UES20AE1T Course Name ENVIRONMENTAL STUDIES							C Ca	ours	se ory		A	1	Abili	ity E Co	nha ours	ncer es	nen	t	L 3	T 0	P 0	C 3
Pre-	requis	ite Courses	Nil	Co-requisite Courses	Nil			Ρ	rogr Cou	essive Nil													
Cours Depart	Course Offering Department Computer Applications Data Book / Codes/Standard														Nil								
Course Learning Rationale (CLR):         The purpose of learning this course is to:								Leari	ning				Pro	gran	n Le	arni	ng C	)utc	ome	s (P	L0)		
CLR- 1:	To tea	ach the importa	nce of enviror	nment		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR- 2 :	To im	part the knowle	edge about ec	osystem																			
CLR- 3 :	To tea	ach about Biod	iversity																				1
CLR- 4 :	- To create awareness about environmental pollution										es			е									1
CLR- 5 :	To un	derstand abou	t Environment	Protection		(mool	y (%)	it (%)	ledge	cepts	isciplin	dge	uo	owledg		ata		ills	lls				
						B (B	cienc	mer	Now	Conc	ed D	owled	ılizati	Ř	g	ret D	kills	ig Sk	א Ski	6			1
Course Outco	Course Learning Outcomes (CLO): At the end of this course, learners will be able to:				will be able to:	Level of Thinkir	Expected Profi	Expected Attair	Fundamental k	Application of	Link with Relat	Procedural Kno	Skills in Specia	Ability to Utilize	Skills in Modeli	Analyze, Interp	Investigative S	Problem Solvir	Communicatio	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO- 1:	To gain knowledge on the importance of natural resources and energy						75	60	Н	Н	Н	-	-	-	-	-	-	-	-	-	-	-	-
CLO- 2 :	To understand the structure and function of an ecosystem						80	70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-
CLO- 3:	<ul> <li><b>O-</b> To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence</li> </ul>					2	70	65	Н	-	-		-	-	-	-	-	-	-	-	-	-	-
CLO- 4 :	<b>CLO-</b> 4: To understand the causes of types of pollution and disaster management					2	70	70	Н	-	Н	Н	Н	-	-	-	-	-	-	-	-	-	-
CLO- 5 :	O- To observe and discover the surrounding environment through field work				2	80	70	-	Н	-	Н	-	-	-	-	-	-	-	-	-	-	-	

Dui (h	ration our)	9	9	9	9	9
6.4	SLO-1	Environmental Studies- Concept	Concept of an ecosystem	Biodiversity at Global, National And Local Levels	Causes, Effects and	Need for equitable utilization
3-1	SLO-2	Scope and Importance of Environmental Studies	Ecosystem degradation and Resource utilization	India as a Mega Diversity Nation	Nuclear hazards	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 Causes, Effects and	Urban – rural equity issues
	SLO-2	Institutions in Environment	Producers, consumers and decomposers	man-wildlife conflicts	and Industrial Waste	The need for Gender Equity
	SLO-1	People in Environment	Energy flow in the ecosystem	Endangered species of India		Preserving resources for future generations
S-3	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	Role of Individuals In Pollution Prevention	The rights of animals
S-4	SLO-1	Introduction to natural resources- Associated Problems	Ecological succession	Environmental Pollution- Definition	Disaster management- Nature	The ethical basis of environment education and
	SLO-2	Renewable and Nonrenewable resources	Food chains, Food webs and Ecological pyramids		Floods, Earthquakes	awareness
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			
	SLO-1	Mineral Resources	Grassland ecosystem	Causes, Effects and	Social Issues and the	
S-6	SLO-2	Food Resources	Desert ecosystem	Control Measures of Water Pollution	Environment From Unsustainable to Sustainable Development	Wasteland Reclamation
S-7	SLO-1	Energy Resources	Aquatic ecosystems (ponds, lakes, streams)	Causes, Effects and Control Measures of Soil	Water Conservation	Climate change & Global
	SLO-2	_0-2 Land Resources Aquatic ecosystems (riv estuaries, oceans)		Pollution		warming
S-8 SLO-1		Renewable and non- renewable resources- Wind	Value Of Biodiversity		Rain Water Harvesting Watershed	Acid rain & Ozone layer depletion

	SLO-2	Renewable and non- renewable resources- geothermal	Consumptive Value And Productive Value	Causes, Effects and Control Measures of Marine pollution		
50	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
3-9	SLO-2	Renewable and non- renewable resources- Biomass	Aesthetic Value and Option Value	Causes, Effects and Control Measures of Thermal Pollution	Resource consumption patterns	Nuclear Holocaust

	Theory:	
	1.	Bharucha Erach, (2013), Textbook of Environmental Studies for Undergraduate Courses (Second edition).
		Telangana, India: Orient BlackSwan.
Learning	2.	Basu Mahua, Savarimuthu Xavier, (2017), SJ Fundamentals of Environmental Studies. Cambridge, United Kingdom:
Resources		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)

Learnir	earning Assessment												
	Bloom's		Co	Final Examina	tion (50%								
Level	Level of	CLA –	1 (10%)	CLA – 2 (10%)		CLA –	3 (20%)	CLA –	4 (10%)#	weightage)			
	Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice		
Laurald	Remember	40		40		40		40		40			
Leveil	Understand	40	-	40	-	40	-	40	-	40	-		
	Apply	20		20	_	30		30		20			
Leveiz	Analyze	30	-	30	-	30	-	30	-	50	-		
	Evaluate	20		20		20		20		20			
Levels	Create	30	-	30	-	30	-	30	-	50	-		
	Total	10	) %	100	) %	10	) %	100 %		100 %			

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										
		2.Dr.S.Albert Antony Raj, Associate Professor and Head, SRMIST										

Course Code	UJK20501T	Course Name	Leadership and Management Skills	Course Category	JeevanKaushal- JK	Life Skill Courses	LTPC	2
0000				eatege.j	0.1		2002	<u> </u>

Pre- requisite Course	e Nil s		Co- requisite Courses	Nil		Progress Course	ive s	lil																
Course Departn	Course Offering Department *Parent Department Data Book / Codes/Standards -																							
Course Learning Rationale (CLR): The purpose of learning this course is to:									ing				Pro	ograi	m Le	arni	ng C	)utco	mes	s (PL	.0)			
CLR-1	help students	s to develop e	ssential s	skills to	influence and mot	ivate others	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	Inculcate en effective lead	notional and Iership	social int	telligen	ce and integrative	e thinking for																		
CLR-3	create and m	aintain an eff	ective and	d motiv	ated team to work t	for the society																		
CLR-4 :	nurture a cre	ative and enti	repreneur	ial min	dset		(μ	(9)	(9	е	s	olines			adge									
CLR-5 :	make studen in professior	ake students understand the personal values and apply ethical principle professional and social contexts						Pucy (%	nent (%	owledg	ncept	Discip	ledge	ation	Snowle	_	t Data	S	Skills	Skills			avior	þ
CLR-6 :	manage com	petency-mix a	at all leve	ls for a	chieving excellenc	e with ethics	<sup>-</sup> hinking	Proficie	Attainn	ntal Kno	n of Co	Related	al Know	pecializ	Utilize I	lodeling	Interpre	ive Skill	Solving	cation	Skills		nal Beh	Learnir
Course Outcom	Learning es (CLO):	At the end o	of this cou	urse, le	arners will be able	to:	Level of 1	Expected	Expected	Fundame	Applicatic	Link with	Procedur	Skills in S	Ability to	Skills in <b>N</b>	Analyze,	Investigat	Problem:	Commun	Analytica	ICT Skills	Professio	Life Long
CLO-1	examine var	ious leadersh	nip model	s and	understand / asse	ess their skills	,	00	75	L	М	Н	-	М	М	-	-	-	М	Н	L	-	Η	Η
:	their leaders	nip vision			r leader si lip style a		5 3	00	75															
CLO-2 :	learn and der self-manager	monstrate a s ment, handlin	et of prac	ctical sk s, team	ills such as time m leadership, etc	nanagement,	3	80	75	L	М	Н	-	М	М	-	-	-	М	Η	L	-	Η	Н
CLO-3 :	-3 understand the basics of entrepreneurship and develop business plan						3	75	70	L	М	Н	-	М	М	-	-	-	М	Н	L	-	Η	Η
CLO-4 apply the design thinking approach for leadership :						3	75	70	L	М	Н	-	М	М	-	-	-	М	Η	L	-	Η	Н	
CLO-5 appreciate the importance of ethics and moral values for making of a balanced personality						<sup>a</sup> 3	75	70	L	Η	Η	-	М	М	-	-	-	М	Η	L	-	Η	Η	
CLO-6 :	CLO-6 be an integral human being					3	75	70	L	Η	Η	-	М	М	-	-	-	М	Η	L	-	Η	Η	

Duration (hour)		6	6	6	6	6
	SLO- 1	Leadership - definition	Team building	Management – definition	Women in management	Entrepreneurship
S-1	SLO- 2	Leadership – qualities	Team dynamics	Manager – traits	Global gender perspective in business. Do women make good managers? - discussion	Entrepreneurship
6.2	SLO- 1	Leadership – styles	Work delegation	Scheduling work	Confronting problems faced by women managers – case study	Successful Indian entrepreneurs – case study
S-2	SLO- 2	Leadership – styles	Work delegation – activity	Scheduling work – activity	Confronting problems faced by women managers – case study	Successful Indian entrepreneurs – case study
	SLO- 1	Difference between leader and boss	Decision making	Strategic planning	Successful women managers – documentary screening	Successful women entrepreneurs – case study
3-3	SLO- 2	Case study (based on leadership styles)	Decision making - activity	Strategic planning	Successful women managers – documentary screening	Successful women entrepreneurs – case study
	SLO- 1	Case study (based on leadership styles)	Motivation	Change management	Women labour force in work place	Ethics – definition
S-4	SLO- 2	Case study (based on leadership styles)	Motivating for results	Change management – activity	Problems faced by women labour force in work place - case study	Corporate ethics
S-5	SLO- 1	Leadership in diverse organizational structures, cultures and communications	Argumentation, Persuasion	Energy management	Sexual harassment of women at workplace (prevention, prohibition, and redressal) Act, 2013	Essential elements of business ethics
	SLO- 2	Leadership in diverse organizational structures, cultures and communications	Negotiation , Networking	Novel ways to manage energy in work place – activity	Documentary screening - Sexual harassment of women at workplace	Activity (students formulate ethical code of their business organization)
S-6	SLO- 1	Leading the organisation through stability and turbulence	Budget planning	Work force management	Transgender persons protection of rights act, 2019	Ethical dilemma
SLO- 2	Case study	Taking risk	Grievance redressal policy in organisations	Documentary screening – based on inclusiveness of the third gender in workplace	Ethical dilemma study	- case
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	1.	Craig E Johnson. Meeting the ethical challenges of leadership.	4.	Alexander Osterwalder, Business Model Generation, Wiley, 2013
		Sage publications, 2018	5.	Deborah Tannen, Talking from nine to five: Women and men in the
Learning	2.	Allan R Cohen, David L Bradford, Influence without authority,		workplace, Harper Collins publishers, 2010
Resources		Wiley, 2018	6.	Amish Tandon, Law of sexual harassment at workplace: Practice
	3.	T V Rao, Managers who make a difference: Sharpening your		and procedure.Nivogi books, 2017
		management skill, Random house India, 2016		Rashmi Bansal, Connect the dots, Westland books, 2012

Learning Assessment										
		C	ontinuous Learning Ass	essment (100% weightag	je)					
Level	Bloom's Level of Thinking	CLA-1 (20%)	CLA-2 (20%)	CLA-3 (30%) #	CLA-4 (30%) ##					
		Theory	Theory	Theory	Theory					
Level 1	Remember	100/	100/	200/	450/					
Level I	Understand	10%	10%	30%	15%					
	Apply	50%	50%	40%	50%					
	Analyze	50 %	50%	4078	50 %					
Laural 2	Evaluate	400/	400/	200/	250/					
Levers	Create	40%	40%	30%	33%					
	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
1. Ajay Zener, Director, Career Launcher	-	1. Ms Sindhu Thomas B, AssistantProfessor& Head in Charge, CDC, FSH, SRMIST 2. Mr Rajsekar, Assistant Professor, CDC,
		FOM, SRMIST

Course Code	UMA20601	Course Name	C	OMPLEX AI	NALYSIS	3	(	Cou Cate	rse gory	e C Professional Core Course					L 5	T 1	P 0	C 6						
Pre- requis Cours	- ite Nil ies			Co- requisite Courses	Nil			Progressive Courses Nil																
Course Offering         Data Book /           Department         Codes/Standards																								
Course Learning Rationale (CLR): The purpose of learning this course is to:									Lean	ning				Pro	gran	n Le	arnir	ng O	utco	mes	; (PL	.0)		
CLR-1 :	To understan	d the conc	epts of ana	alytic functio	n.		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	To learn the	concepts of	f transform	ation in com	nplex vai	riable.																		
CLR-3 :	To know how	to integrat	e the com	plex functio	n																			
CLR-4 :	To learn the	concepts of	f different f	ypes of sing	Jularities								ų			ity								
CLR-5 :	To learn the	calculation	of residue	s			(mool	y (%)	ıt (%)	e		ent	esearc			ainabil		Vork		eor				
CLR-6 :	To understan	d the evalu	ation of in	tegrals of di	fferent ty	pes	inking (B	Proficienc	Attainmer	Knowledg	nalysis	Developm	Jesign, Re	ol Usage	Culture	nt & Sust		& Team V	ation	t. & Finar	-earning			
Course Outcom	Learning nes (CLO):	At the end	of this co	urse, learne	rs will be	able to:	Level of Th	Expected F	Expected /	Scientific 1	Problem A	Design & D	Analysis, D	Modem To	Society & (	Environme	Ethics	Individual	Communic	Project Mg	Life Long L	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Explain the a	nalytic fund	tion and it	s properties			3	85	80	н	н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO-2 :	Explain the tr	ansformati	on concep	ts in comple	x variab	le.	3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-
CLO-3 :	-3 Explain several facts on complex integration						3	85	80	Н	н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO-4 :	0.4 Relate the singularities of different types and determine the power series expansion of Taylor's and Laurent's series.						3	85	80	Н	Н		М	-	-	-	-	М	L	-	Н	-	-	-
CLO-5 :	O-5 Evaluate the different types of real definite integrals.						3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-
CLO-6 :	LO-6 Explain the fundamental concepts in complex analysis such as analyticity transformation, singularities and contour integration.						3	85	80	М	н	-	-	-	-	-	-	М	-	-	Η	-	-	-

Dura (ho	ation our)	Module-I (18)	Module-II (18)	Module-III (18)	Module-IV (18)	Module-V (18)
C 1	SLO- 1	Complex function- Definition, examples.	Mappings Introduction	Integration of complex function	Power series	Residues -Definition
5-1	SLO- 2	Extended complex plane	Conformal Mapping	Simple curve	Radius of convergence of the power series	Calculation of residues
6.2	SLO- 1	Stereographic projection	Isogonal mapping	Contour integral	Taylors series	Calculation of residuesExamples
3-2	SLO- 2	Riemann Sphere	Magnification	Simple integral using definition	Taylors theoremproof	Problems based on residue
6.2	SLO- 1	Complex variable ,Limit of a function	Magnification and rotation	Definite integrals of function	Uniqueness theorem	Cauchy Residue theorem
5-3	SLO- 2	Continuity of a function	Inversion and reflection	Definite integrals problems.	Taylor's theorem-Examples	Cauchy Residue theorem with proof
C 4	SLO- 1	Theorems based on continuity	w=az+b transformation	. Definite integrals problems	Taylor's theorem-Examples.	Cauchy Residue theorem with proof
5-4	SLO- 2	Uniform continuity	,w=1/z transformation	Simply connected region	Zeros of an analytic function.	Problems based on Cauchy Residue theorem
0.5	SLO- 1	Differentiability of a function	Problems based on transformation	Cauchy fundamental theorem	Laurent's theorem with proof	Practice Problems
5-5	SLO- 2	Theorems based on differentiability	w=z <sup>2</sup> transformation	Integral along an arc joining two points	Laurent's theorem with proof	Problems based on Cauchy Residue theorem
0.0	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-0	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0.7	SLO- 1	Analyticity of a function	w= $\sqrt{z}$ transformation	Practice Problems	Laurent Series	Real definite integral
5-1	SLO- 2	2 differentiability transformation Cauchy goursat Problems based on theorem-statement theorem			Problems based on Laurent theorem	Real definite integral
S-8	SLO- 1	Sufficient condition for differentiability	W= e <sup>z</sup> transformation	Cauchy integral theorem	Problems based on Laurent theorem	Evaluation of Integral of the type $\int_{0}^{2\pi} f(\cos\theta, \sin\theta) d\theta.$

	SLO- 2	CR equations in polar form	Problems based on transformation	Problems based on theorem	Problems based on Laurent theorem	Evaluation of Integral of the type $\int_{0}^{2\pi} f(\cos\theta, \sin\theta) d\theta.$
	SLO- 1	Practice Problems	Theorems based on transformation	Practice Problems	Singularity-Definition	Practice Problems
S-9	SLO- 2	Harmonic function Definition, examples	Bilinear transformation	integral theorem for first derivatives	Singularity-Examples	Jordan's lemmaStatement
S-10	SLO- 1	Analytic function Properties	Cross ratio and its invariance property	Integral formula for nth derivative	Isolated Singularity- Definition	Evaluation of Integral of the type $\int_{-\infty}^{\infty} f(x) \sin ax dx a > 0$
	SLO- 2	Analytic function Properties	Theorems based on Bilinear transformation	Problems based on theorem	Isolated Singularity Examples	Evaluation of Integral of the type $\int_{-\infty}^{\infty} f(x) \sin ax dx a > 0$
0.11	SLO- 1	Problems based on properties	Theorems based on Bilinear transformation	Problems based on theorem	Removable Singularity- Definition	Practice Problems
5-11	SLO- 2	Harmonic conjugate	Theorems based on Bilinear transformation	Problems based on theorem	Removable Singularity - Example	Problems based on properties
S-12	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
0-12	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Determination of harmonic conjugate examples	Problems based on Bilinear transformation	Related integral theorem.	Essentialsingularity- Definition	Evaluation of Integral of the type $\int_{-\infty}^{\infty} f(x) \cos ax dx a > 0$
	SLO- 2	Determination of harmonic conjugate examples	Problems based on Bilinear transformation	Related integral theorem—Morera's theorem	Essential singularity- Examples	Evaluation of Integral of the type $\int_{-\infty}^{\infty} f(x) \cos ax dx a > 0$
C 14	SLO- 1	Construction of an Analytic function	Special Bilinear transformation	Related integral theorem—Liouville's theorem	pole-Definition	Practice Problems
5-14	SLO- 2	Construction of an Analytic function when real part is known	Practice Problems	Related integral theorem—Cauchy Inequality	Pole-examples	Problems on the above
S-15	SLO- 1	Problem on the above	Problem on the above	Problem on the above	Problem on the above	Evaluation of Integral of the type $\int_{-\infty}^{\infty} \frac{p(x)}{q(x)} dx$
	SLO- 2	More problems	More problems	More problems	More problems	More problems
S-16	SLO- 1	Construction of an Analytic function when real part is known.	Theorems based on special bilinear transformation.	Related integral theorem- Fundamental theorem of Algebra	Nature of singularities	Evaluation of Integral of the type $\int_{-\infty}^{\infty} \frac{p(x)}{q(x)} dx$
	SLO- 2	Construction of an Analytic function when imaginary part is known	Theorems based on special bilinear transformation	Poisson integral formula	Determination of Nature of singularities	Practice problems
0.47	SLO- 1	Construction of an Analytic function when imaginary part is known	Theorems based on special bilinear transformation	Maximum modulus principle	Nature of singularities problems	Evaluation of Integrals of the form $\int_{-\infty}^{\infty} f(x) dx$
5-17	SLO- 2	Construction of an Analytic function when imaginary part is known	Theorems based on special bilinear transformation	Maximum modulus principle with proof	Nature of singularities- problems	Evaluation of Integrals of the form $\int_{-\infty}^{\infty} f(x) dx$
	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

Learning Resources	<ol> <li>S.Narayanan and T.K.Manicavachagompillai, Complex Analysis, Revised Edition.S.Viswanathan Printers &amp; Publishers,2002</li> <li>P.Duripandian and LaxmiDuraipandian, Complex Analysis,EmeraldPublishers,Chennai, 2006.</li> <li>S.Ponnusamy,Foundations of Complex Analysis,Narosa Publishing House,New Delhi,2<sup>nd</sup> edition,2013.</li> <li>Murray R.Spiegel, Theory and problems of complex variable,Tata McGraw Hill Edition,New Delhi 2005</li> </ol>	<ol> <li>Janles Ward Brown and Kder V. Churchin, Complex Variables and Applications, 8th Ed.,McGraw – Hill International Edition, 2009.</li> <li>Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts inMathematics, Springer-Verlag New York, Inc., New York, 3<sup>rd</sup> edition 2010.</li> <li>J.N. Sharma, Functions of a Complex variable, Krishna Prakasan Media(P) Ltd, 13th Edition, 1996-97.</li> <li>B.S. Thagi, Functions of a Complex variable,Kedarnath Ramnath,Meerut,2015</li> </ol>
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Learning	Learning Assessment													
	<b>_</b>		Contin	uous Lea	arning As	sessmer	Final Francisco (FOO/ unightage)							
	Bloom's	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (50% weightage)				
	Lever of Thinking		Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice			
Remember		400/		200/		200/		200/		200/				
Level 1	Understand	40% -		30%	-	30%	-	30%	-	30%	-			
Lovel 2	Apply	100/	_	100/	_	40%	-	100/	<u>.</u>	10%				
Leverz	Analyze	40%	-	40%	-	40%	-	40 %	-	40%	-			
Lovel 2	Evaluate	- 20% -		200/		200/		200/		200/				
Level 3	Create			30%	-	30%	-	30%	-	30 %	-			
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %				

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Course Code	UMA20602T	Course Name			Mechar	ics		Cou Cate	rse gory	С	Professional Core Course					L 5	T 1	P 0	C 6							
Pre requis Cours	- site Nil ses			Co- requisite Courses	Nil			Pr	ogres Cours	ssive ses	Nil															
Course Depart	Offering ment	Math	ematics			Data Book / Codes/Standards																				
Course Rationa	Learning ale (CLR):	The	purpose o	f learning th	is course	e is to:			Lear	ning	]			Pro	ograr	n Le	arni	ng C	outco	mes	s (PL	(PLO)				
CLR-1 : CLR-2	To understand study simple h To relate the c	the conc armonic r concepts c	ept of sta notion and of impulse	tics and dyn its propert and familiar	amics w ies with the	hich will be able to characteristic of	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
CLR-3 : CLR-4	To learn conco To understance and trajectorie	astricity learn concepts related to spheres and properties understand concepts of motion and study in detail motion of a projectile											۲			ity										
CLR-5 : CLR-6	To learn the c	oncepts o	f central fo	orces and or	bit body		(Bloom)	tiency (%)	iment (%)	/ledge	SIS.	opment	n, Research	sage	e	Sustainabili		am Work		-inance	ing					
: Course Outcon	Learning nes (CLO):	At the end	I of this co	urse, learne	ers will be	e able to:	evel of Thinkir	Expected Profic	Expected Attair	scientific Know	roblem Analys	lesign & Devel	vnalysis, Desig	Aodem Tool U	society & Cultu	invironment &	thics	ndividual & Tea	Communication	Project Mgt. & F	ife Long Learn	SO - 1	SO - 2	SO – 3		
CLO-1 :	Acknowledge objects called	the existe simple ha	nce of the	mathematic otion	cal repre	sentation of physical	3	85	80	H	Н	L	•	-	-	-	-	M	L	-	Н	-	-	-		
CLO-2 :	Prior knowled	ge about t	he fundan	nentals of si	mple hai	monic motion	3	85	80	М	Н	-	М	М	-	-	-	М	-	-	Н	-	-	-		
CLO-3 :	Develop a bro spheres and e	elop a broad coverage of the topics on impulse, impulsive forces , eres and elasticity							80	н	Н	-		-	-	-	-	М	-	-	Н	-	-	-		
CLO-4 :	Examine the s	ignificanc	e of motio	n of a projec	ctile and	trajectories	3	, 85 80 H H H M M <sub>L</sub> -						Н	-	-	-									
CLO-5 :	Acquire skill a	nd sketch	es on cent	tral orbit and	l its prop	erties	3 85 80 M H L M					-	Н	-	-	-										
CLO-6 :	Know the func compound per of a rigid body	lamental o ndulum, p	concepts in eriod of os	n two dimen scillations, ce	sional rig entre of	gid body such as oscillations and axis	3	85	80	М	н	-	-	-	-	-	-	М	-	-	н	-	-	-		

Dura (ho	tion ur)	Module-I (18)	Module- II (18)	Module-III (18)	Module- IV (18)	Module-V (18)
	SLO- 1	Statics-ODE-Problems, examples.	Impact- Definition, Examples	Projectiles- Definition, Examples	Central Orbits- General Orbits- Definition, Examples	Two dimensional motion of a rigid body- Definition, Examples
S-1	SLO- 2	Statics-PDE- Problems, ,examples	Impulsive force- Impulse- Definition, Examples	Forces on a projectile- Horizontal range, Maximum height, time of flight,Range on an incline plane- Definition, Examples	Central force, conic, Equiangular spiral- Definition, Examples	Kinetic energy, Angular momentum , Moment of effective forces- Definition, examples
S-2	SLO- 1	Dynamics-Rigid bodies- Definition, examples	Conservation of linear momentum	Displacement as a combination of vertical and horizontal displacements- Definition, examples	Centre of force, polar coordinates- Definition, examples	Motion of a rigid body rotating about a fixed axis- Kinetic energy, angular momentum
	SLO- 2	Dynamics- Parallel axis, Hooke's law, examples	Kinetic energy generated impulsively	Nature of a trajectory- Definition, Examples	Apse, maximum and minimum angular velocity- Definition, Examples	Motion of a rigid body rotating about a fixed axis- Moment , angular velocity
	SLO- 1	Velocity- Velocity of a particle describing a circle , resultant velocity- Definition, Problems	Impact – More problems	Nature of a trajectory- Derive the path of a projectile is a parabola	Areal velocity, moment of momentum – Definition, examples	Motion of a rigid body rotating about a fixed axis- Practice problems
S-3	SLO- 2	Acceleration –Rectilinear motion, Rectilinear motion with a constant acceleration- Definition, Problems	Impact of spheres- Definition- examples	Height of the directrix, Distance of focus from the point of projection- Definition, examples	Coplanar motion- Definition, examples	Motion of a rigid body rotating about a fixed axis- Practice problems
S-4	SLO- 1	Newton's law of motion, Resultant of two forces on a particle- Definitions, Problems	Laws of impact- Law 1. Collision of two smooth spheres-	Nature of a trajectory- Derive the speed of a projectile at any point equals the speed falling from directrix	Velocity and acceleration in a coplanar motion- finding the components in two fixed perpendicular directions	Motion of a rigid body rotating about a fixed axis- more problems
	SLO- 2	Forces on a rigid body- Moment of a force- Definition, Examples	Laws of Impact – Law 2 – Newton's Experimental law, ideal cases	Motion of a projectile, Results pertaining to the motion of projectile- Definition, results	velocity and acceleration of a particle- radial and transverse directions	Motion of a rigid body rotating about a fixed axis- Practice more problems

	SI 0-	Equations of motion of a	Impact of two smooth	Motion of a projectile, Results pertaining to the	Central orbits- more	Compound pendulum, centre of
0.5	1	Kinetic energy of a rigid Direct and oblique body- Definitions, impacts Dofinition		motion of projectile- Definition, results	problems	Suspension, Deminion, examples
S-5	0.0	Kinetic energy of a rigid	Direct and oblique	Kinetic energy, potential	Central orbits- more	Period, simple equivalent pendulum,
	2	Examples	impacts- Definition, Examples	case of projective sum be	problems	centre of oscillation- Definition, examples
	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-6	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
	SLO- 1	Coplanar motion-Angular velocity- Definition, Examples	Direct impact of two smooth spheres- Definition, Examples	Maximum horizontal range for a given velocity- Definition, examples	Central orbit-practice problems	To find the Period of small oscillations of a compound pendulum
S-7	SLO- 2	Coplanar motion- velocity and acceleration in a coplanar motion- Definition, Examples	Direct impact of two smooth spheres – Derive the velocities of two smooth spheres between	Two trajectories with a given speed and range- Introduction	Central orbit- practice problems	Period of small oscillations- Problems
		Simple Harmonic motion-	them Two smooth spheres	Nature of a trajectory -	Central orbit- motion of a	
S_8	SLO- 1	Amplitude, Period, Phase- Definition, examples	collide directly- Derive its Impulse imparted to each sphere	more problems	particle subject to the action of a central force	Period is unaltered when the centre of suspension and oscillation are interchanged
0-0	SLO- 2	Simple Harmonic motion- Finding velocity and acceleration	Two smooth spheres collide directly- find the change in the total kinetic energy of the spheres	Nature of a trajectory - more problems	Central orbit- finding a central orbit is a plane curve	Finding minimum period of the compound pendulum
6.0	SLO- 1	Projection of a particle having a uniform circular motion - Problems	Direct impact of two smooth spheres- More problems	Nature of a trajectory - more problems	Differential equation of a central orbit in polar coordinates-the motion is a coplanar	Compound pendulum- More problems
3-9	SLO- 2	Composition of two simple harmonic motions of same period- Problems	Direct impact of two smooth spheres- More problems	Nature of a trajectory - more problems	Differential equation of a central orbit in polar coordinates- coplanar motion	Compound pendulum -Practice Problems
S-10	SLO- 1	Simple Harmonic motion along a horizontal line- Derive the motion of a light spiral spring pulled through a distance	Impact of a smooth sphere on a fixed plane- Introduction, Definition, examples	Projectile projected horizontally- Introduction	Differential equation for an attractive central force- Derivation	Compound pendulum- More problems
	SLO- 2	Simple Harmonic Motion along a horizontal line – Examples, Problems	Impact of a smooth sphere on a fixed plane- Problems	Projectile projected on an inclined plane- time of flight, range on the plane	Differential equation for an attractive central force – constancy of moment of momentum	Compound pendulum -Practice Problems
S-11	SLO- 1	Simple Harmonic Motion along a vertical line- Derive the motion of light elastic strings and earths gravitation	Direct impact of a smooth sphere on a plane- Definition, Examples	Maximum range on an inclined plane- finding angle between the inclined plane and the vertical line	Differential equation of a central orbit in p-r coordinates- Derivation	Reaction of the axis on a rigid body revolving around it
0-11	SLO- 2	Simple Harmonic Motion along a vertical line- Examples, Problems	Oblique impact of a smooth sphere on a plane- Definition, Examples	Maximum range down an inclined plane formula	Differential equation of a central orbit in p-r coordinates- finding equation for an attractive central force	Resultant reaction of the axis on the rigid body
-	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-12	SLO-	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
S-13	SLO- 1	Motion under gravity in a resisting medium- Definitions, examples	Direct impact of a smooth sphere on a plane-Derive its Velocity of rebound, impulse imparted to the sphere	Projectile projected on an inclined plane- more problems	Law of central force- Introduction, Inverse Square law	Reaction of the axis on a rigid body revolving around it- Problems
	SLO- 2	Resistance proportional to a square of velocity- Derive its motion of a particle	Direct impact of a smooth sphere on a plane-Derive its loss in Kinetic energy-	Projectile projected on an inclined plane- more problems	Method to find the central orbit	Reaction of the axis on a rigid body revolving around it- Problems
S-14	SLO- 1	Resistance proportional to a square of the speed- Derive its motion of a particle	Direct impact of a smooth sphere on a plane- More problems	Enveloping parabola or bounding parabola - Introduction	Central orbit of a particle under an attractive central force inversely as the square of the distance	Equation of motion for a two dimensional motion
0-14	SLO- 2	Motion under gravity in a resisting medium- Problems	Direct impact of a smooth sphere on a plane- More problems	Finding the envelope of a family of trajectories from a fixed point and constant velocity	Central orbit of a particle under an attractive force- find its nature of the orbit and critical velocity	Angular acceleration, point of contact, centre of mass- Definition, examples
S-15	SLO- 1	O- 1 Notion under gravity in a resisting medium- Problems Dane- Derive its		Trajectories touch the enveloping parabola- Remarks, examples	Central orbit and its nature in p-r coordinates	Motion of a uniform circular disc rolling down an inclined plane

			of rebound, impulse imparted to it , loss in kinetic energy			
	SLO- 2	Motion under gravity in a resisting medium- Problems	Oblique impact of a smooth sphere on a plane- more problems	Motion of a projectile- more problems	Central orbit of a particle under an attractive force varying as the distance	Motion of a uniform circular disc rolling down an inclined plane- Acceleration, distance travelled in time
	SLO- 1	Resistance proportional to velocity- Definitions, Examples	Oblique impact of a smooth sphere on a plane- more problems	Motion of a projectile- more problems	Central orbit under an attractive force- more problems	Motion of a uniform circular disc rolling down an inclined plane- Other rolling bodies
S-16	SLO- 2	Resistance proportional to velocity- Derive its motion fall rest, resistance varies as the speed.	Oblique impact of two smooth spheres- find the velocities of the spheres after impact	Moment of inertia- simple bodies- Definitions, Examples	Conic as a central orbit- Introduction, examples, problems	Motion of a uniform circular disc rolling down an inclined plane- Condition for rolling without sliding
S-17	SLO- 1	Resistance proportional to velocity- Derive its motion projected vertically upwards, whose resistance varies as the speed.	Oblique impact of two smooth spheres- find the impulse imparted of the spheres and change in kinetic energy due to impact	Moment of inertia - Perpendicular axis theorem- Statement only	Central orbit is a conic – find its law of force	Motion of a uniform circular disc rolling down an inclined plane- Problems
	SLO- 2	Resistance proportional to velocity- more Problems	Oblique impact of two smooth spheres- problems	Moment of inertia- Parallel axis theorem- statement only	Central orbit is a conic – find its speed of a particle	Motion of a uniform circular disc rolling down an inclined plane- Problems
0.40	SLO- 1	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session
5-18	SLO- 2	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session	Tutorial Session

	1.	M.K. Venkataraman, Statics, A. Rajhans Publications, 16th Edition,	3.	Naik, K.V and Kasi, M.S, Statics and Dynamics, Emerald
Learning		Meerut, 1990.		Publishers, 1992.
Resources	2.	A.V Dharmapadam, Mechanics, S. Viswanathan Printers and	4.	P. Duraipandian and others , S. Chand and company Pvt. Ltd., New
		Publishers, Chennai, 1991.		Delhi, 1979.

Learnin	g Assessment										
	Discusio		Continu	uous Lea	arning As	sessmen	it (50% we	eightage		Final Examination //	50% woightaga)
	BIOOM'S	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#		ou /o weigillage)
	Bomomhor		Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Lovel 1	Remember	10%		30%		30%		30%		30%	
Levei i	Understand	40 %	-	30%	-	30%	-	30%	-	30%	-
Lovel 2	Apply	10%		10%		10%		10%		10%	
Level Z	Analyze	40 %	-	40 %	-	40%	-	40%	-	40%	-
	Evaluate	200%		30%		30%		30%		30%	
Level 3	Create	20%	-	30%	-	30%	-	30%	-	30 %	-
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	0

Course Designers		
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	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. G. Sheeja, SRMIST

Course Code	UMA20D10L	Course Name		Project	Work	Course Category D		Discipline Specific Elective	L 0	T 0	P 12	C 6
Pre- requis Cours	ite <i>Nil</i> es		Co- requisite Courses	Nil		Progres Cours	ssive ses	Nil				
Course Departm	Offering nent	Mathematics			Data Book / Codes/Standards	Nil						

## Assessment Method

	Continuous Learning Assessme	ent (50% weightage)	Final Evaluation (	50% weightage)
	Deview 1	Deview 9	Draiget Depart	
Project Work	Review – 1	Review – 2	Project Report	viva-voce
	20%	30 %	30 %	20 %

Cours Code	e UMA2	DA01T	Course Name		Allied Mathematics-I			Co Cat	ourse egory	G	i		Ge	nerio	c Ele	ective	e Co	urse	)		L <sup>-</sup> 3 (	í F ) (	) (
Pre- requis Cours Course Departr	- site Nil ses Offering ment	N	IATHEMATIC	Co- requisite Courses S	Nil Data Book / Codes/Standards		P	Progre Cours	ssive ses	Nil													
Course Rationa	Learning ale (CLR):	The p	urpose of lear	ning this cou	urse is to:	L	earn	ning				Pro	grai	n Le	arni	ng C	Outco	omes	s (PL	.0)			
CLR-1	Understand	the con	cept of sets, r	elations and	I functions	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1
CLR-2	Gain knowl	edge on	the basics of	logic																			
CLR-3	Obtain the	knowled	lge on polyno	mial equatio	ns																		
CLR-4	gain knowle	edge on	Matrices and	its applicatio	ons										1								
CLR-5	comprehen	d the wo	orking principle	e of various	calculus techniques	(mo	(%)	(%)	ge		۲.	search			inability		urk		е				
CLR-6 :	Understand	various	Mathematica	l evaluation	procedure	ng (Blo	ciency	nment	Jowled	sis	lopmer	gn, Res	sage	ar	Sustai		am Wc	c	Finano	ning			
						inki	lo	<b>tta</b> i	g Kr	Jaly	eve	esic	이이	Cultu	nt &		Te	atio	∞ŏ	ean			

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Course Outcor	e Learning nes (CLO):	At the end of this course, learners will be able to:	Level of 1	Expected	Expected	Engineeri	Problem ,	Design &	Analysis,	Modem T	Society &	Environm	Ethics	Individual	Commun	Project M	Life Long	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Acquire the k	nowledge on sets and functions	3	80	85	М	Н	-	-		-	-	-	-	-	-	Η	-	-	-
CLO-2 :	Gain the abil	ty to identify science and engineering problems logically	1	75	80	М	Н	-	1	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Understand t	he basic ideas about polynomial equations	3	85	80	М	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Appreciate th	e concepts of Matrices in real life situations	3	80	75	М	Н	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Apply the kno	owledge of different calculus techniques	1	75	85	М	-	-	Η	-	-	-	-	-	-	-	-	-	-	-
CLO-6	obtain the kn	owledge on Mathematical evaluation method	3	80	85	М	-	-	-	-	-	-	-	-	-	-	H	-	-	-

Du (H	ration lour)	Module 1 (9)	Module 2 (9)	Module 3 (9)	Module 4 (9)	Module 5 (9)
C 1	SLO- 1	Sets - sets definition and representation of sets	Statements	Polynomial equations	Symmetric matrices,	Introduction to calculus
3-1	SLO- 2	Examples for sets and representations	Examples for statements	Examples for Polynomial equations	Skew symmetric matrices	Differential calculus - Introduction
	SLO- 1	Types of sets, operation on sets, Venn diagram	connectives, conjunction	Irrational roots	Hermitian, skew Hermitian matrices	Maxima and minima- Introduction
S-2	SLO- 2	Examples for types of sets and operations on sets	Examples for connectives, conjunction	Problems on irrational roots	Examples for different types of matrices	Simple problems on maxima and minima of functions of single variable
	SLO- 1	Relation - Types of Relation	Disjunction, negation	complex roots(up to third order equations only)	Orthogonal, Unitary matrices	More problems on maxima and minima
S-3	SLO- 2	Examples for types of relation	Examples for Disjunction, negation	Problems on equations with complex roots	Examples for Orthogonal, Unitary matrices	More problems on maxima and minima
c 1	SLO- 1	Equivalence Relation	Tautology, Contradiction	Reciprocal equations	Cayley Hamilton Theorem	More problems on maxima and minima
3-4	SLO- 2	Examples and problems on equivalence relation	Problems on tautology, contradiction	Problems on reciprocal equation	Problems on Cayley Hamilton Theorem	Radius of curvature – Introduction
S-5	SLO- 1	Function - Introduction	logical equivalence	Approximation of roots of a polynomial equation	Problems on Cayley Hamilton Theorem	Problems on Radius of curvature- Cartesian co – ordinate
	SLO- 2	Types of functions	Examples for logical equivalence	Newton's Method- Introduction	Eigen values- Eigen vectors	Problems on Radius of curvature
	SLO- 1	Problems for different functions	tautological implications	Newton's method- Finding positive roots	Problems on Eigen values– Eigen vectors	More problèmes on radius of curvature
S-6	SLO- 2	Composite of two functions	Examples for tautological implications	More problems Newton's method- Finding positive roots	Problems on Eigen values– Eigen vectors	Partial differentiation
S.7	SLO- 1	Examples for composite functions	arguments , Validity of arguments	Problems on Newton's method- Finding reciprocal of a given number	Problems on Eigen values– Eigen vectors	Problems on partial differentiation
3-1	SLO- 2	Composite of three functions	Normal forms	Problems on Newton's method- Finding Square root of a given number	Problems on Eigen values– Eigen vectors	More problems on partial diferentiation

<b>.</b> .	SLO- 1	Exan three	nples for composite of functions	Principal disjunctive normal form	Horner's met	nod-	Cramer's rule-Introduction	Euler's theorem- Introduction			
5-0	SLO- 2	Prob	lems on functions	Problems for pdnf	Horner's met positive roots	nod Finding	Solving system of linear equations- Crammer's rule	Problems on Euler's theorem			
SLO- Prol 1 two			lems on composite of functions	Principle conjunctive normal form	Problems on method- findi between give	Horner's ng roots n values	Problems on Crammer's rule	More Problems on Euler's theorem			
3-9	S-9 SLO- P 2 th		lems on composite of functions	Problems for pcnf	More Problen method	ns on Horner's	More Problems on Crammer's rule	More Problems on Euler's theorem			
		1.	T. Veerarajan, Discrete	Mathematics, 7th Edition, Tat	a-Mcgraw	3. P. R. Vittal, A	Reprint, Margham				
Lea	rning	ng hill, New Delhi, 2006. Publications, Chennai, 2013.					nennai, 2013.				
Res	ources	2.	A. Singaravelu, ALLIEL	MATHEMATICS, 3rd Edition	, Meenakshi	s, 1st Edition Reprint,					
			Agency, Cheminal, 2011	•		ivial griatti Fubli					

Learnin	g Assessment										
			Contin	uous Lea	arning As	sessmer	it (50% we	eightage)	)	Einal Examination //	50% weightege)
	Bloom's Level of Thinking	CLA –	1 (10%)	CLA –	2 (10%)	CLA –	3 (20%)	CLA –	4 (10%)#	Final Examination (	50% weightage)
	Lover of finitiality	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Lovel 1	Remember	400/		200/		200/		200/		200/	
Leveii	Understand	40 %	-	30%	-	30%	-	30%	-	30%	-
Lovel 2	Apply	10%		10%		10%		10%		40%	
Leveiz	Analyze	40 %	-	40 %	-	40%	-	40%	-	40%	-
Lovol 3	Evaluate	20%		30%		30%		30%		30%	
Level 3	Create	2070	-	30 /6	-	30%	-	50%	-	50 %	-
	Total	10	0 %	10	0 %	10	0 %	1(	00 %	100 %	0

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. V. Maheshwaran, Cognizant Technology Solutions maheshwaranv@yahoo.com	Prof. Y.V.S.S. Sanyasiraju, IIT Madras, sryedida@iitm.ac.in	Dr. A. Govindarajan, SRMIST Prof. K.S. Ganapathy Subramanian, SRMIST
	Prof. B. V. Rathish Kumar, IIT Kanpur, bvrk@iitk.ac.in	Dr. N. Balaji, SRMIST Dr. P. Sampath, SRMIST

Course Code	UMA20A02T	Course Name	Allied Mathematics II					Cour Categ	rse gory	G	Generic Elective Course L T 3 0					P 0	C 3							
Pre- requisi Course	Pre- equisite UMA20A01T requisite Nil Courses Courses								ogres Cours	sive es	Nil													
Course Departn	Offering nent	Math	ematics			Data Book / Codes/Standards																		
Course Learning Rationale (CLR): The purpose of learning this course is to:									Learr	ning				Pro	grar	n Le	arnii	ng C	Outco	omes	s (PL	.0)		
CLR-1 :	To understand the basics of integration.						1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-2 :	To learn the f	undament	al concept	t of Trigonor	netry.																			
CLR-3 :	Understand to solve ordinary differential equations.												ų			lity								
CLR-4 :	To understand concepts of Laplace Transform and its properties.						(mool	(%) (i	nt (%)	je		lent	esearc			tainabi		Vork		JCe				
CLR-5 :	To learn the concepts of inverse Laplace Transform.						king (B	oficienc	ainmer	owledg	lysis	velopm	sign, R	Usage	lture	& Sus		Feam V	ion	& Finaı	arning			
Course Outcom	Learning es (CLO):	At the end of this course, learners will be able to:				-evel of Thin	Expected Pro	Expected Att	Scientific Kn	Problem Ana	Design & De	Analysis, De	Modem Tool	Society & Cu	Environment	Ethics	ndividual & <sup>-</sup>	Communicat	Project Mgt.	-ife Long Lea	-SO - 1	-SO - 2	-SO - 3	
CLO-1 :	Students will able to apply the concepts of integral calculus, in finding area, surfaces, volume of the solid.						3	85	80	Н	Н	L	-	-	-	-	-	М	L	-	Н	-	-	-
CLO-2 :	2 Students will able to be familiar with Trigonometry.						3	85	80	М	Н	-	М	М	-	-	-	М	-	-	н	-	-	-
CLO-3 :	Students will understand the concept of second order differential equations with constant coefficient and applying in mechanics and dynamics.						3	85	80	Н	Н	-		-	-	-	-	М	-	-	Н	-	-	-
CLO-4 :	Students are able to understand the concept of Laplace transformation and applying in Science and Engineering						3	85	80	Н	Н	Н	М	-	-	-	-	М	L	-	Н	-	-	-
CLO-5 :	Students are able to understand the concept of Inverse Laplace transformation and applying in Science and Engineering.						3	85	80	М	Н	L	-	-	-	-	-	М	-	-	Н	-	-	-

Du (ł	ration nour)	9	9	9	9	9		
S-	SLO- 1	Integral calculus-Basic integral formulae.	Expansion of $\sin n\theta$ , $\cos n\theta$ in powers of $\sin \theta$ and $\cos \theta$ , where n being a positive integer.	Introduction to second order differential equations with constant coefficients.	Introduction to Laplace Transforms	Introduction t Inverse Laplace Transforms		
1	SLO- 2	Problems related to integral formulae.	Expansion of $\tan n\theta$ .	Finding the order and degree of the differential equations.	Standard results of Laplace transforms	Standard results of Inverse Laplace transforms		
S-	SLO- 1	Integrals of the type $\int \frac{dx}{ax^2 + bx + c}$	$\frac{dx}{dx^2 + bx + c}$ Problems based on $\sin n\theta$ Solution of the differential equation – Complementary function and particular function. Derivation of the standard results of Laplace transforms.					
2	SLO- 2	Problems related to the above integral type.	Problems based on $\sin n \theta$	Problems based on $(aD^2 + bD + c)y = 0$	sed on Derivation of the standard results of Laplace transforms.			
S-	SLO- 1	Integrals of the type $\int \frac{px+q}{ax^2+bx+c} dx$	Additional problems based on $\sin n \theta$	Additional problems on $(aD^2 + bD + c)y = 0$	Simple problems based on results.	Simple problems based on results.		
3	SLO- 2	Problems related to the above integral type.	Problems based on $\cos n \theta$	Problems based on $(aD^2 + bD + c)y = e^{ax}$	Simple problems based on results.	Simple problems based on results.		
S- 4	SLO- 1	Integrals of the type $\int \frac{dx}{\sqrt{ax^2 + bx + c}}$	Problems based on $\cos n \theta$	Additional problems on $(aD^2 + bD + c)y = e^{ax}$	Properties of Laplace Transforms.	Simple problems based on results.		
	SLO- 2	Problems related to the above integral type.	Additional problems based on $\cos n  heta$	Problems based on $(aD^2 + bD + c)y = \sin ax$	Properties of Laplace Transforms.	Inverse Laplace transforms of $sF(s)$		
	SLO- 1	Integrals of the type $\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$	Problems based on $\cos n\theta$ and $\tan n\theta$	Problems based on $(aD^2 + bD + c)y = \sin ax$	Problems related to the properties of Laplace transforms.	$\begin{array}{lll} {\sf Problems} & {\sf based} & {\sf on} \\ {\sf L}^{-1}[{\sf s}{\sf F}({\sf s})] \end{array}$		
S- 5	SLO- 2	Problems related to the above integral type.	Expansion of $\sin^n \theta$ and $\cos^n \theta$ interms of multiples of $\sin \theta$ and $\cos \theta$ where $n$ being a positive integer.	Additional problems based on $(aD^2 + bD + c)y = \sin ax$	Problems related to the properties of Laplace transforms.	Additional problems on $L^{-1}[s F(s)]$		

	SLO- 1	Integration by Partial fraction method (Simple algebraic functions only)	Problems based on $\sin^n \theta$ interms of $\sin \theta$ .	Additional problems based on $(aD^2 + bD + c)y = \sin ax$	Additional problems related to the first shifting property.	Inverse Laplace transforms of $\frac{F(s)}{s}$	
S- 6	SLO- 2	Problems related to the partial fraction method.	Problems based on $\sin^n \theta$ interms of $\cos \theta$ .	Problems based on $(aD^2 + bD + c)y = \cos ax$	Laplace transform of tf(t)	Problems based on $L^{-1}\left[\frac{F(s)}{s}\right]$	
S-	SLO- 1	Additional problems related to the partial fraction method.	Problems based on $\sin^n \theta$ interms of $\cos \theta$ .	Additional problems based on $(aD^2 + bD + c)y = \cos ax$	Problems on Laplace transform of $tf(t)$	Additional problems based on $L^{-1}\left[\frac{F(s)}{s}\right]$	
7	SLO- 2	Bernoulli's formula and related problems.	Problems based on $\cos^n \theta$ interms of $\cos \theta$ .	Additional problems based on $(aD^2 + bD + c)y = \cos ax$	Problems on Laplace transform of $\frac{f(t)}{t}$	Inverse Laplace transforms -partial fraction method	
	SLO- 1	Reduction formula for $\int \sin^n x  dx$	Problems based on $\cos^n \theta$ interms of $\cos \theta$ .	Problems based on $(aD^2 + bD + c)y = x^n$	Additional problems on Laplace transform of $\frac{f(t)}{t}$	Partial fraction method- Related problems.	
S- 8	SLO- 2	Evaluation of $\int_{0}^{\frac{\pi}{2}} \sin^{n} x  dx$	Problems based on $\sin^n \theta$ $\cos^n \theta$ interms of multiples of $\sin \theta$ and $\cos \theta$	Additional problems on $(aD^2 + bD + c)y = x^n$	Problems on Laplace transform of t e <sup>at</sup> f (t)	Additional problems on partial fraction method.	
c	SLO- 1	Reduction formula for $\int \cos^n x  dx$	Problems based on $\sin^n \theta$ $\cos^n \theta$ interms of multiples of $\sin \theta$ and $\cos \theta$	Additional problems on $(aD^2 + bD + c)y = x^n$	Additional problems on Laplace transform of $t e^{at} f(t)$	Additional problems on partial fraction method.	
9	SLO- 2	Evaluation of $\int_{0}^{\frac{\pi}{2}} \cos^{n} x  dx$	Problems based on $\sin^n \theta$ $\cos^n \theta$ interms of multiples of $\sin \theta$ and $\cos \theta$	Additional problems on $(aD^2 + bD + c)y = x^n$	Additional problems on Laplace transform of $t e^{at} f(t)$	Additional problems on partial fraction method.	

Learning Resources	1. 2. 3. 4.	Singaravelu. A, Allied Mathematics, 6th Revised Edition, Meenakshi Agency, 2014. Vittal. P.R, Allied Mathematics, 4th Edition Reprint, Margham Publications, 2013. Venkatachalapathy, S.G, Allied Mathematics, 1st Edition Reprint, Margham Publications, 2007. T.K. Manickavasagam Pillai and S. Narayanan, Ancillary Mathematics, Reprint, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.	5. 6. 7.	<ul> <li>E. Kreyszig, Advanced Engineering Mathematics, John Wiley &amp; Sons. Singapore, 10th edition, 2012.</li> <li>T. Veerajan, "Engineering Mathematics I", Tata McGraw Hill Publishing Co., New Delhi, 5th edition, 2006.</li> <li>B.S. Grewal, Higher Engineering Mathematics, Khanna Publications, 42nd Edition, 2012.</li> </ul>
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Learning Assessment															
	Discusto		Contin	uous Lea	arning Ass	sessmer	Final Examination (50%) weighters)								
	Bloom's	CLA –	1 (10%)	CLA – 2 (10%)		CLA – 3 (20%)		CLA –	4 (10%)#	Final Examination (50% weightage)					
	Lever of Thinking	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice				
	Remember	100/		200/		200/		200/		200/					
Level I	Understand	40%	-	30 %	-	30 %	-	30%	-	50%	-				
	Apply	100/	400/	100/	100/	400/		40%		40%		400/		409/	
LEVEIZ	Analyze	40 /0	-	40 %	-	40 /0	-	40 /0	-	40%	-				
	Evaluate	200/		200/	-	200/		200/		200/					
Creat	Create	20%	-	30%		30%	-	30%	-	30 %	-				
	Total	10	0 %	10	0 %	10	0 %	10	00 %	100 %	0				

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