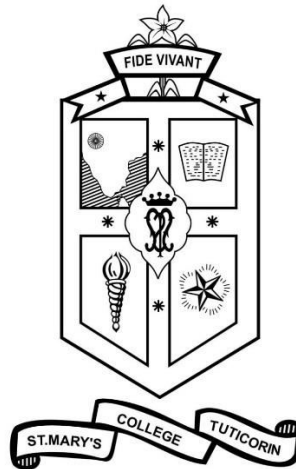


ST. MARY'S COLLEGE (AUTONOMOUS)

Re-accredited with A+ Grade by NAAC

Thoothukudi – 628001, Tamil Nadu

(Affiliated to Manonmaniam Sundaranar University)



Syllabus

B.Sc. Mathematics

School of Computing Sciences

Outcome Based Curriculum

(w.e.f. 2021)

Preamble

Mathematics, the foundation of all sciences is a subject which offers limitless scope for diversification in higher education. The improvements and achievements in various fields are the gift of Mathematics. The world of education without mathematics would be non-existent. The fields of Information Technology, Social Research and Economic forecasts will not be successful but for the effective application of Mathematics. The demand for courses in Mathematics is bound to be consistent, continual and increasing.

Vision

To promote and support a comprehensive, innovative and dynamic learning environment that meets the changing needs of a diverse global student population.

Mission

- To provide an exemplary mathematics programme that prepares students to be life-long learners and responsible, numerate citizens.
- To enhance the students logical, reasoning, analytical and problem solving skills.
- To provide meaningful support services, responds to the changing environment of mathematics education.
- To promote effective instructional strategies with students actively participating in the learning process.

Programme Outcome

PO.No	Upon completion of B.Sc Degree programme, the graduates will be able to
PO 1	apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.
PO 2	inculcate innovative skills and team – work among students to meet societal expectations.
PO 3	perform analysis to assess, interpret, and create innovative ideas through practical experiments.
PO 4	facilitate to enter multidisciplinary path to solve day-to-day scientific problems.
PO 5	carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.
PO 6	improve communication ability and knowledge transfer through ict aided learning integrated with library resources.
PO 7	transfer the knowledge to the other stakeholders through extensive community development programme.
PO 8	attain competency in job market / entrepreneurship.
PO 9	focus on developing domain specific language skills and knowledge of the students.

Programme Specific Outcome

PSO No.	Upon completion of the B.Sc. Mathematics program, students will be able to:	PO Mapped
PSO-1	understand the foundations of mathematics and perform basic computations in higher mathematics.	PO - 1
PSO-2	understand the power of abstraction and generalization and to carry out investigative and mathematical work with independent judgement.	PO - 3
PSO-3	communicate mathematical ideas, develop proficiency in the analysis of problems and use mathematical or other appropriate techniques to solve them.	PO – 6,7
PSO-4	apply mathematical ideas to model real-world problems.	PO - 4
PSO-5	apply rigorous, analytic, highly numerate approach to analyze, execute tasks and solve problems in daily life and at work.	PO - 2
PSO-6	appreciate the role of mathematical proof as a means of conveying mathematical knowledge.	PO - 1
PSO-7	carry out objective analysis and prediction of quantitative information with independent judgement.	PO - 5
PSO-8	create, use and analyze graphical representation of mathematical relationships	PO – 3
PSO-9	develop language communication skills.	PO – 9

Department of Mathematics
Course Structure (w.e.f. 2021)
Semester I

Part	Components	Sub. Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil	21ULTA11	அக்காலஇலக்கியம் செய்யுள், இலக்கணம், இலக்கியவரலாறு,உரைநடை சிறுகதை	6	3	40	60	100
	French	21ULFA11	Introductory French Course					
II	General English	21UGEN11	Poetry, Prose, Extensive Reading and Communicative English – I	6	3	40	60	100
III	Core I	21UMAC11	Classical Algebra	4	3	40	60	100
	Core II	21UMAC12	Calculus	4	3	40	60	100
	Allied I	21UPHA11	Allied Physics	4	3	40	60	100
	Allied Practical I	21UPHAR1	Allied Physics	2	--			
IV	Skill Enhancement Course – I	21UMAPE1	Professional English for Mathematics - I	2	2	20	30	50
	Ability Enhancement Course – I	21UAVE11	Value Education	2	2	20	30	50
Total				30	19			

Semester II

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil	21ULTA21	சமய இலக்கியங்களும் நீதி இலக்கியங்களும், செய்யுள் இலக்கணம், இலக்கியவரலாறு, உரைநடை, வாழ்க்கை வரலாறு	6	3	40	60	100
	French	21ULFA21	Intermediate French Course					
II	General English	21UGEN21	Poetry, Prose, Extensive Reading and Communicative English – II	6	3	40	60	100
III	Core III	21UMAC21	Analytical Geometry of Three Dimensions	4	3	40	60	100
	Core IV	21UMAC22	Differential Equations	4	3	40	60	100
	Allied II	21UPHA21	Allied Physics II	4	3	40	60	100
	Allied Practical I	21UPHAR1	Allied Physics Practical	2	2	40	60	100
IV	Skill Enhancement Course – I	21UMAPE2	Professional English for Mathematics - II	2	2	20	30	50
	Ability Enhancement Course – II	21UAEV21	Environmental Studies	2	2	20	30	50
Total				30	21			

Semester III

Part	Components	Course Code	Course Title	Hrs/Week	Credit	Max.Marks		
						CIA	ESE	Total
I	Tamil	21ULTA31	காப்பிய இலக்கியம்: செய்யுள்,இலக்கணம், உரைநடை,சிறுகதை, இலக்கியவரலாறு	6	4	40	60	100
	French	21ULFA31	Advanced French Course					
II	General English	21UGEN31	Poetry, Prose, Extensive Reading and Communicative English – III	6	4	40	60	100
III	Core V	21UMAC31	Sequences and Series, Trigonometry	6	5	40	60	100
	Allied III	21UMMA31	Statistics I	6	4	40	60	100
	Skill Based Elective	21UMAS31/ 21UMAS32	Introduction to Python Programming/Quantitative Aptitude-I	2	2	20	30	50
	NME I	21UMAN31	Mathematics for Competitive Examinations I	2	2	20	30	50
IV	Ability Enhancement Course – III	21UAWS31	Women’s Synergy	2	2	20	30	50
	Self Study Course / /On-line Course/ Internship(Compulsory)	21UMASS1/	Fundamentals of Mathematics		+2		50	50
Total				30	23+2			

Semester IV

Part	Components	Course Code	Course Title	Hrs We	Credits	Max.Marks		
						CIA	ESE	Total
I	Tamil	21ULTA41	சங்க இலக்கியம்: செய்யுள், இலக்கணம்,உரைநடை,வாழ்க்கைவரலாறு, இலக்கியவரலாறு	6	4	40	60	100
	French	21ULFA41	Language through Literature					
II	General English	21UGEN41	Poetry, Prose, Extensive Reading and Communicative English-IV	6	4	40	60	100
III	Core VI	21UMAC41	Modern Algebra	6	5	40	60	100
	Allied IV	21UMMA41	Statistics II	6	4	40	60	100
	Skill Based Elective	21UMAS41/	Documentation using LaTeX/	2	2	20	30	50
		21UMAS42	Quantitative Aptitude-II					
NME II	21UMAN41	Mathematics for Competitive Examinations II	2	2	20	30	50	
IV	Ability Enhancement Course – IV	21UAYM41	Yoga & Meditation	2	2	20	30	50
	Self Study / On-line Course/ Internship(Optional)	21UMASS2/ 21UMAM41/ 21UMAI41	Industrial Mathematics		+2		50	50
V	NCC, NSS & Sports				1			
	Extension Activities CDP				+1			
Total				30	24+3			

Semester V

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
	Core VII (Common Core)	21UCMC51	Computer Oriented Numerical Methods	6	5	40	60	100
III	Core VIII	21UMAC51	Linear Algebra	5	4	40	60	100
	Core IX	21UMAC52	Graph Theory	5	4	40	60	100
	Core X	21UMAC53	Real Analysis	4	4	40	60	100
	Core XI	21UMAC54	Vector Calculus and Fourier Series	4	4	40	60	100
	Core Elective	21UMAE51/ 21UMAE52	Discrete Mathematics / Transforms	4	4	40	60	100
IV	Common Skill Based	21UCSB51	Computers for Digital Era and Soft Skills	2	2	20	30	50
	Self Study or On-line Course (Optional)	21UMASS3/ 21UMAM51	Astronomy	--	2		50	50
Total				30	29			

Semester VI

Part	Components	Course Code	Course Title	Hrs/ Week	Credits	Max.Marks		
						CIA	ESE	Total
III	Core XII	21UMAC61	Complex Analysis	6	5	40	60	100
	Core XIII	21UMAC62	Modern Analysis	6	5	40	60	100
	Core XIV	21UMAC63	Mechanics	6	5	40	60	100
	Core XV	21UMAC64	Operations Research	6	5	40	60	100
IV	Core XVI / Project	21UMAC65/ 21UMAP61	Coding Theory/ Project	6	4	40	60	100
Total				30	24			
Total				180				

Semester	Hours	Credits	Extra Credits
I	30	19	---
II	30	21	---
III	30	23	2
IV	30	24	3
V	30	29	--
VI	30	24	--
Total	180	140	5

Courses	Number of Courses	Hours / week	Credits	Extra Credits
Tamil	4	24	14	--
English	4	24	14	--
Core	15	76	63	--
Skill Based Elective	2	4	4	--
Core Elective	1	4	4	--
Group Project	1	6	4	--
Allied	4T+1P	20T+4P	14T+2P	--
NME	2	4	4	--
Skill Enhancement Course	2	4	4	--
Ability Enhancement Course	4	8	8	--
Common Skill Based	1	2	2	--
NCC, NSS & Sports		--	1	
Extension Activities		--		1
Self Study Papers (Optional)	1	--		2
Self Study Papers (Compulsory)	1	--	2	--
Field Project				2
Total		180	140	5

SEMESTER - 1**Part – 1** பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம்
(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)**Course Code: 21ULTA11 | Hrs/Week:6 | Hrs/Semester: 90 | Credits: 3****Objectives:**

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.
- இலக்கிய மாந்தரின் வாழ்க்கை அனுபவங்கள் மூலம் வாழ்வில் பிரச்சனைகளை எதிர்கொள்ளும் திறம், தன்னம்பிக்கை, ஆளுமைத்திறம், மொழிஅறிவு இவற்றை உருவாக்குதல்.

Course Outcome:

CO.NO	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	பெண் சார்ந்த விடுதலை உணர்வை வளர்க்கிறது.	வளர்ச்சி
CO-2	பொதுமைச் சிந்தனையை வளர்க்கிறது	வளர்ச்சி
CO-3	இனம் சாதி குறித்த பாகுபாட்டிலிருந்து விடுதலை பெறும் வழிவகைகளைக் கற்றுக்கொடுக்கிறது.	நடைமுறைப்படுத்துதல்
CO-4	இயற்கையைப் பேணுதற்கும் வாழ்வின் வளர்ச்சி நிலையை மேம்படுத்திக் கொள்ளுதற்கும் உதவுகிறது.	நடைமுறைப்படுத்துதல்
CO-5	சமய நல்லிணக்கம், ஒற்றுமை உணர்வு, இறை நம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-6	மொழியைப் பிழையின்றி பேசவும் எழுதவும் உதவுகிறது.	புரிதல் திறன் மேம்பாடு
CO-7	எதார்த்த வாழ்வை மேற்கொள்ள உதவுகிறது.	புரிதல் திறன் மேம்பாடு
CO-8	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது.	நடைமுறைப்படுத்துதல்
CO-9	சமுதாயப் பிரச்சனைகளை எதிர்கொள்ளும் திறம் கிடைக்கிறது.	நடைமுறைப்படுத்துதல்
CO-10	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல் திறன் மேம்பாடு

SEMESTER - 1			
Part – 1 பொதுத்தமிழ் தாள் - 1 இக்கால இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, சிறுகதை)			
Course Code: 21ULTA11	Hrs/Week:6	Hrs/Semester: 90	Credits: 3

அலகு – 1 செய்யுள் - 2 மணி

1. தமிழ்மொழி வாழ்த்து – பாரதியார்
2. புதுமைப் பெண் - பாரதியார்
3. புதிய உலகு செய்வோம் - பாரதிதாசன்
4. உலகை மாற்றுவோம் - கவியரசு முடியரசன்
5. கண்ணீரின் இரகசியம் - அப்துல் ரகுமான்
6. மரங்கள் - மு.மேத்தா
7. கால வித்தியாசம் - வைரமுத்து
8. வையத்தை வெற்றி கொள்ள - சி.சிவரமணி
9. கவிதைப் பூங்காடு – பா.விஜய்
10. பெண் இனமே – மைத்ரேயி
11. ஹைக்கூ கவிதைகள்
12. நாட்டார் பாடல்கள்

அ. தாலாட்டுப் பாடல்

ஆ. மீனவர் பாடல்

அலகு - 2 இலக்கணம் - 1 மணி

எழுத்து

1. எழுத்து - விளக்கம்,
2. முதலெழுத்துகள், சார்பெழுத்துகள்
3. சுட்டெழுத்துகள், வினா எழுத்துகள்
4. மொழி முதல் எழுத்துகள், மொழி இறுதி எழுத்துகள்
5. வல்லினம் மிகும் இடங்கள், வல்லினம் மிகா இடங்கள்
6. மொழிப்பயிற்சி : புதுக்கவிதை, சிறுகதை,
பத்திரிகைக்குச் செய்தி அனுப்புதல்

அலகு - 3 இலக்கிய வரலாறு - 1 மணி

1. புதுக்கவிதை தோற்றமும் வளர்ச்சியும்
2. சிறுகதை தோற்றமும் வளர்ச்சியும்
3. உரைநடை தோற்றமும் வளர்ச்சியும்
4. நாட்டுப்புற இயல் அறிமுகம்

அலகு - 4 உரைநடை - 1 மணி

நீயே வெல்வாய் - க.ப.அறவாணன்

அலகு - 5 சிறுகதை - 1 மணி

1. கேதாரியின் தாயார் - கல்கி
2. விடியுமா? - கு.ப.ராஜகோபாலன்
3. காலனும் கிழவியும் - புதுமைப்பித்தன்
4. கருப்பண்ணசாமி யோசிக்கிறார் - அறிஞர் அண்ணா
5. நாற்காலி - கி.ராஜநாராயணன்
6. ராஜா வந்திருக்கிறார் - அழகிரி சாமி
7. ஜோடிப் பொருத்தம் - ஜெயரதி அகஸ்டின்

I B.A., / B.Sc Part I FRENCH

SEMESTER – I			
PART – I French Paper – I Introductory French Course			
Course Code :21ULFA11	Hrs/week : 6	Hrs/ Sem : 90	Credits : 3

Objectives

To initiate a beginner to the francophonic world and to train them to make their maiden efforts in spoken and written French.

To create a number of real-life situations to make the learner express herself in the target language through experiential teaching method.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	greet and introduce oneself and others	Kn, Ap
2.	fill an identity form	Ap, Cr
3.	ask, give and understand directions	Kn, Ap
4.	frame a questionnaire	Cr
5.	place order in a restaurant	Ap, Cr
6.	tell and understand opening and closing time	Kn
7.	express likes and dislikes	Ap
8.	describe an object and to say what it serves for	Kn, Un
9.	ask and say a price of a product	Ap
10.	understand the French and francophonic lifestyle	Kn

SEMESTER – I			
PART – I French Paper – I Introductory French Course			
Course Code :21ULFA11	Hrs/week : 6	Hrs/ Sem : 90	Credits : 3

Unit 1 – Bienvenue !

- 1.1- Une introduction à la langue française
- 1.2 – Les Salutations
- 1.3 – Les pronoms
- 1.4 – Les couleurs
- 1.5 – Dans la classe

Unit 2 – Et vous ?

- 2.1 – Se présenter, demander de se présenter
- 2.2 – Donner des informations personnelles
- 2.3 – Demander et donner des coordonnées
- 2.4 – Artistes francophone
- 2.5 – Réaliser une fiche d'identité

Unit 3 – On va où ?

- 3.1 – Demander / Indiquer un chemin
- 3.2 – Comprendre un itinéraire
- 3.3 – Se déplacer en métro ou en bus
- 3.4 – Paris / Montréal : deux villes à découvrir
- 3.5 – Réaliser un questionnaire sur la vie dans un quartier

Unit 4 – Qu'est-ce qu'on mange ?

- 4.1 – Comprendre / Donner des horaires
- 4.2 – Faire des courses / Commander au restaurant
- 4.3 – Exprimer ses goûts
- 4.4 – Québec / France : qu'est-ce que vous mangez ?
- 4.5 – Créer la carte d'un bar à jus

Unit 5 – Les soldes, c'est parti !

- 5.1 – Situer un moment dans une année
- 5.2 – Parler du métro
- 5.3 – Demander / dire la taille et la pointure
- 5.4 – Décrire un objet, dire à quoi ça sert
- 5.5 – Demander / Dire un prix

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob, Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob, Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercices*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahierd'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

SEMESTER-I			
Part II GeneralEnglish	Poetry, Prose, Extensive Reading and Communicative English-I		
Course Code 21UGEN11	Hrs/Week: 6	Hrs/Semester:90	Credits:3

Objectives:

- To provide adequate exposure and opportunities for students to imbibe, develop, practise and use LSRW skills
- To help students read and comprehend contents in English

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
CO- 1	improve their listening and writing skills.	Un
CO- 2	apply and incorporate basic grammar and mechanics in writing.	Ap
CO- 3	paraphrase main ideas through reading passages.	Ap
CO- 4	communicate in English with confidence.	Ap
CO- 5	appreciate literary pieces.	Ap
CO- 6	label and paraphrase main ideas through reading passages.	Ap
CO- 7	imbibe ethical and moral values through the study of the literary pieces.	Ev
CO- 8	construct simple sentences and short paragraphs in response to reading and writing.	Cr

SEMESTER-I			
Part II GeneralEnglish	Poetry, Prose, Extensive Reading and Communicative English –I		
Course Code 21UGEN11	Hrs/Week: 6	Hrs/Semester:90	Credits:3

Unit I –Poetry

- Rabindranath Tagore – Leave This Chanting
W.W. Gibson – The Stone
Ted Hughes – Hawk Roosting

Unit II – Prose

- Stephen Leacock – My Lost Dollar
J.B. Priestley – On Doing Nothing
Robin Sharma – Your Commitment to Self- Mastery: Kaizen

Unit III – Short Story

- Oscar Wilde – The Model Millionaire
Leo Tolstoy – Three Questions
K.A. Abbas – The Refugee

Unit IV – Grammar

- Parts of Speech – Noun, Pronoun, Article, Adjective, Verb - Modals and
Auxiliaries – Types of Sentences - Subject -Verb Agreement

Unit V- Communication Skills

- Vocabulary, Listening Comprehension – Speaking – Reading, Filling Forms
(TANSICHE – Module I)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit IV- Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006. Print.

Unit – V – CLIL (Content & Language Integrated Learning) – Module I by TANSICHE (Tamil Nadu State Council for Higher Education)

SEMESTER – I			
Part III	Core I	Classical Algebra	
Course Code:21UMAC11	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Objectives:

To provide a platform to students so that they can develop algebraic problem solving strategies.

To Transform real life problems into equations and then solve them.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	solve polynomial equations and simultaneous linear equations.	3	An
CO-2	solve the equations using the relation between the roots and coefficients.	3	An
CO-3	form the equations from the given roots and identify and solve the reciprocal equations	8	Cr
CO-4	transform the equations by increasing, decreasing and multiplying the roots of the equations	3	Un
CO-5	solve the equations by removing the terms of the equations.	3	An
CO-6	locate real and imaginary roots of the equations	4	Un
CO-7	find the approximate values of the irrational roots of the equations.	3	Cr
CO-8	determine the roots of the equations by using various methods like Cardon's method, Ferrari's method.	3	Cr

Semester – I			
Part III	Core I	Classical Algebra	
Course Code :21UMAC11	Hrs/week: 4	Hrs/Semester: 60	Credits: 3

Unit I

Fundamental theorem of algebra - In an equation with real coefficients, imaginary roots occur in pairs - In an equation with rational coefficients, irrational roots occur in pairs -Relations between the roots and coefficients of equations. Symmetric function of the roots

(Chapter 6, Sec 1 – 12, pages 282-307)

Unit II

Sum of the powers of the roots of an equation - Newton's theorem on the sum of the powers of the roots -Transformation of equation - Reciprocal equation - Standard form of reciprocal equations.

(Chapter 6, Sec 13-16, pages 308-327)

Unit III

To increase or decrease the roots of a given equation by a given quantity – Form of the quotient and remainder when a polynomial is divided by a binomial - Removal of terms – To form an equation whose roots are any power of the roots of a given equation - Transformation in General

(Chapter 6, Sec 17-23, pages 327-351)

Unit IV

Descarte's rule of signs - Rolle's theorem -Multiple roots -Strum's Theorem.

(Chapter 6, Sec 24 – 26, pages 351-362)

Unit V

Horner's method.- General solution of the cubic equations - Cardon's method – Trigonometrical method – Solution of biquadratic equation - Ferrari method.

(Chapter 6, Sec 30,34 , pages:376-382,390-398)

Text Book

1. Manicavachagom Pillay T.K., Natarajan T., Ganapathy K.S., *Algebra*, Volume-I, Ananda Book Depot, Chennai, Reprint 2017.

Books for Reference

1. Arumugam S. and A. Thangapandi Isaac, *Algebra*, New Gamma Publishing House, August 2006.

2. Kandasamy P. and Thilagavathi K., *Mathematics for B.Sc.*, 2004, Volume I and VolumeIV, S. Chand & Co., New Delhi.

SEMESTER – I			
Core II		Calculus	
Course Code :21UMAC12	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Objectives:

- To train the students to take up the challenges and risks in their day to day life and to work collaboratively with others.
- To prepare students for success in Calculus and to develop an appreciation and proficiency with mathematical thinking.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	state the concept of curvature of a plane curve.	4	Re
CO-2	calculate the curvature of various curves in plane and space	4	Ev
CO-3	apply the fundamental concepts of Calculus to variety of real world problems.	3	Ap
CO-4	find surface area using a double integral.	7	Un
CO-5	evaluate triple integrals and use them to find volumes in rectangular, cylindrical and spherical coordinates.	3	Ev
CO-6	compute definite and indefinite integrals of algebraic and trigonometric functions using formulae and substitution	3	Cr
CO-7	know the relationship between the Gamma and Beta functions	5	An
CO-8	use Beta and Gamma function to solve different type of integrals and to understand Gamma function as a generalization of factorial function.	6	Ev

Semester – I			
Part III	Core II	Calculus	
Course Code :21UMAC12	Hrs/week :4	Hrs/ Semester :60	Credits :3

Unit I

Curvature and radius of curvature – Cartesian form-Centre of curvature

(Vol I, Chapter X, Sec 2.1 - 2.4, Pages : 291-309)

Unit II

Evolute and Involute-Pedal Equation -Asymptotes

(Vol I Chapter X, Sec 2.5 - 2.8, Pages: 309-317, Exercises 45: 1-11, Chapter XI, Pages: 324-341)

Unit III

Singular Points (Node, cusp, conjugate points) and Tracing of curves (Cartesian only)

(Vol I, Chapter XII, Chapter XIII, Pages: 342-372)

Unit IV

Double and Triple Integrals - Changing the order of integration. Jacobians and Change of variables

(Vol II , Chapter V, Pages : 203-213,219-223,Chapter VI, Pages : 251-269)

Unit V

Beta and Gamma functions – Application of Beta and Gamma Functions in evaluation of Double and Triple Integrals, Improper Integrals.

(Vol II, Chapter VII, Pages: 278-300)

Text Book

1. S.Narayanan and T.K.Manicavachagom Pillay, *Calculus*, Vol I and Vol II,S.Viswanathan (Printers & Publishers) PVT. LTD. (Edition-2015).

Books for Reference

1. Kandasamy P and K. Thilagavathi, *Mathematics for B.Sc.*, Volume II – 2004, S.Chand& Co., New Delhi.
2. Apostol T.M., *Calculus*, Vol. I &II John Wiley and Sons, Inc., Newyork.

SEMESTER-I			
Skill Enhancement Course - I Professional English for Mathematics - I			
Course Code:21UMAPE1	Hrs/Week: 2	Hrs/Sem: 30	Credits: 2

Objectives:

- To develop the language skills of students by offering adequate practice in professional contexts.
- To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PO addressed	CL
CO-1	Recognise their own ability to improve their own competence in using the language	3	Un
CO-2	Use language for speaking with confidence in an intelligible and acceptable manner	3	An
CO-3	Understand the importance of reading for life	8	Cr
CO-4	Read independently any unfamiliar texts with comprehension	3	Un
CO-5	Understand the importance of writing in academic life	3	An
CO-6	Write simple sentences without committing error of spelling or grammar.	4	Un
CO-7	Develop critical thinking skills and get culturally aware of the target situation	3	Cr

SEMESTER-I			
Skill Enhancement Course - I Professional English for Mathematics - I			
CourseCode :21UMAPE1	Hrs/Week: 2	Hrs/Sem: 30	Credits: 2

UNIT 1: COMMUNICATION

Listening and Speaking:

Listening to audio text and answering questions

Listening to Instructions

Pair work and small group work.

Reading and writing:

Comprehension passages –Differentiate between facts and opinion

Developing a story with pictures.

Word Power/Vocabulary:

Register specific - Incorporated into the LSRW tasks

Grammar in Context:

Adverbs, Prepositions.

UNIT 2: DESCRIPTION

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning-Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition- Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming.(Mind mapping). Small group discussions (Subject-Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations

Interpreting Visuals inputs

Vocabulary: Register specific -Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading: Comprehension passages –Note making.

Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary:Register specific - Incorporated into the LSRW tasks

Links for Reference

1. Britannica, T. E. (Ed.). (2020, April 16). Marie Curie. Retrieved June 18, 2020, from Encyclopedia
2. Britannica. Wikipedia, T. E. (Ed.). (16, June 2020). Marie Curie. Retrieved June 18, 2020, from Wikipedia.
3. <https://www.myindiamyglory.com/2018/07/12/raman-effect-how-indian-scientist-cv-raman-discovered-why-sea-is-blue/>
4. <https://opensource.com/resources/internet-of-things>
5. <http://warofcurrents.newtfire.org/>
6. <https://www.youtube.com/watch?v=ubpsosv7mHM>
7. <https://www.englishclub.com/reading/health/cell-phone.htm>
8. <https://www.britannica.com/biography/Isaac-Asimov>
9. <https://www.softschools.com/>
10. <https://www.space.com/17056-kalpana-chawla-biography.html>
11. <https://labour.gov.in/childlabour/census-data-child-labour>
12. https://www.bu.edu/csp/Conferences/Space_Exploration/Day1/Presentations/Kalam_Space%20Exploration%20and%20Human%20Life.pdf
13. <https://www.youtube.com/watch?v=WEKzNH09Vqs>
14. <https://www.bbc.com/news/world-europe-48616174>
15. <https://semiengineering.com/how-5g-differs-from-previous-network-technologies/>
16. <https://www.thehindubusinessline.com/info-tech/scientists-caution-government-to-go-slow-on-5g-roll-out/article28737197.ece>
17. <https://www.downtoearth.org.in/interviews/science-and-technology/-5g-is-unlikely-to-cause-health-concerns--63698>

SEMESTER - I			
Ability Enhancement Course -Value Education			
Code : 21UAVE11	Hrs/Week : 2	Hrs / Semester: 30	Credits : 2

Unit I: Introduction to Value Education

Concept of Values -Types of Values- Approaches to values - Benefits of Value Education-Characteristics of Values

Unit II: Human Values

Human Values -Sources of Human Values - Love -Compassion - Gratitude - Courage - Optimism - Forgiveness- the need and urgency to reinforce Human Values

Unit III: Social Values

Role of family and society in teaching values - Role of educational institutions in inculcating values-Three general functions of education for society-Self-Reflection- Our society's needs - Social Responsibilities of a student

Unit IV: Spiritual Values

Spiritual Values - Spiritual Development -Moral Development - Importance of Spiritual Values - Cultivation of Spiritual Values -Five most common spiritual values -Spiritual Resources

Unit V: Values for Life Enrichment

Goal Setting - Building relationship - Friendship - Love relationship - Family relationship - Professional relationship Interpersonal Relationship -Essential Life Skills that Help in Students Future Development-Life Enrichment Skills Domain

Books for Reference:

1. Sneha M. & K. Pushpanadham Joshi. *Value Based Leadership in Education Perspective and Approaches*, Anmol Publications Pvt. Limited, 2002.
2. Venkataiah.N. *Value Education*, APH Publishing, 1998
3. Pramod KumarM.*A Handbook on Value Education*, Ramakrishna Mission Institute of Culture (RMIC) 2007
4. Jagdosh Chand.*Value Education*. Shipra Publication 2007
5. Indrani Majhi (Shit)Ganesh Das, *Value Education*, Laxmi Publication Pvt. Ltd., 2017
6. Arumugam, N. S. Mohana, Lr.Palkani, *Value Based Education*, Saras Publication 2014

SEMESTER - II

Part -1 பொதுத்தமிழ் - தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)

Course Code: 21ULTA21 | **Hrs/Week:6** | **Hrs/ Semester : 90** | **Credits :3**

Objectives:

- வாழ்வியல் நன்னெறிகளான மனிதநேயம், சமத்துவம் போன்றவற்றை வளர்த்துக் கொள்ளக் கற்றுக் கொடுத்தல்
- அறநெறியைக் கடைப்பிடிப்பதே நிலையானதும் நீடித்ததுமான நன்மையைத் தருவது என்பதைச் சான்றோரின் வாழ்க்கை நெறிகள் மூலம் உணரச்செய்தல், மொழி அறிவு, இலக்கிய அறிவு இவற்றை வளர்த்துக் கொள்ளக் கற்றுக் கொடுத்தல்

Course Outcome

Co.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	இறை ஆற்றலை உணர்ந்துகொள்ள உதவுகிறது	மதிப்பீடு
CO-2	நல்ல நண்பர்களையும் நல்ல மனிதர்களையும் இனம் கண்டுகொள்ள வழி வகுக்கிறது.	நடைமுறைப்படுத்துதல்
CO-3	அன்பு, இரக்கம், நற்சொல், நற்செயல் போன்ற நற்பண்புகளோடு வாழ வழி வகுக்கிறது.	மதிப்பீடு
CO-4	மனித நேய பண்புகளோடு வாழ்ந்த சான்றோரின் அனுபவங்களைப் பெற்றுக்கொள்ள உதவுகிறது	நடைமுறைப்படுத்துதல்
CO-5	மொழியைப் பிழையின்றி பேசவும் எழுதவும் பயன்படுகிறது	புரிதல், திறன் மேம்பாடு
CO-6	தனிமனித வாழ்க்கைச் சிக்கல்களையும் பிரச்சனைகளையும் எதிர்கொள்ளும் ஆற்றலை உருவாக்குகிறது.	நடைமுறைப்படுத்துதல், திறன் மேம்பாடு
CO-7	இறைவன் முன் அனைவரும் சமம் என்ற சிந்தனையை உருவாக்குகிறது.	மதிப்பீடு
CO-8	போட்டித்தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல்

SEMESTER - II**Part-1 பொதுத்தமிழ் - தாள் 2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, வாழ்க்கை வரலாறு)****Course Code: 21ULTA21****Hrs/Week:6****Hrs/ Semester : 90****Credits :3****அலகு - 1 செய்யுள் - 2 மணி****சமய இலக்கியங்கள்**

இறைவணக்கம் - திருநாவுக்கரசர்
சைவம் 1. தேவாரம் - திருஞான சம்பந்தர், திருநாவுக்கரசர், சுந்தரர்
2. திருவாசகம் - மாணிக்கவாசகர்
3. திருமந்திரம் - திருமூலர்
4. திருப்புகழ் - அருணகிரி நாதர்

வைணவம்: 1. திருப்பாவை - ஆண்டாள்

2. திருவாய்மொழி- நம்மாழ்வார்

பௌத்தம்: மணிமேகலை - சீத்தலைச் சாத்தனார்

கிறித்தவம்: 1. தேம்பாவணி - வீரமாமுனிவர்

2. இயேசு காவியம் - கவிஞர் கண்ணதாசன்

இசுலாமியம்: பேட்டை ஆம்பூர் அப்துல் காதிர் சாகிபு பாடல் - சக்கராத்து நாமா

நீதி இலக்கியங்கள்

1. திருக்குறள் - ஊக்கமுடைமை

2. நாலடியார் - 1. நன்னிலைக் கண்

2. உறங்கும் துணையது

3. பழமொழி நானூறு- 1. பொல்லாத சொல்லி

2. வருவாய் சிறிதெனினும்

அலகு - 2 இலக்கணம் - 1 மணி

1. சொல்லின் பொது இலக்கணம்

2. ஓரெழுத்து ஒருமொழி, சொல்லின் வகைகள்

3. பெயர்ச்சொல் - அறுவகைப் பெயர்கள்

4. வினைச்சொல் - வகைகள்- முற்று, எச்சம், ஏவல், வியங்கோள், செய்வினை, செயப்பாட்டுவினை, தன்வினை, பிறவினை

5. இடைச்சொல் - ஏகார, ஓகார, உம்மை இடைச்சொற்கள்

6. உரிச்சொல் - இலக்கணம், வகைகள்

மொழிப்பயிற்சி - ஒலி வேறுபாடு அறிதல்**அலகு - 3 இலக்கிய வரலாறு - 1 மணி**

1. சைவ இலக்கியங்கள்

2. வைணவ இலக்கியங்கள்

3. கிறித்தவம் தமிழுக்குச் செய்த தொண்டு

4. இசுலாமியம் தமிழுக்குச் செய்த தொண்டு

5. பதினெண் கீழ்க்கணக்கு நூல்களில் 11 அறநூல்கள்

அலகு - 4 உரைநடை - 1 மணி

நிறைவான வாழ்க்கைக்கு நேரம் ஒதுக்குங்கள் - ஜே.மௌரஸ்

(10 முதல் 19 வரை உள்ள கட்டுரைகள்)

அலகு - 5 வாழ்க்கை வரலாறு - 1 மணி

மனிதமே புனிதம் - சுடர்ந்தெழு - முனைவர் அருட்சகோதரி ஆ.மரிய சாந்தி

I B.A., / B.Sc Part I FRENCH**SEMESTER – II****PART – I French Paper – II Intermediate French Course**

Course Code :21ULFA21	Hrs/week : 6	Hrs/ Sem : 90	Credits : 3
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Objectives

To develop and improve upon the acquisition of four competencies of language learning.

To motivate the learner through role plays as to create real life situations. To prepare her for the real communication challenges.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	talk about her activities, hobbies	Kn, Ap
2.	ask and say time	Ap, Cr
3.	fix, accept or refuse a meeting	Kn, Ap, Cr
4.	talk about her family and describe a character	Kn, Un
5.	describe and give information about a lodging	Ap
6.	express her preferences	Ap, Un
7.	write a formal mail and a postcard	Cr, Ap
8.	express emotions and surprise	Ap
9.	get a gist of the French literature	Kn, Un

SEMESTER – II			
PART – I French Paper – II Intermediate French Course			
Course Code :21ULFA21	Hrs/week : 6	Hrs/ Sem : 90	Credits : 3

Unit 1 – C'est quoi le programme ?

- 1.1 – Parler de ses activités quotidiennes
- 1.2 – Demander/ Dire l'heure
- 1.3 – Proposer/ fixer / accepter ou refuser un rendez-vous.
- 1.4 – Réserver par téléphone
- 1.5 – Créer un mini-article sur un loisir

Unit 2 – Félicitations !

- 2.1 – Comprendre un arbre généalogique
- 2.2 – Présenter sa famille
- 2.3 – Féliciter / adresser un souhait
- 2.4 – Décrire le physique et le caractère d'une personne
- 2.5 – Créer les personnages d'une famille pour un film

Unit 3 – Chez moi

- 3.1 – Comprendre un état des lieux simple
- 3.2 – Se renseigner sur un logement
- 3.3 – Comprendre un règlement intérieur d'immeuble
- 3.4 – Exprimer des règles de vie commune
- 3.5 – S'excuser dans un message

Unit 4 – Bonnes vacances

- 4.1 – Comprendre un site de réservation en ligne
- 4.2 – Exprimer la préférence / Hésiter
- 4.3 – Ecrire un mail formel / une carte postale
- 4.4 – Exprimer des sensations, une émotion positive, la surprise
- 4.5 – Ecrire une liste de voyage

Unit 5 – Le texte littéraire

- 5.1. Le Petit Prince (Chapitre 1) - Antoine de Saint Exupéry
- 5.2. La colombe poignardée et le jet d'eau – Calligramme - Guillaume Apollinaire

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob, Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob, Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercices*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothee, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- Apollinaire Guillaume, *Calligrammes :Poèmes de la paix et de la guerre 1913-1916*.Paris: Gallimard, 1966.
- Antoine de Saint-Exupéry.*Le Petit Prince*. Paris : Gallimard, 2007.
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com

SEMESTER-II			
Part II General English	Poetry, Prose, Extensive Reading and Communicative English –II		
Course Code 21UGEN21	Hrs/Week: 6	Hrs/Semester:90	Credits:3

Objectives

- To help students realise how life, literature and language are closely connected
- To expose students to language skills through the core subjects

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	comprehend passages.	Un
CO- 2	build effective communication skills.	Un
CO- 3	demonstrate improved oral fluency.	Un
CO- 4	use vocabulary through the study of word parts.	Ap
CO- 5	construct paragraphs and essays through prose writings.	An
CO- 6	develop the skills of interpretation, critical thinking, and clear writing.	An
CO- 7	make use of context clues and analyse poetic content and correlate to experiences.	An
CO- 8	support future academic study by developing a high social, aesthetic and cultural literacy.	Cr

SEMESTER-II			
Part II General English	Poetry, Prose, Extensive Reading and Communicative English–II		
Course Code: 21UGEN21	Hrs/Week: 6	Hrs/Semester:90	Credits:3

Unit I –Poetry

William Wordsworth	– Resolution and Independence
Henry W. Longfellow	– Psalm of Life
Toru Dutt	– The Lotus

Unit II – Prose

A.G. Gardiner	– On Courage
Desmond Morris	– A Little Bit of What You Fancy
Kalpna Chawla	– The Sky is the Limit

Unit III – Short Story

Saki	– Mrs. Packletide’s Tiger
Liam O’Flaherty	– The Sniper
Langston Hughes	– Thank You Ma’am

Unit IV – Grammar

Tenses: Present, Past and Future

Unit V- Communication Skills

Listening, Reading, Pronunciation, Key Functions, Speaking (TANSCHE - Module - II)

Text Books:

Units I-III – To be compiled by the Research Department of English

Unit – IV - Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit - V – CLIL (Content & Language Integrated Learning) – Module II by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER – II			
Core III		Analytical Geometry of Three Dimensions	
Course Code :21UMAC21	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Objectives:

- To study the properties of cosmic structures and mathematical objects in three-dimensional surfaces.
- To explore the implementation and far-reaching consequences of systems of measurement and geometry.
- To help students visualize ideas, classify and identify different problem types in analytical geometry of three dimensions.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	understand the fundamental aspects of three-dimensional geometry.	1	Un
CO-2	represent simple three-dimensional figures using two-dimensional drawings.	3	Un
CO-3	demonstrate basic mathematical understanding and computational skills in three dimensions.	8	Un
CO-4	apply algebraic methods to the study of curves and surfaces that lie in three dimensions.	4	Un
CO-5	apply geometric properties and relationships to solve problems in three dimensions.	4	Un
CO-6	develop logical thinking, geometric thinking and three-dimensional spatial ability.	6	An
CO-7	solve many difficult problems with simple solutions.	5	Cr
CO-8	create opportunities to use spatial skills in problem-solving tasks.	4	Cr

SEMESTER – II			
Part III Core III - Analytical Geometry of Three Dimensions			
Course Code :21UMAC21	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Unit I

Direction cosines - direction ratios - angle between the lines – condition for perpendicularity and parallelism.

(Chapter 1, Sec 1 – 10, pages 1 – 23)

Unit II

Equation of planes - normal form - intercept form - angle between two planes

(Chapter 2, Sec 1 – 11, pages 24-45)

Unit III

Straight line- symmetrical form - plane and the straight line- angle between two planes - image of a point - image of line.

(Chapter 3, Sec 1 – 6, pages 46-61)

Unit IV

Skew lines - shortest distance between two lines - coplanar lines - volume of tetrahedron.

(Chapter 3, Sec 7 - 11, pages 61 - 91)

Unit V

Sphere - plane section of sphere - tangent line - intersection of two spheres - intersection of a plane with sphere.

(Chapter 4, Sec 1 – 8, pages 92 - 114)

Text Book

Manicavasagom Pillay T.K. and Natarajan T., *Analytical Geometry of 3D*, S.Viswanathan (Printers&Publishers) Pvt. Ltd, Reprint 2017.

Books for Reference

1. Arumugam S. and Thangapandi Isaac A., *Analytical Geometry of 3D and Vector Calculus*, New Gamma Publishing House, January 2006.
2. Arup Mukherjee and Naba Kumar Bej., *Analytical Geometry of Two and Three Dimensions*, Books and Allied (P) Ltd., Kolkata, November 2010.

SEMESTER – II			
Part III Core IV		Differential Equations	
Course Code :21UMAC22	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3

Objectives:

- To make the students to understand differential Equations as a powerful tool in solving problems in physical and social sciences.
- To furnish the students the tools necessary to solve ordinary differential equations.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	identify an ordinary differential equation and its order.	3	Un
CO-2	verify whether a given function is a solution of a given ordinary differentialequation (as well as verifying initial conditions when applicable).	8	An
CO-3	classify ordinary differential equations into linear and nonlinear equations.	4	Un
CO-4	solve first order linear differential equations.	3	An
CO-5	find the general solution of second order linear homogeneous equations withconstant coefficients.	3	Cr
CO-6	compute the laplace transform of a functionuse shift theorems to compute the Laplace transform and inverse Laplacetransform	3	An
CO-7	use the laplace transform to compute solutions of second order, linearequations with constant coefficients	3	An
CO-8	identify essential characteristics of ordinary and partial differential equations.	3	Un

Semester – II			
Part III	Core IV	Differential Equations	
Course Code: 21UMAC22	Hrs/week :4	Hrs/Semester :60	Credits :3

Unit I

Equations of the first order, but of higher degree - Solvable for p , x & y - Clairaut's form – Equations that do not contain x explicitly- Equations that do not contain y explicitly- Equations homogeneous in x and y . **(Chapter4, Sec 1- 4, pages 60 – 67)**

Unit II

Linear equation with constant coefficients: Complementary function of a linear equation with constant coefficients-Particular Integral-Special methods for finding Particular Integral
(Chapter 5, Sec 1-4, pages 68-88)

Unit III

Linear equations with variable coefficients- Special method of evaluating the P.I when X is of the form - Equations reducible to the linear equations-Linear equations of the second order - Complete solution given a known integral - Reduction to the normal form–Change of the independent variable– variation of parameters -Methods of operational factors.
(Chapter 5, Sec 5 and 6 pages 89-102 &Chapter8,Sec1-5, pages 145- 160)

Unit IV

Laplace transform - Definition-Sufficient conditions for the existence of Laplace transform- Laplace transform of periodic functions-Some general theorems- the Inverse transforms.
(Chapter9, Sec 1-6, pages 161-199)

Unit V

Partial differential equation of first order – Classification of integrals - Derivation of partial differential equations - Lagrange's method of solving the linear equation – Special methods, Standard forms – Charpit's method.
(Chapter 12, Sec1-4, Sec 5 (5.1-5.4) pages 219-238)

Text Book

S.Narayanan and T.K.Manickavachagam Pillay, *Differential Equations and its applications*. Published by: Divya Subramanian for Aanda Book Depot, Edition 2017.

Books for Reference

1. A.R.Vasishtha and Dr.S.K.Sharma, *Differential Equations*, Krishna Educational Publishers,Seventeenth Edition : 2015
2. Dr.S.Arumugam and A.Thangapandi Issac, *Differential Equations and Applications*, New Gamma Publishing House, Edition 2011

SEMESTER-II			
Skill Enhancement Course - II Professional English for Mathematics - II			
Course Code :21UMAPE2	Hrs/Week: 2	Hrs/Sem: 30	Credits: 2

Objectives:

- To Increase the proficiency of students from all levels and abilities by refining their speaking, writing, reading, and listening skills.
- To provide a comprehensive and intensive course that assists students in achieving their professional, personal and educational objectives.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PO addressed	CL
CO-1	understand the basic objective of the course and obtain strong professional vocabulary for its application at different platforms	3	Un
CO-2	Apply the knowledge for writing purposes such as Presentation, drafting and project report etc.	2	Ap
CO-3	Evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication and presentation.	8	Ev
CO-4	Apply techniques for developing inter-personal communication and to respond questions at a formal interview	8	Ap
CO-5	Apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics	6	Ap
CO-6	Use critical thinking skills to face everyday life situations.	5	Cr
CO-7	Develop strategic competence that will help in efficient communication	6	Ap
CO-8	Apply the acquired knowledge and ideas in giving opinions during the meeting and making concluding remarks.	8	An

SEMESTER-II			
Skill Enhancement Course –II Professional English for Mathematics - II			
Course Code :21UMAPE2	Hrs/Week: 2	Hrs/Sem: 30	Credits: 2

UNIT 1: COMMUNICATIVE COMPETENCE

Listening and Speaking:

Listening and responding to complaints (formal situation)

Listening to problems and offering solutions (informal)

Reading and writing:

Reading aloud (brief motivational anecdotes)

Writing a paragraph on a proverbial expression/motivational idea.

Word Power/Vocabulary:

Synonyms & Antonyms

Grammar in Context:

Adverbs, Prepositions.

UNIT 2: PERSUASIVE COMMUNICATION

Listening and Speaking:

Listening to famous speeches and poems

Making short speeches- Formal: welcome speech and vote of thanks.

Informal occasions- Farewell party, graduation speech

Reading and Writing:

Writing opinion pieces (could be on travel, food, film / book reviews or on any contemporary topic)

Reading poetry

Reading aloud: (Intonation and Voice Modulation)

Identifying and using figures of speech - simile, metaphor, personification etc.

Word Power/Vocabulary:

Idioms & Phrases

Grammar in Context

Conjunctions and Interjections.

UNIT 3: DIGITAL COMPETENCE

Listening and Speaking:

Listening to Ted talks

Making short presentations – Formal presentation with PPT, analytical presentation of graphs and reports of multiple kinds

Interactions during and after the presentations

Reading and writing:

Writing emails of complaint
Reading aloud famous speeches

Word Power/Vocabulary:

One Word Substitution

Grammar in Context:

Sentence Patterns

UNIT 4: CREATIVITY AND IMAGINATION**Listening and Speaking**

Participating in a meeting: face to face and online
Listening with courtesy and adding ideas and giving opinions during the meeting and making concluding remarks.

Reading and Writing

Reading visual texts – advertisements
Writing a Brochure

Word Power/Vocabulary:

Denotation and Connotation

Grammar in Context:

Sentence Types.

UNIT 5: WORKPLACE COMMUNICATION & BASICS OF ACADEMIC WRITING**Listening and Speaking:**

Informal interview for feature writing
Listening and responding to questions at a formal interview

Reading and Writing

Writing letters of application
Readers' Theatre (Script Reading)
Dramatizing everyday situations/social issues through skits. (Writing scripts and performing)

Word Power/Vocabulary:

Collocation

Grammar in Context:

Working With Clauses.

Links for Reference

1. <https://www.collinsdictionary.com/>
2. https://youtu.be/moJkqkn_Xs
3. <https://www.collinsdictionary.com/>
4. <https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3>
5. https://owl.purdue.edu/owl/general_writing/academic_writing/essay_writing/argumentative_essay_says
6. <https://youtu.be/5ctbvKAMQO4>
7. <https://www.wearable.com/fitness-trackers/how-your-fitness-tracker-works-1449>
8. <https://www.hfe.co.uk/blog/a-study-of-fitness-trackers-and-wearables/>
9. https://youtu.be/o_f7mp_tTqw
10. <https://www.youtube.com/watch?v=IOluK9i1yiw&feature=youtu.be>
11. <https://www.sciencehistory.org/historical-profile/antoine-laurent-lavoisier>
12. <https://youtu.be/AE0kuHKoitE>
13. <https://science.howstuffworks.com/math-concepts/fibonacci-nature.html>
14. <https://youtu.be/nt2OIMAJ6o>
15. <https://www.everythingrf.com/community/what-is-electronic-warfare>
16. <https://www.youtube.com/watch?v=Rsa1zsOx5Mw>
17. <http://www.bhopal.com/>
18. <https://www.youtube.com/watch?v=4WZTzKu3CsY>
19. <https://www.youtube.com/watch?v=khc2wUBsFU4>
20. <http://www.bhopal.com/>
21. <https://www.youtube.com/watch?v=32vJxDUr-nE>
22. <https://www.youtube.com/watch?v=BLhwNhtYU5E>
23. <https://www.bbc.com/news/science-environment-55365434>
24. https://www.ted.com/talks/ray_kurzweil_get_ready_for_hybrid_thinking?referrer=playlist-talks_on_artificial_intelligen%23t-146994
25. <https://celebratepicturebooks.com/tag/writing-resources-for-kids/>
26. <http://www.englishclub.com/writing/punctuation.htm>
27. <http://guidetogrammar.org/grammar/marks/marks.htm>
28. http://www.grammarbook.com/english_rules.asp

Semester – II			
Environmental Studies			
Course Code : 21UAEV21	Hrs/ Week : 2	Hrs/Sem:30	Credits : 2

Course Outcomes:

Upon completion of this course, the students will be able to

- 1 Recognize the biotic and abiotic components of ecosystem and how they function.
- 2 Use natural resources more efficiently and know more sustainable ways of living.
3. Acquire an attitude of concern for the environment.
4. Participate in improvement and protection of environment.
5. Manage unpredictable disasters.
- 6 Create awareness about environmental issues to the public.

Unit I Environment and Ecosystem

Aim and need for Environmental Awareness - Components of Environment Ecosystem
 - Components of Ecosystem: Abiotic and biotic factors (Producer, Consumer and Decomposer) – Food Chain, Tropic Levels - Food Web, Energy flow and Ecological pyramids

Unit II Natural Resources:

Renewable and non-renewable resources – Water Resources: Uses and Conservation of Water – Rain Water Harvesting – Forest Resources: Importance of Forests - Major and Minor forest produces - Conservation of Forest Energy Resources: Solar Fossil Fuel – Wind – Role of individuals in the conservation of natural resources

Unit III Environmental Pollution

Pollutants – Types of pollution: Air, Water, Noise and Plastic Pollution – Causes, effects and Control measures – Global warming and Climate Change

Unit IV Human Population and Environment

Effect of human population on environment – Population Explosion problems related to population explosion – Involvement of population in conservation of environment – Measures adopted by the Government to control population growth – Environment and human health

Unit V Disaster Management

Floods–Drought–Earthquakes– Cyclones – Landslide–Tsunami–Control measures

SEMESTER – III			
Part-I பொதுத்தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்.)			
Course Code: 21ULTA31	Hrs / Week:6	Hrs / Semester: 90	Credits: 4

Objectives:

- மாணவியர் இறை நம்பிக்கையிலும், நற்பண்புகளிலும் வளர்ந்து, இலக்கிய அறிவிலும் மொழித்திறனிலும் சிறந்து விளங்க வழிகாட்டல்.
- காப்பிய மாந்தரின் வாழ்க்கையின் மூலமாக கடவுள் நம்பிக்கை, நல்ல உறவுகள், இயற்கையை நேசித்தல், மொழிஅறிவு போன்றவற்றை வளரச் செய்தல்.

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	பெண்களின் சட்டங்கள் உரிமைகள், வேலைவாய்ப்பு பற்றிய விபரங்களை அறிந்து கொள்ள உதவுகிறது.	நடைமுறைப்படுத்தல்
CO-2	அரசியல் சூழ்ச்சி, இனம், சாதி குறித்த பாகுபாடு இவற்றிலிருந்து விடுதலை பெறும் வழிவகைகளைக் கற்றுக்கொடுக்கிறது.	நடைமுறைப்படுத்தல்
CO-3	இலக்கிய அறிவினை வளர்க்க, காப்பியச் சுவை உணர்ந்து சுவைக்க வாய்ப்பளிக்கிறது.	நடைமுறைப்படுத்தல்
CO-4	சமய நல்லிணக்கம், இறைநம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-5	மொழியைப் பிழையின்றிப் பேசவும் எழுதவும் உதவுகின்றது. படைப்பாற்றல் திறனை வளர்க்க உதவுகிறது.	புரிந்துகொள்ளுதல், திறன் மேம்பாடு
CO-6	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடைமுறைப்படுத்தல்
CO-7	இப்பகுதியில் வாழும் அடித்தட்டு மக்களின் வாழ்வு நிலையை அறிந்து கொள்ள உதவுகிறது. பெண்கள் நீதிக்குப் போராடும் உணர்வை வளர்க்கிறது.	நடைமுறைப்படுத்தல், திறன் மேம்பாடு
CO-8	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல், திறன் மேம்பாடு

SEMESTER – III			
Part-I பொதுத்தமிழ் - தாள் 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, புதினம்,)			
Course Code: 21ULTA31	Hrs / Week:6	Hrs / Semester: 90	Credits: 4

அலகு - 1 செய்யுள் - 2 மணி
காப்பியங்கள்

1. சிலப்பதிகாரம் - அடைக்கலக் காதை : 11 – 94 பாடலடிகள்
2. மணிமேகலை - ஆபுத்திரன் திறன் அறிவித்த காதை : 1 முதல் 56 பாடலடிகள்
3. பெரியபுராணம் - கண்ணப்ப நாயனார் புராணம். (பாடல்கள்: 757 - 762, 67, 74, 81, 84,85, 804, 05, 06, 12, 14, 18, 19, 825 – 832, 834.
4. கம்பராமாயணம் - நட்புக்கோட் படலம்.
5. சீறாப்புராணம் - கள்வரை நதி மறித்த படலம்.
6. தேம்பாவணி - வளன் சனித்த படலம்.- 9 முதல் 31 பாடல்கள்.

சிற்றிலக்கியம்

1. திருக்குற்றாலக் குறவஞ்சி. IV குறவஞ்சி நாடகம். 8. எங்கள் மலையே.

அலகு - 2 இலக்கணம் - 1 மணி

பொருள் இலக்கணம்

1. அகப்பொருள் : எழுதிணை விளக்கம் - முதல், கரு, உரிப்பொருள்
2. புறப்பொருள் : வெட்சித்திணை முதல் பாடாண்திணை வரை விளக்கம் மட்டும்

யாப்பு இலக்கணம்

1. யாப்பு உறுப்புகள். (எழுத்து, அசை, சீர், தளை, அடி, தொடை)

அலகு - 3 இலக்கிய வரலாறு - 1 மணி

1. ஐம்பெருங்காப்பியங்கள்
2. ஐஞ்சிறுகாப்பியங்கள்
3. சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும், பிள்ளைத்தமிழ், கலம்பகம், குறவஞ்சி, பரணி.
4. புதினம் தோற்றமும் வளர்ச்சியும்..

அலகு - 4 உரைநடை - 1மணி

இப்பொழுது இவள் - ப. திருமலை.

அலகு - 5 புதினம் - 1 மணி

தேரியாயணம் (சமூக நாவல்) - கண்ணகுமார விஸ்வரூபன்.

B.A., / B.Sc Part I FRENCH**SEMESTER – III**

PART – I French Paper – III Advanced French Language			
Course Code : 21ULFA31	Hrs/week : 6	Hrs/ Sem : 90	Credits : 4

Objectives

To enhance the acquisition of all the four competencies of language learning.

To create the independent capability of the learner to respond and tackle the various situations of communication when the learner is in the native country of the target language

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	give an explanation	Ap
2.	ask and say height and weight	Ap
3.	understand student exchange programme and professional world	Kn, Un, Ap
4.	express a goal and a skill	Ap
5.	understand a comic	Un
6.	describe a lifestyle	Kn, Ap
7.	talk about plans and difficulties	Ap
8.	enjoy, appreciate and understand the lyrics of the French songs	An
9.	write a CV	Cr
10.	comprehend French literature	Kn

SEMESTER – III			
PART – I French Paper – III Advanced French Language			
Course Code : 21ULFA31	Hrs/week : 6	Hrs/ Sem : 90	Credits : 4

Unit 1 – Pas de chance !

- 1.1 – Se plaindre / plaindre quelqu'un
- 1.2 – Donner une explication
- 1.3 – Exprimer une émotion négative
- 1.4 – Demander et dire le poids et la taille
- 1.5 – Chance et malchance

Unit 2 – Beau travail ?

- 2.1 – Comprendre un programme d'échange universitaire
- 2.2 – Exprimer le but, le souhait et un projet professionnel
- 2.3 – Exprimer une capacité, une compétence
- 2.4 – Comprendre des tâches professionnelles
- 2.5 – Universités 2.0

Unit 3 – Au grand air

- 3.1 – Comprendre une BD sur un changement de vie
- 3.2 – Exprimer son insatisfaction
- 3.3 – Exprimer un choix de vie
- 3.4 – Décrire son mode de vie
- 3.5 – Je cultive mon jardin

Unit 4 – C'était bien ?

- 4.1 – Parler de ses difficultés
- 4.2 – Encourager, rassurer
- 4.3 – Parler d'un projet
- 4.4 – Exprimer son accord, son désaccord et intérêt
- 4.5 – Les Français en chanson

Unit 5 – Le texte littéraire

- 5.1 – Demain dès l'aube - Victor Hugo
- 5.2 – La Laitière Et Le Pot Au Lait - Jean De La Fontaine

Prescribed Textbook :

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob, Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Méthode de français*. Paris : Didier, 2016.

Céline Braud, Aurélien Calvez, Guillaume Cornuau, Anne Jacob, Sandrine Vidal, Cécile Pinson, Marion Alcaraz. *Edito A1 Cahier d'exercices*. Paris : Didier, 2016.

Books, Journals and Learning Resources

- J.Girardet&J.Pécheur avec la collaboration de C.Gibble.*Echo A1*. Paris : CLE International, 2012.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLEInternational, 2003.
- Cocton Marie-Noëlle.*Génération 1 Niveau A1, Méthode de français et cahier d'exercices*.Paris : Didier, 2016.
- Dintilhac Anneline, De Oliveira Anouchka, Ripaud Delphine, DupleixDorothée, Cocton Marie-Noëlle.*Saison 1 Niveau 1, Méthode de français et cahier d'exercices*. Paris : Didier, 2015
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- <https://www.frenchtoday.com/french-poetry-reading/>

SEMESTER – III			
Part II English Poetry, Prose, Extensive Reading and Communicative English - III			
Course Code: 21UGEN31	Hrs/ Week: 6	Hrs/ Semester: 90	Credits: 4

Objectives:

- To acquaint students with literary art and writings of universal appeal.
- To strengthen the proficiency of communicative English through literary based study.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand the language and literary components of texts	2,8	Un
CO-2	gain insight into literary experience and expressions of writers	8	Un, Ev
CO-3	comprehend aspects of grammar and its application	4	Un
CO-4	enrich vocabulary and its regular usage	9	Un, Ap
CO-5	analyse functional English in literary texts	1,8	An
CO-6	evaluate perspectives and human values for life	2,10	Ev
CO-7	adopt appropriate technique to enhance communication and writing	1,7	Ap, Cr
CO-8	develop skills of formal writing and speech	4,7	Cr

SEMESTER – III

Part II English Poetry, Prose, Extensive Reading and Communicative English - III

Course Code: 21UGEN31

Hrs/ Week: 6

Hrs/ Semester: 90

Credits: 4

Unit I –Poetry

- William Shakespeare – All the World’s a Stage
Dylan Thomas – Do not go gentle into that good night
Sri Aurobindo Ghosh – The Divine Worker

Unit II – Prose

- Bertrand Russell – How to Avoid Foolish Opinions
Virginia Woolf – Men and Women
M.K. Gandhi – At School

Unit III – Fiction

- Charlotte Bronte – *Jane Eyre* (Abridged Version)

Unit IV – Grammar

Active and Passive Voice, Direct and Indirect Speech

Unit V –Communication Skills

Listening Comprehension, Close Reading, Conversational English, Formal Writing

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay

Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content & Language Integrated Learning) – Module IV by TANSICHE.

Semester – III			
Part III Core V		Sequences and Series, Trigonometry	
Course Code :21UMAC31	Hrs/week : 6	Hrs/Semester : 90	Credits : 5

Objectives:

- To have a good foundation in Sequence of Bounded, Monotonic, Cauchy etc., and Summation of infinite series of positive terms and arbitrary terms.
- To develop the skill of computation with real sequences and series

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO s addressed	CL
CO-1	develop the analytical thinking to generalize the known concepts.	3	Cr
CO-2	know the important inequalities necessary to compare the real numbers.	3	Ev
CO-3	explain the difference between a sequence and a series in the mathematical context.	2	Un
CO-4	able to identify boundedness, monotonic, limit points etc. of a sequence.	8	Un
CO-5	able to apply various tests to verify the convergence or divergence of a given sequence and also the series.	4	Ap
CO-6	gain a basic knowledge about analysis which helps them in higher studies.	3	Re
CO-7	apply the real situation wherever usage of trigonometrical equations	4	Ap
CO-8	reconstruct the formulae which are accustomed in elementary levels	8	Ev

Semester – III			
Part III Core V - Sequences and Series, Trigonometry			
Course Code :21UMAC31	Hrs/week : 6	Hrs/Semester : 90	Credits : 5

Unit I

The Completeness Property of \mathbb{R} – Suprema and Infima - The Completeness Property of \mathbb{R} – Applications of the Supremum Property – Functions -The Archimedean Property – The Existence of $\sqrt{2}$ - Density of Rational Numbers in \mathbb{R} .

(Text Book 1: Chapter 2 Sec 2.3 – 2.4, pages 36 – 46)

Unit II

Sequences - Bounded Sequences - Monotonic Sequences - Convergent Sequences - Divergent and oscillating sequences - The algebra of limits- Behaviour of monotonic sequences

(Text Book 2: Chapter 3 Sec 3.1 – 3.7, pages 39 - 68)

Unit III

Some theorems on limits – Subsequences - Limit points - Cauchy sequences - Cauchy's general principle of convergence of sequences

(Text Book 2: Chapter 3 Sec 3.8 – 3.11, pages 69 - 103)

Unit IV

Series of Positive Terms - Infinite series - Comparison test - Kummer's test - D' Alembert's ratio test - Raabe's test - Gauss's test - Cauchy's Root test – Cauchy's condensation test(without proof)

(Text Book 2: Chapter 4 Sec 4.1 - 4.4, pages 112 - 150)

UNIT V

Hyperbolic functions - Logarithm of a complex number - Gregory's Series - Summation of trigonometric series using C+iSmethod(only)

(Chapter 7, pages: 7-01 – 7-17, Chapter 8, pages 8-01 – 8-05,Chapter 9, pages 9-15 – 9-33)

Text Book

1. Robert G. Bartle, Donald R. Sherbert, *Introduction to Real Analysis* (Fourth edition), Wiley Publication, 2017
2. Dr.Arumugam.S&ThangapandiIssac.A,*Sequences and Series and Trigonometry*, New Gamma Publishing House, Palayamkottai (June 2014).

Books for Reference

1. J.A. Green, *Sequences and Series*, Routledge& Kegan Paul Ltd, 1958

Semester - III			
Part III	Allied	Statistics I	
Course Code :21UMMA31	Hrs/week : 6	Hrs/Sem : 90	Credits : 4

Objectives:

- To help the students to understand the uses of statistics in various competitive fields.
- To apply the statistical tools in their day to day problems.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	understand the difference between the central moments and general moments	1	Un
CO-2	compute the central moments and general moments	3	Ev
CO-3	apply concepts and theorems in solving problems	8	Cr, Ap
CO-4	find correlation between two variables	3	Ap
CO-5	evaluate particular regression lines	3 and 7	Ap
CO-6	understand the difference between the discrete random variables and the continuous random variables and solve the problems	8	Un, Ap
CO-7	fit Binomial, Poisson and Normal distribution.	8	Ap
CO-8	compare moment generating function and cumulant generating function	2 and 7	Ev

Semester - III			
Part III	Allied	Statistics I	
Course Code : 21UMMA31	Hrs/week :6	Hrs/Sem: 90	Credits : 4

Unit I

Moments - Skewness and kurtosis - Curve fitting - Method of least squares - fitting lines - parabolic, exponential & logarithmic curves (Text book 1 Chapter 4,5)

Unit II

Correlation & regression - scatter diagram - Karl Pearson's coefficient of correlation - properties - lines of regression coefficient & properties - rank correlation
(Text book 1 Chapter 6 §sections 6.1,6.2 6.3)

Unit III

Random variables, distribution function, two dimensional random variables, moment generating function, cumulants and characteristic function
(Text book 2 chapter 5&7 §sections 5.2 to 5.5 and 7.1 to 7.3)

Unit IV

Discrete probability distribution - Geometric, Binomial & Poisson distribution & their moment generating functions, characteristic function, properties & simple application.
(Text book 2 §Chapter 8 §Section 8.4,8.5,8.7 (Omitting Negative Binomials)

Unit V

Continuous probability distributions - Gamma distributions, Normal distributions - their properties - simple problems - importance of normal distribution
(Text book 2 § Chapter 9 §sec 9.2, 9.5,9.6 and 9.7)

Text Books

1. S.Arumugam and A.Issac, *Statistics*, New Gamma publishing House. Palayamkottai
2. Gupta S.C., Kapoor V.K., *Fundamentals of mathematical Statistics* Eleventh edition, Sultan Chand & Sons, Educational Publishers, New Delhi.

Reference books

1. H.C.Saxena, *Elementary Statistics*, S.Chand & Company Ltd., New Delhi
2. J.N.Kapur and Saxena, *Mathematical Statistics*, S.Chand & Company Ltd., New Delhi.

Semester - III			
Part III Skill Based Elective Introduction to Python Programming			
Course Code :21UMAS31	Hrs/week :2	Hrs/Sem :30	Credits : 2

Objectives:

- To acquire Programming skills and Object Oriented Skills in Python
- To develop the ability to write database applications in Python

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	apply decision and repetitions structures in programme design	5	Ap
CO-2	demonstrate the use of Python	5	Ap
CO-3	write python programs to solve problems	8	Cr
CO-4	distinguish various Python Objects	8	An
CO-5	use string function in Python	7	Ev
CO-6	understand the fundamental concepts to write a Python Program	1	Un
CO-7	demonstrate how to read and write files Programs in Python	4	Ap
CO-8	use compound data using Python lists and tuples	5	Ev

Semester - III			
Part III Skill Based Elective Introduction to Python Programming			
Course Code :21UMAS31	Hrs/week :2	Hrs/Sem :30	Credits : 2

Unit I

Introduction to Python – Operations – Variables and Assignment – Numbers and Strings – Errors and Exceptions – Python Basics

(Chapter II Sec 2.1 – 2.16 , Chapter III Sec 3.1 – 3.6)

Unit II

Python Objects – Internal Types – Standard Type Operators – Standard Type Built-in Functions

(Chapter IV, Sec 4.1 – 4.5)

Unit III

Introduction to Numbers – Integers – Complex Numbers – Built-in and Factory Functions – Other Numeric Types

(Chapter V, Sec 5.1 – 5.7)

Unit IV

Strings – Strings and Operators – Built-in Functions – String Built-in Methods –Lists – List Type built-in Methods – Tuples – Tuple Operators and Built-in Functions

(Chapter VI, Sec 6.2 – 6.6, 6.11 -6.17)

Unit V

Conditionals and Loops – if, else if – Conditional Expressions – while, for, break, pass Statements

(Chapter VIII, Sec 8.1 – 8.10)

Text Book

Wesley J.Chun, *Core Python Programming*, Pearson Education, Second Edition, 2012.

Web Resources : 1.<https://www.tutorialspoint.com/python/index.htm>

2.<https://youtu.be/kqtD5dpm9C8>

3. https://youtu.be/_uQrJ0TkZlc

Reference Books:

1. Charles Dierbach, *Introduction to Computer Science Using Python*, Wiley, 2015
2. Jeeve Jose & P. SojanLal, *Introduction to Computing and Problem Solving with Python*, Khanna Publishers, New Delhi, 2016.

Semester – III			
Part III Skill Based Elective Quantitative Aptitude I			
Course Code : 21UMAS32	Hrs/week : 2	Hrs/ Semester : 30	Credits : 2

Objectives:

- To bring out the mental ability and skill of the students
- To train the students for competitive and professional examinations

Course outcome:

Co No	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	solve the problems easily by using short-cut method with time management to face the competitive examinations	4	Ap
Co-2	develop their calculating and computing skills.	5	Ap
Co-3	acquires the ability to understand and analyze the problem	2	Un
Co-4	apply quantitative methods to solve a variety of business problems	5	Ap
Co-5	solve the questions with accuracy and approach the problems in different manner	3	Cr
Co-6	enhances logical skills, arithmetic skills and aptitude skills.	5	Ap
Co-7	simplify and evaluate algebraic expressions.	3	Ev
Co-8	use mathematical concepts in real world situations.	8	Ap

Semester – III			
Part III Skill Based Elective Quantitative Aptitude I			
Course Code :21UMAS32	Hrs/week : 2	Hrs/ Semester : 30	Credits : 2

Unit I

Numbers – Square roots & cube roots

(Chapters 1& 5, pages 1-24, 96-122)

Unit II

Time & Distance – Polygons

(Chapters 17 & 25, 343-360, pages 478-484)

Unit III

Problems on Numbers – Problems on Ages

(Chapters 7 & 8, pages 143-163)

Unit IV

True Discount – Banker’s Discount – Calendar

(Chapters 26, 27 & 29, pages 485-493, 500-503)

Unit V

Simplification-Average

(Chapters 4 & 6, 68-95, pages 123-142)

Text Book

Agarwal R.S., *Arithmetic Subjective and Objective for Competitive Examinations* (Revised Edition 2011), S.Chand and Company Ltd. , Ram Nagar, New Delhi – 55.

Semester – III			
Women’s Synergy			
Code : 21UAWS31	Hrs/ Week : 2	Hrs/Sem:30	Credits : 2

Unit I - Physical Health

Woman’s Structural Organisation – Levels of organisation – Body image - Reproductive health – Hormonal Cycle and its Psycho-somatic implications – Child birth – lactation – Nutritional status of women.

Unit II – Psychological Health

Examining factors determining psychological conditions of women – Depression, anxiety, stress, hysteria – Socio – cultural and familial conditioning of women’s minds – Self Image, Discrimination against women.

Unit III – Women and Legal Awareness

Women specific – centered legislations – legal issues – laws to prevent gender based violence National / State Pro-women schemes – educational and Employment schemes. Laws for protection of Women – Women’s rights to property – Women’s Rights in the Indian Constitution – Maternity benefit act.

Unit IV – Women and Finance

Manager of domestic finance – Budgeting basics – Create a family budget - Set financial goals – Plan for financial emergencies – Budget for travel – Saving strategies – Investment options

Unit V – Women’s Empowerment in Various Domain

Introduction - Women created history in sports and music – P. T. Usha, M. S. Subbulakshmi - Women who crossed hurdles in Social Service – Mother Theresa, Muthulakshmi Reddy, Medha Patkar - Role of Women in Indian independence movement and Politics – Indira Gandhi, Aruna Asaf Ali.

SEMESTER – IV

Part-1 பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம்
(செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)

Course Code: 21ULTA41

Hrs / Week:6

Hrs / Semester: 90

Credits: 4

Objectives:

- மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து, வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.
- இலக்கியமாந்தரின் மூலம் நல்ல வாழ்க்கை அனுபவங்களைப் பெறச்செய்து தன்னம்பிக்கை, ஆளுமைத் திறம், மொழி அறிவு இவற்றை உருவாக்குதல்.

Course Outcome:

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	அனுபவ அறிவை வளர்க்கிறது.	நடைமுறைப்படுத்தல்
CO-2	பழந்தமிழர் வாழ்வியல் முறைகளை கற்று பயனடைய உதவுகிறது.	நடைமுறைப்படுத்தல்
CO-3	ஆய்வு நோக்கினை வளர்க்கவும் வாழ்வின் வளர்ச்சி நிலையை மேம்படுத்திக் கொள்ளவும் உதவுகிறது.	நடைமுறைப்படுத்தல், உருவாக்கம்
CO-4	மனிதநேயம், இறைநம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்
CO-5	மொழியைப் பிழையின்றி பேசவும் எழுதவும் உதவுகின்றது.	திறன் மேம்பாடு
CO-6	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	நடைமுறைப்படுத்தல், உருவாக்கம்
CO-7	சமுதாய பிரச்சினைகளை எதிர்கொள்ளும் திறம் கிடைக்கிறது.	நடைமுறைப்படுத்தல், திறன் மேம்பாடு
CO-8	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	படைப்பாற்றல், திறன் மேம்பாடு

SEMESTER – IV			
Part-1 பொதுத்தமிழ் - தாள் 4 சங்க இலக்கியம் (செய்யுள், இலக்கணம், இலக்கிய வரலாறு, உரைநடை, நாடகம்)			
Course Code: 21ULTA41	Hrs / Week:6	Hrs / Semester: 90	Credits: 4

அலகு - 1 செய்யுள் - 2 மணி

எட்டுத்தொகை

1. நற்றிணை - பாடல்கள் : 64, 318
2. குறுந்தொகை - பாடல்கள் : 3, 20, 75
3. ஐங்குறுநூறு - செலவு அழுங்குவித்தப் பத்து - பாடல்கள் : 304, 307, 308, 309
4. பதிற்றுப்பத்து - பாடல் : 25
5. பரிபாடல் - பாடல் 6 (1-10 அடிகள்)
5. கலித்தொகை - பாடல் : 51
6. அகநானூறு - பாடல்கள் : 20, 194
7. புறநானூறு - பாடல்கள் : 191, 204

பத்துப்பாட்டு

மதுரைக்காஞ்சி - 63 வரிகள்

அலகு -2 இலக்கணம் - 1 மணி

1. பாவகைகள் - வெண்பா, ஆசிரியப்பா பொது இலக்கணம்
2. அணி இலக்கணம் -
உவமை, உருவகம், வேற்றுமை, வஞ்சப்புக்கழ்ச்சி, சிலேடை, தற்குறிப்பேற்றம்
3. வாக்கிய வகைகள்
4. பிறமொழிச் சொற்களை நீக்கி எழுதுதல்
அ. ஆங்கிலச் சொற்கள்
ஆ. வடமொழிச் சொற்கள்
இ. தெலுங்குச் சொற்கள்

அலகு 3 இலக்கியவரலாறு - 1 மணி

1. எட்டுத்தொகை நூல்கள்
2. பத்துப்பாட்டு நூல்கள்
3. சங்க இலக்கியத்தின் தனிச்சிறப்புகள்
4. நாடகம் - தோற்றமும் வளர்ச்சியும்

அலகு - 4 உரைநடை - 1மணி

இலக்கியத் தென்றல் - தமிழ்த்துறை - கட்டுரைத் தொகுப்பு,
தூய மரியன்னைகல்லூரி (தன்னாட்சி), தூத்துக்குடி

அலகு -5 நாடகம் - 1 மணி

ஆயிரம் பூக்கள் மலரட்டும் - கீழ்க்குளம் வில்லவன்

II B.A., / B.Sc Part I FRENCH

SEMESTER – IV			
PART – I French Paper – IV French Course and Literature			
Course Code : 21ULFA41	Hrs/week : 6	Hrs/ Sem : 90	Credits : 4

Objectives

To create and develop the taste for literary readings in the target language.

To motivate students to appreciate the French literature.

Course Outcomes

CO	At the end of this course, the students will be able to	CL
1.	comprehend the French literary background	Un, An
2.	imbibe the basic grammatical structures of the language	Un, An
3.	inculcate the values imparted through the literary texts	Un, An
4.	appreciate simple literary texts	An, Ap
5.	acquire literary knowledge and enhance aesthetic perception	An, Ap
6.	explore a literary text, with the perspective of analyzing the content and manner of writing	An, Ap
7.	reflect upon the author's ideas and transform her own personality	Ap, Cr
8.	discover, interrogate and reflect on the humanistic value	Cr
9.	understand the history of France	Un

SEMESTER – IV			
PART – I French Paper – IV French Course and Literature			
Course Code : 21ULFA41	Hrs/week : 6	Hrs/ Sem : 90	Credits : 4

Unit 1 – XVII^esiècle

- 1.1 – Le Corbeau et le Renard - Jean de la Fontaine
 1.2 – Le Petit Chaperon Rouge - Charles Perrault
 1.3 – Le Passe Composé

Unit 2 – XVIII^esiècle

- 2.1 – Zadig : La danse - Voltaire
 2.2 – La Révolution française
 2.3 – L'imparfait

Unit 3 – IX^esiècle

- 3.1 – Chansons d'automne - Paul Verlaine
 3.2 – Le Père Goriot (*extrait*) - Honoré de Balzac
 3.3 – Les Pronoms relatifs

Unit 4 – XX^esiècle

- 4.1 – Le Pont Mirabeau - Guillaume Apollinaire
 4.2 – L'Etranger (*extrait*) - Albert Camus
 4.3 – Les Indicateurs temporels

Unit 5 – La littérature francophone

- 5.1 – Le Grand Cahier (*extrait*) - Agota Kristof
 5.2 – Le fils à la recherche de sa mère- Pape Faye
 5.3 – Le Futur proche et le futur simple

Books, Journals and Learning Resources

- K. Madanagobalane, N.C.Mirakamal.*Le Français par les Textes*. Chennai :Samhita Publications, 2019.
- Blondeau Nicole, Allouache Ferroud jà, Ne Marie-Françoise.*Littérature Progressive du Français*.Paris : CLE International,2004.
- Carlo Catherine, Causa Mariella.*Civilisation Progressive du Français – I*. Paris : CLE International, 2003.
- Akyuz Anne,Bazelle-Shahmaei Bernadette, Bonenfant Joelle, GliemannMarie-Francoise.*Les 500 exercices de grammaire*. Paris : Hachette livre,2005
- Grégoire Maria.*Grammaire Progressive du français*. Paris :CLE International,2002.
- Sirejols Evelyne, TempestaGiovanna,Grammaire. *Le Nouvel Entraînez-vous avec 450 Nouveaux Exercices*. Paris : CLE International, 2002
- www.francaisfacile.com/exercices/
- www.bonjourdefrance.com
- <https://www.conte-moi.net/node/120>

SEMESTER – IV**Part II English Poetry, Prose, Extensive Reading and Communicative English - IV****Course Code 21UGEN41****Hrs/ Week: 6****Hrs/ Semester: 90****Credits: 4****Objectives:**

- To advance students' understanding of literary art and writings of universal appeal.
- To further the proficiency of communicative English through literary studies.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand better the language and literary components of texts	2,8	Un
CO-2	gain deeper insight into literary experience and expressions of writers	8	Un
CO-3	comprehend sentence types and its application	5	Un
CO-4	be competent in conversational and functional English	1	Ap
CO-5	rightly employ verbal and non-verbal communication skills	2,4,10	Ap
CO-6	adopt right perspectives of human values for life	10	Ap
CO-7	develop skills of creative/ formal writing and speech	3,7	Cr
CO-8	face interviews and competitive exams with confidence	6,10	Ap

SEMESTER - IV			
Part II English Poetry, Prose, Extensive Reading and Communicative English - IV			
Course Code :21UGEN41	Hrs/ Week: 6	Hrs/ Semester: 90	Credits: 4

Unit I –Poetry

John Keats – Bright star, would I were steadfast

E.E. Cummings – I carry your heart with me

Jayanta Mahapatra – Relationship

Unit II – Prose

Helen Keller – Three Days to See

Jerzy Kosinski – TV as a Baby Sitter

Bhabani Bhattacharya – Names are not Labels

Unit III – Fiction

Thomas Hardy – *Tess of the d' Urbervilles* (Abridged Version)

Unit IV – Grammar

Types of Sentences, Transformation of Sentences

Unit V – Communication Skills

Verbal and Non-Verbal Communication, Interview, CV- Resume, Presentation Skills

Text Books:

Units I – III – Compiled by the Research Department of English.

Units IV – Joseph, K.V. *A Textbook of English Grammar and Usage*. Chennai: Vijay Nicole Imprints Private Limited, 2006.

Unit V – CLIL (Content & Language Integrated Learning) – Module IV by TANSICHE.

Semester – IV			
Part III Core VI		Modern Algebra	
Course Code: 21UMAC41	Hrs/week : 6	Hrs/Semester: 90	Credits : 5

Objectives:

- To give an introductory knowledge of the basics abstract systems of mathematics.
- To train the students to generalize the known concepts and to develop analytical thinking.

Course Outcome:

Co. No	Upon completion of this course, students will	PSOs addressed	CL
Co-1	explain the theory behind relations and functions and how functions may relate dissimilar structures to each other.	3	Cr
Co-2	describe and generate the basic algebraic structures such as Groups, Rings, Fields, Integral Domain, Euclidean Domain, etc., and will identify examples of these specific constructs.	1	Ev
Co-3	have a working knowledge of important mathematical concepts such as order of Group, order of an element, generator of a cyclic group, index of a subgroup, characteristic of a Ring, Maximal and Prime Ideals etc.,	2	Un
Co-4	analyze relationship between abstract algebraic structures with familiar number system such as integers, complex and real numbers	2	An
Co-5	critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra. (Proof and Reasoning).	8	An
Co-6	develop ability to form and evaluate conjectures.	1 and 5	Ap
Co-7	produce the group concepts in other science disciplinary	3	Ap
Co-8	illustrate the isomorphic structures	8	An

Semester – IV			
Part III Core VI		Modern Algebra	
Course Code: 21UMAC41	Hrs/week : 6	Hrs/Semester: 90	Credits : 5

Unit I

Relations and Mappings - Relations - Equivalence Relations - Functions – Binary Operations

(Chapter 2, Sec 2.1 - 2.5, pages 2.1 – 2.18)

Unit II

Permutation groups - Sub groups - Cyclic Groups - Order of an Element - Cosets and Lagrange's theorem - Euler's theorem - Fermat's theorem

(Chapter 3, Sec 3.4 - 3.8, pages 3.12 – 3.31)

Unit III

Normal Subgroups and Quotient Groups - Isomorphism - Cayley's theorem - Homomorphism - Automorphism - Fundamental theorems of Homomorphism

(Chapter 3, Sec 3.9 - 3.11, pages 3.31 – 3.50)

Unit IV

Rings - definition and examples – Elementary properties of rings- Isomorphism – Types of rings - Characteristic of a ring - Sub rings

(Chapter 4, Sec 4.1 - 4.6, pages 4.1 – 4.18)

Unit V

Ideals - Quotient Rings - Maximal and Prime I – Homomorphism of rings - Unique factorization domain(U.F.D.) – Euclidean domain.

(Chapter 4, Sec 4.7 - 4.10, 4.13- 4.14, pages 4.18 – 4.26, 4.31-4.36)

Text Book

1. Arumugam S. and Thangapandi Isaac A - *Modern Algebra*, Scitech Publications (India) PVT Ltd. Chennai Edition, 2003

Books for Reference

1. Bhattacharya P.B., Jain S.K., Nagpaul S.R., *Basic Abstract Algebra*, Second Edition, Cambridge University Press.
2. Santiago M.L., *Modern Algebra*, Arul Publications, Madras, 1988.

Semester – IV			
Part III Allied		Statistics II	
Course Code : 21UMMA41	Hrs/week : 6	Hrs/Sem : 90	Credits : 4

Objectives:

- To cater needs of statistics in professional and academic courses
- To understand the application of statistics in various fields.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	understand the difference between the weighted index numbers and unweighted	1 and 2	Un
CO-2	compute the upper and lower control limits for different chart	3	Ev
CO-3	find approximate solutions to problems	4 and 8	Cr & Un
CO-4	apply concepts and theorems in solving problems.	4	Ap
CO-5	demonstrate problem solving skills	3	An
CO-6	know type I and type II error	1	Cr
CO-7	classify the different test static	5	Un & Ap
CO-8	apply the correct test static	4	Ap

Semester – IV			
Part III	Allied	Statistics II	
Course Code : 21UMMA41	Hrs/week :6	Hrs/Sem :90	Credits :4

Unit I

Characteristics of index numbers, Laspeyers and Paasche's – Bowley's - Marshall and Erdgeworth's index numbers - Tests - Unit test - Commodity reversal test, Time reversal test, Circular test. §Text book 2 chapter 9

Unit II

Statistical Quality Control - Definition, Advantages, Process control - Control chart, Mean chart, Range chart, p - chart, np – chart.

§Text book1 volume2 chapter 7 (page 1052 - 1074)

Unit III

Testing of hypothesis - Null and Alternate Hypothesis. Type I and Type II errors - Critical region, level of significance - Test of significance for large samples - Testing a single proportion - Difference of proportions - testing a single mean - Difference of means. §Text book1 volume2 chapter 3 (page 881 -908)

Unit IV

Tests based on t - distribution - Single mean - Difference of means - Tests based on F distribution - Variance ratio test - Test based on chi square distribution - Independence - Goodness of fit.

§Text book1 volume2 chapters 3&4 (page 910 -920, 939-990, 1006-1009)

Unit V

Analysis of Variance - One way and two way classified data - Basis of experimental design - simple problems. §Text book2 chapter17

Text Books

1. Gupta S.P., *Statistical Method*, forty fourth edition Sultanch and & sons publishers-New Delhi.
2. Arumugam S. and Issac A., *Statistics*, New Gamma publishing House. Palayamkottai.

Reference Book

1. Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics* , Eleventh edition, Sultan Chand & Sons, Educational Publishers, New Delhi.

Semester - IV			
Part III Skill Based Elective Documentation using LaTeX			
Course Code :21UMAS41	Hrs/week :2	Hrs/ Semester:30	Credits :2

Objectives:

- To give deep knowledge of the LaTeX for Mathematical documentation
- To train the students to use LaTeX skills in documenting and preparing for publications.

Course Outcome:

Co No	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	know the difference between MS Word and LaTeX	3	Un
Co-2	understand the uses of LaTeX	2	Un
Co-3	apply LaTeX in their typing work	1	Un
Co-4	handle math symbols and tables	3	An
Co-5	create documents and make small presentations.	3	Ap
Co-6	become proficient in the use of software applications as used in an office environment.	3 and 8	Ap
Co-7	manipulate with the real life needs in preparing documents	3	Ap
Co-8	prepare projects in updating with the new updates and versions	8	Cr

Semester - IV			
Part III Skill Based Elective		Documentation using LaTeX	
Course Code :21UMAS41	Hrs/week : 2	Hrs/ Semester: 30	Credits : 2

Unit I

Typing text : Words, sentences, and paragraphs - Symbols not on the keyboard - Comments and footnotes - Changing font characteristics - Lines, paragraphs, and pages – Spaces – Boxes.
(Chapter 5, Sec 5.1 - 5.9, pages: 61 - 115)

Unit II

Text environments: Some general rules for displayed text environments - List environments - Style and size environments - Proclamations (theorem-like structures) - Proof environments - Tabular environments - Tabbing environments - Miscellaneous displayed text environments
(Chapter 6, Sec 6.1 to 6.8, pages 117 - 149)

Unit III

Typing math: Math environments - Spacing rules - Equations - Basic constructs - Arithmetic operations - Delimiters - Operators - Math accents - Stretchable horizontal lines - Formula Gallery
(Chapter 7, Sec 7.1 to 7.9, pages 151 - 186)

Unit IV

More math: Spacing of symbols Building new symbols - Math alphabets and symbols - Vertical spacing - Tagging and grouping - Generalized fractions - Boxed formulas
(Chapter 8, Sec 8.1 to 8.6, pages 187 - 206)

Unit V

LaTeX documents: The structure of a document - The preamble - Abstract - Sectioning - Cross-referencing - Bibliographies.
(Chapter 10, Sec 10.1 to 10.6, pages 245 - 270)

Text Book:

George Gratzer, *More Math into LaTeX*, 4th Edition, Springer, 2007.

<https://www.javatpoint.com/latex>

<https://www.overleaf.com/learn/latex/Tutorials>

Books for Reference:

Helmut Kopka and Patrick W. Daly, *A guide to LaTeX*, Fourth Edition, Addison-Wesley.

David R. Wilkins, *Getting started with LaTeX*, Second Edition.

Practicals: Typing Text and Tables: Chapter 4.1 - Inserting Figures: Chapter 5.1 - Mathematical Equations: Chapter 6.3- Inserting References: Chapter 7.6 - Preparing an article for mathematical journal

Semester – IV			
Part III Skill Based Elective		Quantitative Aptitude II	
Course Code : 21UMAS42	Hrs/week : 2	Hrs/ Semester : 30	Credits : 2

Objectives:

- To bring out the mental ability and skill of the students
- To train the students for competitive and professional examinations

Course outcome:

Co No	Upon completion of this course, students will be able to	PSO s addresse d	CL
Co-1	acquires the ability to understand and analyze the problem	2	Un
Co-2	develop their calculating and computing skills.	5	Ap
Co-3	solve mathematical problems using shortcut methods.	4	Cr
Co-4	build confidence to face the competitive examinations.	5	Cr
Co-5	solve the questions with accuracy and within the given time limit.	3	Cr
Co-6	enhances logical skills, arithmetic skills and aptitude skills.	5	Ap
Co-7	simplify and evaluate algebraic expressions.	3	Ev
Co-8	use mathematical concepts in real world situations.	4 and 8	Ap

Semester – IV			
Part III Skill Based Elective		Quantitative Aptitude II	
Course Code : 21UMAS42	Hrs/week : 2	Hrs/ Semester : 30	Credits : 2

Unit I

Percentage– Time and Work

(Chapters 10&15, pages 179-218, 309-330)

Unit II

Ratio and Proportion-Chain Rule

(Chapters 12& 14, Pages 248-276, 291-398)

Unit III

Problems on Trains – Boats and Streams

(Chapters 18 &19, Pages 361-381)

Unit IV

Profit and Loss-Alligation or Mixture

(Chapters 11 &20 , Pages 219-247, 382-387)

Unit V

Line Graphs-Pie charts - Bar Diagrams

(Chapters 33,34 &35, Pages 525-549)

Text Book

1. Aggarwal R.S., *Arithmetic Subjective and Objective for Competitive Examinations*, S.Chand and Company Ltd. , Ram Nagar, New Delhi - 55. Revised Edition 2014.

Books for Reference

1. Aggarwal R.S., *Quantitative Aptitude*, S.Chand and Company Ltd. , Ram Nagar, New Delhi.
2. Abhijit Guha, *Quantitative Aptitude for Competitive Examinations*, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

SEMESTER- IV			
Ability Enhancement Course: Yoga and Meditation			
Code: 21UAYM41	Hrs/Week : 2	Hrs/Semester : 30	Credits: 2

Course Outcome:

- To learn and practice various meditation, yoga methods to transform the ordinary life into a healthy, harmonious life leading to holistic wellbeing,
- To create an eco-friendly, loving and compassionate world.
- Acquire knowledge and skill in yoga for youth empowerment.
- Increase their power of concentration
- Learn the causes and ways to overcome fear and sadness.
- Create a ecofriendly, loving and compassionate world.

Unit I: Meditation

(6 Hrs)

Meditation – Purposes of meditation– Major types of meditations: Zazen, Mindfulness, Vipasana, Yoga, Self-inquiry, Listening, Qi Gong, Taoist, Tantra– Health benefits of meditation: physical, psychological, spiritual–Meditation and Silence:Silence of the body, mind, heart,and beyond – General methodology of meditation – Tips for better meditation

Exercises: Practicing Zazen meditation – Self-enquiry meditation exercises

Unit II: Self-Awareness

(6 Hrs)

Awareness – Self-awareness – Importance of self-awareness – Shades of self-awareness – Difference between Awareness and Concentration – Power of concentration – Levels of concentration – How to increase concentration? – Beauty of living here and now – Ways to develop your presence – Self-awareness and Ecology: interconnectedness

Exercises: Body Scan exercise – Self-Witnessing exercise – Eating Raisin with full awareness

Unit III: Yoga

(6 Hrs)

Meaning and importance of yoga – Yoga and human physical system – Principles of Yoga – Different types of yoga – Yoga and balanced diet – Yoga and energy balance – Pranayama – Surya namaskaram– Basic asanas for healthy life – Therapeutic benefits of simple yogasanas – Naturopathy for common ailments.

Exercises:Practicing basic Asanas – Doing Sun Salutation

Unit IV: Mindfulness

(6 Hrs)

Definition of mindfulness – Three components of mindfulness– Benefits of mindfulness – Mindfulness and Brainwave patterns – Myths about mindfulness – Scientific Facts about mindfulness – Formal method to practice mindfulness – Qualities of Mindfulness – Obstacles for mindfulness – informal ways of practicing mindfulness – Mindfulness to get rid of addictions

Exercises: Practice Mindful Walking –Practice Mindful Talking

Unit V: Heartfulness

(6 Hrs)

Attitude to life – Power of positive attitude – Techniques to develop positive attitude – Positive vs negative people – Forms of negative attitude – Heartfulness – Managing fear: Basic 5 fears, Ways to overcome fear–Handling anger: Anger styles, Tips to tame anger – Coping with sadness: Causes and ways to overcome sadness, dealing with depression – Ultimacy of compassion: Compassion to oneself, towards others: Forgiveness, to nature: Seeing God in all

Exercises: Practice Loving-Kindness meditation– Doing compassionate actions

Text Book:

- 1) Thamburaj Francis. *Meditation and Yoga for Holistic Wellbeing*. Trichy:Grace Publication. 2019.

Books References:

- 1) Osho. *Meditation the Only Way*. New Delhi: Full Circle Publication, 2009.
- 2) Thamburaj Francis. *Journey from Excellence to Godliness: Zen Meditation for Transformation*. Grace Publication, Trichy, 2017.
- 3) Osho. *Awareness: The Key to Living in Balance*. New York: St.Martin's Griffin Publication, 2001.
- 4) Tolle Eckart. *The Power of Now: A Guide to Spiritual enlightenment*. New World Library, 2004.
- 5) Swami Gnaneswarananda. *Yoga for Beginners*. Calcutta: Sri Ramakrishna Math, 2010.
- 6) HanhThichNhat. *The Miracle of Mindfulness: An Introduction to the Practice of Meditation*. Beacon Press, 2016.
- 7) Kamlesh D. Patel and Joshua Pollock. *The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation*. Westland Publications, 2018.

Semester - V			
Part III Core VII (Common Core) Computer Oriented Numerical Methods			
Course Code: 21UCMC51	Hrs/Week: 6	Hrs/ Semester : 90	Credits : 5

Objectives:

- To understand and apply different methods to find the value of definite integrals.
- To analyse and evaluate the accuracy of common numerical methods and implement numerical methods in MATLAB.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	find numerical solution of a problem in all aspects and apply these methods to practical implementation as reliable and efficient.	3	Re
CO-2	recognize and apply appropriate principles and concept relevant to numerical analysis.	5	Ap
CO-3	discover the most appropriate estimate for the missing data.	1	Cr
CO-4	analyze the errors obtained in the numerical solutions of problems.	6	An
CO-5	use appropriate numerical methods, determine the solutions to given problems.	3	Ap
CO-6	demonstrate the use of the interpolation method to find the solution for the data.	8	Un
CO-7	develop their calculation skills.	1	Cr
CO-8	differentiate gauss jacobi iteration and gauss seidal iteration method.	3	An

Semester - V			
Part III Core VII (Common Core) - Computer Oriented Numerical Methods			
Course Code: 21UCMC51	Hrs/Week: 6	Hrs/ Semester : 90	Credits : 5

Unit I

Difference operators-Other difference operators-Newton's interpolation formulae-Lagrange's interpolation formula-Divided difference-Divided difference formula-Inverse interpolation.

(Textbook: 1, Chapter 3, Sec 3.1, 3.2, Chapter 4, Sec 4.1,4.3,4.4,4.5,4.6, pages 3.1 – 3.45, 4.1- 4.16, 4.31- 4.54) (Problems only)

Unit II

Derivatives using Newton's forward difference formula-Derivatives using Newton's backward difference formula-Derivatives using Newton's central difference formula-Maxima and minima of the interpolating Polynomial-Numerical Integration-Newton – Cote's quadrature formula-Trapezoidal Rule-Simpson's one third rule-Simpson's three eighth rule-Weddley's rule.

(Textbook: 1, Chapter 5, Sec 5.1 - 5.4, Chapter 6, Sec 6.1 - 6.4, pages 5.1 – 5. 24, 6.1 – 6.26) (Problems only)

Unit III

Taylor series method-Picard's method- Runge-Kutta method.

(Textbook: 1, Chapter 7, Sec 7.1,7.2,7.4, pages 7.1-7.15, 7.25-7.40) (Problems only)

Unit IV

Introduction to MATLAB: MATLAB environment – Types of files _ platform – search path – Constants, variables and expressions – Vectors and Matrices – Polynomials – Input Output statements – MATLAB Graphics.

(Textbook: 2, Chapters:1,2,3,4,5,6)

Unit V

Control Structures- writing programs and functions – ordinary differential equation and symbolic mathematics.

(Textbook: 2, Chapters: 7,8,9)

Text Book

1. Arumugam S and Thangapandi Isaac A, *Numerical Analysis With Programming in C*, New Gamma Publishing House, Palayamkottai.
2. Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, *MATLAB and its Applications in Engineering*, Pearsons Publications.

Books for Reference

1. Stormy Attaway, *MATLAB- A Practical Introduction to Programming and ProblemSolving*.
2. Stephen J. Chapman, *Essentials of MATLAB Programming*, Published November 1st 2007 by Thomson Learning.

Semester - V			
Part III	Core VIII	Linear Algebra	
Course Code: 21UMAC51	Hrs/week : 5	Hrs/Semester : 75	Credits : 4

Objectives:

- To extend the knowledge in Abstract Algebra and develop analytical thinking.
- To equip the students with the ideas of Linear Algebra to pursue their higher studies.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
Co-1	know all the definitions in Linear Algebra	1	Un
Co-2	analyze and construct mathematical arguments that relate to the study of linear algebra. (proof and reasoning).	3	An
Co-3	solve systems of linear equations.	3	Ap
Co-4	work within vector spaces and to distill vector space properties	3	An
Co-5	determine whether a system of equations is consistent or not and find its general solution.	6	An
Co-6	compute eigenvalues and eigenvectors of a matrix.	4	Ap
Co-7	develop analytical thinking in R-Programming	5	An
Co-8	understand the concept of Inner Product Spaces	1	Un

Semester - V			
Part III	Core VIII	Linear Algebra	
Course Code: 21UMAC51	Hrs/week : 5	Hrs/Semester : 75	Credits : 4

Unit I

Vector spaces - Elementary properties - subspaces - Quotient spaces - Direct sum - Linear span of a set - Linear dependence and independence

(Text Book 1: Chapter 5, Sec 5.1, 5.2, 5.4, 5.5, Pages 5.1-5.10, 5.14-5.19)

Unit II

Basis - Dimension, Any two bases of a finite dimensional vector space have the same number of elements –Theorems on dimension.

(Text Book 1: Chapter 5, Sec 5.3, 5.6, Pages 5.10-5.13, 5.19-5.26)

Unit III

Linear transformations - vector space of linear transformations - Rank and nullity theorem – Matrix of linear transformations – Algebra of matrices -Types of matrices – The inverse of a matrix.

(Text Book 1: Chapter 5, Sec 5.7, 5.8, Chapter 7, Sec 7.1, 7.2, 7.3, Pages 5.26-5.30, 7.1-7.15)

Unit IV

Elementary transformations – Rank of a matrix - Characteristic equation of a matrix - Eigen values and eigen vectors - Cayley Hamilton theorem and problems – Solution of simultaneous equations using matrices.

(Text Book 1: Chapter 7, Sec 7.4, 7.5, 7.6, 7.7, 7.8, Pages 7.15-7.40)

Unit V

Inner product spaces – Norm – Schwartz inequality – Triangular inequality - GramSchmidt orthogonalisation process - orthogonal complement - Vectors and Matrices in R programming

(Text Book 1: Chapter 6, Pages 6.1-6.9& Text Book 2)

Text Book

1. Arumugam .S and ThangapandiIssac.A , Modern Algebra , Scitech Publications (India) Pvt. Ltd., Chennai, Reprint 2017.
2. Linear algebra in R SørenHøjsgaard February 15, 2005

Books for Reference

1. Bhattacharya P.B., Jain S.K., Nagpaul S.R., *Basic Abstract Algebra*, Second Edition, Cambridge University Press.
2. Santiago M.L., *Modern Algebra*, Arul Publications, Madras, 1988.
3. Hrishikesh-D-Vinod,*Hands-on Matrix Algebra Using R: Active And Motivated Learning with Applications*, World Scientific Publications, 2011.
4. S.Kumaraesan, *Linear Algebra A geometric Approach*, PHI Learning Publishers

Semester V			
Part III Core IX		Graph Theory	
Course Code : 21UMAC52	Hrs / Week : 5	Hrs / Semester: 75	Credits: 4

Objectives:

- To learn basic concepts in graph theory.
- To translate situations to diagrammatic representations and to develop problem solving skills.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	interpret the basics of graphs.	1	Un
Co-2	identify induced subgraphs, paths,cycles ,independent sets and coverings in graphs	1	Re
Co-3	determine whether graphs are Hamiltonian and/or Eulerian and to solve problems involving vertex and edge connectivity, planarity and crossing numbers	5	An
Co-4	combine theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.	8	Un
Co-5	inspect the applications of graph theory	7	An
Co-6	model and solve real-world problems using graphs both quantitatively and qualitatively.	4	Ap
Co-7	develop an appropriate level of mathematical literacy and competency.	6	Cr
Co-8	formulate problems in terms of graphs, solve graph theoretic problems and apply algorithms.	5	Cr

Semester V			
Part III Core IX		Graph Theory	
Course Code :21UMAC52	Hrs / Week : 5	Hrs / Semester: 75	Credits: 4

Unit I

Graphs and sub graphs:

Introduction - Definition and examples - Degrees - Sub graphs –Isomorphism - independent sets and coverings - intersection graphs - Line graphs - Matrices - Operation on graphs

(Chapter 2, Sec 2.1-2.4, 2.6-2.9, pages 5-17, 19-27).

Unit II

Degree Sequences: Introduction –Degree sequences - Graphic Sequence Connectedness - introduction-walks - trails and paths - Connectedness and components - blocks - connectivity.

(Chapters 3 and 4 Sec 3.1-3.2, 4.1-4.4, pages 29-47).

Unit III

Eulerian and Hamiltonian graphs:

Introduction - Eulerian graphs - Hamiltonian graphs - Trees – introduction - Characterization of trees - Centre of a tree .

(Chapters 5 and 6, Sec 5.1-5.2, 6.1-6.2, pages 48-65).

Unit IV

Planarity:

Definition and properties, Characterization of planar graphs – thickness, crossing and outer planarity

(Chapter- 8, Sec 8.1-8.3, pages 73-84).

Unit V

Colourability:

Chromatic number and Chromatic index - the five colour theorem –Chromatic polynomials

(Chapter- 9, Sec 9.1-9.4, pages: 85-98).

Text Book

S. Arumugam , S. Ramachandran - *Invitation to Graph theory*, Scitech Publications (India) Pvt. Ltd., (2001) Chennai - 17.

Books for Reference

1. Parthasarathy K.R., *Basic Graph Theory*, Tata McGraw Hill Publishing Company Limited, New Delhi
2. John Clark and Derek Allan Holton, *A First Look at Graph Theory*, World Scientific Publishing Co.Pte.Ltd, Singapore, Reprint 2013.

SEMESTER – V			
Part III Core X		Real Analysis	
Course Code :21UMAC53	Hrs / Week: 4	Hrs / Semester: 60	Credits: 4

Objectives:

- To inculcate knowledge on Real numbers and their properties & proofs.
- To develop the application of the concepts.

Course Outcomes

Co No	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	interpret real number system and its properties.	1	Un
Co-2	define and recognize the continuity of real functions	1	Re
Co-3	define and recognize the real functions and its limits	1	Re
Co-4	interpret mathematical ideas via extended written presentation.	2	Un
Co-5	develop a broad understanding encompassing logical reasoning, generalization, abstraction, and formal proof.	5	An
Co-6	formulate proofs and structure mathematical arguments.	6	An
Co-5	determine the continuity, differentiability of functions defined on subsets of the real line	3	Ev
Co-7	apply the Mean Value Theorem and the intermediate value property to problems in the context of real analysis	5	Ap
Co-8	describe fundamental properties of the real numbers that lead to the formal development of real analysis.	3	An

SEMESTER – V			
Part III - Core X-		Real Analysis	
Course Code :21UMAC53	Hrs / Week: 4	Hrs / Semester: 60	Credits: 4

Unit I

Continuous functions – Sequential Criterion for continuity – Discontinuity Criterion - Combinations of continuous functions – Composition of continuous functions - Continuous functions on intervals–The Maximum-Minimum theorem.

(Chapter 5, Sec 5.1 - 5.3(upto 5.3.6), pages 124-137).

Unit II

Bolzano's theorem- Uniform continuity – Nonuniform continuity Criteria – Lipschitz Functions - The continuous extension theorem - Step function - Extreme value theorem - Monotone functions.

(Chapter 5, Sec 5.3 - 5.4, pages 138-148).

Unit III

Continuity and Gauges - Existence of δ -fine partitions - Monotone and inverse functions - The n^{th} root function - Rational Powers.

(Chapter 5, Sec 5.5 - 5.6, pages 149-159).

Unit IV

Differentiation - The derivative- The chain rule - Inverse functions - The Mean value theorem - First Derivative Test for Extrema - Applications of Mean value theorem - Inequalities - The intermediate value property of derivatives.

(Chapter 6, Sec 6.1-6.2, pages 161-179)

Unit V

L'Hospital's rules - Indeterminate forms - Taylor's Theorem- Applications of Taylor's Theorem - Relative Extrema - Convex functions - Newton's Method.

(Chapter 6, Sec 6.3 - 6.4, pages 180-196).

Text Book

Robert G. Bartle and Donald R. Sherbert, *Introduction to Real Analysis*, Fourth Edition, Wiley India Edition, Reprint 2017.

Books for Reference

1. Richard R. Goldberg, *Methods of Real Analysis*, Oxford & IBH Publishing Co., New Delhi. Reprint 1973.
2. Ajit Kumar and S. Kumaresan, *Real Analysis*, Crc Press, 2015.

Semester –V			
Part III Core XI- Vector Calculus and Fourier Series			
Course Code :21UMAC54	Hrs/week :4	Hrs/Semester :60	Credits :4

Objectives:

- To introduce physical application of derivatives of vectors.
- To study the line integral, surface integral and volume integral and their applications.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	differentiate and integrate vector-valued functions and apply calculus to motion problems in two and three dimensional space	2	An
Co-2	compute gradient, curl and divergence of vector fields.	1 and 3	C
Co-3	use the gradient to find directional derivatives.	3	Ap
Co-4	solve problems in multiple integration using rectangular, cylindrical, and spherical coordinate systems	8	A
Co-5	select and apply appropriate models and techniques to define and evaluate integrals	3	E
Co-6	apply greens theorem, stokes theorem and gauss divergence theorem to evaluate integrals.	3	A
Co-7	know that any periodic function can be expressed as a fourier series.	6	Cr
Co-8	expand an odd or even function as a half-range cosine or sine fourier series.	1	Un, An

Semester –V			
Part III Core XI		Vector Calculus and Fourier Series	
Course Code :21UMAC54	Hrs/week :4	Hrs/Semester :60	Credits :4

Unit I

Vector differentiation –Differentiation of vectors – Gradient

(Text Book 1: Chapter 5, Sec5.0,5.1,5.2,5.3, Pages 5-1 to 5-18)

Unit II

Divergence and Curl – Solenoidal, Irrotational

(Text Book 1: Chapter 5, Sec5.4, Pages 5-18 to 5-30)

Unit III

Vector integration - line integrals - surface integrals

(Text Book 1: Chapter 7, Sec 7.1, 7.2, Pages L&S INT 1 to 11)

Unit IV

Vector integration - Gauss, Stokes and Green's theorems (Without proof), problems only

(Text Book 1: Chapter 7, Sec 7.3, Pages L&S INT 11 to 32)

Unit V

Fourier series - Half - range, sine & cosine series

(Text Book 2: Part II Chapter 5, 459-478)

Text Books

1. Arumugam S. and Thangapandi Isaac A, *Analytical Geometry of Three Dimensions and Vector Calculus*, New Gamma Publishing House, Edition 2014,
2. Arumugam S. and Thangapandi Isaac A, *Calculus*, New Gamma Publishing House, Edition 2014.

Books for Reference

1. DuraiPandian P and Laxmi Duraipandian, *Vector Analysis*, Emerald Publishers, Edition 1986.
2. Piskunov N, *Differential and Integral Calculus*, Vol II, CBS Publishers and Distributors.

Semester –V			
Part III	Core Elective	Discrete Mathematics	
Course Code : 21UMAE51	Hrs/week : 4	Hrs/ Semester: 60	Credits : 4

Objectives:

- To provide students with the basic knowledge, both theoretical and empirical, necessary to understand, analyze and solve discrete mathematical problems arising throughout their higher education and professional future.
- To familiarize the students with the basic concepts, results, methods, vocabulary and notation associated with Discrete Mathematics.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
Co-1	understand logic and mathematical reasoning to count or enumerate objects in a systematic way.	1	Un
Co-2	use truth tables for expressions involving the logical connectives .	8	Ap
Co-3	develop capacity in knowing what constitutes a valid argument, and in constructing valid arguments or proofs.	3	An
Co-4	apply standard rules of inference.	3	Ap
Co-5	grasp the notions of lattices.	1	Un
Co-6	understand Boolean algebra and truth tables.	1	Un
Co-7	evaluate and simplify expressions using the properties of Boolean Algebra.	5	Ev
Co-8	apply logical reasoning to solve a variety of problems.	4	Ap

Semester –V			
Part III Core Elective Discrete Mathematics			
Course Code : 21UMAE51	Hrs/week : 4	Hrs/ Semester: 60	Credits : 4

Unit I

Propositional logic - Propositional equivalences - Predicates and Quantifiers - Nested Quantifiers - Rules for inference - Introduction to proofs - Proof Methods and strategy

(Text Book 1 :Chapter 1- Sec 1.1, 1.2, 1.4-1.8)

Unit II

Mathematical Induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and Combinations – Recurrence relations – Solving linear recurrence relations

(Text Book 1 :Chapter 5 - Sec 5.1, 5.2, Chapter 6 - Sec 6.1,6.2 &6.3, Chapter 8 - Sec 8.1 & 8.2)

Unit III

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths

(Text Book 1 :Chapter 10 - Sec 10.1 – 10.5)

Unit IV

Generating functions – Inclusion and Exclusion Principle and its applications – Relations and their properties – Representing relations – Closure of relations – Equivalence of relations – Partial orderings

(Text Book 1 :Chapter 8 - Sec 8.4, 8.5, 8.6, Chapter 9 - Sec 9.1, 9.3-9.6)

Unit V

Partial ordering – Posets – Lattices as posets – Properties of Lattices – Lattices as algebraic systems – sub lattices – Direct product and homomorphism – some special lattices – Boolean algebra.

(Text Book2 , Chapter 4, 4-1, 4-2, pages 378 – 401)

Text Books

1. Kenneth H. Rosen, *Discrete Mathematics and its Applications*, 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2012
2. Trembly J.P and Manohar R, *Discrete Mathematical Structures and Applications to computer Science*, Tata McGraw hill Pub. Co. Ltd, New Delhi 35th Reprint, 2008.

Book for Reference

1. Seymour Lipschutz, Marc Lars Lipson, *Discrete Mathematics*, Tata McGraw Hill, NewDelhi.
2. K.Chandrasehara Rao, *Discrete Mathematics*, NAROSA Publishing House Pvt. Ltd, 2012.

Semester V			
Part III	Core Elective	Transforms	
Course Code: 21UMAE52	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Objectives:

- To enable the students to study the Laplace Transforms, properties of Laplace Transforms, inverse Laplace transforms and some applications to solve the differential equation and integral equations.
- To enable the students to study Fourier Transforms and its applications to solve some boundary value problems.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	represent periodic functions using Fourier series.	1	Un, Ap
CO-2	Understand the relation between Fourier and Laplace transforms.	4	Ap
CO-3	learns complex numbers and their properties.	2,3	Un
CO-4	Evaluate complex integrals by various methods.	1	An
CO-5	understand Z - Transforms	1	Un
CO-6	solve ordinary differential equations using Laplace transform.	1,4	An
CO-7	understand the applications of Laplace transform and Fourier Transform	1,5	Un
CO-8	apply the Transforms to various differential equations.	2	Ap

Semester V			
Core Elective		Transforms	
Course Code: 21UMAE52	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Unit I

Application of Laplace Transform to solve Integral Equations – Integral Equation – Abel’s Integral Equation – Volterra Integral Equation – Fredholm Integral Equation – Integro-Differential Equation.

(Text Book 1: Chapter 10: Page No: 437-448)

Unit II

Fourier Transforms: Introduction – Fourier Integral Theorem – Fourier Transforms – Properties of Fourier Transforms – Convolution – Parseval’s identity for Fourier Transforms

(Text Book 2: Chapter 22: Page No: 836 - 851)

Unit III

Relation between Fourier and Laplace Transforms - Fourier Transforms of the derivatives of a function – Inverse Laplace transforms by method of residues – Application of transforms to boundary value problems

(Text Book 2: Chapter 22: Page No: 851- 865)

Unit IV

Z-Transforms: Introduction –Definition – Some standard Z – Transform - Linear property – Damping rule – Some standard results – multiplication by n - Two basic theorems

(Text Book 2: Chapter 23: Page No: 866 - 874)

Unit V

Some useful inverse Z- Transforms – Convolution Theorem – Convergence of z-Transform – Evaluation of inverse Z – Transform – Applications to difference Equations

(Text Book 2: Chapter 23: Page No: 876 - 884)

Text book:

1. Rakesh Kumar and Nagendra Kumar, *Differential Equations and Integral Transforms*, BS Publishers & Distributers Pvt Ltd, New Delhi, First Edition 2016
2. Dr. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 40th Edition, October, 2007

Reference books:

T.Veerarajan, *Engineering Mathematics*, Tata McGraw-Hill Publishing Company Limited, New Delhi, Third Edition 2008.

Semester - V			
Common Skill Based Core		Computer for Digital Era and Soft Skills	
Code : 21UCSB51	Hrs / Week : 2	Hrs / Sem : 30	Credits : 2

Course Outcome

- Identify different types of computer systems.
- Classify various types of software being used.
- Compare various digital payments and use them in day to day life.
- Recognise the innovative technologies IoT and integrate it in various fields.
- Analyze various social networking platforms and use them efficiently.
- Distinguish various cyber attacks and apply preventive measures.
- Understand the various soft skills needed to become successful.
- Analyze self and adapt oneself to work in a team.

Unit I: Fundamentals of Computers:

Introduction to computers- Components of computers-Working principle-Types of computers-Tablet-Notebook-Smart phone-PDA-Impact of computers on society-Types of software.

Unit II: Recent Trends in Computer Science and e-Governance:

IoT - applications- Mobile applications - E-Learning- E-Commerce - digital payments

Unit III: Social Media:

Face book-Twitter-Linked In-Instagram-Advantages of Social Networking-Issues/Risks of Social Networking-Protecting ourselves from social Networking problems-Cybercrimes-Hacking-Phishing- Cyber Security

Unit IV: Introduction to Soft Skills:

Learning objectives – What are soft skills?-Categories of Soft Skills-Integral Parts of Soft Skills.

Unit V: Understanding Self and Team Building:

Transactional Analysis (TA) - Structural analysis of Ego states- The functional model of Ego states - Egogram-Storke - Life Position - Egogram and Life Positions Questionnaire-Team and Team Building- Features of effective creative teams

Books for Reference:

1. Peter Norton, Introduction to Computers 6th Edition
2. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing, I Edition, Pearson Education, 2003.
3. E.Balagurusamy, Fundamentals of Computers, McGraw Hill
4. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang , E-Commerce fundamentals and applications, Wiley Student edition
5. Benita Bhatia Dua, DeepaJeyaraman, Profit with Social Media, CNBC
6. Dr.K.Alex, Soft Skills, S.Chand & Co
7. <http://www.digitalindia.gov.in/content/social-media-analytics>
8. https://www.researchgate.net/publication/307878962_Introduction_to_E-Governance
9. <http://www.ijqr.net/journal/v10>
10. https://www.researchgate.net/publication/258339295_FUNDAMENTALS_OF_COMPUTER_STUDIES

Semester –VI			
Part III Core XII		Complex Analysis	
Course Code : 21UMAC61	Hrs/week :6	Hrs/Semester :90	Credits :5

Objectives:

- To expose students to more complex theories of study.
- To sharpen analytical thinking and their problem solving capacity.

Course Outcome:

Co No	Upon successful completion of this course students will be able to:	PSO s addressed	CL
Co-1	compute sums, products, quotients, conjugate, modulus, and argument of complex numbers.	1	An
Co-2	understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.	2	Un
Co-3	evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem.	6	Ev
Co-4	know the condition(s) for a complex variable function to be analytic and/or harmonic.	3	Un
Co-5	compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.	2	An
Co-6	use the Cauchy Residue theorem to evaluate integrals and sum series.	6	Ap
Co-7	demonstrate curve properties for image processing with transformation	6	Ap
Co-8	outline complex number system with intense perception	6	An

Semester –VI			
Part III Core XII-		Complex Analysis	
Course Code :21UMAC61	Hrs/week : 6	Hrs/Semester : 90	Credits : 5

Unit I

Complex Numbers- Conjugation and modulus – Inequalities –Square Root – Geometrical Representation of Complex Numbers – nth Roots of Complex numbers - Circles and Straight lines – Regions in the Complex Plane - Extended Complex Plane - Continuous functions- Differentiability - The Cauchy - Riemann equations- Analytic Functions.

(Chapter 1 Sec 1.0 – 1.9, Chapter 2 Sec 2.4, 2.5, 2.6 & 2.7, pages 1- 21, 30 - 50)

Unit II

Harmonic functions - Conformal mapping – Elementary Transformations -Bilinear Transformations - Cross ratio –Fixed points of Bilinear Transformations – Some Special Bilinear Transformation.

(Chapter 2 Sec 2.8 - 2.9, Chapter 3, pages 50 - 100)

Unit III

Complex integration- Definite integral - Cauchy's theorem - Cauchy's integral formula - Higher derivatives

(Chapter 6, Sec 6.0 – 6.4, pages 132-172)

Unit IV

Series Expansions - Taylor's series - Laurent's series - Zeros of Analytic Functions – Singularities

(Chapter 7, Sec 7.0 – 7.4, pages 173 - 208)

Unit V

Calculus of Residues - Residues - Cauchy's Residue Theorem - Evaluation of Definite Integrals

(Chapter 8, Sec 8.0 – 8.3, pages 209 -255)

Text Book

ArumugamS.,ThangapandiIssacA., SomasundaramA.,*Complex Analysis*, SciTech publications(India) Pvt.Ltd, 2014.

Books for Reference

1. Narayanan,ManicavachagomPillai,*Complex Analysis*,S.Viswanathan printers & Publishers Pvt. Ltd.
2. P.Duraipandian,Laxmi Duraipandian&D.Muhilan, *Complex Analysis*,Emerald Publishers, Chennai.

Semester – VI			
Part III Core XIII		Modern Analysis	
Course Code : 21UMAC62	Hrs / Week: 6	Hrs / Semester: 90	Credits: 5

Objectives:

- To introduce the basic concepts in Analysis and to enable the students to understand fundamental ideas and theorems on Metric spaces
- To develop the application of the concepts.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	gain knowledge of concepts of modern analysis, such as open sets ,closed sets, completeness, connectedness and compactness in metric spaces	1	Un
Co-2	be able to write simple proofs on their own and study rigorous proofs	5	Ap
Co-3	develop a higher level of mathematical maturity combined with the ability to think analytically	2	Un
Co-4	develop a broad understanding encompassing logical reasoning, generalization, abstraction, and formal proof.	5	Ap
Co-5	formulate proofs and structure mathematical arguments.	6	Ap
Co-6	explain the basic theory of metric spaces and its application to function spaces.	3	Ev
Co-7	follow more advanced treatments of real analysis and study its applications	3	Ap
Co-8	apply the theory to solve mathematical problems including the construction of simple proofs.	2	An

Semester – VI			
Part III Core XIII		Modern Analysis	
Course Code : 21UMAC62	Hrs / Week: 6	Hrs / Semester: 90	Credits: 5

Unit I

Metric spaces - Bounded sets - open ball - open sets - diameter of a set - interior of set
(Chapter 2, Sec 2.1-2.6, pages 17-58).

Unit II

Closed sets - closure - limit point - dense sets
(Chapter 2, Sec 2.7-2.10, pages 59-79).

Unit III

Complete metric space - Cantor's intersection theorem - Baire's Category Theorem
(Chapter 3, Sec 3.1-3.2, pages 80-100).

Unit IV

Connectedness - equivalent conditions - connected subsets of \mathbb{R} - connectedness and continuity - continuous image of a connected set is connected - Intermediate mean value theorem
(Chapter 5, Sec 5.1-5.3, pages 139-150).

Unit V

Compactness - definition of open cover - compact metric space – Heine Borel theorem - compactness and continuity - continuous image of a compact set is compact - uniform continuity – Continuous function on a compact metric space is uniformly continuous – equivalent characterizations of compactness–compactness and continuity.
(Chapter 6, Sec: 6.1-6.4, pages: 150-178).

Text Book

Arumugam S. and Issac, *Modern Analysis*, New Gamma Publishing House, Edition 2010.

Books for Reference

1. Richard R Goldberg, *Methods of Real Analysis*, Oxford & IBH Publishing Co, New Delhi, Reprint 1973.
2. Robert G.Bartle and Donald R.Sherbert, *Introduction to Real Analysis Fourth Edition* Wiley India Edition, Reprint 2017.

Semester VI			
Part III Core XIV		Mechanics	
Course Code :21UMAC63	Hrs/week :6	Hrs/Semester :90	Credits :5

Objectives

To provide basic knowledge of the behavior of objects in motion

To develop a working knowledge to handle practical problems

Course Outcomes

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	understand the equilibrium of forces	1	Un
CO-2	know the conditions for equilibrium	3	Ev
CO-3	distinguish between parallel and non parallel forces	8	Cr & Ap
CO-4	know the types of friction laws	1	Cr
CO-5	apply friction laws in problems	5	Un & Ap
CO-6	understand the two types of impact	1	Ap
CO-7	understand the simple harmonic motion	3 and 7	Ap
CO-8	determine the simple harmonic motion	4	Ap

Semester VI			
Part III	Core XIV	Mechanics	
Course Code :21UMAC63	Hrs/week :6	Hrs/Semester :90	Credits :5

Unit I

Lami's theorem, Parallel forces and moments - Resultant of Two like and unlike parallel forces, moment of a force - Varignon's theorem - moment of force about an axis couples.

(Text Book 1: Chapter 3,4, pages 52-96)

Unit II

Equilibrium of three forces acting on rigid body subjected to any three forces - three coplanar forces theorem, Two Trigonometrical theorems, problems.

(Text Book 1: Chapter5, pages 98-142)

Unit III

Frictions - Laws of friction - angle of friction - cone of friction - Equilibrium of particle on a rough inclined plane under a Force.

(Text Book 1: Chapter7, pages 206-262)

Unit IV

Fundamental laws of impact - impact of a smooth sphere on a fixed smooth plane - direct impact of smooth elastic spheres.

(Text Book2: Chapter 8, pages 215-261)

Unit V

Definition - Geometrical representation of S.H.M.'s –Composition of S.H.M.'s of the same period and in the same line - Composition of S.H.M.'s of the same period and in two perpendicular directions.

(Text Book2: Chapter 10, pages 309-355)

Text Books

1. Venkatraman,M.K.*Statics*,Agasthiar Book House, Tiruchirapalli, Aug 2011
- 2.Venkatraman M.K, *Dynamics*,Agasthiar Book house, Tiruchirapalli, 16th Edition, Jan 2014

Books for Reference

1. Duraipandian P., *Mechanics*,S.Chand and Company Ltd
- 2.Bali N.P., *Dynamics*, Laxmi Publication, Delhi

Semester –VI			
Part III Core XV		Operations Research	
Course Code :21UMAC64	Hrs/week : 6	Hrs/Semester :90	Credits : 5

Objectives:

- To introduce the various techniques of operations research
- To apply Mathematical theories to Commerce and Business and Management

Course Outcome:

Co No	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	develop a fundamental understanding of linear programming models	1,3	Un
Co-2	express the dual of a linear programming problem and solve the resulting dual problem using the dual simplex method.	8	Cr, Ap
Co-3	solve a two – dimensional linear programming problem graphically.	8	Ap
Co-4	interpret the mathematical tools that are needed to solve optimization problems.	2	Ap
Co-5	apply the simplex method for solving linear programming problem	5	Ap
Co-6	comprehend the concept of a Transportation Model and develop the initial solution for the same	4	Un
Co-7	apply the Hungarian method for solving assignment problems	5	Ap
Co-8	examine the significant impact of job sequencing system on total elapsed time management	8	An

Semester – VI			
Part III Core XV		Operations Research	
Course Code :21UMAC64	Hrs/week : 6	Hrs/Semester :90	Credits : 5

Unit I

Introduction - Linear programming problem - Mathematical formulation of the problem - Introduction - Graphical Solution method - General linear programming problem - Canonical and standard forms of L.P.P. -Introduction - The Simplex algorithm
(Chapter 2, Sec 2.1 - 2.3, Chapter 3, Sec 3.1, 3.2, 3.4, 3.5, Chapter 4, Sec 4.1, 4.3, pages 39 - 40, 65 - 76, 79 - 84, 87 - 89, 99 - 106)

Unit II

Use of artificial variables - Two phase method - Big - M method (Method of penalties) - Introduction - General primal - dual pair -Formulating a dual problem - Primal - Dual pair in matrix form -Duality and Simplex method- Dual simplex method
(Chapter 4, Sec 4.4, Chapter 5, Sec5.1 – 5.4, 5.7, 5.9, pages 106 - 114, 129 - 134, 138 - 142, 148 - 150)

Unit III

Transportation problem: Introduction-LP formulation of the Transportation problem- Solutions of a Transportation Problem - Finding an initial basic feasible solution - Test for optimality - Degeneracy in Transportation Problem - Transportation Algorithm (MODI Method).

(Chapter 10, Sec 10.1, 10.2, 10.8 – 10.13, pages 247, 248, 252 – 266, 269 - 273)

Unit IV

Assignment problem: Introduction - Mathematical formulation of the problem -Solution methods of assignment problem-Special cases in assignment problems.

(Chapter 11, Sec 11.1 - 11.4, pages 295 – 315)

Unit V

Sequencing problem:Introduction - Problems of sequencing - Basic terms used in sequencing - Processing n jobs through Two machines -Processing n jobs through k machines, Processing 2 jobs through k machines

(Chapter 12, Sections 12.1 - 12.6, pages 327 – 342)

Text Book

1.Kantiswarup, P.K. Gupta, and Manmohan: *Operations Research*, Sultan Chand & Sons, Educational Publishers, New Delhi, Reprint 2013.

Books for Reference

1.Prem Kumar Gupta and Hira D.S:*Operations Research*, Sultan Chand & Sons, Educational Publishers, New Delhi -2 .

2.Billy E Gillet: *Introduction to Operations Research*, Tata McGraw Hill publishing Company, New Delhi.

Semester VI			
Part IV Core XVI		Coding theory	
Course Code: 21UMAC65	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Objectives:

- To obtain the concept of source coding and various coding techniques that are used for practical purposes.
- To generate mathematical ideas and methods that can be used to transmit information more reliably.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	understand the fundamental concepts of coding theory, types of error and control code technique.	1	Un
CO-2	perform with vectors, matrices and projective spaces over finite fields and polynomials.	4	Cr
CO-3	describe the concepts of extended golay code and decode the extended golay code.	3	Ev
CO-4	analyze the theoretical principles of source coding.	6	An
CO-5	analyze the notion of various decoding techniques.	3	An
CO-6	understand and analyze the concepts of error control coding.	2	Un, An
CO-7	prove general facts about different codes and block control coding.	6	Ev
CO-8	apply the knowledge of perfect codes, hamming codes, extended codes and golay codes for error detection and correction.	5	Ap

Semester VI			
Part IV Core XVI		Coding theory	
Code: 21UMAC65	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Unit I

Basic assumptions – Correcting and detecting error patterns – Information rate – Effects of error correction and detection – Finding the most likely code word transmitted.

(Chapter 1, Sections: 1.1 - 1.6)

Unit II

Linear codes – Two important subspaces - Independence – Basis, Dimension – Matrices – Bases for C and C^+ – Generating matrices and Encoding.

(Chapter 2, Sections: 2.1 - 2.6)

Unit III

Parity check matrices – Equivalent codes – Distance of a linear code – Cosets – MLD for linear codes – Reliability of IMLD for linear codes.

(Chapter 2, Sections: 2.7 - 2.12)

Unit IV

Some bounds for codes – Perfect codes – Hamming codes – Extended codes – The Extended Golay code – Decoding the extended Golay code – The Golay code.

(Chapter 3, Sections: 3.1 - 3.7)

Unit V

Polynomials and Words – Introduction to cyclic codes – Polynomial Encoding and Decoding – Finding cyclic codes – Dual cyclic codes.

(Chapter 4, Sections: 4.1 - 4.5)

Text Book

D.G. Hoffman, D.A Leonard, C.C. Linder, K.T. Phelps, C.A. Rodger and J.R. Wall, *Coding Theory - The Essentials*, Marcel Dekker, Inc., 1991, New York.

Books for Reference

1. Ron M. Roth, *Introduction to Coding Theory*, 2006, Cambridge University Press, Cambridge, UK.
2. Raymond Hill, *A first course in coding theory*, 2004, Clarendon Press, Oxford.