

Curriculum & Syllabus

B.Sc., Mathematics

REGULATION 2023

Applicable for students admitted during

Academic Year 2023-2024 Onwards

Based on Outcome Based Education

PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

CURRICULUM AND SYLLABUS FOR B.Sc. (MATHEMATICS)

BACHELOR OF SCIENCE (THREE YEAR - FULL TIME)

REGULATION - 2023

SEMESTER - I

Part	Category	Course Code	Course Name	L	T	P	SS	H	C
I	Language	XGT101	Tamil – I	3	0	0	0	3	3
II	Language	XGE102	English – I	3	0	0	0	3	3
III	Core – 1	XMT103	Algebra & Trigonometry	3	1	0	0	4	4
	Core – 2	XMT104	Differential Calculus	3	1	0	0	4	4
	Allied–1 (GE)	XPG105	Allied Physics - I	2	1	0	0	4	3
	Allied–1 (GE)	XPG106	Allied Physics Practical - I	0	0	2	0	2	1
IV	FC	XMT107	Foundation Course-Bridge Course	1	1	0	0	2	2
	UMAN - 1	XUM001	Human Ethics, Values, Rights and Gender Equality	1	0	0	1	1	1
			Total	16	4	2	1	23	21

SEMESTER - II

I	Language	XGT201	Tamil – II	3	0	0	0	3	3
II	Language	XGE202	English – II	3	0	0	0	3	3
III	Core – 3	XMT203	Analytical Geometry 3-D and Integral Calculus	3	1	0	0	4	4
	Core – 4	XMT204	Sequence and Series	3	1	0	0	4	4
	Allied- 2 (GE)	XPG205	Allied Physics - II	2	1	0	0	3	3
	Allied- 2 (GE)	XPG206	Allied Physics Practical - II	0	0	2	0	2	1
	SEC – 1	XMT207	Quantitative Aptitude – I	1	1	0	0	2	2
IV	UMAN - 2	XUM002	Environmental Studies	1	0	0	1	1	1
			Field Visit	0	0	0	0	0	2
			Total	16	4	2	1	22	23

SEMESTER - III

I	Language	XGT301	Tamil – III	3	0	0	0	3	3
II	Language	XGE302	English – III	3	0	0	0	3	3
III	Core – 5	XMT303	Differential Equations and Applications	3	1	0	0	4	4
	Core – 6	XMT304	Vector Calculus and Applications	3	1	0	0	4	4
	Allied – 3 (DSC)	XMT305	Statistics for Data Science - I	2	1	0	0	3	3
	Allied – 3 (DSC)	XMT306	Statistics for Data Science - I - Lab using R-Programming	0	0	2	0	2	1
	SEC – 2	XMT307	Quantitative Aptitude - II	1	1	0	0	2	2
IV	GE: Open Elective		Open Elective- I	3	0	0	0	3	3
	UMAN -3	XUM003	Disaster Management	1	0	0	1	1	1
			Total	19	4	2	1	25	24

SEMESTER - IV

I	Language	XGT401	Tamil – IV	3	0	0	0	3	3
II	Language	XGE402	English – IV	3	0	0	0	3	3
III	Core – 7	XMT403	Object Oriented Programming with C++	3	1	0	0	4	4
	Core - 8	XMT404	Fourier Series and Transforms	3	1	0	0	4	4
	Allied – 4 (DSC)	XMT405	Statistics for Data Science - II	2	1	0	0	3	3
	Allied – 4 (DSC)	XMT406	Statistics for Data Science –II - Lab using R-Programming	0	0	2	0	2	1
	SEC – 3	XMT407	Vedic Mathematics - I	1	1	0	0	2	2
IV	GE: Open Elective		Open Elective- 2	3	0	0	0	3	3
	UMAN - 4	XUM004	Introduction to Entrepreneurship Development	1	0	0	1	1	1
			Total	19	4	2	1	25	24

SEMESTER -V

III	Core - 9	XMT501	Abstract Algebra	3	1	0	0	4	4
	Core - 10	XMT502	Real Analysis	3	1	0	0	4	4
	Core - 11	XMT503	Number Theory	3	1	0	0	4	4
	DSE – 1	XMT504A	Graph Theory	3	1	0	0	4	4
		XMT504B	Mathematical Modeling						
		XMT504C	Numerical Methods with MATLAB						
		XMT504D	Discrete Mathematics						
	SEC - 4	XMT505	Vedic Mathematics - II	1	1	0	0	2	2
	NME	XMT506	Python Programming / Mathematics for Finance	2	1	0	0	3	3
	GE: Open Elective		Open Elective- 3	3	0	0	0	3	3
IV	IPT		IPT/Internship	0	0	0	0	0	2
	Core		Project Phase - I	0	0	3	0	3	1
			Total	18	6	3	0	27	27

SEMESTER - VI

III	Core -12	XMT601	Complex Analysis	3	1	0	0	4	4
	Core -13	XMT602	Mechanics	3	1	0	0	4	4
	Core – 14	XMT603	Optimization Techniques	3	1	0	0	4	4
	DSE – 2	XMT604A	Industrial Mathematics 4.0	3	1	0	0	4	4
		XMT604B	Introduction to Machine Learning						
		XMT604C	Astronomy						
		XMT604D	Stochastic Processes						
	Core-15	XMT605	Project Phase - II	1	0	4	0	5	3
IV	UMAN - 5	XUM005	Cyber Security	1	0	0	1	1	1
			Total	14	4	4	1	22	20
			Total Credit						139

**NOTES ON CREDIT DISTRIBUTION AND COMPARISON
WITH UGC LOCF GUIDELINES**

B.Sc. Mathematics Credit distribution

S. No.	Type of Subject	Numbers	Total Credit (PMIST)	Credits As per UGC norms
1	AECC	04	12	08
2	Core Course (Theory & Lab)	19	76	84
3	DSE (Theory & Lab)	03	11	24
4	SEC-2 IKS-2	04	08	08
5	GE	03	09	24
6	UMAN	05	05	-
7	LAN	04	12	-
9	IPT	01	02	-
10	Field Visit	01	02	
11.	Foundation course	01	02	-
Total		45	139	148

Distribution of different courses in each semester with their credits

for B.Sc. Mathematics Programme

SEMESTER	Compulsory Core Courses	Discipline specific Elective	Ability enhancement Courses (AECC)	Language	Generic elective	Skill Enhancement courses (SEC)	Total Credits
Semester I	CC-1 CC-2 A-1 FC-2		AECC-1	LAN-1			20
Semester II	CC-3 CC-4 A-2		AECC-2	LAN-2		SEC-1	20
Semester III	CC-5 CC-6 A-3		AECC-3	LAN-3	GE-1	SEC-2	23
Semester IV	CC-7 CC-8 A-4		AECC-4	LAN-4	GE-2	SEC-3	23
Semester V	CC-9 CC-10 CC-11 CC-15	DSE-1 NME-1			GE-3	SEC-4	25
Semester VI	CC-12 CC-13 CC-14 CC-15	DSE-2					19
Total Credits (PMIST)	78	11	12	12	9	8	130
Extra Credit	IPT-2 Field Visit-2 UMAN-5						

Total Credits- 139

Total Credit and Mark Distribution

Parts	Category of Courses	No of Courses ×Credits	Semesters						Total Credits	UGC Credits (Hons)	Deviation %	Total Marks
			I	II	III	IV	V	VI				
Part – I	Tamil – I / Foundational Tamil – I Tamil – II / Foundational Tamil – II Tamil – III and Tamil – IV	4 x 3	3	3	3	3			12	-	+12	200
Part – II	English I , English II, English III and English IV	4 x 3	3	3	3	3			12	8	+4	200
Part – III	Core	14 x 4	8	8	8	8	12	12	56	84	-12	1200
Part – III	Allied Theory	4 x 4	3	3	3	3			12			400
	Allied Practical	4 x 1	1	1	1	1			4			400
Part – III	SEC: Skill Based Elective Course	4 x 2		2	2	2	2		8	8	-	400
Part – III	DSE: Discipline Specific Elective	2 x 4					4	4	8	24	-16	400
Part – IV	GE: Open Elective	3 x 3			3	3	3		9	24	-15	300
Part – IV	IPT: Internship Programme Training	1 x 2					2		2	-	+2	100
Part – IV	UMAN1:Human Ethics, Values, Rights, and Gender Equality UMAN2:Environmental Studies UMAN3:Disaster Management UMAN4: Introduction to Entrepreneurship Development UMAN5: Cyber Security	5 x 1	1	1	1	1		1	5	-	+5	400
Part – IV	Foundation Course-Bridge Course	1x2	2						2		+2	
Part – III	Project	1 x 4					1	3	4	-	+4	100
Part – IV	Field Visit	1 x 2		2					2	-	+2	100
Part – IV	Non Major Elective	1 x 3					3		3	-	+3	100
	Total		21	23	24	24	27	20	139	148	-5	4300

SEMESTER I

பொதுத்தமிழ் - 1 (முதற்பருவம்)

பாடக்குறியீடு / Course Code	பாடப்பெயர்/ Course Name	Category	L	T	P	SS	H	C
XGT101	பொதுத்தமிழ் - 1	Supportive	3	0	0	0	3	3
Pre-requisite	பன்னிரெண்டாம்வகுப்பில் தமிழை ஒருபாடமாகப் பயின்றிருக்க வேண்டும்.							
பாடப்பயன்கள் / Course outcomes	இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.							
CO1	கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன் பெறுதல்.				புரிந்துகொள்ளல் (Understand)			
CO2	புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்.				புரிந்துகொள்ளல் (Understand)			
CO3	இக்கால இலக்கிய வகையினைக் கற்பதன் மூலம் படைப்பாக்கத் திறனைப் பெறுவர்.				பகுப்பாய்வுசெய்தல் Analyze			
CO4	மொழி அறிவோடு சிந்தனைத் திறன் அதிகரித்தல்.				தெரிந்துகொள்ளல் (Apply)			
CO5	தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச்சொற்களை உருவாக்கவும் அறிந்து கொள்ளுதல்.				புரிந்துகொள்ளல் (Understand)			
	K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.							
அலகு - I	மரபுக்கவிதை					9 மணிகள்		
	1. பெ. சுந்தரனார்- தமிழ்த்தெய்வ வணக்கம். 2. பாரதிதாசன் – சிறுத்தையை வெளியேவா. 3. கவிமணி - புத்தரும் சிறுவனும் 4. முடியரசன் – மொழி உணர்ச்சி 5. கண்ணதாசன் – ஆட்டனத்தி ஆதிமந்தி – ஆதிமந்தி புலம்பல். 6. சுரதா துறைமுகம் தொகுப்பிலிருந்து ஏதேனும் ஒரு கவிதை							

	7. தமிழ் ஒளி - கடல்	
அலகு - II	புதுக்கவிதை	9 மணிகள்
	<ol style="list-style-type: none"> 1. அப்துல்ரகுமான் – வீட்டுக்கு ஒருமரம் வளர்ப்போம். 2. ஈரோடு தமிழன்பன் - வணக்கம் வள்ளுவ. 3. வைரமுத்து – பிற்சேர்க்கை 4. மு.மேத்தா – வாழை மரம். 5. அறிவுமதி – வள்ளுவன் பத்து. 6. நா.முத்துக்குமார் – ஆனந்தயாழை மீட்டுகிறாய். 7. சுகிர்தாராணி – சபிக்கப்பட்ட முத்தம். 8. இளம்பிறை – நீ எழுத மறுக்கும் எனது அழகு. 	
அலகு - III	சிறுகதைகள்	9 மணிகள்
	<ol style="list-style-type: none"> 1. வாய்ச் சொற்கள் – ஜெயகாந்தன் (மாலை மயக்கம் தொகுப்பு) 2. கடிதம் - புதுப்பித்தன். 3. கரு - உமாமகேஸ்வரி. 4. முள்முடி - திஜானகிராமன். 5. சிதறல்கள் - விழி.பா.இதயவேந்தன். 6. காகிதஉறவு - சு.சமுத்திரம். 7. வீட்டின் மூலையில் சமையலறை - அம்பை. (மொழிபெயர்ப்புக் கதை) ஆண்டன் செக்காவ் – நாயக்காரச் சீமாட்டி. 	
அலகு - IV	இலக்கியவரலாறு	9 மணிகள்
	பாடம் தழுவிய இலக்கிய வரலாறு	
அலகு - V	மொழித் திறன்/ போட்டித் தேர்வு	9 மணிகள்
	<ol style="list-style-type: none"> 1. பொருள் பொதிந்த சொற்றொடர் அமைத்தல் 2. ஓர் எழுத்து ஒருமொழி 3. வேற்றுமை உருபுகள் 4. திணை, பால், எண், இடம் 5. கலைச் சொல்லாக்கம், மொழிபெயர்ப்பு 	

	(குறிப்பு : அலகு 4, 5 ஆகிய பகுதிகள் போட்டித்தேர்வு நோக்கில் நடத்தப்பட வேண்டும்)	
		9 மணிகள்
பாடநூல்கள்		
1.	மேலே சுட்டப்பட்டுள்ள கவிதைகள், பாடம் தொடர்புடைய நூல்கள்	
பார்வைநூல்கள்		
1.	தமிழ் இலக்கிய வரலாறு – சிற்பி பாலசுப்பிரமணியன்.	
2.	புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல்	
3.	வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு – எஃப்.பாக்கியமேரி.	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
Web Sources
<ul style="list-style-type: none"> • Tamil Heritage Foundation - www.tamilheritage.org<http://www.tamilheritage.org> • Tamil virtual University Library - www.tamilvu.org/library http://www.virtualvu.org/library • Project Madurai - www.projectmadurai.org. • Chennai Library - www.chennailibrary.com<http://www.chennailibrary.com>. • Tamil Universal Digital Library-www.ulib.prg<http://www.ulib.prg>. • Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com • Tamil Books online - books.tamilcube.com • Catalogue of the Tamil books in the Library of British Congress archive.org • Tamil novels online - books.tamilcube.com
Strong-3, Medium-2, Low-1

COURSE CODE		XGE102		L	T	P	SS	H	C	
COURSENAME		ENGLISH I		3	0	0	0	3	3	
C:P:A- 3:0:0										
COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:				Domain		Level				
CO1	Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing			Cognitive		Understand				
CO2	Understand the total content and underlying meaning in the context.			Cognitive		Apply				
CO3	Form the habit of reading for pleasure and for information			Cognitive		Understand				
CO4	Comprehend material other than the prescribed text			Cognitive		Understand				
CO5	Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.			Cognitive		Understand				
SYLLABUS								HOURS		
UNIT-I		POETRY						6+3+0=9		
		1.1 A Patch of Land - Subramania Bharati 1.2 The Sparrow - Paul Laurence Dunbar 1.3 A Nation’s Strength – Ralph Waldo Emerson 1.4 Love Cycle - Chinua Achebe								
UNIT-II		PROSE						6+3+0=9		
		2.1 JRD - Harish Bhat 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim 2.3 Uncle Podger Hangs a Picture - Jerome K Jerome								
UNIT-III		SHORT STORIES						6+3+0=9		
		3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read - Sudha Murthy 3.3 The Gold Frame- R.K. Laxman								
UNIT-IV		LANGUAGE COMPETENCY						6+3+0=9		
		4.1 Vocabulary : Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction								
UNIT - V		ENGLISH FOR WORKPLACE						6+3+0=9		
		5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions								
L=30 / T=15								Total Hours		45

Tutorial Activities <ol style="list-style-type: none"> 1) Reading and understanding incomplete texts 2) Summarize a piece of prose or poetry 3) Communication Practice 4) Role play 	
Text books <ul style="list-style-type: none"> • Hogan, Sharon. <i>The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace</i> -Margaret Shepherd, Penny Carter, (Illustrator), 2015. • Kumar, Vijay T. <i>English in Use - A Textbook For College Students</i> (English ,Paper back, - K Durga Bhavani, YL Srinivas,2015 • Murthy, Sudha. <i>How I taught my Grandmother to Read and other Stories</i>. Penguin Books, India, 2014 • Swan, Michael. <i>Practical English Usage</i> - 4th Edition By, 2018 	

COURSE NAME			Algebra & Trigonometry		L	T	P	C
COURSE CODE			XMT103		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Number systems					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Utilize Horner’s Method to obtain the roots of polynomials				Cognitive		Applying	
CO 2	Find the summation of the given series such as binomial, exponential and logarithmic series				Cognitive		Remembering	
CO 3	Utilize Cayley-Hamilton theorem to find powers of a given square matrix and inverse of a given matrix				Cognitive		Applying	
CO 4	Find the expansion of trigonometric ratios in terms of θ				Cognitive		Remembering	
CO 5	Explain the relation between circular and hyperbolic functions				Cognitive		Understanding	
UNIT 1							9 + 3	
Reciprocal Equations - Standard form – Increasing or decreasing the roots of a given equation – Removal of terms, Approximate solutions of roots of polynomials by Horner’s method – related problems.								
UNIT 2							9 + 3	
Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations – related problems.								
UNIT 3							9 + 3	
Characteristic equation – Eigen values and Eigen Vectors - Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems.								
UNIT 4							9 + 3	
Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion of $\tan n\theta$ in terms of $\tan\theta$, Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta\sin^n\theta$ –Expansions of $\tan(\theta_1+\theta_2+\dots+\theta_n)$ -Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ - related problems.								
UNIT 5							9 + 3	
Hyperbolic functions – Relation between circular and hyperbolic functions-Inverse hyperbolic functions, Logarithm of complex quantities, - related problems.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Mathematics, Volume - I and II, P. Kandasamy, K. Thilagavathy, S.Chand Publication, 1 st Edition, 2004. Unit I - 1 [Vol-I], 21-23, 36-43, 65-70 Unit II - 2, 3, 4 [Vol-I], 71-100 Unit III - 4 [Vol-II], 59-96 Unit IV - 6 [Vol-I], 122-141								

Unit V -7 [Vol-I], 143-155, 1 [Vol-II], 242-247.
References
1. Algebra and Trigonometry, J. Stewart, L. Redlin, and S. Watson, Cengage Learning, 2012. 2. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9 th Edition, 2010.
E-References
https://nptel.ac.in

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	2	1	0	0	0	1	1	1	2	1	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	2	1	0	0	0	1	1	1	2	1	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	13	10	5	0	2	10	10	10	13	10	0
SCALED VALUE	3	3	1	0	1	2	2	2	3	2	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Differential Calculus		L	T	P	C		
COURSE CODE			XMT104		3	1	0	4		
C	P	A			L	T	P	H		
4	0	0			3	1	0	4		
PREREQUISITE			Basic differentiation formula							
On successful completion of this course, the students will be able to:										
COURSE OUTCOMES					DOMAIN		LEVEL			
CO 1	Utilize Leibnitz formula to find n th derivative of a given function.				Cognitive		Applying			
CO 2	Identify the partial derivatives of the given functions.				Cognitive		Applying			
CO 3	Utilize Lagrange’s method to find the maxima and minima of a function of two variables.				Cognitive		Applying			
CO 4	Identify the envelope of various family of curves.				Cognitive		Applying			
CO 5	Identify evolute of a given family of curves.				Cognitive		Applying			
UNIT 1							9 + 3			
Introduction (Review of basic concepts) – The n th derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n th derivative of a product.										
UNIT 2							9 + 3			
Partial derivatives - Successive partial derivatives – Function of function rule – Total differential coefficient – Implicit functions										
UNIT 3							9 + 3			
Homogeneous functions – Partial derivatives of a function of two functions – Maxima and minima of functions of two variables – Lagrange’s method of undetermined multipliers.										
UNIT 4							9 + 3			
Method of finding envelope – Another definition of envelope- Envelope of family of curves which are quadratic in the parameter.										
UNIT 5							9 + 3			
Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involute – Radius of curvature in polar co- ordinates.										
LECTURE		45	TUTORIAL		15	PRACTICAL		0	TOTAL	60
Text Book										
1. Calculus Volume I, S. Narayanan and T.K. Manicavachagom Pillay, S. Viswanathan Pvt. Ltd., 2014. Unit I - Chapter III All sections (Pages 69 to 87) Unit II - Chapter VIII Sections: 1.1 to 1.5 (Pages 178 to 191) Unit III - Chapter VIII Sections: 1.6 to 1.7,4 & 5 (Pages 191 to 204,222 to 2347) Unit IV- Chapter IV Sections: 1.1 to 1.4, (Pages 281 to 291) Unit V- Chapter V Sections :2.1 to 2.3& 2.5 (Pages 291 to 301,309 to 312)										

References											
<ol style="list-style-type: none"> 1. Calculus, H. Anton, I. Birens and S. Davis, John Wiley and Sons, Inc., 2002. 2. Calculus, G.B. Thomas and R.L. Finney, Pearson Education, 2010. 3. Calculus, M.J. Strauss, G.L. Bradley and K. J. Smith, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007. 4. Introduction to Calculus and Analysis (Volumes I & II), R. Courant and F. John, Springer- Verlag, New York, Inc., 1989. 5. Calculus, Volumes I and II, T. Apostol. 6. Calculus and mathematical analysis, S. Goldberg, 											
E-References											
<ol style="list-style-type: none"> 1. https://nptel.ac.in 2. https://www.math.columbia.edu/programs-math/undergraduate-program/ [Columbia University] 3. https://www.math.harvard.edu/undergraduate/?courseid=63/(Harvard University) 											

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	15	10	0	5	15	15	15	15	15	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE CODE			COURSE NAME	L	T	P	C
XPG105			ALLIED PHYSICS – I	3	0	0	3
C	P	A		L	T	P	H
2.7	0	0.3		3	1	0	4
COURSE OUTCOMES : At the end of the course, the student will be able to							
OBJECTIVES : To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.				DOMAIN		LEVEL	
CO1	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.			Cognitive		Remember, Understand Apply	
CO2	Explain their knowledge of understanding about materials and apply it to various situations in laboratory and real life.			Cognitive		Understand apply	
CO3	Comprehend basic concept of thermodynamics concept of entropy and interpret the process of flow temperature.			Cognitive		Remember understand	
CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and analyze them mathematically verify circuits.			Cognitive		Understand Analyze	
CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and Infer operations using Boolean algebra and acquire elementary ideas of IC circuits.			Cognitive		Remember analyze	

UNIT – I	WAVES, OSCILLATIONS AND ULTRASONICS	9 + 3
Simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – lithotripsy, ultrasonography – ultrasonic imaging- ultrasonics in dentistry – physiotherapy, ophthalmology – advantages of noninvasive surgery – ultrasonics in green chemistry		
UNIT – II	PROPERTIES OF MATTER	9 + 3
<i>Elasticity</i> : elastic constants – bending of beam – theory of non- uniform bending – determination of Young’s modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum <i>Viscosity</i> : streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille’s formula – comparison of viscosities – burette method,		

<i>Surface tension</i> : definition – molecular theory – droplets formation–shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method – interfacial surface tension.				
UNIT – III		HEAT AND THERMODYNAMICS		9 + 3
: Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde’s process of liquefaction of air– liquid Oxygen for medical purpose– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot’s cycle – efficiency – entropy – change of entropy in reversible and irreversible process.				
UNIT – IV		ELECTRICITY AND MAGNETISM		9 + 3
Potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart’s law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit – types of switches in household and factories– Smart wifi switches- fuses and circuit breakers in houses.				
UNIT – V		DIGITAL ELECTRONICS AND DIGITAL INDIA		9 + 3
Logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan’s theorem – verification – overview of Government initiatives: software technological parks under MeitY, NIELIT- semiconductor laboratories under Dept. of Space – an introduction to Digital India.				
HOURS		LECTURE	TUTORIAL	TOTAL
		45	15	60
TEXT BOOKS				
1. Murugeshan R , "Properties of Matter For B. Sc. Students", S Chand & Company Limited, Mohan Co-Operative Industrial Estate, New Delhi - 110 044, First edition 1994, Reprint 2022.				
2. R. Murugesan, Er. Kiruthiga Siva Prasath, "Properties of Matter and Acoustics", S.Chand & Company Ltd, Ram Nagar, New Delhi - 110 055, First edition 2005, Second Edition 2012.				
3. Brijlal and N.Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi				
4. V.K.Metha(2004). Principles of electronics 6 th Edn. S. Chand and company.				
5. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8 th edition), S.Chand&Co.,New Delhi.				

REFERENCE BOOKS

1. DS Mathur, "Elements of Properties of Matter", S. Chand Limited, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi - 110 055, First edition 1949, Reprint 2016.
2. Brij Lal, N Subrahmanyam, "*A Textbook of Sound*" 2nd Edition, Vikas Publishing House Pvt. Ltd. A-27, 2nd Floor, Mohan Co-operative Industrial Estate, New Delhi-110044, 2018.
3. Resnick Halliday and Walker (2018). *Fundamentals of Physics* (11th edition), John Wiley and Sons, Asia Pvt. Ltd., Singapore.
4. R. Murugesan (2001), *Allied Physics*, S. Chand & Co, New Delhi
5. V.R. Khanna and R.S. Bedi (1998), *Text book of Sound* 1st Edn. Kedharnaath Publish & Co, Meerut.
6. N.S. Khare and S.S. Srivastava (1983), *Electricity and Magnetism* 10th Edn., Atma Ram & Sons, New Delhi

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1. https://youtu.be/M_5KYncYNyc
2. <https://youtu.be/ljJLJgIvaHY>
3. https://youtu.be/7mGqd9HQ_AU
4. <https://youtu.be/h5jOAw57OXM>
5. <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>
6. <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>
7. <https://www.youtube.com/watch?v=gT8Nth9NWPM>
8. <https://www.youtube.com/watch?v=9mXOMzUruMQ&t=1s>
9. <https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s>
10. <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>

Mapping with Programme Outcomes

Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PSO1	PSO2
CO ₁	3	0	1	0	1	3	1	2	1	2	2	1
CO ₂	2	0	1	2	1	3	1	1	1	2	2	1
CO ₃	2	1	3	3	1	3	2	1	0	2	1	1
CO ₄	1	1	2	3	2	3	1	2	0	2	2	2
CO ₅	2	1	1	3	1	3	1	2	1	2	1	1
Total	10	3	8	11	6	15	6	8	3	10	8	6
Scaled to 1, 2, 3	2	1	2	3	2	3	3	2	1	2	2	2

0 – No relation 1 – Low relation 2 – Medium relation 3 – High relation

COURSE CODE			COURSE NAME	L	T	P	C
XPG106			ALLIED PHYSICS PRACTICAL – I	0	0	1	1
C	P	A		L	T	P	H
0	0.75	0.25		0	0	2	2
COURSE OUTCOMES				Domain		Level	
On the successful completion of this course students would able to							
CO1	<i>Develop Knowledge</i> on bending of beams, its properties and <i>application</i>			Psychomotor		Mechanism	
CO2	<i>Identify</i> the principles of elasticity, <i>derive</i> expression for twisting couple and <i>determine</i> rigidity modulus of a wire.			Psychomotor : Affective:		Analyze, Mechanism Respond	
CO3	<i>Understand</i> flow of liquid, viscosity and <i>identify</i> its <i>applications</i> and <i>Define</i> surface tension			Psychomotor : Affective:		Apply Mechanism Receive	
CO4	<i>recall</i> the concepts of electric and magnetic field and <i>explain</i> the calibration of the equipments.			Psychomotor : Affective:		Analyze Mechanism Receive	
CO5	<i>Understand</i> basic concepts of gates and <i>identify</i> its <i>applications</i>			Psychomotor : Affective:		Analyze Mechanism Receive	

Ex. No	Experiments (Any eight experiments)	Cos
1.	Young's modulus by non-uniform bending using pin and microscope	CO2
2.	Young's modulus by non-uniform bending using optic lever, scale and telescope	CO2
3.	Rigidity modulus by static torsion method.	CO1
4.	Rigidity modulus by torsional oscillations without mass	CO1
5.	Surface tension and interfacial Surface tension – drop weight method	CO3
6.	Comparison of viscosities of two liquids – burette method	CO3
7.	Specific heat capacity of a liquid – half time correction	CO3

8.	Verification of laws of transverse vibrations using sonometer		CO4
9.	Calibration of low range voltmeter using potentiometer		CO4
10.	Determination of thermo emf using potentiometer		CO4
11	Verification of De Morgan’s theorems using logic gate ICs.		CO5
12	Use of NAND as universal building block.		CO5
HOURS	LECTURE	PRACTICAL	TOTAL
	0	30	30
TEXT BOOKS			
1. C. L. Arora, “B.Sc .Practical Physics”, S. Chand & Company Ltd. Ram Nagar, New Delhi–110055. 2007.			
2. R. K. Shukla & Anchal Srivastava. “Practical Physics,” New Age International (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, Ansari Raod, Daryagani, New Delhi–11002. 2006.			
REFERENCE BOOKS			
1. Geeta Sanon, “B. Sc., Practical Physics”, 1st Edition, S. Chand and Company, 2007.			
2. Chattopadhyay, D., Rakshit, P. C. and Saha, B., “An Advanced Course in Practical Physics,” 8th Edition, Books & Allied Ltd., Calcutta, 2007.			
3. G. L. Squires, “Practical Physics”, Fourth edition, Cambridge University Press, 2001.			
4. Indu Prakash and Ramakrishna, “A Text Book of Practical Physics,” 11th Edition, Kitab Mahal, New Delhi, 2011.			
5. C. Ouseph,K. Rangarajan, “A Text Book of Practical Physics”, Volume I,II, S.Viswanathan Publishers,1997.			
E–Resources:			
1. Amal Kumar Das , Department of Physics, IIT Kanpur, “Introduction to Electromagnetic Theory”, National Programme on Technology Enhanced Learning (NPTEL), https://onlinecourses.nptel.ac.in/noc20_ph16/preview			

Mapping of COs with POs

Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PSO1	PSO2
CO ₁	1	1	3	3	2	3	1	3	0	1	2	1
CO ₂	1	1	3	2	1	3	1	3	1	1	2	1
CO ₃	1	1	3	3	1	3	2	3	1	2	2	1
CO ₄	1	1	2	2	2	3	1	3	1	2	2	1
CO ₅	1	1	3	3	2	3	1	3	1	2	2	1
Total	5	5	14	13	8	15	6	15	4	8	10	5
Scaled to 1, 2, 3	1	1	3	3	2	3	2	3	1	2	2	1

0 – No relation

1 – Low relation

2 – Medium relation

3 – High relation

COURSE NAME			Foundation Course		L	T	P	C	
COURSE CODE			XMT107		1	1	0	2	
C	P	A			L	T	P	H	
2	0	0			1	1	0	2	
PREREQUISITE			Number systems & Algebra						
On successful completion of this course, the students will be able to:									
COURSE OUTCOMES					DOMAIN		LEVEL		
CO 1	Find a general term and middle term in a binomial expansion using binomial theorem.				Cognitive		Remembering		
CO 2	Find the number of possible combinations for a given situation using the fundamental counting principle.				Cognitive		Remembering		
CO 3	Find the combinations of objects with repetitions.				Cognitive		Remembering		
CO 4	Find the 6 trigonometric functions using a calculator, as well as determining exact values for some special angles without a calculator.				Cognitive		Remembering		
CO 5	Find derivatives of the given composite functions.				Cognitive		Remembering		
UNIT 1							3+3		
Binomial theorem, General term, middle term, problems based on these concepts.									
UNIT 2							3+3		
Fundamental principle of counting. Factorial n.									
UNIT 3							3+3		
Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.									
UNIT 4							3+3		
Introduction to trigonometric ratios, proof of $\sin(A+B)$, $\cos(A+B)$, $\tan(A+B)$ formulae, multiple and sub multiple angles, $\sin(2A)$, $\cos(2A)$, $\tan(2A)$ etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule.									
UNIT 5							3+3		
Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.									
LECTURE		15	TUTORIAL		15	PRACTICAL	0	TOTAL	30
Text Book									
1. NCERT class XI and XII text books									
2. Any State Board Mathematics text books of class XI and XII current Edition									
References									
Any State Board Mathematics text books of class XI and XII, Old Edition.									
E-References									

COs Vs POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	2	1	0	0	0	1	1	1	2	1	0
CO 2	2	1	0	0	0	1	1	1	2	1	0
CO 3	2	1	0	0	0	1	1	1	2	1	0
CO 4	2	1	0	0	0	1	1	1	2	1	0
CO 5	2	1	0	0	0	1	1	1	2	1	0
TOTAL	10	5	0	0	0	5	5	5	10	5	0
SCALED VALUE	2	1	0	0	0	1	1	1	2	1	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE CODE		XUM001				L	T	P	SS	C
COURSE NAME		HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY				1	0	0	1	1
PREREQUISITES		Not Required				L	T	P	SS	H
C:P:A		0.8:0.1:0.1				1	0	0	1	2
COURSE OUTCOMES					Domain		Level			
CO1	Relate and Interpret the human ethics and human relationships				Cognitive		Remember, Understand			
CO2	Explain and Apply gender issues, equality and violence against women				Cognitive		Understand, Apply			
CO3	Classify and Develop the identify of women issues and challenges				Cognitive & Affective		Analyze Receive			
CO4	Classify and Dissect human rights and report on violations.				Cognitive		Understand, Analyze			
CO5	List and respond to family values, universal brotherhood, fight against corruption by common man and good governance.				Cognitive & Affective		Remember, Respond			
UNIT I HUMAN ETHICS AND VALUES									3+3	
HUMAN ETHICS AND VALUES Human Ethics and values - Family and Society, Social service, Social Justice, Integrity, Caring and Sharing, Honesty and Courage, Time Management, Co-operation, Commitment, Sympathy and Empathy, Self respect, Self-Confidence, Personality Development										
UNIT II GENDER EQUALITY									3+3	
Gender Discrimination in society and in family, Gender equity, equality, and empowerment. Social and Economic Status of Women in India in Education, Health, Employment, Definition of HDI, GDI and GEM. Contributions of Dr.B.R. Ambethkar, Thanthai Periyar and Phule to Women Empowerment.										
UNIT III WOMEN ISSUES AND CHALLENGES									3+3	
Women Issues and Challenges- Female Infanticide and Feticide, Violence against women, Domestic violence, Sexual Harassment, Trafficking, Remedial Measures – Acts related to women: Political Right, Property Rights, and Rights to Education, Dowry Prohibition Act.										
UNIT IV HUMAN RIGHTS									3+3	
Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economical, Social and Cultural Rights, Rights against torture, Forced Labour, Child helpline- Intellectual Property Rights (IPR) and its types. National Policy on occupational safety and health.										
UNIT V GOOD GOVERNANCE									3+3	
Good Governance - Democracy, People’s Participation, Transparency in governance and audit, Corruption, Impact of corruption on society and Remedial measures, Government system of Redressal. Creation of People friendly environment and universal brotherhood.										
				LECTURE		SELF STUDY			TOTAL	
				15		15			30	
REFERENCES										

1. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
2. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
3. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
4. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
5. Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)
6. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).
7. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
8. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
9. Veeramani, K. (ed) Periyar Feminism, (Periyar Maniammai University, Vallam, Thanjavur: 2010).
10. Planning Commission report on Occupational Health and Safety
http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
11. Central Vigilance Commission (Gov. of India) website: <http://cvc.nic.in/welcome.html>.
12. Weblink of Transparency International: <https://www.transparency.org/>
13. Weblink Status report: <https://www.hrw.org/world-report/2015/country-chapters/india>

Table 1 : Mapping of COs with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								2						
CO2								3	1					
CO3								2						
CO4								3		2				
CO5								3	2	2		2		
Total		2						13	3	4		2		
Scaled Value		1						3	1	1		1		

SEMESTER II

பொதுத்தமிழ் - 2 (இரண்டாம் பருவம்)

பாடக்குறியீடு/ Course Code	பாடப்பெயர்/ Course Name	Category	L	T	P	SS	H	C
XGT201	பொதுத்தமிழ் - 2	Supportive	3	0	0	0	3	3
Pre-requisite	பன்னிரெண்டாம்வகுப்பில்தமிழைஒருபாடமாகப்பயின்றிருக்கவேண்டும்.							
பாடப்பயன்கள் / Course outcomes	இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.							
CO1	நீதி இலக்கியங்களைக் கற்பதன் மூலம் நீதிநெறியினையும் வாழ்வியல் மற்றும் மேலாண்மைச் சிந்தனைகளையும் தெரிந்து பின்பற்றுவர்					புரிந்துகொள்ளல் (Understand)		
CO2	சிற்றிலக்கியங்களின்வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர்					புரிந்துகொள்ளல் (Understand)		
CO3	பட்டப்படிப்பினைப் படிக்கும் போதே பெரும்பான்மையான தமிழ் இலக்கியங்கள் குறித்த அறிவினைப் பெறுவர்					பகுப்பாய்வுசெய்தல் Analyze		
CO4	தமிழ்ச்சமூகப் பண்பாட்டு வரலாற்றினை இலக்கியங்கள் வாயிலாக அறிவர்					தெரிந்துகொள்ளல் (Apply)		
CO5	போட்டித் தேர்வுகளில் வெற்றிபெறுவதற்குத் தமிழ்ப் பாடத்தினைப் பயன்கொள்ளும் வகையில் ஏற்ற பயிற்சி பெறுவர்					புரிந்துகொள்ளல் (Understand)		
	K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.							
அலகு - I	நீதிஇலக்கியம்					9மணிகள்		
	திருக்குறளில் வாழ்வியல் – திருக்குறளில் மேலாண்மைச் சிந்தனைகள்							
அலகு - II	பிறஇலக்கியங்கள்					9மணிகள்		

	வள்ளலார் – அருள் விளக்க மாலை (முதல் 10 பாடல்கள்) – எச்.ஏ.கிருட்டிணப்பிள்ளை – இரட்சணிய மனோகரம் – பால்ய பிரார்த்தனை – குணங்குடிமஸ்தான் சாகிபு – பராபரக் கண்ணி (முதல் 10 கண்ணி)	
அலகு - III	சிற்றிலக்கியங்கள்	9மணிகள்
	தமிழ்விடு தூது (முதல் 20 கண்ணி) – திருக்குற்றாலக் குறவஞ்சி – குறத்தி மலைவளம் கூறல் – முக்கூடல் பள்ளு – நாட்டுவளம்	
அலகு -IV	இலக்கியவரலாறு	9மணிகள்
	பாடம் தழுவிய இலக்கிய வரலாறு (பல்லவர் காலம், நாயக்கர் காலம்)	
அலகு - V	மொழித் திறன்/ போட்டித் தேர்வுத் திறன்	9மணிகள்
	1. தொடர் வகைகள் 2. மரபுத்தொடர், பழமொழிகள் 3. பிறமொழிச் சொற்களைக் களைதல் 4. வழுச்சொற்கள் நீக்குதல் 5. இலக்கணக் குறிப்பு அறிதல்	
	(குறிப்பு : அலகு 4, 5 ஆகிய பகுதிகள் போட்டித் தேர்வு நோக்கில் நடத்தப்பட வேண்டும்)	45 மணிகள்
பாடநூல்கள்		
1.	திருக்குறள், மணிவாசகர் பதிப்பகம், சென்னை	
2.	இலக்கியத்தல் மனித வள மேம்பாடு, சி. சரவண ஜோதி, பாவை பப்ளிகேசன்ஸ்,	
3.	தமிழ் விடுதூது	
4.	திருக்குற்றாலக் குறவஞ்சி	
5.	எச்.ஏ.கிருட்டிணப்பிள்ளை – இரட்சணியமனோகரம்	
பார்வைநூல்கள்		
1.	தமிழ்இலக்கிய வரலாறு – சிற்பிபாலசுப்பிரமணியன்.	

2.	புதியநோக்கில் தமிழ்இலக்கிய வரலாறு - தமிழண்ணல்	
3.	வகைமைநோக்கில் தமிழ்இலக்கிய வரலாறு – எஃப்.பாக்கியமேரி.	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

Web Sources

- Tamil Heritage Foundation - www.tamilheritage.org<<http://www.tamilheritage.org>>
- Tamil virtual University Library - www.tamilvu.org/library <http://www.virtualvu.org/library>
- Project Madurai - www.projectmadurai.org.
- Chennai Library - www.chennailibrary.com<<http://www.chennailibrary.com>>.
- Tamil Universal Digital Library-www.ulib.prg<<http://www.ulib.prg>>.
- Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com
- Tamil Books online - books.tamilcube.com
- Catalogue of the Tamil books in the Library of British Congress archive.org
- Tamil novels online - books.tamilcube.com

Strong-3, Medium-2, Low-1

COURSE CODE		XGE202		L	T	P	SS	H	C
COURSENAME		ENGLISH II		2	1	0	0	3	3
C:P:A- 3:0:0									
COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:				Domain		Level			
CO1	Learn to introduce themselves and talk about everyday activities confidently			Cognitive		Understand			
CO2	Able to write short paragraphs on people, places and events			Cognitive		Apply			
CO3	Identify the purpose of using various tenses and effectively employ them in speaking and writing			Cognitive		Understand			
CO4	Gain knowledge to write subjective and objective descriptions			Cognitive		Understand			
CO5	Identify and use their skills effectively in formal contexts.			Cognitive		Understand			
SYLLABUS							HOURS		
UNIT-I	POETRY						6+3+0=9		
1.1Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 The Flower -Tennyson 1.4 On Killing a Tree - Gieve Patel									
UNIT-II	PROSE						6+3+0=9		
2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - Shashi Tharoor 2.3 The Spoon-fed Age- W.R. Inge									
UNIT-III	FICTION						6+3+0=9		
Alchemist - Paulo Coelho									
UNIT-IV	LANGUAGE COMPETENCY						6+3+0=9		
4.1 Homonyms, Homophones, Homographs Portmanteau words 4.2 Verbs and Tenses, Subject Verb Agreement 4.3 Error correction									
UNIT - V	ENGLISH FOR WORKPLACE						6+3+0=9		
5.1 Reading for General and Specific Information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes									
L=30 / T=15				Total Hours			45		
Tutorial Activities									
5) Reading and understanding incomplete texts 6) Summarize a piece of prose or poetry 7) Communication Practice 8) Role play									

<p>Textbooks</p> <ul style="list-style-type: none"> • Coelho, Paulo. <i>The Alchemist</i>. Harper ,2016 • Chambers, Pearson. <i>Brilliant Speed Reading: Whatever you need to read, however ...</i>Phil, 2013 • Hewings, Martin. <i>Advanced English Grammar</i>. Cambridge University Press, 2000 • Sharma, Richa <i>Descriptive English</i>. Arihant Publications (India) Ltd, 2019 <p>E- Resources:</p> <ul style="list-style-type: none"> • Very Indian poem by Nissim Ezekiel • http://econtent.in/pacc.in/admin/contents/40_%20_2020103001102714.pdf • Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise • Kindly Adjust please - Shashi Tharoor • https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3lhdtXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKg_iNKKwdkeSg3qWp-U/ • The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU 	
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COURSE NAME			Analytical Geometry 3-D and Integral Calculus		L	T	P	C
COURSE CODE			XMT203		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			2D and 3D Shapes & Basic Integration Formulae					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Find the equation tangent plane to a given sphere.				Cognitive		Remembering	
CO 2	Find the equation tangent plane to a given cone and cylinder.				Cognitive		Remembering	
CO 3	Apply the properties of definite integral to find reduction formulae for a given integral.				Cognitive		Applying	
CO 4	Examine the relation between beta and gamma function and also find recurrence for gamma function.				Cognitive		Analyzing	
CO 5	Utilize the change of order of integration to obtain area the given bounded region.				Cognitive		Applying	
UNIT 1							9 + 3	
Sphere- Tangent plane- intersection of two spheres – Equation of tangent plane to a sphere.								
UNIT 2							9 + 3	
The equation of surface – cone- Right Circular Cone- Tangent plane and normal –Cylinder- Enveloping Cylinder.								
UNIT 3							9 + 3	
Properties of definite integrals - Reduction formulae of the types: $\int x^n e^{ax} dx$, $\int x^n e^{ax} \cos ax dx$, $\int \sin^n x dx$, $\int \cos^n x dx$, $\int \sin^m x \cos^n x dx$, $\int \tan^n x dx$.								
UNIT 4							9 + 3	
Beta and Gamma Functions: Definitions – Convergence of $\Gamma(n)$ – Recurrence formula of gamma function – Properties of beta function – relation between beta and gamma functions.								
UNIT 5							9 + 3	
Multiple integral: Double integral – Evaluation of double integral - change of order of integration – Polar coordinates - Triple integrals - Application of multiple integrals.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Analytical Geometry Part II – Three Dimensions: T.K. M. Pillai, 2015 (for Unit I, II) Unit I - Chapter 4 Sec: 1 – 8 (pages:92 -111) Unit II - Chapter 5 Sec: 1 – 8 (pages :115-139) 2. Calculus Vol II: T.K. M. Pillai, 2015 (for Unit III, IV & V) Unit III - Chapter 1 Sec: 11, 13.1 – 13.6 (pages: 66-72,79-88) Unit IV- Chapter 7 Sec: 2 – 5 (pages 278-290) Unit V- Chapter 5 Sec: 2 – 5.4(pages 203-231)								

References											
1. Analytical Geometry and Vector Calculus, S. Arumugam and Issac, New Gamma, 2008.											
2. Engineering Mathematics, Dr. M.K. Venkatraman, National Publishing Company.											
3. Ancillary Mathematics, T.K. M. Pillai, P. Natarajan, S. Viswanathan (Printers & Publishers) Pvt Ltd. 1992.											
E-References											
1. https://sites.math.washington.edu/~m125/ [Washington University]											
2. https://courses.maths.ox.ac.uk/node/28 [Oxford University]											

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	2	1	0	0	0	1	1	1	2	1	0
CO 2	2	1	0	0	0	1	1	1	2	1	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	3	1	2	3	3	3	3	3	1
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	13	11	7	1	4	11	11	11	13	11	1
SCALED VALUE	3	3	2	1	1	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Sequence and Series			L	T	P	C	
COURSE CODE			XMT204			3	1	0	4	
C	P	A				L	T	P	H	
4	0	0				3	1	0	4	
PREREQUISITE			Algebra and Number Systems							
On successful completion of this course, the students will be able to:										
COURSE OUTCOMES						DOMAIN		LEVEL		
CO 1	Demonstrate if an infinite sequence is bounded, monotonic or oscillating.					Cognitive		Understanding		
CO 2	Demonstrate the given series whether it is convergent or divergent by using the appropriate tests.					Cognitive		Understanding		
CO 3	Demonstrate the series whether it is convergent or divergent by using the appropriate tests such as Raabe’s test and Cauchy’s root test.					Cognitive		Understanding		
CO 4	Identify the sequence of partial sum for a given infinite series.					Cognitive		Applying		
CO 5	Demonstrate the concepts about the Weirstrass inequalities and Cauchy’s inequality.					Cognitive		Understanding		
UNIT 1								9 + 3		
Sets, Sequences – Aggregate: Upper and lower bounds – Bounded sequences - monotonic sequence always tends to a limit, finite or infinite.										
UNIT 2								9 + 3		
Some general theorems concerning infinite series – series of positive terms – comparison tests – Cauchy’s condensation test – D-Alembert’s ratio test - Definition of convergence, Divergence and Oscillation- Necessary condition for convergence- convergence of $\sum \frac{1}{n^p}$ and Geometric series.										
UNIT 3								9 + 3		
Cauchy’s root test and their simple problems - Raabe’s test – Absolutely convergent series - Alternative series with simple problems.										
UNIT 4								9 + 3		
Summation of series – Summation by different series – recurring series.										
UNIT 5								9 + 3		
Inequalities- Geometric and Arithmetic means - Weirstrass inequalities- Cauchy’s inequality.										
LECTURE		45	TUTORIAL		15	PRACTICAL		0	TOTAL	60
Text Books										
1. Algebra, Volume I, T.K.M. Pillay, T. Natarajan and K.S.Ganapathy, S. Viswanathan (Printers & Publishers) Pvt. Ltd., 2015. Unit I : Chapter 2 (Sec: 4 – 7), Pages: 20 - 40 Unit II : Chapter 2 (Sec: 8 – 16), Pages: 41 - 68 Unit III: Chapter 2 (Sec: 17 – 19, 21 – 24), Pages: 68 - 88 Unit IV: Chapter 5 (Sec: 1 – 7), Pages: 246 – 281.										

2. Algebra Volume II, T.K.M. Pillay, T. Natarajan and K.S.Ganapathy, S. Viswanathan (Printers & Publishers) Pvt. Ltd., 2015.

Unit V : Chapter 4 (Sec: 1 – 12), Pages: 179 – 212.

Reference

1. Sequence and Series: S. Arumugam and Isaac, New Gamma Publishing House – 2002 Edition

E-References

1. <https://courses.maths.ox.ac.uk/node/43846>[Oxford University]

2. <https://explore.course.stanford.edu/search?q=MATH21>[Stanford University]

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	11	6	0	1	11	11	11	15	11	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE CODE			COURSE NAME		L	T	P	C
XPG205			ALLIED PHYSICS –II		3	0	0	3
C	P	A			L	T	P	H
2.7	0	0.3			3	1	0	4

COURSE OUTCOMES

On the successful completion of this course students would able to

OBJECTIVES : To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.		DOMAIN	LEVEL
CO1	<i>Explain</i> the concepts of interference diffraction and <i>rephrase</i> the concept of polarization based on wave patterns	Cognitive	Understanding analyze
CO2	<i>Outline</i> the basic foundation of different atom models and <i>Relate</i> the importance of interpreting improving theoretical models based on observation.	Cognitive	Remembering understanding
CO3	<i>Summarize</i> the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models. <i>Interpret</i> nuclear processes like fission and fusion. <i>Understand</i> the importance of nuclear energy, safety measures.	Cognitive	Remembering, understanding apply
CO4	<i>Describe</i> the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation.	Cognitive	Remembering, understanding apply
CO5	<i>Summarize</i> the working of semiconductor devices, Zener diode, transistors and practical devices.	Cognitive	Remembering understanding

UNIT – I	OPTICS	9 + 3
Interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster’s law – optical activity – application in sugar industries.		
UNIT – II	ATOMIC PHYSICS	9 + 3
Atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli’s exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect – Zeeman effect (elementary ideas only) – photo electric effect – Einstein’s photoelectric equation – applications of photoelectric effect: solar cells, solar panels, optoelectric devices		

UNIT – III	NUCLEAR PHYSICS	9 + 3		
Nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods –introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion.				
UNIT – IV	INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES	9 + 3		
Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence –introduction on gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences.				
UNIT – V	SEMICONDUCTOR PHYSICS	9 + 3		
p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger –introduction to e-vehicles and EV charging stations				
HOURS		LECTURE	TUTORIAL	TOTAL
		45	15	60
TEXT BOOKS				
1. R. Murugesan (2005), Allied Physics, S. Chand & Co, New Delhi.				
2. K. Thangaraj and D. Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.				
3. Brijlal and N. Subramanyam(2002), Text book of Optics, S. Chand & Co, New Delhi.				
4. R.Murugesan (2005), Modern Physics, S. Chand & Co, New Delhi.				
5. A. Subramaniyam Applied Electronics, 2 nd Edn., National Publishing Co., Chennai..				
REFERENCE BOOKS				
1. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11 th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore.				
2. D.R. Khannaand H.R. Gulati (1979).Optics, S.Chand & Co. Ltd., New Delhi.				
3. A. Beiser (1997), Concepts of Modern Physics, Tata Mc Graw Hill Publication, New Delhi.				
4. Thomas L. Floyd (2017), Digital Fundamentals, 11 th Edn., Universal Book Stall, New Delhi.				
5. V.K.Metha (2004), Principles of electronics, 6 th Edn. ,S. Chand and Company, New Delhi.				
E REFERENCES				
1. https://www.berkshire.com/learning-center/delta-p-facemask/				
2. https://www.youtube.com/watch?v=QrhxU47gtj4				
3. https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo				
4. https://www.youtube.com/watch?v=JrRp5F-Qu4				
5. https://www.validyne.com/blog/leak-test-using-pressure-transducers/				
6. https://www.atoptics.co.uk/atoptics/blsky.htm -				
7. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects				

Mapping with Programme Outcomes

Course Outcomes	PO₁	PO₂	PO₃	PO₄	PO₅	PO₆	PO₇	PO₈	PO₉	PO₁₀	PSO1	PSO2
CO₁	3	0	1	0	1	3	1	2	1	2	2	1
CO₂	2	0	1	2	1	3	1	1	1	2	2	1
CO₃	2	1	3	3	1	3	2	1	0	2	1	1
CO₄	1	1	2	3	2	3	1	2	0	2	2	2
CO₅	2	1	1	3	1	3	1	2	1	2	1	1
Total	10	3	8	11	6	15	6	8	3	10	8	6
Scaled to 1, 2, 3	2	1	2	3	2	3	3	2	1	2	2	2

0 – No relation 1 – Low relation 2 – Medium relation 3 – High relation

COURSE CODE			COURSE NAME	L	T	P	C
XPG206			ALLIED PHYSICS PRACTICAL – II	0	0	1	1
C	P	A		L	T	P	H
0	0.75	0.25		0	0	2	2
COURSE OUTCOMES							
On the successful completion of this course students would able to							
OBJECTIVES : Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results				Domain		Level	
CO1	Understand basic concepts of physics and identify its applications			Psychomotor		Mechanism	
CO2	Identify the principles of optics, and determine refractive index.			Psychomotor : Affective:		Analyze, Respond	
CO3	Develop Knowledge to differentiate resistance of material affected by temperature.			Psychomotor : Affective:		Mechanism Receive	
CO4	Recall the concepts of laws and explain the methods of magnetic field.			Psychomotor : Affective:		Mechanism Receive	
CO5	Understand function of semiconductor and zener diode and how it is working regulator.			Psychomotor : Affective:		Analyze Receive	

Any Eight of the experiments

Ex. No	Experiments (Any eight experiments)	Cos
1.	Radius of curvature of lens by forming Newton's rings	CO1
2.	Thickness of a wire using air wedge	CO1
3.	Wavelength of mercury lines using spectrometer and grating	CO1
4.	Refractive index of material of the lens by minimum deviation	CO2
5.	Refractive index of liquid using liquid prism	CO2
6.	Specific resistance of a wire using PO box	CO3
7.	Thermal conductivity of poor conductor using Lee's disc	CO3
8.	Determination of Earth's magnetic field using field along the axis of a coil	CO4
9.	Characterisation of Zener diode	CO5
10.	Construction of Zener/IC regulated power supply	CO5
11.	Construction of AND, OR, NOT gates using diodes and transistor	CO5

12.	NOR gate as a universal building block			CO5
		LECTURE	PRACTICAL	TOTAL
HOURS		0	30	30
TEXT BOOKS				
1. C. L. Arora, “B.Sc .Practical Physics”, S. Chand & Company Ltd. Ram Nagar, New Delhi–110055. 2007.				
2. R. K. Shukla & Anchal Srivastava. “Practical Physics,” New Age International (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, Ansari Raod, Daryagani, New Delhi–11002. 2006.				
REFERENCE BOOKS				
1. Geeta Sanon, “B. Sc., Practical Physics”, 1st Edition, S. Chand and Company, 2007.				
2. Chattopadhyay, D., Rakshit, P. C. and Saha, B., “An Advanced Course in Practical Physics,” 8th Edition, Books & Allied Ltd., Calcutta, 2007.				
3. G. L. Squires, “Practical Physics”, Fourth edition, Cambridge University Press, 2001.				
4. Indu Prakash and Ramakrishna, “A Text Book of Practical Physics,” 11th Edition, Kitab Mahal, New Delhi, 2011.				
5. C. Ouseph,K. Rangarajan, “A Text Book of Practical Physics”, Volume I,II, S.Viswanathan Publishers,1997.				
E–Resources:				
1. Amal Kumar Das , Department of Physics, IIT Kanpur, “Introduction to Electromagnetic Theory”, National Programme on Technology Enhanced Learning (NPTEL), https://onlinecourses.nptel.ac.in/noc20_ph16/preview				

Mapping of COs with POs

Course Outcomes	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PSO1	PSO2
CO ₁	1	1	3	3	2	3	1	3	0	1	2	1
CO ₂	1	1	3	2	1	3	1	3	1	1	2	1
CO ₃	1	1	3	3	1	3	2	3	1	2	2	1
CO ₄	1	1	2	2	2	3	1	3	1	2	2	1
CO ₅	1	1	3	3	2	3	1	3	1	2	2	1
Total	5	5	14	13	8	15	6	15	4	8	10	5
Scaled to 1, 2, 3	1	1	3	3	2	3	2	3	1	2	2	1

0 – No relation 1 – Low relation 2 – Medium relation 3 – High relation

COURSE NAME			Quantitative Aptitude – I		L	T	P	C	
COURSE CODE			XMT207		1	1	0	2	
C	P	A			L	T	P	H	
2	0	0			1	1	0	2	
PREREQUISITE			Number Systems						
On successful completion of this course, the students will be able to:									
COURSE OUTCOMES					DOMAIN		LEVEL		
CO 1	Explain the basic concepts of Numbers, H.C.F. & L.C.M of Numbers and to solve the problems.				Cognitive		Understanding		
CO 2	Explain the basic concepts of Decimal Fractions, Simplification and to solve the problems.				Cognitive		Understanding		
CO 3	Explain the basic concepts of Square Roots & Cube Roots, Average and to solve the problems.				Cognitive		Understanding		
CO 4	Explain the basic concepts of Problems on Numbers, Problems on Ages and to solve the problems.				Cognitive		Understanding		
CO 5	Explain the basic concepts of Surds & Indices, Percentage and to solve the Problems.				Cognitive		Understanding		
UNIT 1							3+3		
Numbers, H.C.F. &L.C.M of Numbers.									
UNIT 2							3+3		
Decimal Fractions, Simplification.									
UNIT 3							3+3		
Square Roots & Cube Roots, Average.									
UNIT 4							3+3		
Problems on Numbers, Problems on Ages.									
UNIT 5							3+3		
Surds & Indices, Percentage.									
LECTURE		15	TUTORIAL		15	PRACTICAL	0	TOTAL	30
Text Book									
1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S Chand; 20 th edition (2013).									
References									
1. Banking awareness by Sangram Keshari Rout and Soumya Ranjan Behera, B.K. Publications Pvt. Ltd.; Second edition (2014).									
2. UGC-CSIR NET/SET by Dr. Pawan Sharma and Anshuman, Arihant Publication.									
3. Fast Track Objective Arithmetic by Rajesh Verma, Arihant Publication, Edition 2012.									
E-References									
1. www.careerbless.com									
2. www.jagranjosh.com									
3. www.bestguru.com									

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	10	5	0	0	10	10	10	15	10	0
SCALED VALUE	3	2	1	0	0	2	2	2	3	2	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

		SEMESTER II		L	T	P	SS	C
COURSE CODE		XUM002		1	0	0	1	1
COURSE NAME		ENVIRONMENTAL STUDIES		L	T	P	SS	H
C: P: A		0.8:0.1:0.1		1	0	0	1	2
COURSE OUTCOMES:			Domain			Level		
CO1	Describe the significance of natural resources and explain anthropogenic impacts.		Cognitive			Remember Understand		
CO2	Illustrate the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.		Cognitive			Understand		
CO3	Identify the facts, consequences, preventive measures of major pollutions and recognize the disaster phenomenon.		Cognitive Affective			Remember Receiving		
CO4	Explain the socio-economic, policy dynamics and practice the control measures of global issues for sustainable development.		Cognitive			Understand Analyse		
CO5	Recognize the impact of population and the concept of various welfare programs, and apply the modern technology towards environmental protection.		Cognitive Psychomotor			Understand Apply		
UNIT - I NATURAL RESOURCES AND ENERGY							3+3	
	World Environment Day and its need- Forest resources: Use, Deforestation– Water resources: over-utilization of surface and ground water- Mineral resources: Environmental effects of mining– Food resources: Modern agriculture, Fertilizer-Pesticide problems, Water logging, Salinity-Energy resources: Renewable and Non-renewable energy sources; Alternate energy resources-Role Of individual in Conservation of Resources.							
UNIT - II ECOSYSTEMS AND BIODIVERSITY							3+3	
	Structure and function of an ecosystem – Producers, consumers and decomposers –Biogeochemical cycles- Food chains, Food webs, Structure and Function of the Forest ecosystem and Aquatic ecosystem– Introduction to Biodiversity- Endemic, Extinct and Endangered species- Conservation of Biodiversity: In-situ and Ex-situ conservation.							
UNIT – III ENVIRONMENTAL POLLUTION							3+3	
	Definition – Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards – Solid waste management: Causes, effects and control measures of industrial wastes – Role of an individual in prevention of pollution – Pollution case studies							
UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT							3+3	
	Rain water harvesting– Resettlement and Rehabilitation of people, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust – Environment Protection Act – Water Act – Wildlife Protection Act – Forest Conservation Act.							
UNIT –V HUMAN POPULATION AND THE ENVIRONMENT							3+3	
	Population growth, Variation among nations - Population explosion - Environment and Human health- HIV / AIDS – Role of Information Technology in Environment and human health – Case studies.							

LECTURE		TUTORIALS	PRACTICALS		TOTAL
30		0	-----		30
	TEXT BOOKS				
	<div>1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, (2000).</div> <div>2. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, (2003).</div> <div>3. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, (2003).</div> <div>4. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, (2006).</div> <div>5. Introduction to International disaster management, Butterworth Heinemann, (2006).</div> <div>6. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, (2004).</div>				
	REFERENCES				
	<div>1. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, (2009).</div> <div>2. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, (2001).</div> <div>3. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, (2012).</div> <div>4. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, (2003).</div> <div>5. Sundar, Disaster Management, Sarup & Sons, New Delhi, (2007).</div> <div>6. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, (2006).</div>				
	E RESOURCES				
	<div>1. http://www.e-booksdirectory.com/details.php?ebook=10526</div> <div>2. https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science</div> <div>3. https://www.free-ebooks.net/ebook/What-is-Biodiversity</div> <div>4. https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4</div> <div>5. http://bookboon.com/en/pollution-prevention-and-control-ebook</div> <div>6. http://www.e-booksdirectory.com/details.php?ebook=8557</div> <div>7. http://www.e-booksdirectory.com/details.php?ebook=6804</div> <div>8. http://bookboon.com/en/atmospheric-pollution-ebook</div> <div>9. http://www.e-booksdirectory.com/details.php?ebook=3749</div> <div>10. http://www.e-booksdirectory.com/details.php?ebook=2604</div> <div>11. http://www.e-booksdirectory.com/details.php?ebook=2116</div> <div>12. http://www.e-booksdirectory.com/details.php?ebook=1026</div> <div>13. http://www.faadooengineers.com/threads/7894-Environmental-Science</div>				

SEMESTER III

பொதுத்தமிழ் - 3 (மூன்றாம் பருவம்)

பாடக்குறியீடு/ Course Code	பாடப்பெயர்/ Course Name	Category	L	T	P	S S	H	C
XGT301	பொதுத்தமிழ் - 3	Supportive	3	0	0	0	3	3
Pre-requisite	பன்னிரெண்டாம் வகுப்பில் தமிழை ஒருபாடமாகப் பயின்றிருக்க வேண்டும்.							
பாடப்பயன்கள் Course outcomes	இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.							
CO1	தமிழ்க் காப்பியங்களின்வழி வாழ்வியல் சிந்தனையைப் பெறுவர்.						புரிந்துகொள்ளல் (Understand)	
CO2	காப்பியங்கள் அறிமுகப்படுத்தப்படுவதால் தமிழ்மொழியின் உயர்வையும் சிறப்பையும் உணர்தல்						புரிந்துகொள்ளல் (Understand)	
CO3	தமிழ்ப் புதினங்களின்வழிச் சமகாலப் படைப்புகளின் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.						பகுப்பாய்வுசெய்தல் Analyze	
CO4	நாவல்இலக்கியம் அறிமுகப்படுத்தப்படுவதால் சிந்தனை ஆற்றல், படைப்பாற்றல், கற்பனைத் திறன் வளர்தல்						தெரிந்துகொள்ளல் (Apply)	
CO5	யாப்பு, அணி இலக்கணங்கள், மொழிபெயர்ப்புத் திறன் ஆகியவற்றைக் கற்பதன் மூலம் போட்டித் தேர்வுகளை எதிர்கொள்ளுதல்						புரிந்துகொள்ளல் (Understand)	
	K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.							

அலகு - I	பெருங்காப்பியங்கள்	9மணிகள்
	சிலப்பதிகாரம் - வழக்குரைகாதை - இளங்கோவடிகள் மணிமேகலை - ஆதிரைபிச்சையிட்டகாதை - சீத்தலைச்சாத்தனார் சீவகசிந்தாமணி - பூமகள்இலம்பகம் - திருத்தக்கதேவர் வளையாபதி - நாதகுத்தனார்	
அலகு - II	சித்தர்பாடல்கள்	9 மணிகள்

	திருமூலர் பாடல்கள் (10 பாடல்கள்) கரூர் சித்தர்பாடல்கள் (10 பாடல்கள்) – பாம்பாட்டிச் சித்தர்கள் - (10 பாடல்கள்) குதம்பைச் சித்தர்கள் - (10 பாடல்கள்)	
அலகு - III	புதினம்	9மணிகள்
	வஞ்சிமா நகரம் (வரலாற்றுப் புதினம்) - நா.பார்த்தசாரதி	
அலகு - IV	பாடம் தழுவிய இலக்கிய வரலாறு	9மணிகள்
அலகு - V	மொழித் திறன்	9மணிகள்
	1. நூல் மதிப்புரை 2. திறனாய்வு செய்தல் 3. கடிதம் வரைதல் 4. விண்ணப்பம் எழுதுதல்	
	Total Lecture Hours	45மணிகள்
பாடநூல்கள்		
1.	சிலப்பதிகாரம், கழக வெளியீடு, சென்னை	
2.	மணிமேகலை, கழக வெளியீடு, சென்னை	
3.	சீவகசிந்தாமணி, கழக வெளியீடு, சென்னை	
4.	சித்தர் பாடல்கள், பாரி நிலையம், சென்னை	
பார்வைநூல்கள்		
1.	தமிழ் இலக்கிய வரலாறு – சிற்பிபாலசுப்பிரமணியன்.	
2.	புதிய நோக்கில் தமிழ்இலக்கிய வரலாறு - தமிழண்ணல்	
3.	வகைமை நோக்கில் தமிழ்இலக்கிய வரலாறு – எஃப்.பாக்கியமேரி.	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

Web Sources
<ul style="list-style-type: none"> • Tamil Heritage Foundation - www.tamilheritage.org<http://www.tamilheritage.org> • Tamil virtual University Library - www.tamilvu.org/library http://www.virtualvu.org/library • Project Madurai - www.projectmadurai.org. • Chennai Library - www.chennailibrary.com<http://www.chennailibrary.com>. • Tamil Universal Digital Library-www.ulib.prg<http://www.ulib.prg>. • Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com • Tamil Books online - books.tamilcube.com • Catalogue of the Tamil books in the Library of British Congress archive.org • Tamil novels online - books.tamilcube.com
Strong-3, Medium-2, Low-1

COURSE CODE		XGE302	L	T	P	SS	H	C
COURSENAME		ENGLISH III	3	0	0	0	3	3
C:P:A- 3:0:0								
COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:			Domain		Level			
CO1	Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.		Cognitive		Understand			
CO2	Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society		Cognitive		Apply			
CO3	Produce grammatically and idiomatically correct language.		Cognitive		Understand			
CO4	Gain knowledge in writing techniques to meet academic and professional needs.		Cognitive		Understand			
CO5	Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.		Cognitive		Understand			
SYLLABUS							HOURS	
UNIT-I	POETRY						6+3+0=9	
1.1 The Voice of the Mountains - Mamang Dai 1.2 Sita - Toru Dutt 1.3 A Song of Hope - Oodgeroo Noonuccal 1.4 In an Artist’s Studio - Christina Rossetti								
UNIT-II	SCENES FROM SHAKESPEARE						6+3+0=9	
2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene								
UNIT-III	SPEECHES OF FAMOUS PERSONALITIES						6+3+0=9	
3.1 Tryst with Destiny- Jawaharlal Nehru 3.2 Yes, We Can-Barack Obama 3.3 You’ve Got to Find What You Love-Steve Jobs								
UNIT-IV	LANGUAGE COMPETENCY						6+3+0=9	
4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram. facebook] 4.3 Learning netiquette, email etiquette								
UNIT - V	ENGLISH FOR WORKPLACE						6+3+0=9	
5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting								
L=30 / T=15			Total Hours				45	

COURSE NAME			Differential Equations and Applications	L	T	P	C	
COURSE CODE			XMT303	3	1	0	4	
C	P	A		L	T	P	H	
4	0	0		3	1	0	4	
PREREQUISITE			Differential Calculus					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES				DOMAIN		LEVEL		
CO 1	Demonstrate the solutions of homogeneous equations, non-homogeneous equations of degree one in two variables.			Cognitive		Understanding		
CO 2	Find the solutions of equations of first order but not of higher degree and to determine particular integrals of algebraic, exponential, trigonometric functions and their products			Cognitive		Remembering		
CO 3	Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters			Cognitive		Remembering		
CO 4	Build a PDE by eliminating arbitrary constants and arbitrary function and to obtain the complete, singular and general integrals.			Cognitive		Applying		
CO 5	Solve Differential equations using Charpit's method			Cognitive		Applying		
UNIT 1	Ordinary Differential Equations					9 + 3		
Variable separable - Homogeneous Equation - Non-Homogeneous Equations of first degree in two variables - Linear Equation – Bernoulli's Equation - Exact differential equations.								
UNIT 2	Equation of first order but not of higher degree					9 + 3		
Equation solvable for dy/dx- Equation solvable for y - Equation solvable for x- Clairaut's form - Linear Equations with constant coefficients - Particular integrals of algebraic, exponential, trigonometric functions and their products.								
UNIT 3	Simultaneous linear differential equations					9 + 3		
Linear Equations of the Second Order - Complete solution in terms of a known integrals - Reduction to the Normal form - Change of the Independent Variable - Method of Variation of Parameters.								
UNIT 4	Partial differential equation					9 + 3		
Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral- General integral -Lagrange's Linear Equations – Simple Applications.								
UNIT 5	Partial differential equation					9 + 3		
Special methods – Standard forms – Charpit's Methods – Simple Applications.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Differential Equations and its applications, S. Narayanan, T. K. Manickavachagam Pillay, S. Viswanathan Printers – Chennai, .2009.								
Unit I : Chapter 2 Sections 1- 6								
Unit II : Chapter 4, 5 Sections 1 – 3, 1 – 4								

Unit III: Chapter 2 Sections 1 – 4
Unit IV: Chapter 12 Sections 1 – 4
Unit V: Chapter 12 Sections 5 – 6
References
1. Differential Equations, Shepley L. Ross, 3rd Ed., John Wiley and Sons, 1984. 2. Elements of Partial Differential Equations, I. Sneddon, McGraw-Hill, International Edition, 2013. 3. G.F. Simmons, Differential equations with applications and historical notes, 2 nd Ed, Tata McGraw Hill Publications, 2017.
E-References
1. http://science.korea.edu/science_en/undergraduate/under_math3.do 2. http://scinece.utm.my/ug/course_list_old/sscm1703/ 3. http://nptel.ac.in

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	2	1	0	0	0	1	1	1	2	1	0
CO 3	2	1	0	0	0	1	1	1	2	1	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	13	8	3	0	0	8	8	8	13	8	0
SCALED VALUE	3	2	1	0	0	2	2	2	3	2	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Vector Calculus and Applications		L	T	P	C
COURSE CODE			XMT304		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Differential and integral calculus					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Find the derivative of a vector, derivative of a scalar and derivative of a scalar product and vector product.				Cognitive		Remembering	
CO 2	Find gradient of a scalar, Divergence and Curl of a vector.				Cognitive		Applying	
CO 3	Solve simple line integrals.				Cognitive		Applying	
CO 4	Solve surface integrals and volume integrals.				Cognitive		Applying	
CO 5	Analyze the theorems of Gauss, Stoke’s and Green’s (Two Dimension).				Cognitive		Applying	
UNIT 1							9 + 3	
Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product.								
UNIT 2							9 + 3	
The vector operator “del”, The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors – simple applications.								
UNIT 3							9 + 3	
Laplacian operator, Vector identities - Line integral - simple problems.								
UNIT 4							9 + 3	
Surface integral - Volume integral – Applications.								
UNIT 5							9 + 3	
Gauss divergence Theorem, Stoke’s Theorem, Green’s Theorem in two dimensions –Applications to real life situations.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Vector Analysis, P. Durai Pandian, Laxmi Durai Pandian, Emerald Publishers 2017.								
Unit I : Chapter 2 Sections 2.1, 2.2., 2.3								
Unit II : Chapter 2 Sections 2.4, 2.5, 2.6, 2.7								
Unit III: Chapter 2, 3 Sections 2.8, 3.1, 3.2, 3.3., 3.4								
Unit IV: Chapter 3 Sections 3.5, 3.6								
Unit V: Chapter 4 Sections 4.2, 4.3, 4.4, 4.5								

References
1. Vector Calculus, J.C. Susan, (4th Edn.) Pearson Education, Boston, 2012. 2. Vector Calculus for College Students, A. Gorguis, Xilbius Corporation, 2014. 3. Vector Calculus, J.E. Marsden and A. Tromba (5 th edn.) W.H. Freeman, NewYork, 1988.
E-References
http://mathforum.org , http://www.opensource.org http://nptel.ac.in

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	2	1	0	0	0	1	1	1	2	1	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	14	13	8	0	4	13	13	13	14	13	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Statistics for Data Science I		L	T	P	C		
COURSE CODE			XMT305		2	1	0	3		
C	P	A			L	T	P	H		
4	0	0			2	1	0	3		
PREREQUISITE			Basic Statistics							
On successful completion of this course, the students will be able to:										
COURSE OUTCOMES					DOMAIN		LEVEL			
CO 1	Demonstrate to understand basics of Data Science.				Cognitive		Understanding			
CO 2	Classify the various types of data collection and pre-processing.				Cognitive		Understanding			
CO 3	Identify measures of central tendency and dispersion for the given data set.				Cognitive		Applying			
CO 4	Construct the model development of simple and multiple regression using visualization.				Cognitive		Applying			
CO 5	Analyze the model selection and the prediction by using regression.				Cognitive		Analyzing			
UNIT 1	Introduction						6 + 3			
Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.										
UNIT 2	Data Collection and Data Pre-Processing						6 + 3			
Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.										
UNIT 3	Exploratory Data Analytics						6 + 3			
Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis–Correlation Statistics – ANOVA.										
UNIT 4	Model Development						6 + 3			
Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines.										
UNIT 5	Model Evaluation						6 + 3			
Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression.										
LECTURE		30	TUTORIAL		15	PRACTICAL		0	TOTAL	45
Text Book										
1. Jojo Moolayil, “Smarter Decisions: The Intersection of IoT and Data Science”, PACKT, 2016.										
References										
1. Cathy O’Neil and Rachel Schutt, “Doing Data Science”, O’Reilly, 2015.										
1. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013										
2. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.										

3. Gupta, S.C. and Kapoor, V.K.: “Fundamentals of Mathematical Statistics”, Sultan & Chand & Sons, New Delhi, 11th Ed, 2002.
4. Hastie, Trevor, et al. “The elements of Statistical Learning”, Springer, 2009.
5. Peter Bruce, Andrew Bruce and Peter Gedeck, “Practical Statistics for Data Scientists”, 2nd Edition, May 2020.
6. Pratap Dangeti, “Statistics for Machine Learning “, July 2017.

E-References

<https://nptel.ac.in>

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	3	1	2	3	3	3	3	3	1
TOTAL	15	13	9	1	4	13	13	13	15	13	1
SCALED VALUE	3	3	2	1	1	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Statistics for Data Science Lab I using R Programming	L	T	P	C
COURSE CODE			XMT306	0	0	2	1
C	P	A		L	T	P	H
1	0	0		0	0	2	1
PREREQUISITE			Basic Statistics				
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Construct the frequency distributions for the given data sets.			Cognitive		Applying	
CO 2	Interpret and draw pie, bar, line, histogram and scatter diagrams for the given data sets.			Cognitive		Evaluating	
CO 3	Identify the coefficient of correlation using Karl Pearson's Method and Spearman's Method.			Cognitive		Applying	
CO 4	Examine the existence of a relationship between two or more variables using linear regression.			Cognitive		Analyzing	
CO 5	Estimate the inter-relation between two or more phenomena with the help of curve fitting.			Cognitive		Evaluating	
List of Experiments							
1. Formation of discrete and continuous frequency distributions-descriptive statistics.							
2. Diagrams: Pie, bar, line and scatter diagrams, Graphs: Histogram and normal probability plot.							
3. Correlation coefficient, rank correlation, partial and multiple correlations.							
4. Regression: Simple and multiple linear regression.							
5. Curve estimation.							

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	3	3	2	3	3	3	3	3	3	2
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	3	1	2	3	3	3	3	3	1
CO 5	3	3	3	2	3	3	3	3	3	3	2
TOTAL	15	15	13	5	9	15	15	15	15	15	5
SCALED VALUE	3	3	3	1	2	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Quantitative Aptitude - II	L	T	P	C
COURSE CODE			XMT307	1	1	0	2
C	P	A		L	T	P	H
2	0	0		1	1	0	2
PREREQUISITE			Number systems and algebra				
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Apply the basic concepts of profit and loss, ratio & proportion to solve the problems.			Cognitive		Applying	
CO 2	Apply the basic concepts of partnership, chain rule to solve the problems			Cognitive		Applying	
CO 3	Apply the basic concepts of time & work, pipes & cisterns to solve the problems.			Cognitive		Applying	
CO 4	Apply the basic concepts of time & distance and problems on trains to solve the problems.			Cognitive		Applying	
CO 5	Apply the basic concepts of boats and streams and allegation or mixture to solve the problems.			Cognitive		Applying	
UNIT 1						3+3	
Profit and Loss, Ratio and Proportion.							
UNIT 2						3+3	
Partnership, Chain Rule.							
UNIT 3						3+3	
Time and work, Pipes and Cisterns.							
UNIT 4						3+3	
Times and Distance, Problems on Trains.							
UNIT 5						3+3	
Boats and Streams and allegation or mixture.							
LECTURE		15	TUTORIAL	15	PRACTICAL	0	TOTAL 30
Text Book							
1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S Chand; 20 th edition (2013).							
References							
1. Banking awareness by Sangram Keshari Rout and Soumya Ranjan Behera, B.K. Publications Pvt. Ltd.; Second edition (2014).							
2. UGC-CSIR NET/SET by Dr. Pawan Sharma and Anshuman, Arihant Publication.							
3. Fast Track Objective Arithmetic by Rajesh Verma, Arihant Publication, Edition 2012.							
E-References							
1. www.careerbless.com							
2. www.jagranjosh.com							
3. www.bestguru.com							

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	15	10	0	5	15	15	15	15	15	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

Course Name			DISASTER MANAGEMENT			L	T	P	C	
Course Code			XUM003			1	0	0	1	
C	P	A				L	T	SS	H	
1	0	0				1	0	1	1	
Prerequisite		Basic knowledge about environment.								
On successful completion of this course, the students will be able to:										
Course Outcomes						Domain		Level		
CO1	Understanding the concepts of application of types Of disaster preparedness					Cognitive		Apply		
CO2	Infer the end conditions &Discuss the failures due to disaster.					Cognitive		Analyze		
CO3	Understanding of importance of seismic waves occurring globally					Cognitive		Analyze		
CO4	Estimate Disaster and mitigation problems.					Cognitive		Apply		
CO5	Keen knowledge one essentials of risk reduction					Cognitive		Apply		
UNIT 1	INTRODUCTION							3		
Introduction–Disasterpreparedness–GoalsandobjectivesofISDRProgramme–Risk identification – Risk sharing – Disaster and development: Development plans and disaster management–Alternative to dominant approach – disaster – development linkages – Principle of risk partnership.										
UNIT 2	APPLICATIONOFTECHNOLOGY INDISASTERRISK REDUCTION							3		
Application of various technologies: Databases–RDBMS–Management Information Systems–Decision support system and other systems – Geographic information systems – Intranets andextranets–videoteleconferencing.Triggermechanism–Remotesensing–aninsight–contributionof remote sensing and GIS–Case study.										
UNIT 3	AWARENESSOF RISKREDUCTION							3		
Triggermechanism–constitutionoftriggermechanism–riskreductionbyeducation–disaster Information network–risk reduction by public awareness.										
UNIT 4	DEVELOPMENTPLANNING ONDISASTER							3		
Implicationofdevelopmentplanning–Financialarrangements–Areasofimprovement–DisasterPreparedness–Communitybased disaster management–Emergency response.										
UNIT 5	SEISMICITY							3		
Seismic waves–Earthquakes and faults– measures of a earth quake, magnitude and intensity–ground damage–Tsunamis and earthquakes.										
Lecture		15	Tutorial		-	Practical		-	Total	15
Text Book										
1.Siddhartha Gautam and K Leelakrishna Rao,“Disaster Management Programmes and Policies”, Vista International PubHouse,2012										

2. ArunKumar, “GlobalDisasterManagement”, SBS Publishers, 2008									
References									
1. “ Encyclopedia Of Disaster Management”, Neha Publishers & Distributors, 2008									
2. Pardeep Sahni, Madhavimalal go daandariya bandu, “DisasterriskreductioninSouthAsia”, PHI, 2002									
3. Amitasinvhal, “Understandingearthquakedisasters” TMH, 2010.									
4. Pardeep Sahni, Alka Dhameja and Umamedury, “Disastermitigation: Experiences and reflections”, PHI, 2000									
E-References									
http://icom.museum/disaster_preparedness_book/copyright.pdf									
http://www.international.icomos.org/centre_documentation/bib/riskpreparedness.pdf									
COs vs POs									
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	3	3	3	2	3	1	1	1	1
CO 2	3	3	3	3	3	1	2	1	1
CO 3	3	3	3	3	3	1	2	1	1
CO 4	3	3	3	2	3	1	1	1	1
CO 5	3	3	3	2	3	1	1	1	1
TOTAL	15	15	15	12	15	5	7	5	5
SCALED VALUE	3	3	3	3	3	1	2	1	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation									
1-5 → 1, 6-10 → 2, 11-15 → 3									

SEMESTER IV

பொதுத்தமிழ் - 4 (நான்காம் பருவம்)

பாடக்குறியீடு/ Course Code	பாடப்பெயர்/ Course Name	Category	L	T	P	SS	H	C
XGT401	பொதுத்தமிழ் - 4	Supportive	3	0	0	0	3	3
Pre-requisite	பன்னிரெண்டாம் வகுப்பில் தமிழை ஒருபாடமாகப் பயின்றிருக்க வேண்டும்.							
பாடப்பயன்கள் / Course outcomes	இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.							
CO1	சங்கஇலக்கியத்தில் காணப்பெறும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.					புரிந்துகொள்ளல் (Understand)		
CO2	தமிழின் தொன்மையையும், செம்மொழித் தகுதியையும் அறிந்து கொள்ளுதல்.					புரிந்துகொள்ளல் (Understand)		
CO3	நாடக இலக்கியம் மூலம் நடிப்பாற்றலையும், கலைத் தன்மையையும், படைப்பாற்றலையும் வளர்த்தல்.					தெரிந்துகொள்ளல் (Apply)		
CO4	தமிழிலிருந்து அலுவலகக்கடிதங்களை மொழிபெயர்ப்பதால் ஆங்கில அறிவைப் பெறுதல்.					தெரிந்துகொள்ளல் (Apply)		
CO5	மொழியறிவோடு வேலை வாய்ப்பினைப் பெறுதல்.					பகுப்பாய்வுசெய்தல் Analyze		
	K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.							
அலகு - I	எட்டுத்தொகை					9மணிகள்		
	நற்றிணை (10,14,16) குறுந்தொகை (16,17,19,20,25,29,38,440), கலித்தொகை(38,51), அகநானூறு (15,33,55), புறநானூறு (37,88,112), பரிபாடல் (55)							
அலகு - II	பத்துப்பாட்டு					9மணிகள்		
	நெடுநல்வாடை – நக்கீரர்.							
அலகு - III	நாடகம்					9மணிகள்		
	கலகக்காரர் தோழர் பெரியார் – மு.ராமசாமி.							

அலகு - IV	பாடம் தழுவிய இலக்கிய வரலாறு	9மணிகள்
அலகு - V	மொழித் திறன்	9மணிகள்
	1. மொழிபெயர்ப்பு / கலைச்சொற்கள் 2. ஆங்கிலப் பகுதியைத் தமிழில் மொழிபெயர்த்தல். 3. அலுவலகக் கடிதம் – தமிழில் மொழிபெயர்த்தல்.	
	Total Lecture Hours	45மணிகள்

பாடநூல்கள்		
1.	எட்டுத் தொகை, எம்.நாராயண வேலுப்பிள்ளை, நர்மதா பதிப்பகம், சென்னை.	
2.	பத்துப்பாட்டு மூலமும் நச்சினார்க்கினியர் உரையும், டாக்டர்.உ.வே.சாமிநாதையர், டாக்டர் .உ.வே.சாமிநாதையர் நூல் நிலையம், சென்னை.	
3.	கலகக்காரர்தோழர்பெரியார் – மு.ராமசாமி (நாடகநூல்)	
பார்வைநூல்கள்		
1.	தமிழ்இலக்கிய வரலாறு – சிற்பிபாலசுப்பிரமணியன்.	
2.	புதியநோக்கில் தமிழ்இலக்கியவரலாறு - தமிழண்ணல்	
3.	வகைமை நோக்கில் தமிழ்இலக்கியவரலாறு – எஃப்.பாக்கியமேரி.	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
Web Sources	
<ul style="list-style-type: none"> Tamil Heritage Foundation - www.tamilheritage.org<http://www.tamilheritage.org> Tamil virtual University Library - www.tamilvu.org/library http://www.virtualvu.org/library Project Madurai - www.projectmadurai.org. Chennai Library - www.chennailibrary.com<http://www.chennailibrary.com>. Tamil Universal Digital Library-www.ulib.prg<http://www.ulib.prg>. Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com Tamil Books online - books.tamilcube.com Catalogue of the Tamil books in the Library of British Congress archive.org Tamil novels online - books.tamilcube.com 	
Strong-3, Medium-2, Low-1	

COURSE CODE		XGE402	L	T	P	SS	H	C
COURSENAME		ENGLISH IV	2	1	0	0	3	3
C:P:A- 3:0:0								
COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:			Domain		Level			
CO1	<i>Learn</i> to communicate effectively and appropriately in real life situation.		Cognitive		Understand			
CO2	<i>Use</i> English effectively for study purpose across the curriculum		Cognitive		Apply			
CO3	<i>Develop</i> interest in and appreciation of Literature		Cognitive		Understand			
CO4	<i>Develop</i> and integrate the use of the four language skills		Cognitive		Understand			
CO5	<i>Enhance</i> their language skills especially in the areas of grammar and pronunciation.		Cognitive		Understand			
SYLLABUS							HOURS	
UNIT-I	LIFE WRITING					6+3+0=9		
1.1 I am Malala-Malala Yousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2								
UNIT-II	ONE ACT PLAY					6+3+0=9		
2.1 The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov								
UNIT-III	INTERVIEWS					6+3+0=9		
Interviews 3.1 Nelson Mandela’s Interview with Larry King. 3.2 Rakesh Sharma’s Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)								
UNIT-IV	LANGUAGE COMPETENCY					6+3+0=9		
4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice 4.3 Interviews (face to face, telephone and video conferencing)								
UNIT - V	ENGLISH FOR WORKPLACE					6+3+0=9		
5.1 Job Applications: Covering letters, CV and Resume 5.2 Creating a digital profile - LinkedIn 5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card 5.4 Body Language -Practical Skills for Interviews.								
L=30 / T=15			Total Hours			45		
Tutorial Activities 9) Reading and understanding incomplete texts 10) Summarize a piece of prose or poetry 11) Communication Practice 12) Role play								

<p>Text books:</p> <ul style="list-style-type: none"> • Borg, Taylor & Francis, <i>Writing Your Life: A Guide to Writing Autobiographies</i>, Mary 2021 • Colin Dolley, Rex Walford. <i>The One-Act Play Companion: A Guide to plays, playwrights</i>, 2015 • Jeanne Kelly. <i>How to Build a Professional Digital Profile</i> Kindle Edition by Bernish, Bernish Communications Associates, LLC; 1st edition, 2012 • Tesla, Nikola. <i>My Inventions by Ingram</i> Short title, 2011 • Yousafzai, Malala. <i>I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban</i>, Christina Lamb , Little Brown, 2013 <p>E-Resources:</p> <ul style="list-style-type: none"> • For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s(the link to the performance; refer scripts by Aaron Sheperd) • http://BBC.learn.English.com • Nelson Mandela with Larry King • Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lkl.00.html 	
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COURSE NAME			Object Oriented Programming with C++		L	T	P	C
COURSE CODE			XMT403		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			C programme					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Define basic concepts on object-oriented programming.				Cognitive		Understanding	
CO 2	Explain the types of inheritances and Applying various levels of Inheritance for real time problem.				Cognitive		Understanding	
CO 3	Explain the operator Overloading function.				Cognitive		Understanding	
CO 4	Demonstrate the concept of Polymorphism.				Cognitive		Understanding	
CO 5	Explain the file concept and exception handlings in C++				Cognitive		Understanding	
UNIT 1	INTRODUCTION TO C++						9 + 3	
Key concepts of Object-Oriented Programming – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: - Decision Making and Statements: If, else ,jump, goto, break, continue, Switch case statements - Loops in C++ : For, While, Do - Functions in C++ - Inline functions – Function Overloading.								
UNIT 2	CLASSES AND OBJECTS						9 + 3	
Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects – friend functions – Overloading member functions – classes – Constructor and destructor with static members.								
UNIT 3	OPERATOR OVERLOADING AND INHERITANCE						9 + 3	
Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.								
UNIT 4	POINTERS AND POLYMORPHISM						9 + 3	
Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.								
UNIT 5	FILES						9 + 3	
File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Ashok N Kamthane , “Object-Oriented Programming With ANSI and TURBO C & C++”, Pearson Education Publication. 2003.								
Reference								

1. E. Balagurusamy, OBJECT - ORIENTED PROGRAMMING WITH C++, Tata McGraw Hill Education Private Limited, 2011, fifth edition.

E-References:

<https://nptel.ac.in>

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	10	5	0	0	10	10	10	15	10	0
SCALED VALUE	3	2	1	0	0	2	2	2	3	2	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Fourier Series and Transforms		L	T	P	C
COURSE CODE			XMT404		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Algebra, Trigonometry, Differential and Integral calculus					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Identify odd and even functions and determine Fourier series expansion of these given functions.				Cognitive		Applying	
CO 2	Determine Half- range Fourier sine and cosine expansions.				Cognitive		Understanding	
CO 3	Demonstrate the properties of Fourier Transform.				Cognitive		Understanding	
CO 4	Solve the linear differential equations using Laplace transform.				Cognitive		Applying	
CO 5	Apply Z-transforms to solve the difference equations.				Cognitive		Applying	
UNIT 1	Fourier series						9 + 3	
Fourier series- definition - Fourier Series expansion of periodic functions with Period 2π and period $2a$ – Use of odd & even functions in Fourier Series.								
UNIT 2	Half-range Fourier Series						9 + 3	
Half-range Fourier Series – definition- Development in Cosine series & in Sine series Change of interval - Root mean square value - Parseval’s identity— Harmonic analysis.								
UNIT 3	Fourier Transforms						9 + 3	
Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Cosine & Sine Transforms. Fourier Cosine & Sine Transforms of elementary functions - Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation. Examples Fourier Transform of Derivatives. Examples. Convolution Theorem (statement only), Inverse of Fourier Transform, Examples.								
UNIT 4	Laplace Transforms						9 + 3	
Laplace transform – Transforms of Elementary functions – Properties of Laplace transform - Transform of periodic functions - Transform of Derivatives - Transform of integrals- Inverse transforms – Convolution theorem – Applications of Laplace Transforms for solving second order differential equations.								
UNIT 5	Z Transforms						9 + 3	
Z-transform – Elementary properties – Inverse Z – transform – Convolution theorem – Initial and Final value theorems - Formation of difference equations – Solution of difference equations. using Z-transform.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Grewal, B.S., “Higher Engineering Mathematics”, 42 nd Edition, Khanna Publishers, New Delhi (2017).								

References
<ol style="list-style-type: none"> 1. Veerarajan. T, "Engineering Mathematics Volume III", Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012. 2. Robert T. Seeley. Fourier Series and Integrals, Dover Publications, New York, 2006. 3. Ray Hanna, J. Fourier Series, Transforms and Boundary Value Problems, Dover Publications, New York, 2008. 4. Churchill, R.V. and Brown, J.W., "Fourier Series and Boundary Value Problems", Fourth Edition, McGraw Hill Book Co., Singapore (1987).
E-References:
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COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	13	8	0	3	13	13	13	15	13	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Statistics for Data Science - II		L	T	P	C
COURSE CODE			XMT405		2	1	0	3
C	P	A			L	T	P	H
2	0	0			2	1	0	3
PREREQUISITE			Basic Statistics					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Demonstrate the basics of R.				Cognitive		Understanding	
CO 2	Explain the basic concepts of probability.				Cognitive		Understanding	
CO 3	Illustrate the discrete and continuous random variable.				Cognitive		Understanding	
CO 4	Demonstrate the concepts of discrete and continuous probability distributions.				Cognitive		Understanding	
CO 5	Construct the statistical inference of Student T test for the given data sets.				Cognitive		Applying	
UNIT 1	R						6+ 3	
An introduction to R - Data structures in R- Data visualization with R- Data analysis with R.								
UNIT 2	Probability Theory						6 + 3	
Random Experiment – Sample Space – Events – Axiomatic Definition of Probability – Addition Theorem – Multiplication Theorem – Baye’s Theorem -Applications.								
UNIT 3	Distribution Function						6 + 3	
Continuous and Discrete Random Variables – Distribution Function of a Random Variable – Probability Mass Functions and Probability Density Functions – Characteristic Functions.								
UNIT 4	Probability Distributions						6 + 3	
Probability Distributions – Recurrence Relationships – Moment Generating Functions – Cumulant Generating Functions – Discrete Probability Distribution – Binomial Distribution – Poisson Distribution – Continuous Probability Distributions - Normal Distribution.								
UNIT 5	Inferential statistics						6 + 3	
Test hypotheses- Central limit theorem - Confidence interval- T-test- Type I and II errors- Student’s T distribution.								
LECTURE		30	TUTORIAL	15	PRACTICAL	0	TOTAL	45
Text Book								
1. Jared P Lander, “R for everyone: Advanced Analytics and Graphics”, Addition Wesley, 2014.								
2. Gupta, S.C. and Kapoor, V.K.: “Fundamentals of Mathematical Statistics”, Sultan & Chand & Sons, New Delhi, 11th Ed, 2020.								
References								
1. Hastie, Trevor, et al. “The elements of Statistical Learning”, Springer, 2009.								

2. Peter Bruce, Andrew Bruce and Peter Gedeck, “Practical Statistics for Data Scientists”, 2nd Edition, May 2020.
3. Pratap Dangeti, “Statistics for Machine Learning”, July 2017.

E-References

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COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	11	6	0	1	11	11	11	15	11	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Statistics for Data Science Lab II using R Programming	L	T	P	C
COURSE CODE			XMT406	0	0	2	1
C	P	A		L	T	P	H
1	0	0		0	0	2	1
PREREQUISITE			Basic Statistics				
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Compare the means using paired T test for the given data sets.			Cognitive		Applying	
CO 2	Compare the means using unpaired T test for the given data sets.			Cognitive		Applying	
CO 3	Test the level of significance using chi – square test.			Cognitive		Analyzing	
CO 4	Analyze the variance for the given data sets by using One-way and two-way ANOVA.			Cognitive		Analyzing	
CO 5	Apply binomial test, run test, and sign test for a given data set.			Cognitive		Applying	
List of Experiments							
1. Comparing means: Independent sample test and paired t-test.							
2. Unpaired T Test.							
3. Cross tabulation and Chi-square-test.							
4. One-way and two-way ANOVA.							
5. Binomial test, run test, and sign test.							

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	3	3	1	2	3	3	3	3	3	1
CO 4	3	3	3	1	2	3	3	3	3	3	1
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	12	8	2	4	12	12	12	15	12	2
SCALED VALUE	3	3	2	1	1	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Vedic Mathematics I		L	T	P	C		
COURSE CODE			XMT407		1	1	0	2		
C	P	A			L	T	P	H		
2	0	0			1	1	0	2		
PREREQUISITE			Number Systems and Algebra							
On successful completion of this course, the students will be able to:										
COURSE OUTCOMES					DOMAIN		LEVEL			
CO 1	Explain the history of Vedic mathematics				Cognitive		Understanding			
CO 2	Explain the concept of multiplication and division using completing the whole and from left to right.				Cognitive		Understanding			
CO 3	Explain the between squaring numbers ending in 5 and squaring numbers near number 50 and manage to simplify algebraic squaring.				Cognitive		Understanding			
CO 4	Identify cube and cube roots, recognize and apply division by 9 and recognize the concept of division by using straight division.				Cognitive		Applying			
CO 5	Demonstrate simple arithmetic calculations of HCF and LCM with speed and accuracy				Cognitive		Understanding			
UNIT 1	Additions and Subtractions						3+3			
History of Vedic Mathematics; Various techniques to carry out basic operations covering Addition - Addition by Left to Right - Dropping tens and grouping techniques; Various techniques to carry out basic operations covering Subtraction -Starting complements from the middle of the sum - leaving complements from the middle of the sum - General case.										
UNIT 2	Multiplication and Division						3+3			
Multiplication by specific numbers – Multiplication by numbers near base - Verifying answers by use of digital roots; Division (Division of Double-Digit Numbers) - Digital Roots - Divisibility tests - Division of numbers near base - Comparison of fractions.										
UNIT 3	Square and Square Roots						3+3			
Introduction of squares of numbers - Difference of two Square numbers - Finding squares of numbers ending with 5 - Different methods of Squares (General method, Base method, Duplex method) - Square Roots.										
UNIT 4	Cube and Cube Roots						3+3			
Cubes - Cube roots - Cube Roots of Exact Cubes - General division.										
UNIT 5	LCM and HCF						3+3			
Factorisation Method of LCM and HCF - HCF and LCM of Arithmetic and Algebra.										
LECTURE		15	TUTORIAL		15	PRACTICAL		0	TOTAL	30
Text Book										
1. Vedic Mathematics, Swami Bharati Krishna Trithaji, Motilal Banarsidas, New Delhi,1990.										
References										

1. Elements of Vedic Mathematics, Udayan S. Patankar, Sunil M. Patankar, TTU Press, 2018.
2. Advanced Vedic Mathematics, Rajesh Kumar Thakur, Rupa Publications, New Delhi, 2019.

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<http://www.funwithfigures.com/>

<http://www.youtube.com/watch?v=b3PFjsUgULM&feature=youtu.be>

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	11	6	0	1	11	11	11	15	11	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

Course Name			Introduction to Entrepreneurship Development	L	T	P	C
Course Code			XUM004	1	0	0	1
C	P	A		L	T	SS	H
1	0	0		1	0	1	1
Prerequisite			Basic skills like critical thinking, creativity, risk-taking, problem-solving, networking, leadership.				
On successful completion of this course, the students will be able to:							
Course Outcomes				Domain		Level	
CO1	Understand the concept of Entrepreneurship			Cognitive		Understanding	
CO2	Understand about an Entrepreneur			Cognitive		Understanding	
CO3	Understand the characteristics of Entrepreneur			Cognitive		Understanding	
CO4	Understand the ways to acquire skills of Entrepreneur			Cognitive		Understanding	
CO5	Understandthe concept of Intrepreneurship			Cognitive		Understanding	
UNIT 1	INTRODUCTION TO ENTREPRENEURSHIP					3+3	
Meaning and Concept of Entrepreneurship, History of Entrepreneurship Development, Role of Entrepreneurship in Economic Development, Myths about Entrepreneurs, Agencies in Entrepreneurship Management and Future of Entrepreneurship							
UNIT 2	THE ENTREPRENEUR					3+3	
Why to become Entrepreneur, Skills/ Traits required for being an Entrepreneur, Creative and Design Thinking, Entrepreneurial Decision Process, Skill Gap Analysis, Role Models, Mentors and Support System, Entrepreneurial Success Stories.							
UNIT 3	CHARACTERISTICS OF AN ENTREPRENEUR					3 +3	
Introduction - Characteristic Features of Successful Indian Entrepreneurs - Differences between an Entrepreneur and a Manager - Difference between an Entrepreneur and an Intrapreneur - Relationship between the terms Entrepreneur, Entrepreneurial and Entrepreneurship - Difference between a Scientist, Inventor and Entrepreneur - Relationship between Entrepreneur and Enterprise - Difference between Entrepreneur and Enterprise - Difference between a Self-employed person and Entrepreneur - Common Myths on Entrepreneur							
UNIT 4	SKILLS FOR AN ENTREPRENEUR					3 + 3	
Business Management Skills - Communication and active listening skills - Risk-taking skills – Networking Skills – Critical Thinking Skills – Problem Solving Skills – Creative Thinking Skills – Customer Service Skills – Financial Skills – Leadership Skills – Time Management and Organizational Skills – Technical Skills							
UNIT 5	INTRAPRENEURSHIP					3 + 3	

What is Intrapreneurship – Understanding Intrapreneurship – Types of Intrapreneurs – Characteristics of Intrapreneurs – Examples of Intapreneurship									
Lecture	15	Self - Study	15	Total					30
Text Book									
1. Jayashree Suresh, Entrepreneurial Development, Margham Publications.									
References									
Essentials of Entrepreneurship and Small Business Management (6th Edition) by Norman M. Scarborough (Paperback - Jan 13, 2010)									
2. Entrepreneurship and Small Business Management, Student Edition by Glencoe McGraw-Hill (Hardcover - Feb 24, 2005)									
3. Vasant Desai, Dynamics of Entrepreneurship Development, Star Publication, New Delhi.									
E-References									
1. https://in.indeed.com/career-advice/career-development/entrepreneur-skills									
2. https://www.investopedia.com/terms/i/intrapreneurship.asp									
COs vs POs									
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	2	1					1	2	1
CO 2	2	1							1
CO 3	2	1					1		1
CO 4	2	2							1
CO 5	2	2							1
TOTAL	10	7	0	0	0	0	2	2	5
SCALED VALUE	2	2	0	0	0	0	1	1	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation									
1-5 → 1, 6-10 → 2, 11-15 → 3									

SEMESTER V

COURSE NAME			Abstract Algebra	L	T	P	C
COURSE CODE			XMT501	3	1	0	4
C	P	A		L	T	P	H
4	0	0		3	1	0	4
PREREQUISITE		Algebra					
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Explain the basics of subgroup and cyclic subgroups.			Cognitive		Understanding	
CO 2	Explain the significance of the notions of quotient groups and permutation groups.			Cognitive		Understanding	
CO 3	Demonstrate the fundamental concepts in ring theory such as of the ideals, quotient rings, integral domains, and fields.			Cognitive		Understanding	
CO 4	Demonstrate the concepts of vector spaces, subspaces, bases, dimension and their properties with examples.			Cognitive		Understanding	
CO 5	Identify the eigenvalues and eigenvectors of linear transformations.			Cognitive		Applying	
UNIT 1						9 + 3	
Subgroup: Necessary and sufficient condition for a subset to be a subgroup – Order of the Group – Order of an element – Centre of a group – Normalizer and Centralizer, Product of two subgroups – Order of HK – Necessary and sufficient condition for HK to be of a cyclic group a subgroup – Intersection and union of subgroups.							
Cyclic subgroups: Subgroups, generators of a cyclic group – Number of generators of a cyclic group – cosets – left cosets and right cosets – Partitioning of a group by cosets – Lagrange’s theorem – Euler’s theorem – Fermat’s theorem.							
UNIT 2						9 + 3	
Normal subgroups: Quotient groups – Group Homomorphism – Canonical Homomorphism – Kernel of a homomorphism – Isomorphism – Automorphism - Inner Automorphism – Cayley’s Theorem – Permutation groups.							
UNIT 3						9 + 3	
Rings: Definition and examples – Types of rings – Elementary properties of a ring – Integral Domain – Field – Sub rings – Sub fields – Ideals – Left ideal – Right ideal – Principal ideal – quotient ring – Maximal and prime Ideals – Characteristic of a ring – PID – UFD – Homomorphisms – Isomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorphism – Field of quotients of an Integral domain – Polynomial rings – Division algorithm – Polynomial rings over a UFD – Gauss lemma – Polynomials over the rational field – Eienstein’s criterion.							
UNIT 4						9 + 3	
Vector Space: Definition and Examples – Subspaces – Linear Transformation – Fundamental Theorem of Homomorphism.							
Span of a Set: Linear Independence – Basis and Dimension – Rank and Nullity – Matrix and Linear transformation.							

UNIT 5							9 + 3
Inner Product Space: Definition and Examples – Orthogonality – Orthogonal Complement – Gram Schmidt orthogonalization process.							
Matrices: Elementary transformation – Inverse – Rank – Test for consistency – Solving Linear Equations – Cayley Hamilton theorem – Uses of Cayley Hamilton theorem – Inverse and power of a matrix, Eigenvalues and Eigenvectors.							
LECTURE	45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book							
1. Herstein .I.N – Topics in Algebra, Vikas Publishing house Pvt. Ltd., 1975, New Delhi.							
References							
1. Arumugam.S and A. ThangapandiIssac – “Modern Algebra”, Scitech Publications (India) Pvt.Ltd. 2. Sharma. J.N. and A.R. Vashistha – “Linear Algebra”, Krishna Prakash Nandir 1981. 3. John B. Fraleigh, “A First Course in Abstract Algebra”, 7th Ed., Pearson, 2002. 4. Murugan .M , “A First Course in Groups and Rings”, Muthali Publishing House, Chennai, 2017. 5. Murugan. M, “A First Course in Linear Algebra and Boolean Algebra”, Muthali Publishing House, Chennai, 2018.							
E-References							
1. https://nptel.ac.in 2. https://franciscan.smartcatalogiq.com/en/2021-2022/Undergraduate-Catalog/Courses/MTH- Mathematics-Course-Descriptions/300 3. http://catalog.yale.edu/ycps/courses/math/ 4. https://www.princeton.edu/academics/area-of-study/mathematics 5. https://lsa.umich.edu/math/undergraduates/undergraduate-math-courses/500-level-math- courses.html							

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	11	6	0	1	11	11	11	15	11	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Real Analysis	L	T	P	C
COURSE CODE			XMT502	3	1	0	4
C	P	A		L	T	P	H
4	0	0		3	1	0	4
PREREQUISITE		Number Systems					
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Summarize the different properties of the real line R.			Cognitive		Understanding	
CO 2	Demonstrate bounded, convergent, divergent, Cauchy, and monotonic sequences, and calculate limit superior, limit inferior of bounded sequences.			Cognitive		Understanding	
CO 3	Demonstrate the basic definition and topology of metric spaces.			Cognitive		Understanding	
CO 4	Explain the concepts of Connectedness, Completeness and Compactness.			Cognitive		Understanding	
CO 5	Demonstrate the consequences of mean value theorems.			Cognitive		Understanding	
UNIT 1						9 +3	
Real Number system: The field axioms, the order axioms, the rational numbers, the irrational numbers, upper bounds, maximum element, least upper bound (supremum)- The completeness axiom- some properties of the supremum- Absolute values - The triangle inequality- the Cauchy-Schwarz's inequality. Elements of point set Topology: Euclidean space -Open sets and closed sets-Bolzano-Weierstrass theorem-The Cantor Intersection theorem-Coverings Lindelof covering theorem.							
UNIT 2						9 +3	
Sequences: Bounded, Convergent, Divergent and oscillating sequences, Algebra of limits - Behaviour of Monotonic sequences. Cauchy's first limit Theorem, Cauchy's second limit Theorem, subsequences, Cauchy sequence, upper and lower limit of sequences. Series: Infinite series –nth term test-Comparison test- Linear Comparison test-Root test- Integral test-Alternating series.							
UNIT 3						9 +3	
Metric Spaces: Metric Spaces - Limit in Metric Spaces- point set topology in metric spaces. Continuous functions on metric spaces: Functions continuous at a point on the real line - Functions continuous in a metric space - - Discontinuous function on \mathbb{R}_1							
UNIT 4						9 +3	
Connectedness, Completeness and Compactness: - Connectedness - Bounded sets and totally bounded sets - Complete metric spaces – Continuous functions on compact metric spaces -Continuity of the inverse function - Uniform continuity							
UNIT 5						9 +3	
Riemann Integral: Existence of the Riemann integral. Derivatives-Rolle's theorem - Fundamental theorem of							

Calculus –Mean value theorem- Cauchy's Mean Value theorem-Taylor's Theorem.							
LECTURE	45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book							
1. Tom M. Apostol - Mathematical Analysis, II Edition, Narosa Publishing House, New Delhi (Unit I), 1997.							
References							
1. Arumugam. S. and Thangapandi Issac, "Sequences and Series", New Gamma, Publishing House, Palayamkottai - 627 002, 1997. 2. Goldberg. R. "Methods of Real Analysis", Oxford and IBH Publishing Co., New Delhi (2000). 3. Arumugam and Issac, "Modern Analysis", New Publishing House, 2017. 4. Malik S.C and Savitha Arora, "Mathematical Analysis", 1991, Wiley Eastern Limited New Delhi. 5. Viswanath Naik, K, "Real Analysis", Emerald Publishers, Chennai.							
E-References							
1. https://nptel.ac.in 2. https://www.google.com/url?sa=t&source=web&rct=j&url=https://alansinyal.files.wordpress.com/2012/08/method-of-real-analysis.pdf&ved=2ahUKEwiHw4Ozusr-AhUdwjgGHQsaBSYQFnoECBsQAQ&usg=AOvVaw0V9zo2qyZvq3sS2eEWAbkY							

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	10	5	0	0	10	10	10	15	10	0
SCALED VALUE	3	2	1	0	0	2	2	2	3	2	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Number Theory		L	T	P	C		
COURSE CODE			XMT503		3	1	0	4		
C	P	A			L	T	P	H		
4	0	0			3	1	0	4		
PREREQUISITE			Number Systems							
On successful completion of this course, the students will be able to:										
COURSE OUTCOMES					DOMAIN		LEVEL			
CO 1	Demonstrate an understanding of the basic properties of the integers by applying principles of mathematical induction.				Cognitive		Understanding			
CO 2	Solve the given Diophantine Equation by using Euclidean algorithm.				Cognitive		Applying			
CO 3	Demonstrate the fundamental theorem of Arithmetic.				Cognitive		Understanding			
CO 4	Explain the basic properties of congruence.				Cognitive		Understanding			
CO 5	Demonstrate the results in theory of numbers including Fermat’s theorem, the Little theorem and Wilson’s theorem.				Cognitive		Understanding			
UNIT 1							9 + 3			
Peano's Axiom - Mathematical Induction - The Binomial Theorem - Early Number Theory.										
UNIT 2							9 + 3			
Divisibility Theory in Integers - The Division Algorithm - The g.c.d. - Euclidean Algorithm - The Diophantine Equation $ax + by = c$.										
UNIT 3							9 + 3			
Primes and their Distributions - The fundamental Theorem of Arithmetic - The sieve of Eratosthenes - The Gull Conjecture.										
UNIT 4							9 + 3			
The Theory of Congruence - Basic Properties of Congruence - Special Divisibility test - Linear Congruence. - Prime modulus- Power residues.										
UNIT 5							9 + 3			
Fermat's Theorem - Fermat's factorization method - The Little theorem - Wilson's theorem.										
LECTURE		45	TUTORIAL		15	PRACTICAL		0	TOTAL	60
Text Book										
1. Elementary Number Theory, David M Burton, McGraw Hill Education, Seventh edition, 2017.										
References										
1. Tom. M. Apostol, Introduction to Analytic Number Theory, Springer, New York, 1976.										
2. Ivan Nivan and H. Zuckerman - An Introduction to theory of Numbers.										
3. Kumaravelu. S and Susheela Kumaravelu – Elements of Number Theory, Nagercoil, 2002.										
4. Neville Robinns, Beginning Number Theory, 2nd Ed., Narosa Publishing House Pvt. Ltd.,Delhi, 2007.										
5. K. C. Chowdhury, A First Course In Number Theory, Asian Books Pvt. Ltd,New Delhi, 2007.										

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1. <https://lsa.umich.edu/math/undergraduates/undergraduate-math-courses/500-level-math-courses.html>
2. <http://collegecatalog.uchicago.edu/thecollege/mathematics/#courseinventory>
3. <https://www.princeton.edu/academics/area-of-study/mathematics>

COs VS POs

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	11	6	0	1	11	11	11	15	11	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Graph Theory	L	T	P	C		
COURSE CODE			XMT504A	3	1	0	4		
C	P	A		L	T	P	H		
4	0	0		3	1	0	4		
PREREQUISITE			Algebra						
On successful completion of this course, the students will be able to:									
COURSE OUTCOMES				DOMAIN		LEVEL			
CO 1	Explain the fundamental concepts in graph theory.			Cognitive		Understanding			
CO 2	Compare Eulerian and Hamiltonian graphs.			Cognitive		Understanding			
CO 3	Relate graph with matrix.			Cognitive		Understanding			
CO 4	Utilize Euler formula to obtain planar graphs.			Cognitive		Applying			
CO 5	Explain an algorithm for vertex colouring.			Cognitive		Understanding			
UNIT 1						9 +3			
Basics: Graphs – Pictorial representation – Subgroups – Isomorphism and degrees – Walks and connected graphs – Cycles in graphs – Cut-vertices and cut-edges.									
UNIT 2						9 +3			
Eulerian and Hamiltonian Graphs: Eulerian graphs – Fleury’s algorithm – Hamiltonian graphs – weighted graphs.									
UNIT 3						9 +3			
Bipartite Graphs and Matrices: Bipartite graphs – Marriage problem – Trees – Connector problem – Matrix representations – Vector spaces associated with graphs – Cycle space – cut-set space.									
UNIT 4						9 +3			
Planar Graphs: Planar Graphs – Euler formula – Platonic solids – Dual of a plane graph – Characterization of planar graphs.									
UNIT 5						9 +3			
Colourings: Vertex colouring – Edge colouring – An algorithm for vertex colouring.									
LECTURE		45	TUTORIAL		15	PRACTICAL	0	TOTAL	60
Text Book									
1. Choudum.S.A. – A First Course in Graph Theory, Macmillan India Limited, 1987 2. “An invitation to Graph theory”, Dr. S. Arumugam & S. Ramachandran, - SCITECH publications (India) Pvt. Ltd., Chennai, 2006.									
References									
1. Graphs Theory with Applications to Engineering and Computer Science –Narsingh Deo, Prentice-Hall of India Private Ltd, 1974. 2. Introduction to Graph Theory – Gary Chartrand and Ping Zhang, Tata McGraw-Hill Edition, 2004.									

3. Graph Theory- F.Harary, Addison- Wesley Publishing Company, Inc., 1969.
4. Murugan.M – Introduction to Graph Theory, Muthali Publishing House, Chennai, 2005.

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1. <https://archive.nptel.ac.in/courses/111/106/111106102/>
2. <https://www.youtube.com/watch?v=sWsXBY19o8I>
3. <https://www.youtube.com/watch?v=3VeQhNF5-rE>

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	11	6	0	1	11	11	11	15	11	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Mathematical Modeling	L	T	P	C
COURSE CODE			XMT504B	3	1	0	4
C	P	A		L	T	P	H
4	0	0		3	1	0	4
PREREQUISITE			Differential Calculus				
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Compare models that can be constructed by ordinary differential equations of first order under study			Cognitive		Applying	
CO 2	Utilize compartment models to solve the problems involved in economics and medicine			Cognitive		Applying	
CO 3	Analyze mathematical models that can be developed by second order linear differential equations			Cognitive		Analyzing	
CO 4	Apply linear difference equation to solve problems in finance and economics			Cognitive		Applying	
CO 5	Identify the solutions of the given problems that can be modelled through graphs			Cognitive		Applying	
UNIT 1	Mathematical Modeling					9 +3	
Simple situations requiring mathematical modeling- Technique of mathematical models – Classification of mathematical models - Characteristics of mathematical models- Mathematical modeling through algebra.							
UNIT 2	Mathematical Modeling through differential equations					9 +3	
Linear Growthand Decay Models - Non-Linear growth and decay models - Compartment models.							
UNIT 3	Mathematical Modeling, through system of Ordinary differential equations of first order					9 +3	
Mathematical modeling in population dynamics – Mathematical modeling of epidemics through systems of ordinary differential equations – Mathematical models Medicine.							
UNIT 4	Introduction to difference equations					9 +3	
The need for mathematical modeling through difference equation – basic theory of linear difference equations with constant coefficients.							
UNIT 5	Mathematical Modeling through difference equations					9 +3	
Mathematical modeling through difference equations in economics and finance - Mathematical modeling through difference equations in population dynamics and genetics.							
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL 60
Text Book							
1. “Mathematical Modelling”, J N Kapur, New Age International publishers, Reprint 2018.							
Unit I	Chapter: 1	Sections: 1.1 – 1.6 (Pages 1 – 20)					
Unit II	Chapter: 2 & 3	Sections: 2.1 – 2.4 (Pages 30 – 42) & Sections: 3.1 – 3.2, 3.5 (Pages 53 – 62 & 69 -72)					

Unit III	Chapter: 4	Sections: 4.1 – 4.3 (Pages 76 – 93)
Unit IV	Chapter: 5	Sections: 5.1 – 5.2 (Pages 96 – 105)
Unit V	Chapter: 5	Sections: 5.3 – 5.5 (Pages 106 – 121)

References

1. Mathematical Modeling by Bimal K. Mishra and Dipak K. Satpathi. Ane Books Pvt. Ltd (1 January 2009)
2. Mathematical Modeling Models, Analysis and Applications, by Sandip Banerjee, CRC Press, Taylor & Francis group, 2014
3. Mathematical Modeling applications with Geogebra by Jonas Hall & Thomas Ligeftjard, John Wiley & Sons, 2017

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1. <https://www.digimat.in/nptel/courses/video/111107113/L19.html>
2. https://www.youtube.com/watch?v=AccTsyDtV_8

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	3	3	1	2	3	3	3	3	3	1
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	15	11	1	6	15	15	15	15	15	1
SCALED VALUE	3	3	3	1	2	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Numerical Methods with MATLAB		L	T	P	C
COURSE CODE			XMT504C		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Algebra and Number systems					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Demonstrate to recognize and use of MATLAB.				Cognitive		Understanding	
CO 2	Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to solve numerical problems.				Cognitive		Applying	
CO 3	Apply curve fitting and construct polynomials for a given set of data points or given functions using MATLAB.				Cognitive		Applying	
CO 4	Identify numerical solutions of algebraic and transcendental equations by using bisection method and Newton’s Method with MATLAB				Cognitive		Applying	
CO 5	Solve ordinary differential equations numerically using Euler and Runge-Kutta methods with MATLAB.				Cognitive		Applying	
UNIT 1							9 + 3	
MATLAB Environment: Getting Started – Solving Problems in MATLAB – Saving your works – Predefined MATLAB Functions – Using Predefined Functions – Manipulating Matrices – Computational Limitations- Special Values and Functions.								
UNIT 2							9 + 3	
Plotting: Introduction to Two-Dimensional Plotting – Three-Dimensional Plotting – Editing Plots from the Menu Bar – Creating Plots from the Workshop Window. Programming in MATLAB: Introduction – Problems with Two Variables – Input/Functions – Statement level Control Structures.								
UNIT 3							9 + 3	
Numerical Techniques: Introduction – Curve Fitting: Linear and Polynomial Regression – Using the Interactive Fitting Tools – Numerical Integration – Numerical Differentiation.								
UNIT 4							9 + 3	
Curve Fitting – Fitting Linear and parabolic curves by the method of least squares principles- Solving algebraic and transcendental equations-Bisection method, false position method and Newton Raphson method – Solving simultaneous algebraic equations – Gauss-Seidel method – Gauss elimination method.								
UNIT 5							9 + 3	
Interpolation – Newton’s forward and backward difference formulae – Lagrange’s interpolation formula – Numerical integrations using Trapezoidal and Simpson’s one – third rules – solution of ODE’s – Euler method and Runge-Kutta fourth order method.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60

Text Book
1. Numerical methods in Science and Engineering, M.K. Venkatraman, National Publisher Company, Fifth Edition, 2001 (For Units IV and V). UNIT – I : Chapter 2&3 of [1] UNIT – II : Chapter 4&5 of [1] UNIT – III : Chapter 8 of [1] UNIT – IV : Chapter 1, Sections 1.7-1.8, Chapter 3, Sections 2, 4 and 5, Chapter 4, Sections 2, 6 of [2] UNIT – V : Chapter 6, Sections 3 & 4, Chapter 8 Section 4, Chapter 9 Sections 8 & 10, Chapter 11 Sections 10 & 16 of [2].
References
1. Introduction to MATLAB, Delores M. Etter, David C. Kuncicky, Holly Moore, Published by Dorling Kindersley (India) Pvt. Ltd., licenses of Pearson Education in South Asia. 2. Let us ‘C’, Yashavant. P. Kanetkar, BPB Publications, 2002. Computer oriented numerical methods, Rajaraman, Prentice-Hall of India, 1971.
E-References
https://nptel.ac.in

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	14	9	0	4	14	14	14	15	14	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Discrete Mathematics		L	T	P	C		
COURSE CODE			XMT504D		3	1	0	4		
C	P	A			L	T	P	H		
4	0	0			3	1	0	4		
PREREQUISITE			Algebra and Number Systems							
On successful completion of this course, the students will be able to:										
COURSE OUTCOMES					DOMAIN		LEVEL			
CO 1	Utilize standard notation of mathematical logic to write English sentences for logical expressions and vice-versa.				Cognitive		Applying			
CO 2	Explain the algebraic structure of groups.				Cognitive		Understanding			
CO 3	Simplify and prove Boolean expressions.				Cognitive		Analyzing			
CO 4	Construct non-deterministic finite state machine.				Cognitive		Applying			
CO 5	Demonstrate the ability to convert numerals into various number systems.				Cognitive		Understanding			
UNIT 1							9 +3			
Mathematical logic: Statement and Notation - Connectives - Negation - Conjunction - Disjunctions - Statement Formula and Truth Table – Conditional and Biconditional - Well defined formulae - Tautologies - Equivalence of formulae - Duality Laws - Normal forms.										
UNIT 2							9 +3			
Algebraic Structures: Groups and Monoids - Simple Properties - Group Codes.										
UNIT 3							9 +3			
Lattices and Boolean Algebra: Lattices and Posets - Properties of Lattices - Special Lattices - Boolean Algebra - Gating Networks - Minimal sums of Products - Karnaugh maps.										
UNIT 4							9 +3			
Languages: Finite State Machines Language - The Set Theory and Strings - Finite State Machine - A first encounter - Finite State machine - a Second encounter.										
UNIT 5							9 +3			
Number system and codes: Decimal, Binary, Octal, Hexadecimal - Conversion from one to another - Binary addition, subtraction multiplication and division - BCD - Weighted excess time - Gray Code - ASCII code, Error Detecting Code.										
LECTURE		45	TUTORIAL		15	PRACTICAL		0	TOTAL	60
Text Book										
1. Trembley and Manohar - Discrete Mathematical structures with application to Computer Science, (Tata McGraw Hill, New Delhi) 35 th reprint 2008.										
References										
1. Koleman and Bushy- Discrete Mathematical Structures, Prentice Hall of India, New Delhi- 2002.										

2. “Discrete Mathematics” by Dr. M.K.Venkatraman, Dr.N.Sridharan, N.Chandrasekeran, the National Publishing Company, 2003.
3. Ralph P. Grumaldi Pearson Edelen - Discrete and Combinational Mathematics - an Applied Introduction (IV Edn.). 1998.
4. Maluino A and Leech - Digital Principles and Application, Mcgraw Hill, 2011.

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1. <https://www.cst.cam.ac.uk/teaching/2021/DiscMath> [University of Cambridge]
2. <https://explorecourses.stanford.edu/search?q=CS157> [Stanford]

COs VS POs

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	3	3	1	2	3	3	3	3	3	1
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	13	9	1	4	13	13	13	15	13	1
SCALED VALUE	3	3	2	1	1	3	3	3	3	3	1

0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation

1-5→1, 6-10→2, 11-15→3

COURSE NAME			Vedic Mathematics - II		L	T	P	C	
COURSE CODE			XMT505		1	1	0	2	
C	P	A			L	T	P	H	
2	0	0			1	1	0	2	
PREREQUISITE			Algebra and Number Systems						
On successful completion of this course, the students will be able to:									
COURSE OUTCOMES					DOMAIN		LEVEL		
CO 1	Solve the linear equations in two variables faster and with ease.				Cognitive		Applying		
CO 2	Utilize vertical and crosswise technique for multiplication of Polynomials.				Cognitive		Applying		
CO 3	Explain the Introduction and history of Matrices and Determinants				Cognitive		Understanding		
CO 4	Explain different forms of straight lines.				Cognitive		Understanding		
CO 5	Solve system of simultaneous linear equations with matrices faster and with ease.				Cognitive		Applying		
UNIT 1	Solution of linear equations						3+3		
Introduction of simple equation - Solutions of simple equations - Solutions of linear equations in two variables - Practical application of linear equations in two variables.									
UNIT 2	Factorization						3+3		
Factorization of Quadratics - cubic polynomials, homogeneous expressions of the second degree – Solving Quadratics by calculus and many other special techniques - Multiplication of Polynomials using vertically and crosswise technique.									
UNIT 3	Vedic Matrix Algebra						3+3		
Introduction and history of Matrices and Determinants - Matrices and Determinants of third order - Inverse of Matrices.									
UNIT 4	Vedic Geometry						3+3		
Different forms of straight lines - The Triangle - The Cyclic Quadrilateral, Squares, and the Circle - Geometrical constructions - Transformation of simple shapes.									
UNIT 5	Solution of linear simultaneous equations						3+3		
Simultaneous Equation with two Variables - Simultaneous Equation with 3 Variables by determinant method.									
LECTURE		15	TUTORIAL		15	PRACTICAL	0	TOTAL	30
Text Book									
1.Vedic Mathematics, Swami Bharati Krishna Trithaji, Motilal Banarsidas, New Delhi,1990.									
References									
1. Elements of Vedic Mathematics, Udayan S. Patankar, Sunil M. Patankar, TTU Press,2018.									
2. Advanced Vedic Mathematics, Rajesh Kumar Thakur, Rupa Publications, New Delhi,2019.									
E-References									
1. http://www.funwithfigures.com/									
2. http://www.youtube.com/watch?v=b3PFjsUgULM&feature=youtu.be									

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	13	8	0	3	13	13	13	15	13	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Python Programming	L	T	P	C
COURSE CODE			XMT506A	2	1	0	3
C	P	A		L	T	P	H
3	0	0		2	1	0	3
PREREQUISITE			Basic programme language				
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Demonstrate the basics of object-oriented concepts and python programming.			Cognitive		Understanding	
CO 2	Utilize the array, develop the programs using selection and jump statements.			Cognitive		Applying	
CO 3	Illustrate the significance of function, strings and modules; and Implement in various applications.			Cognitive		Understanding	
CO 4	Demonstrate the List, Tuples and Dictionary; and write program using the list, tuples and dictionary.			Cognitive		Applying	
CO 5	Analyze the given data by handling the files in Python.			Cognitive		Analyzing	
UNIT 1	Basics of Object Oriented and Python Programming						6 +3
Basics of Object-Oriented Programming: Procedural and Object-Oriented Programming –Classes and Objects – Encapsulation – Polymorphism – Inheritance – Abstraction.							
Basics of Python Programming: History of Python – Features of Python – Literal – Constants – Variables – Identifiers – Keywords – Built-in Data Types – Output Statements – InputStatements – Comments – Indentation – Operators – Expressions – Type conversions.							
UNIT 2	Python Arrays and Control Statements						6 +3
Python Arrays: Defining and Processing Arrays – Array methods.							
Control Statements: Selection / Conditional Branching statements – if, if-else, nested if and if-elif-else statements. Iterative Statements: While loop, for loop, else suite in loop and nested loops. Jump Statements : break, continue and pass statements.							
UNIT 3	Functions, Strings and Modules						6 +3
Functions: Function Definition – Function Call – Variable Scope and its Lifetime – Return Statement – Recursion. Python Strings: String operations – Immutable Strings – Built-in StringMethods and Functions – String Comparison. Modules : Import statement – The Python module – dir() function – Modules and Namespace – Defining our own modules.							
UNIT 4	Lists, Tuples and Dictionaries						6 +3
Lists: Creating a list – Access values in List – Updating values in Lists – Nested lists – Basic list operations – List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples – Difference between lists and tuples. Dictionaries : Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods – Difference between Lists and Dictionaries.							
UNIT 5	File Handling and Data Analysis						6 +3
File Handling: Types of files in Python – Opening and Closing files – Reading and Writing files – Splitting words – File methods – File Positions – Renaming and deleting files. Data Analysis using Python :							

Load data into a Data Frame – Fundamentals of Data Manipulation with Python.							
LECTURE	30	TUTORIAL	15	PRACTICAL	0	TOTAL	45
Text Book							
1. Reema Thareja, “Python Programming using problem solving approach”, 2 nd Edition, 2023, Oxford University Press. 2. Dr. R. Nageswara Rao, “Core Python Programming”, 3 rd Edition, 2021, Dream tech Publishers.							
References							
1. Vamsi Kurama, “Python Programming: A Modern Approach”, Pearson Education. 2. Mark Lutz, “Learning Python”, Orielly. 3. Adam Stewarts, “Python Programming”, Online. 4. Fabio Nelli, “Python Data Analytics: With Pandas, NumPy, and Matplotlib”, APress. 5. Kenneth A. Lambert, “Fundamentals of Python – First Programs”, 2 nd Edition, CengagePublication.							
E-References							
1. NPTEL Course in Python for Data Science by Prof. Ragunathan Rengasamy, IIT Madras, https://onlinecourses.nptel.ac.in/noc22_cs32/preview 2. Python for Beginners, https://alison.com/course/python-for-beginners 3. Python for Fundamentals for Beginners, https://www.mygreatlearning.com/academy/learn-for-free/courses/python-fundamentals-for-beginners 4. Python Certificate Course, https://data-flair.training/courses/python-course/ 5. Crash Course on Python, https://www.coursera.org/learn/python-crash-course							

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	3	2	0	1	3	3	3	3	3	0
CO 5	3	3	3	1	2	3	3	3	3	3	1
TOTAL	15	13	9	1	4	13	13	13	15	13	1
SCALED VALUE	3	3	2	1	1	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Mathematics for Finance		L	T	P	C			
COURSE CODE			XMT506B		2	1	0	3			
C	P	A			L	T	P	H			
3	0	0			2	1	0	3			
PREREQUISITE			Basic Economics								
On successful completion of this course, the students will be able to:											
COURSE OUTCOMES					DOMAIN		LEVEL				
CO 1	Estimate Time value of money and compound interest functions.				Cognitive		Evaluating				
CO 2	Measure breakeven point and make use of breakeven point in managerial decision making				Cognitive		Evaluating				
CO 3	Estimate Annuities and Equation of Value Discounting				Cognitive		Evaluating				
CO 4	Estimate internal rate of return with reference to IRR method and valuing a loan with allowance for capital gains.				Cognitive		Evaluating				
CO 5	Estimate stock and bond price.				Cognitive		Evaluating				
UNIT 1	Introduction						6 +3				
Simple and compound interest. Kinds of interest rates: Effective rate, nominal rate and force of interest rates - Calculation of accumulated value using different kinds of interest rates - the time value of money - Present value calculation and discount rate - Nominal rate of discount and its relationship with effective rate of discount											
UNIT 2	Break even Analysis and leverage						6 +3				
Break-even point – Chart – Decision making – leverage – operating – financial – combined leverage.											
UNIT 3	Annuities and Equation of Value Discounting and Accumulation						6 +3				
Discrete and continuous cash flows; level annuities, deferred and increasing/decreasing annuities, equation of value and yield on transaction, probability of cash flows, higher discount, loan schedules; consumer credit: flat rate and APRs..											
UNIT 4	Capital Budgeting Techniques						6 +3				
Introduction to financial statement, assessing financial performance, net present value, internal rate of return, payback period; projects with different live.											
UNIT 5	Risk and insurance						6 +3				
Long-term and short-term insurance, Life Insurance, Endowment, and annuities, Insurance policies, automobile insurance, property insurance, indemnity principle, coinsurance principle, valuation of stock and bonds.											
LECTURE		30		TUTORIAL		15		PRACTICAL	0	TOTAL	45
Text Books											
1. Arlie O Petters, Xiaoying Dong (2016) An Introduction to Mathematical finance with applications: Understanding and Building Financial Intuition (Springer Undergraduate texts in Mathematics and Technology).											
2. Ross, S.M., (1999): An Introduction to Mathematical Finance, Cambridge University Press, Norton, London.											

3. Martin, P.G. and Michael B., (1991): Applied Financial Mathematics, Prentice Hall.
References
1. Baxter, M. and A. L. Rennie, (1996): Financial Calculus, Cambridge University Press.
2. Karatzas, L. and Shreve S.E., (1998): Methods of Mathematical Finance, Springer.
3. Watsham, T.J. and Perramone. K., (1997): Quantitative Methods in Finance, International Thomson Business Press.
E-References
https://nptel.ac.in

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	3	3	2	3	3	3	3	3	3	2
CO 2	3	3	3	2	3	3	3	3	3	3	2
CO 3	3	3	3	2	3	3	3	3	3	3	2
CO 4	3	3	3	2	3	3	3	3	3	3	2
CO 5	3	3	3	2	3	3	3	3	3	3	2
TOTAL	15	15	15	10	15	15	15	15	15	15	10
SCALED VALUE	3	3	3	2	3	3	3	3	3	3	2
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

SEMESTER VI

COURSE NAME			Complex Analysis		L	T	P	C
COURSE CODE			XMT601		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Real Analysis					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Determine whether the given function is Continuous / differentiable / analytic.				Cognitive		Evaluating	
CO 2	Determine the image of given region under the given bilinear transformation				Cognitive		Evaluating	
CO 3	Explain Cauchy’s theorem and Cauchy Integral formula				Cognitive		Understanding	
CO 4	Determine the annulus of convergence of a given function using the concepts of series expansion				Cognitive		Evaluating	
CO 5	Evaluate complex contour integrals using the Cauchy Residue theorem				Cognitive		Evaluating	
UNIT 1	Complex numbers						9 + 3	
Complex numbers – Functions of a complex variable – Limits – Theorems on limit – Continuous functions – Differentiability - The Cauchy Riemann equations – Analytic functions – Harmonic functions.								
UNIT 2	Bilinear Transformation						9 + 3	
Introduction – Elementary transformations – Bilinear transformation – cross ratio – fixed points of bilinear transformation – some special bilinear transformations.								
UNIT 3	Complex Integration						9 + 3	
Introduction – definite integral – Cauchy’s Theorem – Cauchy’s integral formula – Maximum modulus theorem – Higher derivatives – Cauchy’s inequality – Liouville’s theorem – Fundamental theorem of algebra – Morera’s theorem.								
UNIT 4	Series Expansions						9 + 3	
Introduction – Taylor’s series – Laurent’s series – Zeros of an analytic function – singularities and poles – Riemann’s theorem - meromorphic function.								
UNIT 5	Calculus of Residues						9 + 3	
Residues – Cauchy’s Residue theorem – Argument theorem – Rouche’s theorem - Evaluation of definite integral –Contour integration types.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. “Complex Analysis” by S.Arumugam, A. Thangapandi Isaac, A. Somasundaram, Scitech Publications, 2014.								
Unit I		:	Chapter 1 (Sec: 1.1), Pages: 1 – 2					
		:	Chapter 2 (Sec: 2.1 – 2.8), Pages: 24 – 52					
Unit II		:	Chapter 3 (Sec: 3.1 – 3.5), Pages: 74 – 100					

Unit III	:	Chapter 6(Sec: 6.1 – 6.4), Pages: 132 – 170
Unit IV	:	Chapter 7(Sec: 7.1 – 7.4), Pages: 173 – 207
Unit V	:	Chapter 8(Sec: 8.1 – 8.3), Pages: 209 – 254

References

1. “Foundations of complex Analysis” by S.Ponnusamy- Narosa Publishing House- New Delhi Chennai.
2. “Functions of a complex variables with applications” by E.G. Phillis (1968)- Oliver & Boy D, Edinburg
3. Churchill.R.V.and J.W. Brown - "Complex variables and Applications" - Fourth Edition - McGraw Hill International Editions.
4. Duraipandian. P. and Lakshmi Duraipandian - "Complex Analysis" - Emerald Publications, Chennai (2001).
5. Roopkumar R. Complex Analysis, Pearson Education India, 2014.

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1. <https://courses.maths.ox.ac.uk/node/9>[Oxford]
2. <https://services.math.duke.edu/~ng/math633s14/syllabus.pdf> [Duke]
3. <https://nptel.ac.in>

COs VS Pos											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	3	3	2	3	3	3	3	3	3	2
CO 2	3	3	3	2	3	3	3	3	3	3	2
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	3	3	2	3	3	3	3	3	3	2
CO 5	3	3	3	2	3	3	3	3	3	3	2
TOTAL	15	14	13	8	12	14	14	14	15	14	8
SCALED VALUE	3	3	3	2	3	3	3	3	3	3	2
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Mechanics		L	T	P	C	
COURSE CODE			XMT602		3	1	0	4	
C	P	A			L	T	P	H	
4	0	0			3	1	0	4	
PREREQUISITE			Algebra & Trigonometry						
On successful completion of this course, the students will be able to:									
COURSE OUTCOMES					DOMAIN		LEVEL		
CO 1	Demonstrate necessary conditions for the equilibrium of particles acted upon by various forces				Cognitive		Understanding		
CO 2	Analyze various systems of forces				Cognitive		Analyzing		
CO 3	Explain the relation between work and power				Cognitive		Understanding		
CO 4	Illustrate the effects of a projectile acted upon various forces				Cognitive		Understanding		
CO 5	Apply the theory of central orbit to study planetary motions.				Cognitive		Applying		
UNIT 1	Force:						9 + 3		
Newton’s laws of motion – Resultant of two forces on a particle - Equilibrium of a Particle: Equilibrium of a particle – Limiting equilibrium of a particle on an inclined plane.									
UNIT 2	Forces on a Rigid Body:						9 + 3		
Moment of a Force – General motion of a body – Equivalent systems of forces- Parallel Forces – Forces acting along a Triangle - A specific reduction of Forces: Reduction of coplanar forces into a force and couple.									
UNIT 3	Work, Energy and Power:						9 + 3		
Work – Conservative field of force – Power -Rectilinear Motion under Varying Force: Simple Harmonic Motion – along a horizontal line – along a vertical line.									
UNIT 4	Projectiles:						9 + 3		
Forces on a projectile – Projectile projected on an inclined plane									
UNIT 5	Central Orbits:						9 + 3		
General orbits – Central orbit – Conic as a centered orbit									
LECTURE		45	TUTORIAL		15	PRACTICAL	0	TOTAL	60
Text Book									
1. Mechanics, P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, S.Chand & Company Ltd., Fourth Edition, Sixth Revised Edition 2005.									
References									
1. Introduction to Statics and Dynamics, A. Ruina and R, Pratap,Oxford UniversityPress, 2014.									
2. The Elements of Statics and Dynamics,S.L. Loney, Cambridge University Press,1904.									
3. Engineering Mechanics: Statics, J.L.Meriam and L.G.Kraige, Seventh Edition,Wiley and Sons Pvt ltd., New York, 2012.									

4. Engineering Mechanics: Dynamics, J.L. Meriam, L. G. Kraige, and J.N. Bolton, 8thedn, Wiley and sons Pvt ltd., New York, 2015.
5. Engineering Mechanics (Statics and Dynamics), K. Dhiman, P.Dhinam and D. Kulshreshtha, Mc Graw Hill Education(India) Private Limited, New Delhi, 2015.

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1. <https://nptel.ac.in>
2. <https://archive.nptel.ac.in/courses/115/104/115104094/>
3. <https://www.youtube.com/watch?v=FD4BQjMuhYY>
4. <https://www.youtube.com/watch?v=olTD-mpsU4E>
5. <https://www.digimat.in/nptel/courses/video/122104015/L27.html>

COs VS Pos											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	3	3	1	2	3	3	3	3	3	1
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	3	2	0	1	3	3	3	3	3	0
TOTAL	15	12	7	1	3	12	12	12	15	12	1
SCALED VALUE	3	3	2	1	1	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Optimization Techniques		L	T	P	C
COURSE CODE			XMT603		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Algebra					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Solve linear programming problem using Simplex Method				Cognitive		Applying	
CO 2	Utilize MODI method to obtain optimum solution of Transportation problem				Cognitive		Applying	
CO 3	Apply dominance property to obtain saddle points for the given two-person zero sum games				Cognitive		Applying	
CO 4	Determine the minimum time to complete a project using PERT & CPM				Cognitive		Evaluating	
CO 5	Classify the dynamics of inventory management's principles, concepts, and techniques as they relate to the entire supply chain (customer demand, distribution, and product transformation processes),				Cognitive		Analyzing	
UNIT 1							9 + 3	
Linear Programming Problem: Mathematical formulation of LPP - Simplex Method - Artificial variable technique - Concept of Duality - Primal and Dual Problems - Duality - Dual Simplex Method.								
UNIT 2							9 + 3	
Transportation Problem: North-West Corner Rule - Matrix Minima method - Vogel's Approximation Method - MODI Method - Degeneracy and Unbalanced Transportation Problem.								
Assignment Problem: Hungarian Method - Unbalance Assignment Problem - Travelling Salesman Problem.								
UNIT 3							9 + 3	
Games and Strategies: Two Person Zero sum Games - The Maximin - Minimax Principle - Games without Saddle Points - Mixed Strategies - Graphical Solution of 2 x n and m x 2 games - Dominance Property.								
UNIT 4							9 + 3	
Network scheduling by PERT / CPM: Network and basic components - Rules of Network Construction - Time Calculation in network - Critical Path Method - PERT Calculation.								
UNIT 5							9 + 3	
Inventory Control: Introductions - Types of Inventories - Inventory decisions - Deterministic inventory Problems - EOQ Problems with no shortages - Production Problems with no shortages - EOQ problems with shortages - Production Problems with shortages. EOQ Problems with One and More Price breaks								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Kanti Swarup, P.K. Gupta and Manmohan - Operations Research - Sultan Chand & Sons – 2006, 12th edition.								

References											
1. Gupta.P.K.and D.S. Hira – Operations Research - S.Chand and Company. 2. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network Flows, 2nd Ed., John Wiley and Sons, India, 2004. 3. Hillier, F.S. and G.J. Lieberman, Introduction to Operations Research, 9th Ed., Tata McGraw Hill, Singapore, 2009. 4. Hamdy A. Taha, Operations Research, An Introduction, 8th Ed., Prentice Hall India, 2006. 5. Hadley,G. Linear Programming, Narosa Publishing House, New Delhi, 2002.											
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https://web.stanford.edu/group/sisl/k12/optimization/#!/index.md [StandardUniversity]											

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	3	2	0	1	3	3	3	3	3	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	3	2	3	3	3	3	3	3	2
CO 5	3	3	3	1	2	3	3	3	3	3	1
TOTAL	15	15	12	3	8	15	15	15	15	15	3
SCALED VALUE	3	3	3	1	2	3	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Industrial Mathematics 4.0	L	T	P	C
COURSE CODE			XMT604A	3	1	0	4
C	P	A		L	T	P	H
4	0	0		3	1	0	4
PREREQUISITE			Statistics				
On successful completion of this course, the students will be able to:							
COURSE OUTCOMES				DOMAIN		LEVEL	
CO 1	Infer the reason for adopting Industry 4.0 and Artificial Intelligence.			Cognitive		Understanding	
CO 2	Demonstrate the need for digital transformation.			Cognitive		Understanding	
CO 3	Apply the industry 4.0 tools.			Cognitive		Applying	
CO 4	Analyze the applications of Big Data.			Cognitive		Analyzing	
CO 5	Examine the applications and security of IoT Applications			Cognitive		Analyzing	
UNIT 1	Industry 4.0					9+3	
Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality.							
UNIT 2	Artificial Intelligence					9+3	
Artificial Intelligence: Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI -environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI .							
UNIT 3	Big Data And IoT					9+3	
Big Data : Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning - Big Data in Databases - Big Data Use cases Big Data in Social Causes - Big Data for Industry - Big Data Roles and Skills -Big Data Roles - Learning Platforms; Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications - Applications of IoT - Security in IoT .							
UNIT 4	Applications And Tools Of Industry 4.0					9+3	
Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People. Tools for Artificial Intelligence, Big Data and Data Analytics, Virtual Reality, Augmented Reality, IoT, Robotics.							
UNIT 5	Jobs 2030					9+3	
Industry 4.0 – Education 4.0 – Curriculum 4.0 – Faculty 4.0 – Skills required for Future - Tools for Education – Artificial Intelligence Jobs in 2030 – Jobs 2030 - Framework for aligning Education with Industry 4.0 .							

LECTURE	45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book							
1. Higher Education for Industry 4.0 and Transformation to Education 5.0(2020)- P.Kaliraj& T. Devi							
Reference							
1. Advances in Mathematics for Industry 4.0 1st Edition, Kindle Edition, 2020.							
E-References							
1. https://doi.org/10.1016/j.matpr.2020.06.331							
2. https://nptel.ac.in							

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	3	1	2	3	3	3	3	3	1
CO 5	3	3	3	1	2	3	3	3	3	3	1
TOTAL	15	13	10	2	5	10	13	13	15	13	2
SCALED VALUE	3	3	2	1	1	2	3	3	3	3	1
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Introduction to Machine Learning		L	T	P	C
COURSE CODE			XMT604B		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Algebra, Trigonometry, Probability and Statistics					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Demonstrate the basics of Artificial Intelligence, Machine Learning, and Predictive Models.				Cognitive		Understanding	
CO 2	Interpret the significance of Probabilistic and Stochastic Models used in machine learning algorithms.				Cognitive		Understanding	
CO 3	Apply the basic supervised learning algorithms and Classify the simple datasets.				Cognitive		Applying	
CO 4	Analyze the similarities and Grouping the undefined data sets by the use of unsupervised learning algorithms.				Cognitive		Analyzing	
CO 5	Evaluate the learning models by using basic performance measures.				Cognitive		Evaluating	
UNIT 1	Basics Concepts of Machine Learning						9+ 3	
Introduction–ArtificialIntelligence–DifferencebetweenAIandMachineLearning–Prediction and Classification – A simple predicting machine – Training a simple classifier –Types of machine learning – Applications of Machine Learning – Perspectives and issues in machine learning.								
UNIT 2	Probabilistic and Stochastic Models						9 + 3	
Introduction – Bayesian Learning – Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naive Bayes classifier, Expectation maximization and Gaussian Mixture Models, Hidden Markov models.								
UNIT 3	Supervised Learning						9 + 3	
Introduction–Regression, Linear regression, Classification: Decision trees, k-Nearest Neighbors, Support Vector Machine, Logistic regression, Random Forest. Artificial Neural Network: Introduction, Perceptions, multi-layer networks and back propagation.								
UNIT 4	Unsupervised Learning						9 + 3	
Introduction–Supervised vs Unsupervised Cluster Analysis, K means clustering, Hierarchical clustering. Dimension reduction: Principal Component Analysis, Linear Discriminant Analysis.								
UNIT 5	Modelling and Evaluation						9 + 3	
Introduction – Building the model, training a model, Evaluating a model, Improving a model. Performance Metrics – Accuracy, Precision, Recall, Sensitivity, Specificity, AUC, RoC, Bias Variance decomposition.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Books								
1. Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das, “Machine Learning”, 2 nd Edition, 2018, Pearson Education, India.								
2. Ethem Alpaydin, “Introduction to Machine Learning”, 4 th Edition, 2020, MIT Press.								

3. Tariq Rashid, “Make Your Own Neural Network”,2016, Create Space Independent Publishing Platform

References

1. ShaiShalev- Shwartz,Shai Ben David, “Understanding Machine Learning: From Theory to Algorithms”, Cambridge University Press.
2. T.Hastie,R. Tibshirani and J.Friedman, “Elements of Statistical Learning”, Springer.
3. Charu C.Aggarwal, “DATA CLUSTERING Algorithms and Applications”,2014,CRC Press.
4. C.Bishop, “Pattern Recognition and Machine Learning”, Springer.
5. Sebastian Raschka and Vahid Mirjalili,“PythonMachineLearning”, 3rdedition,2019,Packet Publishing.

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1. NPTEL Course in *Introduction to Machine Learning* by Dr. Balaraman Ravindran, IIT Madras,<https://nptel.ac.in/courses/106106139>
2. NPTELCourse in *Introduction to Machine Learning (Tamil)*by Prof.Arun Rajkumar, IITMadras,<https://nptel.ac.in/courses/106106236>
3. *Machine Learning for Absolute Beginners*,<https://alison.com/topic/learn/132506/introduction-to-ai-and-ml-learning-outcomes>
4. *Supervised Machine Learning :Regression and Classification*,
<https://www.coursera.org/learn/machine-learning>
5. *Unsupervised Learning, Recommenders ,Reinforcement Learning*,
<https://www.coursera.org/learn/unsupervised-learning-recommenders-reinforcement-learning>

COs VS POs

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	3	3	1	2	3	3	3	3	3	1
CO 5	3	3	3	2	3	3	3	3	3	3	2
TOTAL	15	13	10	3	6	13	13	13	15	13	3
SCALED VALUE	3	3	2	1	2	3	3	3	3	3	1

0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation

1-5→1, 6-10→2, 11-15→3

COURSE NAME			Astronomy		L	T	P	C
COURSE CODE			XMT604C		3	1	0	4
C	P	A			L	T	P	H
4	0	0			3	1	0	4
PREREQUISITE			Algebra and Trigonometry					
On successful completion of this course, the students will be able to:								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO 1	Apply the concept of spherical trigonometry to explain celestial sphere and diurnal motion.				Cognitive		Applying	
CO 2	Explain the effects of various types of parallax.				Cognitive		Understanding	
CO 3	Apply Kepler's law of harmonies to make calculations regarding the radius and period of orbits of planets.				Cognitive		Applying	
CO 4	Explain the formation of moon and its surface features.				Cognitive		Understanding	
CO 5	Explain a brief history of Astronomy.				Cognitive		Understanding	
UNIT 1							9 + 3	
Spherical Trigonometry - Spherical Triangle - The fundamental formulae of Spherical Trigonometry, the sine, cosine, four parts and Napier formulae (without proof). The Celestial Sphere: Celestial coordinators - Diurnal motion - Rising and setting of a star - Sidereal time - Circumpolar star - Morning and Evening stars - Twilight - Earth - Length of the day.								
UNIT 2							9 + 3	
Refraction - Tangent Formula – Cassini’s formula - Effects of Refraction - Geocentric Parallax - Effects of Geocentric Parallax - Heliocentric Parallax - Effects of Heliocentric Parallax - Aberration - Its Effects.								
UNIT 3							9 + 3	
Kepler's Laws - Verification of Kepler's Laws - True anomaly, Mean Anomaly - Eccentric Anomaly, Relation between them - Time - Equation of Time - Seasons - Conversion of Time.								
UNIT 4							9 + 3	
Moon - Sidereal Month, Lunation and Relation between them - Phases of the Moon - Lunar Libration - Surface of the Moon - Metonic Cycle - Tides - Eclipses - Shadow Cone - Minimum and Maximum number of Eclipses.								
UNIT 5							9 + 3	
Planetary Phenomena - Bodes law - Elongation - Sidereal Period, Synodic period and the relation between them - Phase - Stationary Points - Solar System - Stellar Universe - A brief history of Astronomy - Astronomical Instruments.								
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL	60
Text Book								
1. Kumaravelu. Sand Susheela Kumaravelu – Astronomy for degree classes, Rainbow printers, Nagarcoil (2005).								
References								
1. A Text-Book of Astronomy, By: Ramachandran, G. V, Tiruchirappalli Rukmani Ramachandran 1970.								

2. George.O.Abell - Exploration of the Universe Holt,Rinehart & Winston of Canada Ltd; 2nd Revised edition (1 June 1969).

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1. <http://bulletin.columbia.edu/columbia-college/departments-instruction/astronomy/#coursestext> [Columbia University]
2. <https://www.physics.utoronto.ca/~Jharlow/Teaching/Astron03/Fullnotes/> [University Of Toronto]

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	3	2	0	1	3	3	3	3	3	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	3	2	0	1	3	3	3	3	3	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	12	7	0	2	12	12	12	15	12	0
SCALED VALUE	3	3	2	0	1	3	3	3	3	3	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

COURSE NAME			Stochastic Processes			L	T	P	C
COURSE CODE			XMT604D			3	1	0	4
C	P	A				L	T	P	H
4	0	0				3	1	0	4
PREREQUISITE			Probability and Statistics						
On successful completion of this course, the students will be able to:									
COURSE OUTCOMES						DOMAIN		LEVEL	
CO 1	Classify a stochastic process according to whether it operates in continuous or discrete time and whether it has a continuous or a discrete state space, and give examples of each type process					Cognitive		Understanding	
CO 2	Demonstrate limit probabilities in Markov chains after an infinitely long period					Cognitive		Understanding	
CO 3	Explain the concepts of birth and death process with examples					Cognitive		Understanding	
CO 4	Demonstrate to recognize the concepts of renewal process					Cognitive		Understanding	
CO 5	Explain in detail the utility of martingales					Cognitive		Understanding	
UNIT 1								9 + 3	
Elements of Stochastic Processes-Two simple examples of Stochastic Processes-Classification of general Stochastic processes – Markov Chains-Definitions – Examples of Markov Chain-Transition probability matrices of a Markov chain - classification of states of a Markov chain-Recurrence.									
UNIT 2								9 + 3	
The basic limit theorem of Markov chains and applications-Discrete renewal equation-proof of theorem-Absorption probabilities - criteria for recurrence- A queuing Example.									
UNIT 3								9 + 3	
Classical Examples of continuous time Markov chains-General pure birth processes and Poisson processes more about Poisson processes- A counter model birth and death processes-Differential equations of birth and death processes-Examples of birth and death processes.									
UNIT 4								9 + 3	
Renewal processes - Definition of Renewal process and related concepts – Some examples of Renewal Processes – More on some special Renewal processes – Renewal equations and elementary Renewal theorem.									
UNIT 5								9 + 3	
Martingales - Preliminary definitions and examples – Super martingalesand Sub martingales- The optional sampling theorem.									
LECTURE		45	TUTORIAL	15	PRACTICAL	0	TOTAL		60
Text Book									
1. A First course in Stochastic Processes - Second Edition by Samuel Karlin and M. Taylor, Academic Press New York.2003.									

References
1. “Stochastic Processes” S.K.Srinivasan and K.M.Mehata, Tata Mcgraw – Hill Publishing Company Ltd., New Delhi.1978.
2. “Stochastic Processes”, 2e, Medhi, John Wiley & Sons (Asia) Pte Ltd ,2000.
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http://nptel.ac.in/courses/111/102/111102014/#
http://nptel.ac.in/courses/111/102/111102014/#
http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=2145&context=graduatereports .

COs VS POs											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO 1	3	2	1	0	0	2	2	2	3	2	0
CO 2	3	2	1	0	0	2	2	2	3	2	0
CO 3	3	2	1	0	0	2	2	2	3	2	0
CO 4	3	2	1	0	0	2	2	2	3	2	0
CO 5	3	2	1	0	0	2	2	2	3	2	0
TOTAL	15	10	5	0	0	10	10	10	15	10	0
SCALED VALUE	3	2	1	0	0	2	2	2	3	2	0
0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation											
1-5→1, 6-10→2, 11-15→3											

Course Name			Cyber Security	L	T	P	C
Course Code			XUM005	1	0	0	1
C	P	A		L	T	SS	H
1	0	0		1	0	1	1
Prerequisite		Basic Programming knowledge and technical skills.					
On successful completion of this course, the students will be able to:							
Course Outcomes				Domain		Level	
CO 1	Understand the fundamentals of Cyber Security and the technologies.			Cognitive		Understanding	
CO 2	Understand the organizational structure of Cyber security			Cognitive		Understanding	
CO 3	Understand the Cyber Security policy development			Cognitive		Understanding	
CO 4	Understand the Indian IT act and the initiatives			Cognitive		Understanding	
CO 5	Understand and Apply the Cyber security practices			Cognitive		Applying	
UNIT 1	INTRODUCTION					3+3	
Cyber Security – Cyber Security policy – Domain of Cyber Security Policy – Laws and Regulations – Enterprise Policy – Technology Operations – Technology Configuration – Strategy Versus Policy – Cyber Security Evolution – Productivity – Internet – E commerce – Counter Measures – Challenges							
UNIT 2	CYBER SECURITY OBJECTIVES AND GUIDANCE					3+3	
Cyber Security Metrics – Security Management Goals – Counting Vulnerabilities – Security Frameworks – E Commerce Systems – Industrial Control Systems – Personal Mobile Devices – Security Policy Objectives – Guidance for Decision Makers – Tone at the Top – Policy as a Project– Cyber Security Management – Arriving at Goals – Cyber Security Documentation – The Catalog Approach – Catalog Format – Cyber Security Policy Taxonomy.							
UNIT 3	CYBER SECURITY POLICY CATALOG					3+3	
Cyber Governance Issues – Net Neutrality – Internet Names and Numbers – Copyright and Trademarks – Email and Messaging – Cyber User Issues – Malvertising – Impersonation –Appropriate Use – Cyber Crime – Geo location – Privacy – Cyber Conflict Issues – Intellectual property Theft – Cyber Espionage – Cyber Sabotage – Cyber Welfare– Computer Forensics – Steganography							
UNIT 4	CYBER SECURITY INITIATIVES AND IT ACT					3+3	
Counter Cyber Security Initiatives in India, Cyber Security Exercise, Cyber Security Incident Handling, Cyber Security Assurance, IT Act, Hackers–Attacker–Counter measures ,Web Application Security , Digital Infrastructure Security ,Defensive Programming. Traditional Problems Associated with Computer Crime, Introduction to Incident Response.							
UNIT 5	SECURITY PRACTICES					3+3	

Guidelines to choose web browsers, Securing web browser, Antivirus, Email security ,Guidelines for setting up a Secure password ,Two-steps authentication ,Password Manager ,Wi-Fi Security ,Guidelines for social media security ,Tips and best practices for safer Social Networking.

Basic Security for Windows, User Account Password Introduction to mobile Smartphone Security, Android Security, IOS Security Online Banking Security , Mobile Banking Security ,Security of Debit and Credit Card ,UPI Security Security of Micro ATMs e-wallet Security Guidelines Security Guidelines for Point of Sales(POS)

Lecture	15	Tutorial	0	SS	15	Total	30
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Text Books

1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs , Jeffrey Schmidt, Joseph Weiss
“Cyber Security Policy Guidebook” John Wiley & Sons 2012.
2. Rick Howard “Cyber Security Essentials” Auerbach Publications 2011.
3. Cyber Laws & Information Technology, Jothi Rathan, VijayRathan, Bhrath Pubishers, 7th Edition January 2019.

References

1. Modern Cyber security Practices by Pascal Ackerman, BPB Publications, 2020
2. Dan Shoemaker Cyber security The Essential Body Of Knowledge, 1st ed. Cengage Learning 2011
3. Rhodes–Ousley, Mark, “Information Security: The Complete Reference”, Second Edition, McGraw–Hill, 2013.

E–References

1. <https://www.coursera.org/specializations/cyber-security>
2. [www. nptel.ac.in](http://www.nptel.ac.in)
3. <http://professional.mit.edu/programs/short-programs/applied-cybersecurity><https://us.norton.com/internetsecurity-how-to-cyber-security-best-practices-for-employees.html>
4. <https://www.meity.gov.in/content/cyber-laws>

COs vs POs									
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	0	0	0	0	0	2	0	3	0
CO 2	0	0	0	0	0	0	2	0	0
CO 3	3	0	0	0	0	2	3	0	3
CO 4	0	0	0	0	0	0	0	0	0
CO 5	3	0	0	0	0	0	0	0	3
TOTAL	6	0	0	0	0	4	5	3	6
SCALED VALUE	2	0	0	0	0	1	1	1	2

0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation

1-5 → 1, 6-10 → 2, 11-15 → 3