Semester –V					
Part III Core VII (Common Core) Computer Oriented Numerical Methods					
Code: 18UCCC51Hrs/Week: 6Hrs/ Semester : 90Credits : 4					

To inspire the students with modern computational methods to carry out the problems.

Mission:

To equip students with the knowledge of algorithms of numerical analysis and execute it efficiently with MATLAB.

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

Semester –V					
Part III Core VII (Common Core) Computer Oriented Numerical Methods					
Code: 18UCCC51Hrs/Week: 6Hrs/Semester: 90Credits: 4					

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

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

Unit II

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

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

Unit III

Taylor series method-Picard's method- Runge-Kutta method. (Textbook: 1, Chapter 7, Sec 7.1,7.2,7.4, pages 7.1-7.15, 7.25-7.40) (Problems only)

Unit IV

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

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

Unit V

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

(Textbook: 2, Chapters: 7,8,9,10)

Text Books

1.Arumugam S and Thangapandi Isaac A, Numerical Analysis With Programming in C, New Gamma Publishing House, Palayamkottai.

2.Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, MATLAB and its Applications in engineering, Pearsons Publications.

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

Semester – V				
Part III Core VIII Modern Algebra				
Code :18UMAC52Hrs/week :5Hrs/Semester :75Credits :4				

To give an introductory knowledge of the basics abstract systems of mathematics

Mission

To train the students to generalize the known concepts and to develop analytical thinking.

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

Semester – V					
Part III Core VIII Modern Algebra					
Code :18UMAC52 Hrs/week :5 Hr			Hrs/Semester :75	Credits :4	

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

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

Unit II

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

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

Unit III

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

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

Unit IV

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

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

Unit V

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

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

Text Book

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

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

Semester – V					
Part III	Core	e IX Mo	dern Analysis		
Code :18UMAC53 Hrs / Week: 5 Hrs / Semester: 75 Credits: 4					

To introduce the basic concepts in Analysis and to enable the students to understand fundamental ideas and theorems on Metric spaces

Mission

To develop the application of the concepts.

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

SEMESTER – V					
Part III	Core]	IX	Mode	rn Analysis	
Code :18U	Code :18UMAC53Hrs / Week:5Hrs / Semester:75Credits:4				

Metric spaces - Bounded sets - open ball - open sets - diameter of a set - interior of set

(Chapter 2, Sec 2.1-2.6, pages 17-58)

Unit II

Closed sets - closure - limit point - dense sets

(Chapter 2, Sec 2.7-2.10, pages 59-79)

Unit III

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

Unit IV

Connectedness - equivalent conditions - connected subsets of R - connectedness and continuity - continuous image of a connected set is connected - Intermediate mean value theorem

(Chapter 5, Sec 5.1-5.3, pages 139-150)

Unit V

Compactness - definition of open cover - compact metric space – Heine Borel theorem - compactness and continuity - continuous image of a compact set is compact - uniform continuity – Continuous function on a compact metric space is uniformly continuous – equivalent characterizations of compactness–compactness and continuity.

(Chapter 6, Sec: 6.1-6.4, pages: 150-178)

Text Book

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

Books for Reference

1.Richard R Goldberg, Methods of Real Analysis, Oxford & IBH Publishing Co, New Delhi, Reprint 1973.

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

Semester –VI						
Part III	Part III Core XI Complex Analysis					
Code :18UMAC61Hrs/week :6Hrs/Semester :90Credits :4						

To expose students to more complex theories of study

Mission

To sharpen analytical thinking and their problem solving capacity

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

Semester –VI						
Part III	Part III Core XI Complex Analysis					
Code :18UMAC61Hrs/week :6Hrs/Semester :90Credits :4						

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

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

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

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

Unit III

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

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

Unit IV

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

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

Unit V

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

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

Text Book

1. Arumugam S, Thangapandi Issac A, SomasundaramA.,Complex Analysis, SciTech publications(India) Pvt.Ltd, 2014

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

Semester –VI					
Part III Core XII Linear Algebra					
Code : 18UMAC62 Hrs/week : 6 Hrs/Semester : 90				Credits : 4	

To extend the knowledge in Abstract Algebra and develop analytical thinking.

Mission

To equip the students with the ideas of Linear Algebra to pursue their higher studies.

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

Semester –VI					
Part III	Part III Core XII Linear Algebra				
Code : 18UMAC62 Hrs/week : 6 Hrs/Semester : 90 Cr				Credits : 4	

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

(Chapter 5, Sec 5.1, 5.2, 5.4, 5.5, Pages 5.1-5.10, 5.14-5.19)

Unit II

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

(Chapter 5, Sec 5.3, 5.6, Pages 5.10-5.13, 5.19-5.26)

Unit III

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

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

Unit IV

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

(Chapter 7, Sec 7.4, 7.5, 7.6, 7.7, 7.8, Pages 7.15-7.40)

Unit V

Inner product spaces – Norm – Schwartz inequality – Triangular inequality – Gram Schmidt orthogonalisation process - orthogonal complement.

(Chapter 6, Pages 6.1-6.9)

Text Book

1. Arumugam .S and Thangapandi Issac.A, Modern Algebra, Scitech Publications

(India) Pvt. Ltd., Chennai, Reprint 2017.

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

Semester –V					
Part III Core Integral I Vector Calculus and Fourier Series					
Code :18UMAI51Hrs/week :4Hrs/Semester :60Credits :4					

To introduce physical application of derivatives of vectors.

Mission

To help the students to study the line integral, surface integral and volume integral and their applications.

	Upon completion of this course, students will be able	PSO	CI
CO. NO	to	addressed	
	differentiate and integrate vector-valued functions and		
CO-1	apply calculus to motion problems in two and three	2	An
	dimensional space		
CO-2	compute gradient, curl and divergence of vector fields.	1, 3	С
CO-3	use the gradient to find directional derivatives.	3	Ap
	solve problems in multiple integration using		
CO-4	rectangular, cylindrical, and spherical coordinate	8	A
	systems		
CO 5	select and apply appropriate models and techniques to	3	Е
0-5	define and evaluate integrals	5	
CO 6	apply greens theorem, stokes theorem and gauss	3	A
0-0	divergence theorem to evaluate integrals.		
CO 7	know that any periodic function can be expressed as a	6	Cr
0-7	fourier series.	0	
CO-8	expand an odd or even function as a half-range cosine	1	Un,
	or sine fourier series.	1	An

Semester –V					
Part III	Part III Core Integral I Vector Calculus and Fourier Series				
Code :18UMAI51Hrs/week :4Hrs/Semester :60Credits :4					

Vector differentiation -Differentiation of vectors - Gradient

(Text Book 1: Chapter 5, Sec 5.0,5.1,5.2,5.3, Pages 5-1 to 5-18)

Unit II

Divergence and Curl - Solenoidal, Irrotational

(Text Book 1: Chapter 5, Sec 5.4, Pages 5-18 to 5-30)

Unit III

Vector integration - line integrals - surface integrals

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

Unit IV

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

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

Unit V

Fourier series - Half - range, sine & cosine series

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

Text Books

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

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

Semester VI					
Part III	Part III Core Integral III Graph Theory				
Code :18UMAI61Hrs / Week:5Hrs / Semester:75Credits:4					

To learn basic concepts in graph theory.

Mission

To translate situations to diagrammatic representations and to develop problem solving skills.

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

Semester VI					
Part III	Core In	tegral III	Grap	h Theory	
Code :18UMAI61Hrs / Week: 5Hrs / Semester: 75Credits: 4					

Graphs and sub graphs:

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

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

Unit II

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

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

Unit III

Eulerian and Hamiltonian graphs:

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

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

Unit IV

Planarity:

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

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

Unit V

Colourability:

Chromatic number and Chromatic index - the five colour theorem –Chromatic polynomials (Chapter- 9, Sec 9.1-9.4, pages: 85-98).

Text Book

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

Books for Reference

1.Parthasarathy K.R., Basic Graph Theory, Tata McGraw Hill Publishing Company Limited, New Delhi

2.John Clark and Derek Allan Holton A First Look at Graph Theory, World Scientific Publishing Co.Pte.Ltd, Singapore, Reprint 2013.

Semester VI					
Core Integral IV	Core Integral IV Coding theory				
Code: 18UMAI62Hrs / Week: 7Hrs / Semester: 105Credits: 4					

To obtain the concept of source coding and various coding techniques that are used for practical purposes.

Mission

To generate mathematical ideas and methods that can be used to transmit information more reliably.

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

Semester VI				
Core Integral IV Coding theory				
Code: 18UMAI62	62Hrs / Week: 7Hrs / Semester: 105Credits: 4			

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

(Chapter 1, Sections: 1.1 - 1.6)

Unit II

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

(Chapter 2, Sections: 2.1 - 2.6)

Unit III

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

(Chapter 2, Sections: 2.7 - 2. 12)

Unit IV

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

(Chapter 3, Sections: 3.1 - 3.7)

Unit V

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

(Chapter 4, Sections: 4.1 - 4.5)

Text Book

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

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

Semester – III					
Part III Core Skill Based Numerical Aptitude and Arithmetic Ability					
Code Hrs/weak + 4 Hrs/ Semester : Credita + 4					
:18UMAS31	1115/WCCK . 4	60	Cleuits .4		

To bring out the mental ability and skill of the students

Mission:

To train the students for competitive and professional examinations

Course outcome

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

Semester – III						
Part III Core Skill Based Numerical Aptitude and Arithmetic Ability						
Code:18UMAS31Hrs/week :4Hrs/ Semester :60Credits :4						

Percentage- Time and Work - Time and Distance

(Chapters 10,15,17, pages 179-218, 309-330, 343-360)

Unit II

True discount and Banker's discount - Ratio and Proportion

(Chapters 26, 27, 12, Pages 485-489, 490-493, 248-276)

Unit III

Average - Chain rule - Calendar - Trains - Boats and Streams

(Chapters 6,14,18,19, Pages 123-142, 291-308, 361-370)

Unit IV

Simplification – profit and loss

(Chapters 4,11, Pages 68-95, 219-247).

Unit V

Line Graphs-Pie charts - Bar Diagrams

(Chapters 33,34,35, Pages 525-536, 537-542, 543-549)

Text Book

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

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

Semester – IV						
Part III Core Skill Based Math Type using LaTeX						
Code :18	Code :18UMAS41Hrs/week :4Hrs/ Semester:60Credits :4					

We give a deep knowledge of the LaTeX for Mathematical documentation

Mission

To train the students to use LaTeX skills in documenting and preparing for publications

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

Semester – IV					
Part III	Part III Core Skill Based Math Type using LaTeX				
Code :18	UMAS41	Hrs/week :4	Hrs/ Semester :60	Credits :4	

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

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

Books for Reference:

- 1. Helmut Kopka and Patrick W. Daly, A guide to LaTeX, Fourth Edition, Addison-Wesley.
- 2. David R. Wilkins, Getting started with LaTeX, Second Edition.

Practicals:

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

Work Book: iSkills, LaTeX for beginners Workbook, 5th Edition, March 2014

	Semester	V
Self Study Course (Compulsory)	Astrono	my
Code:18UMASS3		Credits:2

To enhance and share scientific understanding of the universe.

Mission

To introduce the exciting world of astronomy to the students and to help the students to study about the celestial objects.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	use mathematics to perform calculations on earth or space science problems	4	Ар
CO-2	make observations regarding the earth or space and infer conclusion from them.	3	Ар
CO-3	describe and explain the motion of objects (sun, moon, planets, stars)	4	Un
CO-4	sketch and explain the relationships of objects in solar and lunar eclipse.	8	Cr
CO-5	discuss the contribution of lunar and solar calendar.	6	Cr
CO-6	discuss about stars, meteorites, comets and their masses.	5	Cr
CO-7	describe how stars evolve.	6	Un
CO-8	describe astronomical distance and size scales.	1	Un

Semester - V				
Self Study Course (Compulsory)	Astronom	Ŋ		
Code: 18UMASS3		Credits: 2		

Solar System - The Sun - Mercury - Venus - Mars

(Chapter: XVII, Sections: 328 - 331)

Unit II

Asteroids - Jupiter - Saturn - Uranus - Neptune - Pluto

(Chapter: XVII, Sections : 332 - 337)

Unit III

Comets - Meteors - Zodiacal Light

(Chapter: XVII, Sections: 338 - 340)

Unit IV

Stellar Universe – The Colour And Size Of Stars-Double And Multiple Stars - Variable Stars - Star Cluster – Milky Way

(Chapter: XVIII, Sections: 349 - 351, 353, 357)

Unit V

The calendar –Lunar and solar calenders - Egyptian calendar -Mayen Calender - Roman calendar – Julian calendar -Gregorian calendar – world calendar –Indian National calendar – Tamil and Malayalam Calenders.

(Chapter: XX, Sections: 362 - 370)

Text Book

1. S. Kumaravelu & Susheela Kumaravelu, Astronomy, 2011, A. Baskara Selvan printers, Sivakasi.

SEMESTER – I					
Part III	Core I	Classical Algeb	ra		
Course Co	de:21UMAC11	Hrs / Week: 4	Hrs / Semester: 60	Credits: 3	

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

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

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

Semester – I					
Part III Core I Classical Algebra					
Course Code :21UMAC11Hrs/week: 4Hrs/Semester: 60Credits: 3					

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

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

Unit II

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

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

UnitIII

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

Unit IV

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

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

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

Unit V

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

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

Text Book

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

Books for Reference

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

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

SEMESTER – I					
Core II Calculus					
Course Code :21UMAC12Hrs / Week: 4Hrs / Semester: 60Credits: 3					

• To train the students to take up the challenges and risks in their day to day life and to work collaboratively with others.

• To prepare students for success in Calculus and to develop an appreciation and proficiency with mathematical thinking.

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

Semester – I					
Part III Core II Calculus					
Course Code :21UMAC12Hrs/week :4Hrs/ Semester :60Credits :3					

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

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

Unit II

Evolute and Involute-Pedal Equation -Asymptotes

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

Unit III

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

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

Unit IV

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

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

Unit V

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

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

Text Book

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

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

SEMESTER – II					
Core III Analytical Geometry of Three Dimensions					
Course Code :21UMAC21Hrs / Week: 4Hrs / Semester: 60Credits: 3					

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

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

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

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

(Chapter 1, Sec 1 – 10, pages 1 – 23)

Unit II

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

(Chapter 2, Sec 1 – 11, pages 24-45)

Unit III

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

(Chapter 3, Sec 1 – 6, pages 46-61)

Unit IV

Skew lines - shortest distance between two lines - coplanar lines - volume of tetrahedron. (Chapter 3, Sec 7 - 11, pages 61 - 91)

Unit V

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

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

Text Book

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

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

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

• To make the students to understand differential Equations as a powerful tool in solving problems in physical and social sciences.

• To furnish the students the tools necessary to solve ordinary differential equations.

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

Semester – II					
Part III Core IV Differential Equations					
Course Code: 21UMAC22Hrs/week :4Hrs/Semester :60Credits :3					

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

Unit II

Linear equation with constant coefficients: Complementary function of a linear equation with constant coefficients-Particular Integral-Special methods for finding Particular Integral

(Chapter 5, Sec 1-4, pages 68-88)

Unit III

Linear equations with variable coefficients- Special method of evaluating the P.I when X is of the form - Equations reducible to the linear equations-Linear equations of the second order - Complete solution given a known integral - Reduction to the normal form-Change of the independent variable- variation of parameters -Methods of operational factors.

(Chapter 5, Sec 5 and 6 pages 89-102 & Chapter 8, Sec1-5, pages 145-160)

Unit IV

Laplace transform - Definition-Sufficient conditions for the existence of Laplace transform-Laplace transform of periodic functions-Some general theorems- the Inverse transforms.

(Chapter9, Sec 1-6, pages 161-199)

Unit V

Partial differential equation of first order – Classification of integrals - Derivation of partial differential equations - Lagrange's method of solving the linear equation – Special methods, Standard forms – Charpit's method.

(Chapter 12, Sec1-4, Sec 5 (5.1-5.4) pages 219-238)

Text Book

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

Books for Reference

1. A.R.Vasishtha and Dr.S.K.Sharma, *Differential Equations*, Krishna Educational Publishers, Seventeenth Edition : 2015

2. Dr.S.Arumugam and A.ThangapandiIssac, *Differential Equations and Applications*, New Gamma Publishing House, Edition 2011

Semester – III				
Part III Core V Sequences and Series, Trigonometry				
Course Code :21UMAC31Hrs/week : 6Hrs/Semester : 90Credits : 5				

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

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

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

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

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

Unit II

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

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

Unit III

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

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

Unit IV

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

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

UNIT V

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

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

Text Book

1. Robert G. Bartle, Donald R. Sherbert, *Introduction to Real Analysis* (Fourth edition), Wiley Publication, 2017

2. Dr.Arumugam.S&ThangapandiIssac.A, *Sequences and Series and Trigonometry*, New Gamma Publishing House, Palayamkottai (June 2014).

Books for Reference

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

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

• To give an introductory knowledge of the basics abstract systems of mathematics.

• To train the students to generalize the known concepts and to develop analytical thinking.

Co No	Upon completion of this course students will		CI
CO. NO	Opon completion of this course, students will	addressed	CL
	explain the theory behind relations and functions and how	2	Cr.
0-1	functions may relate dissimilar structures to each other.	5	CI
	describe and generate the basic algebraic structures such as		
Co-2	Groups, Rings, Fields, Integral Domain, Euclidean Domain,	1	Ev
	etc., and will identify examples of these specific constructs.		
	have a working knowledge of important mathematical		
	concepts such as order of Group, order of an element,	2	I In
Co-3	generator of a cyclic group, index of a subgroup,	2	UII
	characteristic of a Ring, Maximal and Prime Ideals etc.,		
	analyze relationship between abstract algebraic structures		
Co-4	with familiar number system such as integers, complex and	2	An
	real numbers		
	critically analyze and construct mathematical arguments that		
Со-5	relate to the study of introductory linear algebra. (Proof and	8	An
	Reasoning).		
Co-6	develop ability to form and evaluate conjectures.	1 and 5	Ap
Co-7	produce the group concepts in other science disciplinary	3	Ap
Co-8	illustrate the isomorphic structures	8	An

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

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

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

Unit II

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

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

Unit III

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

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

Unit IV

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

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

Unit V

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

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

Text Book

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

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

Semester - III					
Part III Skill Based Elective Introduction to Python Programming					
Course Code :21UMAS31Hrs/week :2Hrs/Sem :30Credits : 2					

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

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

Semester - III				
Part III Skill Based Elective Introduction to Python Programming				
Course Code :21UMAS31Hrs/week :2Hrs/Sem :30Credits : 2				

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

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

Unit II

Python Objects – Internal Types – Standard Type Operators – Standard Type Built-in Functions (Chapter IV, Sec 4.1 – 4.5) Unit III

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

(Chapter V, Sec 5.1 – 5.7)

Unit IV

Strings – Strings and Operators – Built-in Functions – String Built-in Methods –Lists – List Type built-in Methods – Tuples – Tuple Operators and Built-in Functions (Chapter VI, Sec 6.2 – 6.6, 6.11 - 6.17)

Unit V

Conditionals and Loops – if, else if – Conditional Expressions – while, for, break, pass Statements (Chapter VIII, Sec 8.1 – 8.10) Text Book

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

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

2.<u>https://youtu.be/kqtD5dpn9C8</u>

3. <u>https://youtu.be/_uQrJ0TkZlc</u>

Reference Books:

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

Semester – III					
Part III Skill Based Elective Quantitative Aptitude I					
Course Code : 21UMAS32Hrs/week : 2Hrs/ Semester : 30Credits : 2					

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

CaNa	Upon completion of this course, students will be able	PSO s	CI
	to	addressed	CL
Co-1	solve the problems easily by using short-cut method with time management to face the competitive examinations	4	Ap
Co-2	develop their calculating and computing skills.	5	Ар
Co-3	acquires the ability to understand and analyze the problem	2	Un
Co-4	apply quantitative methods to solve a variety of business problems	5	Ap
Co-5	solve the questions with accuracy and approach the problems in different manner	3	Cr
Со-6	enhances logical skills, arithmetic skills and aptitude skills.	5	Ap
Co-7	simplify and evaluate algebraic expressions.	3	Ev
Co-8	use mathematical concepts in real world situations.	8	Ар

Semester – III					
Part III Skill Based Elective Quantitative Aptitude I					
Course Code :21UMAS32Hrs/week : 2Hrs/ Semester : 30Credits : 2					

Numbers – Square roots & cube roots

Unit II

Time & Distance – Polygons

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

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

(Chapters 7 & 8, pages 143-163)

Unit III

Problems on Numbers – Problems on Ages

Unit IV

True Discount – Banker's Discount – Calendar

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

Unit V

Simplification-Average

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

Text Book

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

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

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

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

Semester - IV				
Part III Skill Based Elective Documentation using LaTeX				
Course Code :21UMAS41Hrs/week : 2Hrs/ Semester: 30Credits : 2				

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

Unit II

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

Unit III

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

Unit IV

More math: Spacing of symbols Building new symbols - Math alphabets and symbols - Vertical spacing - Tagging and grouping - Generalized fractions - Boxed formulas

(Chapter 8, Sec 8.1 to 8.6, pages 187 - 206)

Unit V

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

Text Book:

George Gratzer, *More Math into LaTeX*, 4th Edition, Springer, 2007. https://www.javatpoint.com/latex

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

Books for Reference:

Helmut Kopka and Patrick W. Daly, A guide to LaTeX, Fourth Edition, Addison-Wesley. David R. Wilkins, Getting started with LaTeX, Second Edition.

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

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

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

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

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

Percentage- Time and Work

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

Unit II

Ratio and Proportion-Chain Rule

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

Unit III

Problems on Trains – Boats and Streams

(Chapters 18 & 19, Pages 361-381)

Unit IV

Profit and Loss-Alligation or Mixture

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

Unit V

Line Graphs-Pie charts - Bar Diagrams

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

Text Book

1. Aggarwal R.S., Arithmetic Subjective and Objective for Competitive Examinations,

S.Chand and Company Ltd., Ram Nagar, New Delhi - 55. Revised Edition 2014.

Books for Reference

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

Semester III		
Self Study Course – Fundamentals of Mathematics (Compulsory)		
Code: 21UMASS1 Credits: 2		

- To equip the students with a foundation for lifelong learning, critical thinking and collaborative, technical problem solving in professional and business context.
- To inspire the students to learn foundation of mathematics and creative approaches to addressing mathematical problem and make them to become competent users of mathematics and mathematical application.

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	gain enriched understanding of concepts of mathematical sets, theory of sets, equivalent sets and cardinal number.	1	Un
CO-2	describe and explain the concepts of axiomatic method and euclidean geometry.	3	Un
CO-3	obtain a basic outline of a paradoxes in set theory, cantor's paradox and russell's paradox.	1	Un
CO-4	differentiate advantages and disadvantages of the axiomatic method and genetic method.	3	An
CO-5	discuss the method of truth table and the predicate calculus.	3	Cr
CO-6	understand and analyze the concepts of axiomatic method and the completeness of an axiom system.	6	Un
CO-7	construct geometry according to euclid, euclid's postulates and non-euclidean geometry	8	Cr
CO-8	analyze the notion of axiomatic method and formal axiomatic method.	2	An

Semester III		
Self Study Course - Fundamentals of Mathematics (Compulsory)		
Code: 21UMASS1	Credits: 2	

The Axiomatic method – Geometry according to Euclid – Euclid's postulates – Non Euclidean Geometry. (Chapter: 1, pages: 1 - 6)

Unit II

The formal axiomatic method - Description of formal axiomatic method – Analysis of axiomatic method – Consistency of axiomatic method - Completeness of an axiom system – Advantages and Disadvantages of the axiomatic method (Chapter: 1, pages:6 - 18)

Unit III

The Genetic method - The theory of sets - Equivalent sets - Cardinal numbers

(Chapter: 1, pages: 18 - 25)

Unit IV

Paradoxes in set theory –Cantor's Paradox – Russell's Paradox – Axiomatic set theory – The three schools of thought. (Chapter: 1, pages: 25 - 40)

Unit V

Truth tables method – The Predicate Calculus (Chapter: 1, pages: 40 - 44)

Text Book

1. K.S. Narayanan and K. Narasimhan, A History of Mathematics ,Taj printers, First Edition Reprint 1985.