III B.Sc MATHEMATICS

			SEMESTER V						
Part-III	Core-09	U21MA509	Linear Algebra	6	3	25	75	100	4
	Core-10	U21MA510	Real Analysis	6	3	25	75	100	4
	Core-11	U21MA511	Statics	6	3	25	75	100	4
	Core -12	U21MA512	Numerical Methods	4	3	25	75	100	4
	Core Lab	U21MA5P1	MATLAB	2	3	40	60	100	2
	Core Elective – I	U21MA5E1A U21MA5E1B U21MA5E1C	LPP Stochastic Process Combinatorial Mathematics	4	3	25	75	100	4
	Institutional Training/ Minor Project	U21MA5IT	Institutional Training/ Minor Project	-	-	40	60	100	2
Part-IV	Skill Enhancement: I	U21SE5S1	Women Studies	2	2	-	50	50	2
Part-V	Self Study Course		General Studies	-	-	-	-	Completion	1
Semester – V Total				**30**				**750**	**27**
			Semester VI						
Part-III	Core-13	U21MA613	Complex Analysis	6	3	25	75	100	4
	Core-14	U21MA614	Dynamics	5	3	25	75	100	4
	Core-15	U21MA615	Graph Theory	6	3	25	75	100	4
	Core Elective -2	U21MA6E2A U21MA6E2B U21MA6E2C	Number Theory Discrete Mathematics Fuzzy Sets	5	3	25	75	100	4

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	Major Group Project & Viva voce	U21MA6MP	Major - Group Project & Viva Voce	6	3	40	60	100	5
	Comprehension – 2(Self Study Course- Online Examination)	U21MA6C3	Comprehension in Mathematics-3	-	1	0	50	50	1
Part-IV	Skill Enhancement :II	U21MA6S2	Mathematical Reasoning	2	2	-	50	50	2
	Extra Department Course open Elective - Self Study Course	To be selected from the courses offered by other departments		-	3	-	100	100	3
Part-V	Spoken Tutorial (Self Study Course - online) / MOOC (online)			-	-	-	-	Completion	2
Semester – VI Total				30				700	29
TOTAL								4200	156

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core-09	U21MA509	Linear Algebra	85	5	-	4

Contact hours per semester: 90Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	25	75	100

Preamble

The course provides basic and thorough knowledge in matrix algebra and understand the concept ofvector spaces, Eigen values and Eigen vectors and Cayley Hamilton theorem.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	recall the basic concepts of algebra and vector spaces	K1
CO2	understand the definitions of vector spaces and basic concepts of matrices	K2
CO3	apply the theorems of vector spaces and Cayley Hamilton theorem in problems	K3
CO4	analyze the theorems in matrix algebra and in vector spaces	K4
CO5	evaluate the problems in vector spaces and in Cayley Hamilton theorem	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	-
CO2	2	3	2	3	1	2	2
CO3	3	2	2	2	2	2	2
CO4	3	3	2	1	2	-	3
CO5	2	2	1	2	2	2	3
Total Contribution of COs to POs	13	12	12	10	9	8	10
Weighted Percentage of COs Contribution to POs	86.67	80	80	66.67	60	53.33	66.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Vector Spaces (L – 1 7+ T – 1 Hours)

Definition and examples – elementary properties – subspaces – linear transformation – fundamental theorem of homomorphism

Chapter 5 – Sections: 5.1 -5.3

Unit II: Basis and Dimension (L – 1 7+ T – 1 Hours)

Span of a set – linear dependence and independence – basis and dimension – theorems

Chapter 5 – Sections: 5.4 -5.6

Unit III: Linear Transformation (L – 1 7+ T – 1 Hours)

Rank and nullity Theorem – matrix of a linear transformation – Problems

Chapter 5 – Sections: 5.7 -5.8

Unit IV: Inner Product Space (L – 17 + T – 1 Hours)

Definitions and examples of inner product space – orthogonality – orthogonal complement – Gram Schmidt orthogonalization.

Chapter 6 – Sections: 6.1 -6.3

Unit V: Matrices (L – 1 7+ T – 1 Hours)

Cayley Hamilton Theorem and its Applications - Eigen values and Eigen vectors – Properties and problems.

Chapter 7 – Sections: 7.7 -7.8

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Tutorial Section:

Unit	Topic	Hours
I	Vector Spaces	1
II	Basic theorems in vector spaces	1
III	Linearly independent and dependent	1
IV	Theorems	1
V	Matrix basic concept, Cayley Hamilton Theorem	1

Text Book:

1. S. Arumugam & Issac – Modern Algebra

Reference Books:

1. Sharma .J.N and Vashistha .A.R, 1981, Linear Algebra, Krishna Prakash Nandir.

2. S. Kumaresan, 2000, Linar Algebra: A Geometric Approach, PHI Learning.

Web References:

1. WhatVS.pdf (toronto.edu)

2. NPTEL

3. Vector Space -- from Wolfram MathWorld

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core-10	U21MA510	Real Analysis	85	5	-	4

Contact hours per semester: 90
Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	25	75	100

Preamble

This course provides the knowledge of metric spaces, the concepts of continuity, connectedness and compactness.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand the basic concepts of Metric Spaces, completeness, continuity, connectedness and compactness	K1, K2
CO2	examine the properties of open sets and closed sets, characterization of completeness, continuity, connectedness and compactness	K3
CO3	analyze Interior and closure, uniform continuity connected subsets and compact subsets of R categorize completeness	K4
CO4	determine dense sets, discontinuities, equivalent characterization for compactness, connectedness and continuity	K5
CO5	predict metric space, completeness, continuity & compactness	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	2	3	1	3
CO2	1	2	2	1	2	1	2
CO3	2	3	1	2	3	-	3
CO4	1	2	2	1	2	1	2
CO5	2	3	1	2	1	2	-
Total Contribution of COs to POs	8	13	8	8	11	5	10
Weighted Percentage of COs Contribution to POs	53.33	86.67	53.33	53.33	73.33	33.33	66.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Countable Sets & Metric Spaces   (L – 17 + T – 1 Hours)

Countable – Uncountable sets – Metric spaces – Bounded sets – Open ball – open sets – subspaces

Chapter 1 - Sections: 1.2 – 1.4 & Chapter 2 - Sections: 2.1 – 2.5

Unit II: Complete Metric Space   (L – 17 + T – 1 Hours)

Interior of a set – closed set – closure, limit point, dense sets – complete metric space – Cantor's intersection theorem – Baire's category theorem

Chapter 2 - Sections: 2.6 – 2.10 & Chapter 3 - Sections: 3.1 & 3.2

Unit III: Continuous Functions   (L – 17 + T – 1 Hours)

Continuity of functions – continuity of composition of functions – equivalent conditions for continuity – algebra of continuous functions – homeomorphism – uniform continuity – discontinuities

Chapter 4 – Sections: 4.1 – 4.4

Unit IV: Connected Metric Space   (L – 17 + T – 1 Hours)

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

Chapter 5 – Sections: 5.1 – 5.3

Unit V: Compact Metric Space   (L – 17 + T – 1 Hours)

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 forms of compactness.

Chapter 6 – Sections: 6.1 – 6.4

Tutorial Section:

Unit	Topic	Hours
I	Subspaces	1
II	Limit points	1
III	Homeomorphism and uniform continuity	1
IV	Connectedness of continuity	1
V	Equivalent forms of compactness	1

Text Book:

1. S. Arumugam and Issac, 2017, Modern Analysis, New Gamma Publishing House.

Reference Books:

1. S. C. Malik,2017, Principles of Real Analysis, 4th Edition, New Age International (P), Ltd

2. Tom M. Apostol, Mathematical Analysis, 2nd Edition, Narosa Phublishing House, New Delhi.

Web References:

1. Basic Real Analysis – Course (nptel.ac.in)
2. Limit Point -- from Wolfram MathWorld
3. Connectedness | Connected Sets, Connectedness in Real Analysis (byjus.com)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit ©
Part III	Core – 11	U21MA511	Statics	85	5	-	4

Contact hours per semester:90

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	25	75	100

Preamble

To provide the basic knowledge of equilibrium of a particle to develop a working knowledge to handle practiced problems

Course Outcomes (Cos)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	understand the concept of forces acting at a point, parallel forces and moments, Equilibrium of three forces acting on a rigid body, Friction, Equilibrium of strings.	K1, K2
CO2	apply parallelogram law of forces, varigon's theorem, three coplanar forces theorem, Laws of friction, equation of the common category to solve problems.	K3
CO3	analyze Lami's theorem, resultant of two unlike, unequal parallel forces, condition of equilibrium of three coplanar parallel forces, equilibrium of a particle, Geometrical properties of common category	K4
CO4	evaluate the problems related with Lami's theorem, parallel forces Equilibrium of three forces acting on a rigid body, friction, common category	K5
CO5	find the solution of a point, parallel forces and moments, friction, Equilibrium of three forces action on a rigid body equilibrium of strings	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO – PO Mapping (Course Articulation Matrix

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	2	3	1	3
CO2	1	2	2	1	2	1	2
CO3	2	3	1	2	3	2	3
CO4	1	2	2	1	2	-	2
CO5	2	3	1	2	1	1	-
Total Contribution of COs to POs	8	13	8	8	11	5	10
Weighted Percentage of COs Contribution to POs	53.33	86.67	53.33	53.33	73.33	33.33	66.67

Low 1; Medium 2; High 3; Not correlated –

COURSE CONTENT

Unit I: Forces acting at a point   **(L – 17 + T – 1 Hours)**

Forces acting at a point – parallelogram Law of forces – Triangle of forces – Lami's Theorem – Problems.

Chapter 2 – Sections: 1 – 10

Unit II: Parallel forces and moments   **(L – 17+ T – 1 Hours)**

Parallel forces and moments – resultant of two parallel forces – resultant of two unlike unequal parallel forces – Varignon''s Theorem – Problems.

Chapter 3 – Sections: 1 – 12

Unit III: Equilibrium of three forces acting on a rigid body   **(L – 17 + T – 1 Hours)**

Equilibrium of three forces acting on a rigid body – three coplanar forces theorem – problems

Chapter 5 – Sections: 1 – 6

Unit IV: Friction   **(L – 17 + T – 1 Hours)**

Friction – Laws of friction – angle of friction – equilibrium of a particle (i) on a rough inclined plane (ii) under a force parallel to the plane (iii) under any force – problems

Chapter 7 – Sections: 1 – 12

Unit V: Equilibrium of strings   **(L – 17 + T –1 Hours)**

Equilibrium of strings – equation of the common catenary – tension at any point – Geometrical properties of common catenary – problems.

Chapter 11 – Sections: 1 – 6

Tutorial Section:

Unit	Topic	Hours
I	Forces action at a point	1
II	Resultant of parallel forces	1
III	Equilibrium of coplanar forces	1
IV	Friction	1
V	Equilibrium of string	1

Text Books:

1. Venkatraman, M.K. – Statics, Agasthiar Publications, Trichy.

References Books:

1. Narayanan.S – Statics, S.Chand & Company, New Delhi.

2. Duraipandian, P, Laxmi Duraipandian and Muthamizh Jayapragasam- Mechanics, S.Chand & Company

Web References:

1. Forces Acting at a Point And Methods of Force Resolution (mechasource.blogspot.com)

2. Parallel Forces (slideshare.net)

3. What is friction? (article) | Khan Academy

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit ©
Part III	Core -12	U21MA512	Numerical Methods	55	5	-	4

Contact hours per Semester: 60
Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	25	75	100

Preamble

The purpose of the course is to encourage the students to apply numerical techniques. To enhance computational skills for solving mathematical equations. To train the students to solve the problems in their respective domain.

Course Outcomes (Cos)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	identify the common numerical methods and use them to obtain approximate solutions.	K1
CO2	understand the methods	K2
CO3	apply numerical methods to obtain approximate solutions to mathematical problems and solve the problems of interpolation, numerical integration and ordinary differential equations.	K3
CO4	explain theory of numerical and analyses error obtained in the numerical solution of the problems	K4
CO5	evaluate the accuracy of common numerical methods.	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO – PO Mapping (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	2	-	2
CO2	3	3	2	1	1	3	-
CO3	3	2	3	3	2	3	3
CO4	2	2	2	3	1	3	2
CO5	2	1	3	3	2	2	3
Total Contribution of COs to POs	13	11	12	12	8	11	10
Weighted Percentage of CO sContribution to POs	86.66	73.33	80	80	53.33	73.33	66.66

Low 1; Medium 2; High 3; Not correlated –

COURSE CONTENT

Unit I: Solution of Numerical algebraic Equations   (L-11 + T -1 Hours)

Bisection method – Newton's method – Criterion of order of convergence of Newton's

method.Regula False method – Gauss elimination – Gauss Jacobi – Gauss Seidal method

Chapter 3 - Sections: 3.2 – 3.7; Chapter 4 - Section: 4.2

Unit II: Finite Difference   (L-11 + T -1 Hours)

First and higher order differences – Forward and backward differences – Properties of Operator –

Differences of a polynomial –Factorial Polynomial

Chapter 5 – Sections: 5.2, 5.3, 5.6, 5.10 – 5.12

Unit III: Interpolation   (L-11 + T -1 Hours)

Newton's Forward – backward, Gauss forward – backward interpolation formula – Bessel's formula.

Divided differences – Newton's divided difference formula – Lagrange's interpolation formula.

Chapter 6 – Sections: 6.3, 6.4; Chapter 7 – Sections: 7.3, 7.4, 7.6 & Chapter 8 – Sections: 8.1, 8.3, 8.4

Unit IV: Numerical Differentiation and Integration   (L-11 + T -1 Hours)

Newton's forward and backward differences for differentiation – Derivatives using Bessel's formula –

Trapezoidal rule, Simpson's 1/3 rule & 3/8 rule.

Chapter 9 – Sections: 9.2 – 9.4, 9.8 & 9.10

Unit V: Difference Equations   **(L-11 + T -1 Hours)**

Definition – order and degree of difference equation – Linear difference equation –

Finding complementary function – particular Integral –simple applications.

Chapter 10 – Sections: 10.2 & 10.3

Text Books:

1. Venkatraman .M.L, 1998, Numerical methods in Science and Engineering National Publishing
    Company V Edition

References Books:

1. Kandasamy.P.K. Thilagavathy and K. Gunavathy, 2006, Numerical Methods,
    S. Chand & Company Ltd. Edn..

2. Autar Kaw and Egwwn Enc Kalu, 2011, Numerical methods with Application
    Abidet. Autokaw.com 2nd Edition.

Web References:

1. Discrete-time Signals and Systems (mit.edu)
2. Numerical methods - Course (nptel.ac.in)
3. Interpolation | Definition, Formula, Methods & Uses (byjus.com)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part- III	Core Lab	U21MA5P1	MATLAB	-	-	2	2

Contact hours per semester: 30
Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	40	60	100

Preamble

This course provides knowledge about the use of MATLAB in modern computing environments for the purpose of symbolic and numerical problem solving and visualization.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	understand the basic commends of MATLAB to find the addition of two matrices and transpose of a matrix	K1, K2
CO2	apply the concepts in linear algebra to find determinant of matrix and multiplication of matrix	K3
CO3	analyze the specific features to plot a function, polar plot, straight line fit, exponential curve fitting	K4
CO4	determine eigen values and eigen vectors	K5
CO5	compose matrix factorization	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	3	2	1	1	3
CO2	3	1	3	2	1	1	3
CO3	1	1	1	2	1	1	2
CO4	3	1	2	2	1	2	-
CO5	3	1	3	2	1	-	2
Total Contribution of COs to POs	13	5	12	10	5	5	10
Weighted Percentage of COs Contribution to POs	86.67	33.33	80	66.67	33.33	33.33	66.67

Low 1; Medium 2; High 3; Not Correlated –

COURSE CONTENT

1. To find the addition of two matrices
2. Transpose of a matrix
3. Matrix multiplication
4. Finding the determinant of a matrix
5. Plotting a function
6. Polar plot
7. Straight line fit
8. Exponential curve fitting
9. Finding Eigen values and Eigen vectors of a matrix
10. Matrix Factorizations

Text Book:

1. Rudra Pratap, 2003, Getting Started with MATLAB - A Quick Introduction for Scientists and Engineers, Oxford University Press.

Reference Books:

1. William John Palm, 2005, Introduction to Matlab 7 for Engineers , McGraw-Hill Professional.
2. Dolores M. Etter, David C. Kuncicky, 2004, Introduction to MATLAB 7, Prentice Hall.

Web References:

1. https://m.njit.edu/Undergraduate/Matlab/M111MATLAB2S08/
2. Scientific Computing using Matlab - Course (nptel.ac.in)
3. MATLAB Online - MATLAB & Simulink (mathworks.com)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core Elective-1	U21MA5E1A	Linear Programming problem	55	5	-	4

Contact hours per semester: 60

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	25	75	100

Preamble

This Course provides the knowledge of applications of linear programming problems in real life situations to the students.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand the concepts of Linear programming problem such as Graphical, Simplex, Big – M Method and Duality , Transportation problem, Assignment problem, Sequencing problem	K1, K2
CO2	apply the concepts of Graphical, Big- M Method, Duality , Transportation problem, Assignment problem, Sequencing problem	K3
CO3	analyze the concepts of Graphical, Big- M Method, Duality , Transportation problem, Assignment problem, Sequencing problem	K4
CO4	evaluate the problem on Graphical, Simplex , Big- M Method, Dual simplex method , Transportation problem, Assignment problem, Sequencing problem	K5
CO5	develop problem solving techniques using operation research to diverse situations in mathematical contexts	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	3
CO2	2	3	2	2	2	3	-
CO3	3	2	2	1	3	-	2
CO4	2	2	1	2	1	2	2
CO5	1	1	2	2	2	2	2
Total Contribution of COs to POs	11	10	10	9	10	9	9
Weighted Percentage of COs Contribution to POs	73.33	66.66	66.66	60	66.66	60	60

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Linear programming problem (L-11+ T-1 Hours)

Mathematical formulation of LPP- Graphical method – Simplex method – Artificial variable technique.

Chapter 2, 3 & 4 – Sections: 3.1 – 3.5 & 4.1 – 4.4

Unit II: Duality (L-11+ T-1 Hours)

Concept of Duality – Primal and Dual Problems – Duality – Dual Simplex method.

Chapter 5 – Sections: 5.1 – 5.7

Unit III: Transportation Problem (L-11+T-1 Hours)

North –West Corner Rule – Matrix Minima method – Vogel's Approximation Method –

MODI Method – Degeneracy and Unbalanced Transportation problem.

Chapter 10 – Sections: 10.1, 10.9 -10.15

Unit IV: Assignment Problem (L-11+ T- 1 Hours)

Hungarian Method - Unbalance Assignment Problem.

Chapter 11– Sections:11.1 -11.4 ,11.7

Unit V: Sequencing Problem (L-11+T-1 Hours)

n- jobs and 2 – machines - n jobs and 3 machines – 2 jobs and m machines

Chapter 12 – Sections: 12.1 -12.6

Tutorial Section:

Unit	Topic	Hours
I	Graphical method, Simplex method	1
II	Dual Simplex method	1
III	MODI Method	1
IV	Hungarian Method	1
V	n- jobs and 2 –machines, 2 jobs and m machines	1

Text Book:

1. KantiSwarup, P.K. Gupta and Manmohan, 2006, Operations Research, 12th edition Sultan Chand & Sons.

Reference Books:

1. Gupta. P.K and D.S. Hira, Operations Research, S. Chand and Company.

2. B.J. Ranganath and A.S.Srikantappa, 2017, Operations Research, Yesdee Publishing House, Chennai.

Web References:

1. https://books.google.co.in/books?id=wYxffB62NUC&pg=PA229&dq=elective+ii+opera
2. SIMPLEX METHODS – Swayam Prabha (newsonair.org.in)
3. Assignment Problem - Introduction | Operations Research (brainkart.com)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core Elective-1	U21MA5E1B	Stochastic Process	55	5	-	4

Contact hours per semester: 60
Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	25	75	100

Preamble

The course provides the knowledge of to know probability and distributive function, to understand the concept of stochastic process and identify Markov Chain.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand the concept of probability and distribution functions, stochastic process, Markov chains, Markov processes	K1, K2
CO2	determine the generating function, Laplace transform of probability distribution. Higher transition probabilities, generation of independent, Bernoulli trails, reducible chains Poisson processes, Markov process with discrete, state spaces	K3
CO3	classify probability distribution, state and chain, Markov chain – Poisson process	K4
CO4	determine the specification of stochastic process, stability of Markov system, Markov Chain with continuous state space, Erlang process, Generalization of Poisson Processes	K5
CO5	formulate graph theoretic approach of Markov system, non homogenous chain, Birth and death processes, derived Markov chain and Erlang processes	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	3	2	1
CO2	2	2	3	2	2	2	2
CO3	2	2	2	2	2	2	2
CO4	3	2	3	2	2	2	-
CO5	3	2	3	2	2	-	2
Total Contribution of COs to POs	13	11	13	10	11	8	7
Weighted Percentage of COs Contribution to POs	86.67	73.33	86.67	66.67	73.33	53.33	46.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Generating Functions   **(L – 11 + T- 1 Hours)**

Generating functions - Laplace transform of probability distribution – Classification of distribution - Stochastic process – introduction - specification of Stochastic process

Chapter 1 - Sections: 1.1 – 1.5

Unit II: Classification of States And Chains   **(L – 11 + T- 1 Hours)**

Markov chains - Definition and examples - Higher transition probabilities Generalization of Independent Bernoulli Trials - classification of states and chains Determination of Higher transition probabilities - Stability of Markov systems - Graph theoretic approach

Chapter 2 - Sections: 2.1 – 2.7

Unit III: Markov Chains   **(L – 11 + T- 1 Hours)**

Markov chain with Denumerable number states - Reducible chains Statistical inference for Markov chains - Markov chain with continuous state space Non homogeneous chains

Chapter 2 - Sections: 2.8 – 2.12

Unit IV: Markov Process   **(L – 11 + T- 1 Hours)**

Markov process with discrete state space - Poisson process Poisson process and related distributions - Generalization of Poisson process - Birth and Death process

Chapter 3- Sections: 3.1 – 3.4

Unit V: Derived Markov Chains   **(L – 11 + T- 1 Hours)**

Markov process with Discrete state space - Derived Markov chains - Erlang process

Chapter 3 - Sections: 3.5 – 3.7

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Tutorial Section:

Unit	Topic	Hours
I	Generating Function	1
II	Higher transition probabilities	1
III	Markov Chain	1
IV	Poisson Process	1
V	Derived Markov Chain	1

Text Book:

1. J.Medhi, Stochastic Process, 3rd Edition New Age International Publishers (p) Ltd

Reference Books:

1. Suddhendu Biswas, Applied Stochastic Process, New Central Book Agency (P) Ltd Kolkatta
2. Hoel Port and Stone, Introduction to Stochastic Process, Universal Book Stall, New Delhi

Web References:

1. StochasticProcesses.ppt (utk.edu)
2. Poisson.Proc.pdf (yale.edu)
3. Derived Markov Chains. I (core.ac.uk)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core Elective – 1	U21MA5E1C	Combinatorial Mathematics	55	5	-	4

Contact hours per semester: 60
Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	25	75	100

Preamble

The course is to introduce the basic concepts of pairings, understand relations, generating functions and to study the concept of designs and square block designs.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand permutations pairing, Fibonacci sequence, relations and the concept of design	K1, K2
CO2	solve the problems in ordered selections, recurrence, pairing inclusion, exclusion and designs	K3
CO3	analyze the properties of ordered selections, pairings, relations and block designs	K4
CO4	evaluate unordered selections, pairing within a set, using generating functions and block designs	K5
CO5	derive the formulas using selections, pairings, generating functions, inclusion – exclusion principles and square block designs	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	3	2	2
CO2	2	2	2	2	2	2	2
CO3	2	3	3	2	3	2	2
CO4	3	2	3	2	2	2	-
CO5	3	2	2	2	3	-	1
Total Contribution of COs to POs	13	11	13	10	13	8	7
Weighted Percentage of COs Contribution to POs	86.67	73.33	86.67	66.67	86.67	53.33	46.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Selections   **(L – 11 + T- 1 Hours)**

Selections and Binomial coefficients – Permutations – Ordered Selections – Unordered Selections – Miscellaneous Problems

Chapter 2 - Sections: 2.1 – 2.5

Unit II: Pairings Problems   **(L – 11 + T- 1 Hours)**

Pairings Problems - Pairings within a set – Pairings between sets

Chapter 3 - Sections: 3.1 – 3.2

Unit III: Generating Functions   **(L – 11 + T- 1 Hours)**

Recurrence – Fibonacci – type relations using generating functions – Miscellaneous methods.

Chapter 4 - Sections: 4.1 – 4.4

Unit IV: Inclusion and Exclusion Principles   **(L – 11 + T- 1 Hours)**

The inclusion – Exclusion Principles – Rook polynomials

Chapter 5 - Section: 5.1 - 5.2

Unit V: Block designs   **(L – 11 + T- 1 Hours)**

Block designs

Chapter 6 - Sections: 6.1

Tutorial Section:

Unit	Topic	Hours
I	Ordered and unordered selections	1
II	Pairing within and between sets	1
III	Relations	1
IV	Inclusion – exclusion principles	1
V	block design	1

Text Book:

1. Ian Andersen, A first course in combinatorial Mathematics, Clarendon Press, Oxford

Reference Books:

1. A. W. Tucker, 2012, Applied Combinatorics, 6th edition, John Wiley & Sons, United States.
2. D. Cohen, 1978, Combinatorics, 2nd Edition, Wiley Publications United States.

Web References:

1. inclusion.dvi (utah.edu)
2. 4. Combinations (Unordered Selections) (intmath.com)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part – IV	Skill Enhancement - 1	U21SE5S1	Women Studies	30	-	-	2

Contact hours per Semester: 30
Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Fifth	-	50	50

Preamble

This is an introductory course that emphasizes the roles of women, their experiences and contributions to society and enables students to analyze contemporary issues from feminist perspective

Course Outcomes

On successful completion of the Course, the learners will be able to

CO No.	Course Outcome	Knowledge Level
CO1	remember the need for gender sensitisation , recall the role of Women as individuals in families and societies, recognise matriarchy and matrilineal societies. list out Women's movements and woman achievers, identify the role of women in National development, identify methods to promote inclusion of women in development of all sectors	K1
CO2	understand the terms and concepts used in women's studies, recognize the need for gender sensitization, discuss about domestic violence against women, illustrate the representation of women in media/sports/politics/arts and literature, demonstrate how gender has been socially constructed and maintained through a variety of institutions	K2
CO3	apply concepts and theories of Women's Studies to life experiences and processes, provide guidance to ignorant women on women's rights, investigate gender issues and gender violence leashed out on women, review the life of women achievers	K3
CO4	analyse gender roles in domestic personal sphere and social spheres, explore the socio-cultural, socio-political and economic factors that deter women's talent, analyse socio-political systems and contemporary issues from feminist perspective	K4
CO5	evaluate the scope, importance and challenges of Women's Studies, appraise the role of women in rural and community development, assess the extent to which women have contributed to preservation of environment and natural resources and in turn to national development, appreciate the life of women achievers, reflect on the role of women in family and society	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

Course content

Unit I: Introduction to women's studies

Definition, need, scope, importance and challenges of Women's Studies- Emergence of Women's studies as an academic discipline in India – - Need for gender sensitisation - Women as individuals in families and societies- Matriarchy and matrilineal societies. Women's movements - global and local.

Unit II: Role of women in family:

Study of the evolution of women's role – Women as individuals in families-Gender roles in domestic/ personal sphere- Women's roles, aspirations and familial expectations on women - Foeticide, Female infanticide, Sex selective abortion, Domestic violence, Gender issues, Gender violence, Maternal mortality rate, Property rights, Reproductive rights – Women's health and nutrition

Unit III: Role of women in society:

Gender roles in social spheres- Choice of profession - Self , Family and Societal pressures, Decision making/ Leadership roles- myths and misconceptions- roles expected from women – stereotyping – Representation in media / politics / arts and literature / sports

Unit IV: Against all odds- Women achievers:

Socio-cultural, socio-political and economic factors that deter women's talent- Life narratives of women achievers- Savitri Bhai Phule, Dr.Muthu Lakshmi Reddy, Kiran Mazumdhar Shah, Kalpana Chawla, Saina Nehwal, Sania Mirza, Deepika Palikkal, Mary Kom, P T Usha, Smriti Mandanna, Arundhati Roy, Vandana Siva, Kamala Das, Indira Goswami, Amrita Pretham, Anita Desai, Jhumpa Lahiri, Kiran Desai, Shashi Deshpande.

Unit V: Role of women in National Development:

Role of women in rural and community development- community bio-diversity conservation –gender and Agro biodiversity-role of women in seed preservation- sustainable development- Joint forest management,- Chipko movement, Narmada Bachao Andolan—India's - Neem patent victory-Living Democracy Movement for reclaiming life's diversity and freedom.

Text books

1. Maithreyi Krishna Raj. (1986). "Women Studies in India: Some Perspectives". Popular Prakasham, Bombay.
2. Sharmila Rege, (Ed.). (2003). "Sociology of Gender: The Challenge of Feminist Sociological Knowledge". Sage Publications, New Delhi.
3. Veena Majumdar. (1974). "Report on the committee on the Status of Women: Towards Equality". Journal of Women Studies Kadambari,V. 2009. Gender Studies: A Primer. Chennai:
4. Devaki Jain and Pam Rajput (Ed). (2003). "Narratives from the Women"s Studies Family: Recreating Knowledge, Sage, and New Delhi.
6. M.S.Swaminathan. (1998)."Gender Dimensions in Biodiversity Management". Konark publishers pvt ltd, New Delhi.

References

1. Amy S. Wharton. (2005). "The Sociology of Gender: An Introduction to Theory and Research". (KeyThemes in Sociology) Blackwell Publishing, UK, Indian Reprint,Kilaso Books, New Delhi
2. Jasbir Jain (Ed). (2005). "Women in Patriarchy: Cross Cultural". Rawat Publications, Jaipur.
3. Lerner, Gerda. (1986). "The Creation of Patriarchy". Oxford University Press, New Delhi.
4. Mala Khullar, (Ed). (2005). "Writing the Women"s Movement: A Reader". Zubaan, Kali for Women, New Delhi.
5. Mies, Maria. (1980). "Indian Women and Patriarchy". Concept Publishing Company, New Delhi.
6. Promilla Kapur (Ed), Empowering Indian Women, Publication Division, Government of India, New Delhi, 20
7. Mitchell, J. 1975. Women in a Man Made World. Chicago: Rand McNally & Co
8. Putnam Tong, Rosemarie. 2013. Feminist Thought: A More Comprehensive Introduction.

USA: Westview.

9. Russell, Bertrand. 1936. Marriage and Morals. London: Bantam.
10. Smith, Bonnie. 2013. Women's Studies: The Basics. London: Routledge
11. Drinkwater, Barabara, Ed. 2000. Women in Sport. Oxford: Blackwell Science
12. Spence, Jean and Sarah Jane et al. 2010. Women Education and Agency 1600- 2000. New York: Routledge Publishing House.
13. Nancy. 2011. Feminism and Science. Indianapolis: Indiana University Press.
14. Tharu, Susie and K. Lalitha (ed). 1991 &1993. Women Writing in India, 2 Vols. New Delhi: Oxford University Press.
15. P.K.Rao. (2000) "Sustainable Development – Economics and Policy". Blackwell, New Delhi.
16. Radha Kumar, (1993). "The History of Doing". Kali for Women, New Delhi.
17. Ronnie Vernooy, (Ed). (2006). "Social and gender Analysis Natural Resource Management: Learning studies and lessons from Aisa". Sage, New Delhi.
18. Swarup, Hemlata and Rajput, Pam. (2000). Gender Dimensions of Environmental and Development Debate: The Indian Experience". In Sturat S.Nagel, (ed). "India"s Development and Public Policy". Ashgate, Burlington.

19. Venkateshwara, Sandhay. (1995). "Environment, Development and the Gender Gap" Sage Publications, NewDelhi.

Web references

1.https://r.search.yahoo.com/_ylt=AwrxhWjc7_9geRUAlADnHgx.;_ylu=Y29sbwMEcG9zAzUEdnRpZAMEc2VjA3Ny/RV=2/RE=1627414620/RO=10/RU=https%3a%2f%2fin.sagepub.com%2fen-in%2fsas%2findian-journal-of-gender-studies%2fjournal200917/RK=2/RS=wGNZp8L5sqXOSojTzCefS4hzShA-
2.https://r.search.yahoo.com/_ylt=Awrx5kom8f9gJDAAXC_nHgx.;_ylu=Y29sbwMEcG9zAzEEdnRpZAMEc2VjA3Ny/RV=2/RE=1627414951/RO=10/RU=https%3a%2f%2fwgs.fas.harvard.edu%2fpast-thesis-topics/RK=2/RS=cjxRQNT0UmGS1Fia5z9Er8a8P.I-

Proficiency Enhancement Course (Self Study Course) : General Studies

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
PART-V	Proficiency Enhancement Courses - Self Study Course		General Studies	-	-	-	1

Year	Semester	-Completion only-
I to III year	I to VI Semester	

Course outcomes

Upon completion of the Course, the learner will be able to

S.No.	Course Outcomes	Knowledge level
CO1	recall the basic principles and laws in Science, recap the important events in history, remember the geography and culture of India and Tamil Nadu, recapitulate the events in Indian polity and Tamil Nadu administration, remember current affairs, geographical land marks, welfare schemes by the Government, scientific inventions and problems in public delivery system	K1
CO2	comprehend the basic principles and laws in Science, demonstrate the important events in history, reproduce the geography and culture of India and Tamil Nadu, the events in Indian polity and Tamil Nadu administration, Public Corruption and Lokpal & Lok ayuktha act, Transport and communication system in India, Industrial growth in T.N. ,unemployment and poverty eradication issues	K2
CO3	solve problems based on Percentage, Ratio and Proportion Time and Work, Simple interest, Compound interest, Area, Volume related problems and exhibit mathematical skills	K3
CO4	analyse and answer questions based on logical, visual and alpha numeric reasoning	K4
CO5	evaluate the constitution of India, Indian Economy, Tamil Nadu administration, social geography of India and Tamil Nadu, political system in India, pollution and its control measures	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

COURSE CONTENT

UNIT-I: General Science

i) General Scientific Laws – Mechanics - Properties of Matter, Force, Motion and Energy –Electricity and Magnetism, Light, Sound, Heat, Nuclear Physics, Electronics and Communications, solar energy

ii) Atomic structure, Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilisers, Pesticides, Energy resources

iii) Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Diseases

iv) Environment and Ecology- Biosphere, Conservation of biodiversity- Biosphere Reserves of India, Sanctuaries and National parks, Environmental pollution, causes and control measures, alternate sources of energy

UNIT-II: General knowledge, Current Events, Quantitative Aptitude and Mental Ability

i) Latest Diary of Events - National symbols - Profile of States and Union territories Eminent persons and places in news – Sports - Books and Authors- Prominent Personalities in various spheres – Arts, Science, Literature and awards.

ii) Political parties and Political system in India – Public awareness and General administration - Welfare oriented Government Schemes and their utility, Problems in Public Delivery Systems. Public Corruption and Lokpal & Lokayuktha act

iii) Geographical landmarks - Current socio - economic issues - Latest inventions in Science and Technology. Industrial growth in India and Tamilnadu

iv) Quantitative Aptitude and Mental Ability- Simplification – Percentage - Ratio and Proportion- Time and Work - Simple interest - Compound interest - Area - Volume – Logical Reasoning -Visual Reasoning – Alpha numeric Reasoning – Number Series

UNIT-III: Geography of India & Tamil Nadu

(i) Location – Physical features - Monsoon, Rainfall, Weather andClimate - Water Resources- Rivers in India - Soil, Minerals and Natural Resources - Forest and Wildlife – Agricultural pattern

(ii) Transport – Communication

(iii) Social Geography –Population, Census, poverty eradication and unemployment

(iv) Natural calamity – Disaster Management – Environmental pollution Climate change, pandemics in history – Green energy initiatives

UNIT–IV : History and Culture of India & Tamil Nadu

i) Ancient India: Indus Valley Civilization - The Maurian empire- Age of the Guptas- vardhana empire- Nalanda university

ii) Medieval India : The Delhi Sultanate, Mughals and Marathas - Age of Vijayanagara and Bahmani Kingdoms –South Indian History.

iii) National Renaissance : Early uprising against British rule – sepoy mutiny Indian National Congress - Emergence of leaders- Gandhian Era

iv) Tamil Nadu : History & Culture, Socio-Political Movements

UNIT-V : Indian Polity, Economy and Tamil Nadu Administration

i) Constitution of India - Preamble to the Constitution – Salient features of the Constitution - Citizenship, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy

ii) Union Executive, Union Legislature (Parliament) – State Executive, State Legislature – Local Governments, Panchayat Raj- Spirit of Federalism - Centre - State Relationships- Election – Judiciary in India – Rule of Law

iii) Indian Economy – Five-year plan models – an assessment – Planning Commission and Niti Ayog - Reserve Bank of India – Fiscal Policy and Monetary Policy – Finance Commission –Goods and Services Tax

iv) Governance in India and Development-Administration in Tamil Nadu

Text Books:

1. TNSCERT Books (Science and Social) from Std VI -X

2. Manorama year Book (Tamil)

3. Arihant General Knowledge,2022-Manohar Pandey

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core-13	U21MA613	Complex Analysis	80	10	-	4

Contact hours per semester: 90
Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Sixth	25	75	100

Preamble

This course provides the knowledge of complex variables, analytic functions and the concepts of elementary transformations and residues.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand the basic concepts of differentiable functions, definite integrals, series of analytic functions and transformations	K1, K2
CO2	determine C-R equations, propertied of definite integrals, Taylor's and Laurent's series, conformal mappings	K3
CO3	analyze analytic functions, Cauchy's theorem, zeros of analytic functions, singularities, bilinear transformations	K4
CO4	relate harmonic and analytic functions. Evaluate definite integrals using Cauchy's integral formula, residues of functions, fixed points, improper integrals	K5
CO5	solve problems in analytic functions. Derive higher derivative theorem, general form of bilinear transformation. Find the integral values of complex function using contour integration	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	2	3	1	3
CO2	1	2	2	1	2	2	2
CO3	2	3	1	2	3	-	2
CO4	1	2	2	1	2	1	3
CO5	2	3	1	2	1	1	-
Total Contribution of COs to POs	8	13	8	8	11	5	10
Weighted Percentage of COs Contribution to POs	53.33	86.67	53.33	53.33	73.33	33.33	66.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Analytic functions   **(L – 17 + T – 1 Hours)**

Functions of a complex variable – Derivatives – Cauchy – Riemann equations –

sufficient conditions – Polar form – Analytic functions – Harmonic functions

Chapter 2 - Sections: 2.1 – 2.8

Unit II: Transformations   **(L – 17 + T – 1 Hours)**

Conformal mappings–basic properties–Bilinear maps – fixed points – Applications.

Chapter 3 - Sections: 3.1 – 3.5

Unit III: Complex Integration   **(L – 17 + T – 1 Hours)**

Definite integrals – Contours – Cauchy – Goursat theorem –– Cauchy Integral formula –

Morera"s theorem.

Chapter 6 - Sections: 6.1 – 6.3

Unit IV: Series Expansions   **(L – 17 + T – 1 Hours)**

Taylor"s series – Examples – Laurent"s series – Zeros of analytic functions –

Principal part of functions.

Chapter 7 - Sections: 7.1 – 7.3

Unit V: Calculus of Residues   **(L – 17 + T – 1 Hours)**

Residues - Residue theorem –Residues at poles Evaluation of improper real integrals – improper

integrals involving sines and cosines – Definite integrals involving sines and cosines.

Chapter 8 - Sections: 8.1 – 8.3

Tutorial Section:

Unit	Topic	Hours
I	Harmonic functions	1
II	Cauchy integral formula	1
III	Zeros of analytic function	1
IV	Integrals involving sine and cosine	1
V	Fixed points of Bilinear transformation	1

Text Book:

1. S. Arumugam and Issac, 2018, Complex Analysis, Scitech Publications PVT Ltd.

Reference Books:

1. Ponnuswamy .S, 2005, Foundations of Complex Analysis, 2nd Edition, Narosa Publication House, New Delhi.
2. Duraipandian .P and Lakshmi Duraipandian, 2001, Complex Analysis, Emerald Publications, Chennai.

Web References:

1. https://www.coursera.ord>learn (Introduction to complex analysis | coursera)
2. https://www.oulu.f1>files
3. lecture14.pdf (iitg.ac.in)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part- III	Core – 14	U21M A614	Dynamics	70	5	-	4

Contact hours per semester: 75
Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Sixth	25	75	100

Preamble

To provide a basic knowledge of the behavior of objects in motion and to develop a working knowledge to handle practical problems.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	understand the concepts of projectiles, collision of elastic bodies simple Harmonic motion, motion under the action of central forces, Differential equation of central orbit	K1, K2
CO2	apply the characteristics of projectile, laws of impact, composition of SHMs, velocity and acceleration in polar co-ordinates pedal equation of central orbit to find the solution of the given problems.	K3
CO3	analyze the range on an inclined plane direct and oblique impact, composition of SHMs, motion under the action of central forces, Differential equation of central orbit.	K4
CO4	evaluate the problems related with characteristics of projectile, collusion of elastic bodies, SHMs, motion under the action of central forces, Differential equation of central orbit.	K5
CO5	solve the problem related with objects to motion.	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 - Create.

CO - PO Mapping (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	2	3	2	3
CO2	1	2	2	1	2	1	3
CO3	2	3	1	2	3	1	2
CO4	1	2	2	1	2	1	2
CO5	2	3	1	2	1	-	-
Total Contribution of COs to POs	8	13	8	8	11	5	10
Weighted Percentage of COs Contribution to POs	53.33	86.67	53.33	53.33	73.33	33.33	66.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Projectiles   (L-14 + T - 1 Hours)

Projectiles- Equation of path – range – maximum height- time of flight- range on an inclined plane - problems

Chapter 6 - Sections: 6.1 – 6.16

Unit II: Collision of Elastic Bodies   (L-14 + T - 1 Hours)

Collision of elastic bodies- Laws of impact- direct and oblique impact-Problems.

Chapter 8 - Sections: 8.1 – 8.9

Unit III: Simple Harmonic Motion   (L-14 + T - 1 Hours)

Simple Harmonic Motion (SHM) in a straight line- Geometrical representation – composition

of SHM's of the same period in the same line and along two perpendicular directions – problems.

Chapter 10 - Sections: 10.1 – 10.7

Unit IV: Motion Under the Action of Central Forces   (L-14 + T - 1 Hours)

 Motion under the action of central forces – velocity and acceleration in polar co-ordinates – problems.

Chapter 11 - Sections: 11.1 – 11. 5

Unit V: Differential Equations of central orbit   (L-14 + T - 1 Hours)

Differential Equation of central orbit - pedal equation of central orbit – problems to find the law of force towards the pole when the orbit is given.

Chapter 11 - Sections: 11.6 – 11. 10

Tutorial Section:

Unit	Topic	Hours
I	Characteristics of motion of the projectile	1
II	Direct and oblique impact	1
III	SHM in Straight lines and perpendicular lines	1
IV	Central forces	1
V	Central Orbit	1

Text Books:

1. Venkatraman, M.K. - A Text Book on Dynamics, Agasthiar Publication, Trichy.

References Books:

1. Narayanan, S- Dynamics, 1986, 16th Edition, S.Chand & company, New Delhi**.**

2. Duraipandiyan, P, Laxmi Duraipandian and Muthamiz Jayaprgasam, 2003, Mechanics, S.Chand & Company**.**

Web References:

1. Central Force: Equations, Motions, Fields & Examples (collegedunia.com)
2. Chapter 8. Cams – Theory of Machines | Online Tutorials (w3it.dev)
3. CENTRAL ORBIT | Meaning & Definition for UK English | Lexico.com

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part – III	Core - 15	U21M A615	Graph Theory	85	5	-	4

Contact hours per semester:90

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Sixth	25	75	100

Preamble

The course provides and to improve the notation of Graph Theory and learn the basic concepts and its applications and also the techniques of combinatorics in Graph Theory.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	find the basic concepts of Graph Theory and its definitions of various graphs	K1, K2
CO2	demonstrate different types of Graphs	K3
CO3	apply the Graph Theory concepts in various problems	K4
CO4	analyze different types of Graphs	K5
CO5	evaluate the problems and theorems using graph theory applications	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 - Create.

CO - PO Mapping (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	3
CO2	2	3	2	3	1	1	2
CO3	3	2	3	2	1	-	-
CO4	3	3	2	2	2	2	3
CO5	2	2	2	1	2	2	2
Total Contribution of COs to POs	13	12	12	10	8	8	10
Weighted Percentage of COs Contribution to POs	86.66	80	80	66.6	53.33	53.33	66.66

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Graphs and Subgraphs   **(L-17 + T - 1 Hours)**

Definition and examples of graph – subgraph - isomorphism - independent sets and

coverings – matrices – operation in graphs

Chapter 2 – Sections: 2.1 – 2.9 (Except 2.5, 2.7)

Unit II: Degree Sequences   **(L-17 + T - 1 Hours)**

Degree sequence – graphic sequence – walks – trails and paths – connectedness and components –
Blocks connectivity

Chapter 3 – Sections: 3.1 – 3.2, Chapter 4 – Sections: 4.1 – 4.4

Unit III: Eulerian Graphs   **(L-17 + T - 1 Hours)**

Eulerian graphs – Hamiltonian graphs – characterization of trees – center of a tree

Chapter 5 – Sections: 5.1 – 5.2, Chapter 6 – Sections: 6.1 – 6.2

Unit IV: Chromatic Number   **(L-17 + T - 1 Hours)**

Definition and properties of planar graphs – chromatic number and chromatic index of graphs

Chapter 8 – Sections: 8.1 – 8.3, Chapter 9 – Section: 9.1

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Unit V: Di Graphs   **(L-17+ T - 1 Hours)**

Chromatic polynomials – definitions and basic properties of digraphs – paths and connectedness
in digraphs.

Chapter 9 – Sections: 9.4 & Chapter 10 – Sections: 10.1 – 10.2

Tutorial Section:

Unit	Topic	Hours
I	Definition of graphs	1
II	Basic concepts of Graph Theory	1
III	Different application of graphs	1
IV	Theorems	1
V	Problems	1

Text Books:

1. Arumugam.S and S. Ramachandran – Invitation to graph Theory, Scitech publications, Chennai

References Books:

1. Kumaravelu. S and Susheela Kumaravelu – Graph Theory.

2. Harary – Graph Theory

Web References:

1. Hamiltonian Graphs (tutorialspoint.com)
2. Graph Theory - Course (swayam2.ac.in)
3. Graph Theory Fundamental Concepts - javatpoint

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core Elective - II	U21MA6E2A	Number Theory	70	5	-	4

Contact hours per semester: 75
Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Sixth	25	75	100

Preamble

The aim of the course is to highlight the beauties in the world of numbers also to prepare the students for coding through congruence.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand mathematical induction concepts, GCD, basic properties of congruences	K1, K2
CO2	solve the problems using induction method, division algorithm, congruences, factorization	K3
CO3	analyze the properties of numbers, congruences and factorization	K4
CO4	relate division algorithm, Euclidean algorithm, Fermat's theorem, Wilson's theorem, linear congruence and Chinese Remainder theorem	K5
CO5	find the solution using binomial theorem, Karachiite Factorization method of Diophantine equation ax + by = c	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs \\ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	2	1	-
CO2	3	3	3	2	2	-	2
CO3	2	2	2	3	2	2	2
CO4	2	3	3	2	2	3	2
CO5	2	3	3	2	2	2	1
Total Contribution of COs to POs	11	13	13	11	10	8	7
Weighted Percentage of COs Contribution to POs	73.33	86.67	86.67	73.33	66.67	53.33	46.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Mathematical Induction   (L-14 + T - 1 Hours)

Peano‟s Axioms – Mathematical Induction – The Binomial Theorem – Early Number Theory.

Chapter 1 – Sections: 1.1 – 1.2, Chapter 2 – Section: 2.1

Unit II: Divisibility Theory in the Integers   (L-14 + T - 1 Hours)

Division Algorithm – GCD – Euclidean Algorithm – The Diaphantine Equation ax+by=c.

Chapter 2 – Sections: 2.2 – 2.5

Unit III: Primes & their Distribution   (L-14 + T - 1 Hours)

The fundamental Theorem of Arithmetic – The Sieve of Eratosthenes – The Goldbach conjecture.

Chapter 3 – Sections: 3.1 – 3.3

Unit IV: The Theory of Congruences   (L-14 + T - 1 Hours)

Basis properties of congruences – Linear congruence and the Chinese Remainder Theorem.

Chapter 4 – Sections: 4.2 – 4.4

Unit V: Fermat's Theorem   (L-14 + T - 1 Hours)

Fermat‟s Theorem – Wilson‟s Theorem.

Chapter 5 – Sections: 5.2 – 5.3

Tutorial Section:

Unit	Topic	Hours
I	Binomial theorem	1
II	The diaphantine equations ax + by =c	1
III	Sieve of Eratos theorem	1
IV	Chinese remainder theorem	1
V	Fermat's theorem, wilson's theorem	1

Text Book:

1. David.M. Burton, Elementary Number Theory, 6th Edition, Tata McGraw Hill Education Pvt. Ltd

Reference Books:

1. Ivan Niven and H, Zuckerman, An Introduction to Theory of Numbers.
2. Kumaravelu. S, and Susheela Kumaravelu, 2002, Elements Theory, Nagercoil.

Web References:

1. [Binomial Theorem - GeeksforGeeks](#)
2. [Chinese Remainder Theorem | Brilliant Math & Science Wiki](#)
3. [Sieve of Eratosthenes - GeeksforGeeks](#)

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core Elective – 2	U21MA6E2B	Discrete Mathematics	70	5	-	4

Contact hours per semester: 75
Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Sixth	25	75	100

Preamble

The course provides the knowledge of mathematical logic, basic of lattices and Boolean algebra, number system and codes.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand conjunction, graphs, Boolean algebra, decimal, binary, octal, Hexadecimal, lattices and posets	K1, K2
CO2	determine statement formula and truth table, properties of lattices, special lattices, normal form, binary arithmetic operations to numbers	K3
CO3	analyze conditional and bi conditional logic, properties in groups and monoids, crating networks BCD, weighted excers time, statement and predicate calculus	K4
CO4	determine tautologies group codes, minimal sums of products, gray code, relate statement calculus and Predicate calculus	K5
CO5	derive statement and well defined formula solve problems in normal forms, lattices and Boolean algebra, number system and codes	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	3	2	1
CO2	2	2	3	2	2	3	2
CO3	2	2	2	2	2	2	2
CO4	3	2	3	2	2	-	2
CO5	3	2	3	2	2	1	-
Total Contribution of COs to POs	13	11	13	10	11	8	7
Weighted Percentage of COs Contribution to POs	86.67	73.33	86.67	66.67	73.33	53.33	46.67

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Mathematical logic   **(L – 14 + T- 1 Hours)**

Statement and notation – Connectives – Negation – Conjunction – Disjunctions – Statement formula and truth table – conditional and Biconditional – Well defined formulae – Tautologies.

Chapter 1 - Sections: 1-1, 1-2.1 to 1-2.8

Unit II: Theory of Inference   **(L – 14 + T- 1 Hours)**

Normal forms - The theory of inference for the statement calculus

Chapter 1 – Sections: 1-3, 1-4

Unit III: Algebraic Structures   **(L – 14 + T- 1 Hours)**

Algebraic systems - Semigroups and Monoids

Chapter 3 – Sections: 3-1 & 3-2

Unit IV: Lattices and Boolean algebra   **(L – 14 + T- 1 Hours)**

Lattices and Posets – Properties of lattices – special lattices – Boolean algebra

Chapter 4 – Sections: 4-1 & 4-2

Unit V: Boolean Functions   **(L – 14 + T- 1 Hours)**

Boolean functions – Representation and Minimization of Boolean functions

Chapter 4 – Sections: 4-3 & 4-4

Tutorial Section:

Unit	Topic	Hours
I	conditional and Biconditional	1
II	Normal forms	1
III	semigroups and monoids	1
IV	special lattices	1
V	Boolean functions	1

Text Book:

1. Tremblay and Manohar, 1997, Discrete Mathematical Structures with application to Computer Science, (Tata Mc Graw Hill, New Delhi)

Reference Books:

1. Ralph P. Grumaldi Pearson Edelen, Discrete and Combinatorial Mathematics – an applied Introduction, 4th edition.

2. Venkataraman M. K and others, 2000, Discrete mathematics, The National Publishing Company.

Web References:

1. Boolean Algebra - Laws, Rules, Theorems, Examples (cuemath.com)
2. I-1.pdf (etsu.edu)
3. Boolean Expression∕Function (tutorialspoint.com)

III B.Sc MATHEMATICS

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part - III	Core Elective - 2	U21MA6E2C	Fuzzy Sets	70	5	-	4

Contact hours per semester: 75
Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Sixth	25	75	100

Preamble

The course provides the knowledge about fuzzy concepts to the students. To facilitate the students to study fuzzy operations and fuzzy numbers.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember the basic concepts of crisp sets and understand the concepts of fuzzy sets, representation of fuzzy sets, fuzzy set operations, fuzzy arithmetic and fuzzy decision making	K1, K2
CO2	apply the concept of fuzzy set operations, fuzzy arithmetic and fuzzy decision making	K3
CO3	analyze the concept of fuzzy set operations, fuzzy arithmetic and fuzzy decision making	K4
CO4	evaluate α-cut, strong α-cut of fuzzy sets, fuzzy union, fuzzy intersection, fuzzy complement, fuzzy arithmetic and fuzzy decision making	K5
CO5	solve fuzzy linear programming problems and find α-cut, strong α-cut of fuzzy sets, fuzzy union, fuzzy intersection, fuzzy complement	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create.

CO-PO Mapping (Course Articulation Matrix)

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	2	3
CO2	3	3	3	3	3	1	3
CO3	3	3	3	3	2	1	2
CO4	3	3	3	3	3	-	3
CO5	2	2	2	2	3	1	-
Total Contribution of COs to POs	14	14	14	14	14	5	11
Weighted Percentage of COs Contribution to POs	93.33	93.33	93.33	93.33	93.33	33.33	73.33

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit I: Crisp Sets Vs Fuzzy Sets:　　　　　　　　　**(L-14 + T-1 Hours)**

Crisp Sets – Fuzzy Sets – Basic Types – Basic Concepts

Chapter 1 – Sections: 1.2 – 1.4

Unit II: Representation of Fuzzy Sets　　　　　　**(L-14 + T-1 Hours)**

Additional properties of α-cuts – representations of fuzzy sets – Extension principle for fuzzy sets**.**

Chapter 2 – Sections: 2.1 – 2.3

Unit III: Fuzzy set operations　　　　　　　　　**(L-14 + T- 1 Hours)**

Fuzzy complements – Fuzzy intersections : t-norms – Fuzzy Unions : t-conorms.

Chapter 3 – Sections: 3.2 - 3.4

Unit IV: Fuzzy set operations & Fuzzy Arithmetic　　　**(L-14 + T- 1 Hours)**

Fuzzy set operations: Combinations of operations – Aggregation operations.

Fuzzy Arithmetic: Linguistic variables – Arithmetic operations on intervals

Chapter 3 – Sections: 3.5, 3.6 & Chapter 4 – Sections: 4.2, 4.3

Unit V: Fuzzy Decision Making　　　　　　　　　**(L-14 + T-1 Hours)**

Individual Decision Making – Multi-person decision making – Fuzzy linear Programming.

Chapter 15 – Sections: 15.2, 15.3 & 15.7

Tutorial Section:

Unit	Topic	Hours
I	Fundamental Properties of crisp sets, Theorems and problems on fuzzy sets	1
II	Additional properties of α-cuts, Extension principle for fuzzy sets	1
III	Fuzzy complements, t-norms, t-conorms	1
IV	Combinations of operations, Aggregation operations.	1
V	Fuzzy Decision Making, Fuzzy Linear programming problems	1

Text Book:

1. George J. Klir and Bo Bo Yuan, 2002, Fuzzy sets and Fuzzy Logic Theory Applications, Prentice Hall of India, New Delhi.

Reference Books:

1. George J. Klir and Tina. A Folger, 2003, Fuzzy sets, uncertainty and Informations – Prentice Hall of India, New Delhi.
2. Pundir. Pundir, 2015, Fuzzy Sets and Their Applications, Pragathi Prakashan, Meerut.

Web References:

1. Introduction to Fuzzy Set Theory, Arithmetic and Logic - Course (nptel.ac.in)
2. PPT - Fuzzy Sets PowerPoint Presentation, free download - ID:543941 (slideserve.com)
3. FUZZY COMPLEMENT (slideshare.net)

III B.Sc MATHEMATICS

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part – III	Comprehension – II	U21MA4C3	Comprehension in Mathematics – III	-	-	-	1

Year	Semester	Internal Marks	External Marks	Total Marks
Second	Four	-	50	50

Multiple Choice Questions taken from Core and Core Elective papers in Semester V & VI

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part – IV	Skill Enhancement - II	U21MA6S2	Mathematical Reasoning	30	-	-	2

Contact hours per semester: 30
Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**Sixth**	-	**50**	**50**

Preamble

This course aims at developing logical thinking and mathematical reasoning. The science of coding and decoding is a hallmark in this era of communication and networking. A logical deduction is an important tool for any sequential programming which is an essence of the present electronic era.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand some basic mathematical concepts to study the Mathematical reasoning	K1, K2
CO2	apply the basic concepts of mathematical logic to solve problems in competitive exams	K3
CO3	analyze the concepts of blood relations, coding, decoding, puzzle test, logical deduction, arguments, deriving conclusions from passages and theme deduction	K4
CO4	evaluate the problems in of blood relations, coding, decoding, puzzle test, logical deduction, arguments, deriving conclusions from passages and theme deduction	K5
CO5	solving the problems in mathematical reasoning using some basic concepts	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 - Create.

CO - PO Mapping (Course Articulation Matrix)

POs \ COs	PO 1	PO2	PO 3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	3	1	1
CO2	3	2	2	3	3	1	1
CO3	3	2	1	3	3	2	2
CO4	2	2	2	3	2	-	1
CO5	2	2	1	2	2	1	-
Total Contribution of COs to POs	13	11	8	13	13	5	5
Weighted Percentage of COs Contribution to POs	86.67	73.33	53.33	86.67	86.67	33.33	33.33

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit – I : Relations   (L- 5 + T- 1 Hours)

Blood relation – Deciphering jumbled up descriptions, Relation puzzle and coded relations.

Section I : 5

Unit – II: Coding and Decoding   (L- 5 + T- 1 Hours)

Coding and Decoding – Letter decoding, Direct letter coding, Number/symbol coding – Matrix

Coding- Substitution – Deciphering message word codes – Deciphering number and symbol codes

for messages – Jumbled coding.

Section I : 4

Unit – III: Puzzle Test   (L- 5 + T- 1 Hours)

Puzzle test: Classification type – Seating/placing arrangements- Comparison type –
Sequential order of things – Selection based on given conditions – Family based puzzles.

Section I : 6

Unit – IV: Logical Deduction   (L- 5 + T- 1 Hours)
Logical deduction – Arguments – Assumptions.

Section II : 1, 2 & 3

Unit – V: Deriving conclusions from passages   **(L- 5 + T- 1 Hours)**

Deriving conclusions from passages – Theme deduction

Section II : 6 & 7

Tutorial Section:

Unit	Topic	Hours
I	Relation puzzle and coded relations	1
II	Deciphering message word codes	1
III	Seating/placing arrangements	1
IV	Arguments and Assignments	1
V	Theme deduction	1

Text Books:

1. Aggarwal R.S, 2006, A Modern approach to Verbal & Nonverbal Reasoning, S. Chand Company Ltd.

Reference Books:

1. Aggarwal R.S, 2010, A Modern approach to Verbal & Nonverbal Reasoning, S. Chand Company Ltd.
2. Aggarwal R.S, 2019, A Modern approach to Verbal & Nonverbal Reasoning, S. Chand Company Ltd.

Web References:

1. https://www.youtube.com/watch?v=4RvlI-FlVnY
2. https://www.youtube.com/watch?v=LRdLhfDupMU
3. CN106548124A - Theme deduction system, theme presumption method - Google Patents

III B.Sc MATHEMATICS

Category	Course Type	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
Part – IV	Extra Department Course Open Elective	U21MA6OE	Quantitative Aptitude	-	-	-	3

Year	Semester	Internal Marks	External Marks	Total Marks
Third	Sixth	-	100	100

Preamble

.   This course aims at developing logical thinking and mathematical reasoning. The science

of coding and decoding is a hallmark in this era of communication and networking.

Course Outcomes (COs)

On successful completion of the course, the learners should be able to

CO No.	Course Outcome	Knowledge Level (RBT)
CO1	remember and understand the basic rules for percentage, profit and loss, mean, median, mode, logical sequence of words, coding, decoding and puzzle test	K1, K2
CO2	apply the basic concepts of mathematical logic to solve problems in competitive exams	K3
CO3	analyze problem solving method of odd man out series, percentage, profit and loss, mean, median, mode, logical sequence of words, coding, decoding and puzzle test	K4
CO4	evaluate the problems in odd man out series, percentage, profit and loss, mean, median, mode, logical Ven diagram, logical sequence of words, coding, decoding and puzzle test	K5
CO5	find the solutions towards simplification related problems on percentage, profit and loss, , mean, median, mode, logical sequence of words, coding, decoding and puzzle test	K6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 - Create.

III B.Sc MATHEMATICS

CO - PO Mapping (Course Articulation Matrix)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	2	3	2	2
CO2	3	2	2	3	3	1	1
CO3	3	2	1	3	3	1	-
CO4	2	2	2	3	2	1	1
CO5	2	2	1	2	2	-	1
Total Contribution of COs to POs	13	11	8	13	13	5	5
Weighted Percentage of COs Contribution to POs	86.67	73.33	53.33	86.67	86.67	33.33	33.33

Low 1; Medium 2; High 3; Not correlated -

COURSE CONTENT

Unit – I : Percentage

Odd man out series – Percentage – Profit and Loss

Section I: 35, 10, 11 in Text Book I

Unit – II: Central Tendency

Mean – Median - Mode.

Sections: 2.1-2.3 in Text Book II

Unit – III: Logical Sequence

Logical Ven diagram – Logical sequence of words

Section I : 9 & 13 in Text Book III

Unit – IV: Coding

Coding – decoding

Section I: 4 in Text Book III

Unit – V: Puzzle test

Puzzle test – Classification type questions- seating / placing arrangements – comparisontype questions.

Sections I : 6 Type I, II & III in Text Book III

Text Books:

1. Aggarwal. R. S , 2014, Quantitative Aptitude , S . Chand and Company Ltd., New Delhi.

2. Arumugam. S & Thangapandian Issac. A, 2013, Statistics, New Gamma Publication House,Palayamkottai.

3. Aggarwal R.S, 2005, A Modern approach to Verbal & Nonverbal Reasoning, S. Chand Company Ltd,New Delhi.

Reference Books:

1. Aggarwal R.S, 2010, A Modern approach to Verbal & Nonverbal Reasoning, S. ChandCompany Ltd.

2. Aggarwal R.S, 2019, A Modern approach to Verbal & Nonverbal Reasoning, S. ChandCompany Ltd.

Web References:

1. https://www.youtube.com/watch?v=ivE5qNFMDNk
2. https://www.youtube.com/watch?v=wwN3mJ-b4FYReasoning - Logical Venn Diagrams (tutorialspoint.com)