PG & RESERACH DEPARTMENT OF MATHEMATICS

B.Sc. MATHEMATICS PROGRAMME

SCHEME OF EXAMINATIONS (2020-23 BATCHES)

Part No.	Subject Code	Subject Title	Lecture + Practical Hours/Week	Duration of Exam Hrs	Max. Marks			Credit points
					CIA	ESE	TOTAL	
SEMESTER – I								
I	20UTL101	Tamil / Hindi Paper-I	6	3	30	70	100	3
II	20UEN101	English Paper-I	5	3	30	70	100	3
III	20UMS101	CORE I: Classical Algebra	5	3	30	70	100	4
III	20UMS102	CORE II: Calculus	6	3	30	70	100	5
III	20UMS1A1	ALLIED I:Mathematical Statistics I	6	3	30	70	100	5
IV	20UHR101	Human Rights in India	1	2	--	50	50	2
IV	20UEC101	Human Excellence: Personal values and sky yoga practice -I	1	2	-	50	50	1
V	_	Extension Activities (See Annexure -I)	--	--	--	--	--	--
		Total					**600**	**23**
SEMESTER – II								
I	20UTL202	Tamil / Hindi Paper- II	6	3	30	70	100	3
II	20UEN202	English Paper –II	5	3	30	70	100	3
III	20UMS203	CORE III: Trigonometry ,Vector Calculus and Fourier Series	5	3	30	70	100	4
III	20UMS204	CORE IV: Analytical Geometry	5	3	30	70	100	4
III	20UMS2A2	ALLIEDII:Mathematical Statistics II	6	3	30	70	100	5
IV	20EVS201	Environmental Studies	2	3	--	50	50	2
IV	20HEC202	Human Excellence: Family values and sky yoga practice-II	1	2	-	50	50	1
V	_	Extension Activities (See Annexure - I)	--	--	--	--	--	--
		Total					**600**	**22**

SEMESTER – III								
I	20UTL303	Tamil / Hindi Paper- III	5	3	30	70	100	3
II	20UEN303	English Paper –III	6	3	30	70	100	3
III	20UMS305	CORE V: Dynamics	5	3	30	70	100	4
III	20UMS306	CORE VI: Numerical Techniques	4	3	30	70	100	3
III	20UMS3A1	ALLIED III: Physics for Mathematics and Chemistry-I	8	3	30	70	100	4
IV	20UMS3N1/ 20UMS3N2	NME - Quantitative Aptitude - I / Astronomy- I	1	2	--	50	50	2
IV	20HEC303	Human Excellence: Professional values and sky yoga practice-III	1	2	-	50	50	1
V	_	Extension Activities (See Annexure -I)	--	--	--	--	--	--
		Total					**600**	**20**

SEMESTER – IV								
I	20UTL404	Tamil / Hindi Paper - IV	5	3	30	70	100	3
II	20UEN404	English Paper - IV	6	3	30	70	100	3
III	20UMS407	CORE VII: Statics	4	3	30	70	100	4
III	20UMS408	CORE VIII: Operation Research-I	5	3	30	70	100	4
III	20UMS4A2	ALLIED IV: -Physics for Mathematics and Chemistry-II	8	3	30	70	100	4
III	20UMS4A3	ALLIED PRACTICAL: Physics lab for Mathematics and Chemistry	--	3	40	60	100	2
IV	20UMS4N3/ 20UMS4N4	NME - Quantitative Aptitude - II/ Astronomy -II	1	2	--	50	50	2
IV	20HEC404	Human Excellence: Social values and sky yoga practice-IV	1	2	--	50	50	1
V	_	Extension Activities (See Annexure -I)	--	--	--	50	50	1
		Total					**750**	**24**

SEMESTER-V								
III	20UMS509	CORE IX: Modern Algebra	6	3	30	70	100	4
III	20UMS510	CORE X: Real Analysis-I	6	3	30	70	100	4
III	20UMS511	CORE XI: Operation Research-II	5	3	30	70	100	4
III	20UMS512	CORE XII: Theory of Numbers	5	3	30	70	100	4
III	20UMS5E1	ELECTIVE-I- Programming in C	4	3	30	70	100	3
III	20UMS5E2	ELECTIVE PRACTICAL - Programming lab in C	2	3	20	30	50	2
IV	20UMS5S1/ 20UMS5S2	SBE: Network and Information Security/ Cyber security – Ethical Hacking	1	2	--	50	50	2
IV	20GKL501	General Knowledge and General Awareness	SS	2	--	50	50	2
IV	20HEC505	Human Excellence: National values and sky yoga practice :V	1	2	--	50	50	1
		Total					**700**	**26**

SEMESTER – VI								
III	20UMS613	CORE XIII: Linear Algebra	6	3	30	70	100	4
III	20UMS614	CORE XIV: Real Analysis-II	6	3	30	70	100	4
III	20UMS615	CORE XV: Complex Analysis	5	3	30	70	100	4
III	20UMS6E3	ELECTIVE-II- Discrete Mathematics	5	3	30	70	100	5
III	20UMS6E4	ELECTIVEIII- OOP with C++	4	3	30	70	100	3
III	20UMS6E5	ELECTIVE PRACTICAL- Programming lab in OOP with C++	2	3	20	30	50	2
IV	20UMS6S3/ 20UMS6S4	SBE - Mathematics for Finance/ Actuarial Mathematics	1	2	--	50	50	2
IV	20HEC606	Human Excellence: Global values and sky yoga practice-IV	1	2	--	50	50	1
		Total					**650**	**25**
		Grand Total					**3900**	**140**

SBE - Skill Based Elective, SS - Self Study, L-Lecture, T - Tutorial and P-Practical, NME - Non Major Elective.

Annexure – I: List of Part – V Subjects

S.No	Subject Code	Subjects
1.	20 UNC 401	NCC
2.	20 UNS 402	NSS
3.	20 USG 403	Sports and Games
4.	20 URO 404	Rotract Club
5.	20 URR 405	Red Ribbon Club
6.	20 UYR 406	Youth Red Cross
7.	20 UCA 407	Consumer Awareness Club
8.	20 UED 408	Entrepreneurship Development Cell
9.	20 UCR 409	Center for Rural Development
10.	20 USS 410	Student Guild of Service
11.	20 UGS 411	Green Society
12.	20 UEO 412	Equal Opportunity Cell
13.	20 UFA 413	Fine Arts Club
14.	20 UAM 414	Arutchelvar Students Thinkers Forum
15.	20 USV 415	Swami Vivekanandar Students Thinkers Forum

List of Electives

1. Astronomy
2. Special Functions
3. Mathematical Modeling
4. Programming in C
5. Fuzzy Set Theory
6. Discrete Mathematics
7. Graph Theory
8. OOP with C++

Bloom's Taxonomy Based Assessment Pattern

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Part I, II & III - Theory: 70 Marks

TEST- I & II and ESE:

Knowledge Level	Section	Marks	Description	Total
K1/K2 Q:1-10	A(Answer all) 1-5 MCQ 6-10 Define/ Short Answers	10x1=10	MCQ/Define	70
K3 Q:11-15	B(Either or Pattern)	5x4=20	Short Answers	
K4/K5 Q:16-21	C(Answer 4 out of 6)	4x10=40	Descriptive/Detailed	

16 th Question is compulsory, Q: 17-21 answer any three

2. Part IV - Theory: 50 Marks

Knowledge Level	Section	Marks	Description	Total
K1/K2	A(Answer all)	10x1=10	MCQ/Define	50
K3 &K4	B(Answer 5 out of 8)	5x8=40	Descriptive/Detailed	

3. Practical Examinations:

Knowledge Level	**Section**	**Marks**	**Total**
K3	Practical & Record work	30	50
K4		20	
K5			

Components of Continuous Assessment

Components		Calculation	Test 1 & 2 Total
Test 1	70	$\frac{70+70+20+20+20+10}{7}$	30
Test 2	70		
Assignment/Seminar	40		

Programme Objectives:

1. To qualify the students to become successful professionals by demonstrating logical and analytical thinking abilities.

2. To provide knowledge in the breadth and depth of mathematics, including the connections between different areas of mathematics.

Programme Outcomes:

PO 1: To develop important analytical skills and problem solving strategies to assess a broad range of issues in real life.

PO 2: To expose a wide range of modern mathematical ideas from pure and applied mathematics to graduate with both technical and quantitative skills that are in demand in the modern world.

PO 3: To formulate and develop mathematical arguments in a logical manner.

PO 4: To acquire a core of mathematical knowledge and understanding in advanced areas of mathematics from the given courses that provides a solid foundation for future learning.

PO 5: To meet the global challenges and accomplish various rewarding positions in the society.

OBE Rubric Mapping System:

The attainment level of the students as Low, Medium, and High is replaced by the numerals as 1, 2 and 3 respectively.

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS101	**Title**	**Batch :**	2020-2023
		CLASSICAL ALGEBRA	**Semester**	I
Hrs/Week	5		**Credits :**	4

Course Objective

This course provides the learners a wide spectrum of basic mathematical concepts including summation of series, roots of an equation and matrices.

Course Outcomes (CO)

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

K1	CO1	understand the basic concepts of algebra and matrices.
K2	CO2	formulate and solve the mathematical equations and analyze the nature of the roots.
K3	CO3	effectively apply the Binomial theorem, Exponential theorem to summation of series.
K4	CO4	evaluate the system of equations using matrices.

Unit – I

Convergency and Divergency of Series: Some general theorems concerning infinite series – Series of positive terms – Comparison tests – Cauchy's condensation test – D'Alembert's Ratio test – Cauchy's Root test – Raabe's test.

Text Book 1: Chapter 2: Sections: 11-20 [14 Hours]

Unit -II

Binomial theorem: Application of Binomial theorem to summation of series.

Exponential and logarithmic series: The Exponential theorem – Summation - The logarithmic series - Modification of the Logarithmic series - Series which can be summed up by the logarithmic series.

Summation of series: Application of partial fractions.

Text Book 1: Chapter 3: Section: 10.

Chapter 4: Sections: 2, 3, 3.1, 5 - 7, 9, 9.1 (No derivations).

Chapter 5: Sections: 2.1, 3.1, 3.2. [13 Hours]

Unit -III

Theory of equations: Symmetric function of roots- Newton's Theorem on the sum of powers of the roots – 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 (Self study).*

Text Book 1: Chapter 6: Sections: 12, 14 17-19 [13 Hours]

Unit -IV

Theory of equations: Multiple roots – Strum's theorem – Solutions of numerical equations – Newton's method of divisors – Horner's Method.

Text Book 1: Chapter 6: Sections: 26, 27, 28.1-28.3, 29.4, 30 [12 Hours]

Unit -V

Fundamental Concepts: Nilpotent – Idempotent – Unitary – Orthogonal Matrices – Related Problems.

Characteristic roots and Characteristic vectors: The Characteristic equation of transformation - Properties of the Eigen vectors - Cayley-Hamilton theorem (statement only)- Diagonalization of a Matrix.

Text Book 2: Chapter 1.

Text Book 2: Chapter 4. [13 Hours]

Seminar, Assignment.

Text Books:

1. Manicavachagom pillay T. K, Natarajan T. and Ganapathy K. S, *Algebra Volume I*, First edition S. Viswanathan Pvt. Ltd, 2010.
2. Kandasamy P. and Thilagavathi K, *Mathematics for B. Sc. Branch - I, Volume II*, First Edition, 2004.

Books for Reference:

1. Ray M. and Sharma H. S, *A text book of Higher Algebra,* S. Chand & Company, 1988
2. Thakur B. R, Sinha H. C, Agarwal B. L. and Johri V. B,*A text book of Algebra,* Ram Prasad & sons, 1970.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	M	L
CO2	H	M	H	M	H
CO3	M	H	M	M	L
CO4	H	H	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS102	**Title**	**Batch :**	2020-2023
		CALCULUS	**Semester**	I
Hrs/Week	6		**Credits :**	5

Course Objective

This paper enables the students to gain the ability to solve the problems related to multiple integrals, Beta and Gamma functions. It also provides the basic knowledge about Laplace transforms and use it to solve the differential equations.

Course Outcomes (CO)

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

K1	CO1	acquire knowledge in solving the double integrals on both Cartesian and polar co-ordinates.
K2	CO2	apply the concepts of Beta and Gamma functions on multiple integrals and demonstrate the different integrals of partial differential equations and Lagrange's equations.
K3	CO3	use the special methods of finding the particular integral of several linear differential equations with constant and variable co-efficients.
K4	CO4	understand the concept of Laplace transforms and inverse Laplace transforms and using it to solve ordinary differential equations with constant co-efficients.

Unit -1

Linear differential equations with constant coefficients: Differential equation of higher order- The operators D and D^{-1} – Particular integral - Special methods of finding particular integral - Linear equations with variable coefficients – To find the particular integral – Special method of evaluating the P.I. when X is of the form x^m.

Text Book 2 : Chapter 2: Sections: 1 - 4 & 8. [15 Hours]

Unit -2

Partial Differential Equations: Derivation of partial differential equations by elimination of arbitrary constants and by arbitrary functions - Different integrals of partial differential equations – Solutions of partial differential equations in some simple cases - Standard types of first order equations (*Type IV - Self study*) - Lagrange's equation.

Text Book 2 : Chapter 4: Sections: 1 - 6. [16 Hours]

Unit -3

Multiple Integrals: Definition of double integral - Evaluation of the double integral - Double integral in polar co-ordinates - Triple integrals – Applications of multiple integrals (problems only).

Text Book 1 : Chapter 5: Sections: 1 - 5. [15 Hours]

Unit -4

Change of Variables : Jacobians - Two important results regarding Jacobians - Change of variable in the case of two variables - Change of variable in the case of three variables - Transformation from Cartesian to polar co-ordinates - Transformation from Cartesian to spherical polar co-ordinates.

Beta and Gamma Functions : Definitions - Convergence of Γ(n) - Recurrence formula of Gamma functions - Properties of Beta functions - Relation between Beta and Gamma functions - Examples - Applications of Gamma functions to multiple integrals.

Text Book 1 : Chapter 6

Chapter 7: Sections 2 - 6. [16 Hours]

Unit -5

The Laplace Transforms: Definitions - Transform of f(t), e^{at}, cos at, sin at and t^n when n is an integer - Using Laplace transforms to evaluate integreals - *Inverse Laplace transforms (Self study)*- Finding the Laplace transforms of functions to get the inverse transforms of functions--Laplace transforms to solve ordinary differential equation with constant coefficients.

Text Book 2 : Chapter 5: Sections 1,2,4 - 8. [16 Hours]

Seminar, Assignment.

Text Books:

1. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - II,* S. Viswanathan Pvt. Ltd, 2010.
2. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - III,* S. Viswanathan Pvt. Ltd, 2010.

Books for References:

1. Dass H. K, *Advanced Engineering Mathematics (Sixteenth Edition),* S. Chand and Company Ltd, New Delhi, 2006.
2. Kandasamy P. and Thilagavathi K, *Allied Mathematics (Paper - II),* S. Chand and Company Ltd, New Delhi, 2004.
3. Kandasamy P. and Thilagavathi K, *Mathematics (Volume - III),* S. Chand and Company Ltd, New Delhi, 2010.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	H	L
CO2	M	H	H	M	H
CO3	H	M	H	H	H
CO4	H	M	M	H	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS1A1	**Title**	**Batch :**	2020-2023
		MATHEMATICAL STATISTICS - I	**Semester**	I
Hrs/Week	6		**Credits :**	5

Course Objective

The aim of this course is to introduce the concept of discrete and continuous random variables, probability functions, expectations, moment generating functions and some discrete and continuous distributions and should have developed skills to apply them to various real life situations.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	understand random variables and probability distributions.
K2	CO2	know the difference between discrete and continuous random variables.
K3	CO3	compute expected value and variance of discrete and continuous random variables.
K4	CO4	acquire the knowledge by using Binomial distribution, Poisson distribution etc.

Unit -1

Random Variables and Distribution Functions:

Two Dimensional Random Variables - Two Dimensional or Joint Probability Mass Function - Two Dimensional Distribution function - Marginal Distribution functions - Joint Density function - Marginal Density Function - The conditional Distribution Function and Conditional Probability Density function - Simple problems.

Chapter 5: Sections: 5.5, 5.5.1 - 5.5.5.

Mathematical Expectation:

Introduction - Mathematical Expectation or Expected value of Random variable - Expected value of function of a Random variable - Properties of Expectation.

Chapter 6: Sections: 6.1-6.4. [16 Hours]

Unit -2

Mathematical Expectation:

Properties of Variance - Covariance – Variance of a linear combination of Random variables - Moments of Bivariate Probability Distributions - Conditional Expectation and Conditional Variance - Simple problems.

Chapter 6: Sections: 6.5, 6.6, 6.6.1, 6.8, 6.9.

Moment Generating Functions:

Moment Generating Functions - Properties of Moment Generating Functions - Uniquness Theorem of Moment Generating Functions - Cumulants - *Properties of Cumulants (Self study)* - Simple problems.

Chapter 7: Sections: 7.1, 7.1.2, 7.1.3, 7.2, 7.2.1. [15 Hours]

Unit -3

Moment Generating Functions:

Characteristic Function (Self study) - Properties of Characteristics Function - Chebychev's inequality - Simple problems.

Chapter 7: Sections: 7.3, 7.3.1, 7.5.

Special Discrete Probability Distributions:

Binomial distribution - Moments of Binomial Distribution - Recurrence Relation for the Moments of Binomial Distribution - Moment Generating function of Binomial Distribution - - Additive property of Binomial Distribution- Simple problems.

Poisson distribution - Moments of Poisson distribution - Recurrence relation of Moments of the Poisson distribution - Moment Generating function of Poisson Distribution - Characteristics Function of the Poisson distribution – Cumulants of the Poisson distribution Additive or reproductive property of independent Poisson variates - Simple problems.

Chapter 8: Sections: 8.4, 8.4.1, 8.4.2, 8.4.6, 8.4.7, 8.5, 8.5.2, 8.5.4, 8.5.5, 8.5.8 [16 Hours]

Unit -4

Special Continuous Probability Distributions:

Normal distribution - Chief Characteristics of the Normal Distribution - M.G.F. of Normal distribution - C.G.F. of Normal distribution - Moments of Normal Distribution - A linear combination of independent normal variates - Simple problems.

Rectangular distribution - Moments of Rectangular distribution - MGF of Rectangular distribution - Characteristic function of Rectangular distribution - Mean Deviation about Mean -Simple problems.

Chapter 9: Sections: 9.2, 9.2.2, 9.2.5, 9.2.6, 9.2.7, 9.2.8, 9. 3-9.3.4. [15 Hours]

Unit -5

Special Continuous Probability Distributions:

Gamma Distribution - M.G.F. of Gamma distribution - C.G.F. of Gamma distribution Additive property of Gamma Distribution - Beta distributions of first kind - Constants of Beta distributions of first kind - Beta distributions of second kind - Constants of Beta distributions of second kind - Exponential distribution - M.G.F. of Exponential distribution - Simple problems.

Chapter 9: Sections: 9.5-9.5.3, 9.6, 9.6.1, 9.7, 9.7.1, 9.8, 9.8.1. [16 Hours]

Seminar, Assignment.

Text Book:

Gupta S. C. and Kapoor V. K, *Fundamentals of Mathematical Statistics, Eleventh Edition* S. Chand & Sons, 2009.

Books for Reference:

1. Hogg R.V. and Craigh A. G, *Introduction to Mathematical Statistics,* Pearson Education publications, 2004.
2. Veerarajan .T, *Fundamentals of Mathematical Statistics,* Yes Dee Publishing Pvt.Ltd, 2017.
3. Vital P. R, *Mathematical Statistics,* Margham publications, 2004.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	M	L
CO2	H	M	M	H	M
CO3	H	H	M	M	M
CO4	M	M	M	H	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UCY1A1	**Title**	**Batch :**	2020-2023
		ANCILLARY MATHEMATICS FOR CHEMISTRY-I	**Semester**	I
Hrs/Week	8		**Credits :**	4

Unit -1

Symmetric and Skew - Symmetric matrices - Hermitian and Skew - Hermitian matrices - Orthogonal and unitary matrices - Characteristic Equation of a matrix - Cayley-Hamilton's theorem (without proof) - Simple Problems.

Chapter 5: Sections: 5.8 - 5.23 and 5.50 - 5.67.

(Pg. No. : 5.8 to 5.23 and 5.50 to 5.67) [22 Hours]

Unit -2

Fundamental theorem in the theory of Equations - Relation between the roots and co-efficient of an Equation - Imaginary and Irrational roots.

Chapter 6 :Sections: 6.1 - 6.17 and 6.19 - 6.25.

(Pg. No. : 6.1 to 6.17 and 6.19 to 6.25) [22 Hours]

Unit -3

Reciprocal Equation - Diminishing the roots of an Equation - Removal of term - Simple Problems.

Chapter 6 :Sections: 6.30 - 6.36 and 6.49 - 6.55.

(Pg. No. : 6.30 to 6.36 and 6.49 to 6.55) [21 Hours]

Unit -4

Summation of Binomial Series - Exponential series - Simple Problems.

Chapter 2: Sections: 2.4 - 2.10, Chapter 3 Sections: 3.1 - 3.9.

(Pg. No. : 2.4 to 2.10 and 3.1 to 3.9) [19 Hours]

Unit -5

Beta, Gamma Functions - Simple Problems.

Chapter 30 :Sections: 30.1 - 30.23. (Pg. No. : 30.1 to 30.23) [20 Hours]

Text Book:

Dr. Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.

Books for Reference :

Frank Ayres*, Shaum's outline of theory and problem of matrices.*

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title:**	Mathematics	
Course Code:	20UPS1A1	**Title**	**Batch :**	2020-2023
		ANCILLARY MATHEMATICS FOR PHYSICS – I	**Semester**	I
Hrs/Week	8		**Credits :**	4

Unit -1

Symmetric and Skew-Symmetric matrices - Hermitian and Skew - Hermitian matrices - Orthogonal and unitary matrices - Characteristic Equation of a matrix - Cayley-Hamilton's theorem (without proof) - Simple Problems.

Chapter 5: Sections: 5.8 - 5.23 and 5.50 - 5.67.

(Pg. No : 5.8 to 5.23 and 5.50 to 5.67) [23 Hours]

Unit -2

Fundamental theorem in the theory of Equations - Relation between the roots and co-efficient of an Equation - Imaginary and Irrational roots.

Chapter 6: Sections: 6.1 - 6.17 and 6.19 - 6.25.

(Pg. No. : 6.1 to 6.17 and 6.19 to 6.25) [22 Hours]

Unit -3

Reciprocal Equation - Diminishing the roots of an Equation - Removal of term - Simple Problems.

Chapter 6: Sections: 6.30 - 6.36 and 6.49 - 6.55.

(Pg. No. : 6.30 to 6.36 and 6.49 to 6.55) [21 Hours]

Unit -4

Logarithmic series - Binomial series - Simple Problems.

Chapter 4: Sections: 4.1 - 4.11

Chapter 2 :Sections: 2.4 - 2.10(Pg. No. : 4.1 to 4.11 and 2.4 to 2.10) [19 Hours]

Unit -5

Beta, Gamma Functions - Simple Problems.

Chapter 30: Sections: 30.1 - 30.23. (Pg. No. : 30.1 to 30.23) [19 Hours]

Text Book:

Dr. Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.

Books for Reference :

Frank Ayres*, Shaum's outline of theory and problem of matrices.*

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS203	**Title**	**Batch :**	2020-2023
		TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES	**Semester**	II
Hrs/Week	5		**Credits :**	4

Course Objective

This paper enables the students to provide basic knowledge of trigonometry, vector calculus and Fourier series.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	understand the expansions of trigonometric functions, the nature of hyperbolic functions, Fourier Series, Vector point functions.
K2	CO2	find the Fourier co-efficient for Periodic functions and its applications.
K3	CO3	apply the concepts of Gradient, Divergence and Curl in solving vector differentiation problems.
K4	CO4	solve the multiple integrals by applying Gauss divergence theorem, Stoke's theorem and Green's theorem.

Unit -1

Expansions and Inverse circular functions:

Expansions of $\cos^n\theta$ and $\sin^n\theta$ - Expansions of $\cos n\theta$ and $\sin n\theta$ – Power series for sin x and cos x – Trigonometric equations – Relations among inverse functions – Related problems.

Text Book 1: Chapter 4: Sections: 4.1 – 4.5. [14 Hours]

Unit -2

Circular and Hyperbolic Functions:

Exponential function – Circular functions - hyperbolic functions - Relations between circular and hyperbolic functions – Peroid of function - Inverse hyperbolic functions.

Text Book 1: Chapter 6: Sections: 6.1 – 6.6. [13 Hours]

Unit -3

Fourier Series:

Definition - Finding Fourier co-efficient for given periodic functions with period 2π and $2l$- Even and odd functions - Half range series.

Text Book 2: Chapter 6: Sections: 1 – 6.1. [13 Hours]

Unit -4

Vector differentiation: Gradient, Curl and Divergence- Scalar and vector point functions - Level surface - Gradient of a scalar point function - Directional derivative of a scalar point function - Theorems (statement only) - *Equations of tangent plane and normal line to a level surface (Self study)* - Divergence and curl of a vector point function - Solenoidal vector - Irrotational vector - Vector identities.

Text Book 3: Chapter 1. [12 Hours]

Unit -5

Vector integration: Line integral - Theorems on line integrals - Surface and Volume integrals - Gauss Divergence theorem - Stoke's theorem - Green's theorem in plane. (Statement only and relevant problems).

Text Book 3: Chapter 2. [13 Hours]

Seminar, Assignment.

Text Books:

1. Duraipandian P, Laxmi Duraipandian and Jayamala paramasivan, Trigonometry, Emerald Publishers, 1999.
2. Narayanan S., Manicavachagom Pillay T. K, Viswanathan S., *Calculus Volume III*, (Printers & Publishers), Pvt. Ltd, 2010.
3. Vittal P. R., Malini V., *Vector Analysis*, Margham publication,1997.

Books for References:

1. Gupta R, *Vector Calculus*, Firewall media.
2. Narayanan S. and Manicavachagom pillay T. K, *Trigonometry*, Viswanathan S, Pvt. Ltd, 2012.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	M	M
CO2	M	H	H	M	M
CO3	H	M	M	M	L
CO4	M	M	M	H	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS204	**Title**	**Batch :**	2020-2023
		ANALYTICAL GEOMETRY	**Semester**	II
Hrs/Week	5		**Credits :**	4

Course Objective

This paper enables the student to gain fundamental ideas about co-ordinate geometry and gives clear knowledge about regular geometrical aspects and their properties in two dimensional and three dimensional analytical geometry.

Course Outcomes (CO)

On completion of this course, the students will be able to:

K1	CO1	recollect the properties of circle, sphere and can able to gain a deep knowledge in it.
K2	CO2	get the clear idea about the relation between polar and cartesian co-ordinates.
K3	CO3	compute the equation of a circle on a sphere.
K4	CO4	analyze the concepts of right circular cone, enveloping cone, General quadric cone and their properties.

Unit -1

Circle - *Common tangents to two circles (self study).*
Text book 1: Chapter 4: Sections: 4.10 – 4.14.
Parabola
Text book 1: Chapter 6: Sections: 6.5-6.7.
Ellipse
Text book 1: Chapter 7: Sections: 7.6-7.8.
Hyperbola - *Some properties of the asymptotes (self study).*

Text book 1: Chapter 8: Sections: 8.4-8.6. [13 Hours]

Unit -2

Polar Equations

Text book 1: Chapter 9: Sections: 9.1 – 9.15. [13 Hours]

Unit -3

Sphere

Text book 2: Chapter 4: Sections: 4.1- 4.8. [13 Hours]

Unit -4

Cone, Cylinder and Central quadrics

Text book 2: Chapter 5: Sections: 5.1 – 5.7. [14 Hours]

Unit -5
Cone, Cylinder and Central quadrics

Text book 2: Chapter 5: Sections: 5.8 – 5.13 [12 Hours]

Seminar, Assignment.

Text Books:

1. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I two dimensions*, S. Viswanathan printers & publishers Pvt. Ltd, 2018.
2. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I three dimensions*, S. Viswanathan printers & publishers, Pvt. Ltd, 2019.

Books for Reference :

1. Duraipandian P, Laxmi Duraipandian, Muhilan D, *Analytical Geometry 2 dimensional*, Emerald publishers, 2000.
2. Duraipandian P, Laxmi Duraipandian, Muhilan D, *Analytical Geometry 3 dimensional*, Emerald publishers, 2000.

3. **Mapping**

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	M	L
CO2	H	M	M	M	M
CO3	H	M	H	M	M
CO4	M	M	H	H	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS2A2	**Title**	**Batch :**	2020-2023
		MATHEMATICAL STATISTICS – II	**Semester**	II
Hrs/Week	6		**Credits :**	5

Course Objective

The objective of this paper is to introduce the concepts about correlation, regression, sample theory, sampling distributions and theory of estimation.

Course Outcomes (CO)

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

K1	CO1	understand the meaning of correlation, regression and its properties.
K2	CO2	analyze the concepts of sampling techniques and procedure for testing of hypothesis for large samples.
K3	CO3	demonstrate the use of chi-square distribution
K4	CO4	apply the concepts of t, F, z-distributions and its applications.

Unit -1

Correlation: Introduction – Meaning of correlation – Scatter diagram - Karl Pearson's co-efficient of Correlation - Limits for Correlation Coefficient - Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution - Rank Correlation - Spearmen's Rank Correlation Coefficient - problems only (no derivations).

Chapter 10: Sections: 10.1, 10.2, 10.3, 10.4, 10.4.1, 10.5, 10.7, 10.7.1.

Linear Regression: Introduction – Linear Regression - Regression Coefficients - Properties of Regression Coefficients- *Angle between two Lines of Regression (Self study)* - Simple Problems.

Chapter 11: Sections: 11.1, 11.2, 11.2.1, 11.2.2, 11.2.3. [16 Hours]

Unit -2

Large Sample Theory: Introduction – Types of sampling – Purposive sampling -Random Sampling – simple sampling – Stratified sampling - Parameter and Statistic - Sampling Distribution of a Statistic - Standard Error - Tests of Significance - Null and alternative Hypothesis - Errors in sampling - Critical Region and Level of Significance - One-tailed and Two-tailed tests - Critical Values or Significant Values - Procedure for Testing of Hypothesis - Tests of Significance for Large Samples - Sampling of Attributes - Test of significance for Single Proportion - Test of significance for Difference of Proportions - Simple Problems.

Chapter 14 : Sections: 14.1, 14.2, 14.2.1, 14.2.2, 14.2.3, 14.2.4, 14.3, 14.3.1, 14.3.2, 14.4, 14.4.1-14.4.5, 14.5, 14.6, 14.7, 14.7.1, 14.7.2. [16 Hours]

Unit -3

Large Sample Theory: Sampling of Variables - Test of significance for Single Mean - *Test of significance for Difference of Means (Self study)*- Simple Problems.

Chapter: 14 : Sections: 14.8, 14.8.3, 14.8.4.

Chi – square (χ^2) Distribution: Applications of Chi- square Distribution - Inferences about a Population Variance - Goodness of Fit Test - Test of Independence of Attributes-- Contingency Tables - Simple Problems.

Chapter 15: Sections: 15.6, 15.6.1, 15.6.2, 15.6.3. [15 Hours]

Unit -4

t, F, z Distributions: Applications of t-Distribution - t-test for Single Mean - t-test for Difference of Means - t-test for Testing the Significance of an Observed Sample Correlation Coefficient - Applications of F-Distribution - F-test for Equality of Two Population Variances - Simple Problems.

Chapter 16: Sections: 16.3, 16.3.1, 16.3.2, 16.3.4, 16.6, 16.6.1. [16 Hours]

Unit -5

Theory of Estimation: Introduction - Characteristic of estimators – Unbiasedness – Consistency – Efficient estimators – Sufficiency – Cramer-Rao inequality – Simple problems – Methods of estimation – Method of maximum likelihood estimation – Properties of maximum Likelihood Estimators – Method of moments - Simple Problems.

Chapter 17: Sections: 17.1, 17.2, 17.2.1, 17.2.2, 17.2.3, 17.2.4, 17.3, 17.6, 17.6.1, 17.6.3. [15 Hours]

Seminar, Assignment.

Text Book:

Gupta S. C and Kapoor V. K, *Fundamentals of Mathematical Statistics,* S. Chand & Sons, 2009.

Books for References:

1. Hogg R. V and Craigh A. G, *Introduction to Mathematical Statistics,* Pearson Education publications, 2004.
2. Veerarajan .T, *Fundamentals of Mathematical Statistics,* Yes Dee Publishing Pvt.Ltd, 2017.
3. Vital P. R, *Mathematical Statistics*, Margham publications, 2004.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	M	M
CO2	H	H	H	M	L
CO3	H	H	H	M	H
CO4	H	H	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UCY2A2	**Title**	**Batch :**	2020-2023
		ANCILLARY MATHEMATICS FOR CHEMISTRY-II	**Semester**	II
Hrs/Week	8		**Credits :**	4

Unit -1

Hyperbolic functions: Relations between circular and hyperbolic functions - Addition formula for hyperbolic functions - Problems.

Chapter 14: Sections : 14.31-14.37&14.40-14.55
(Pg. No. : 14.31 to14.37 and 14.40 to 14.55) [21 Hours]

Unit -2

Laplace Transforms: Definition - Laplace transform of elementary function - Linear Property - Shifting Property - Change of scale property - Laplace transform of derivatives - Laplace transform of integrals - Multiplication by t - problems.

Chapter 27: Sections : 27.1 - 27.19 (Pg. No. : 27.1 to 27.19) [22 Hours]

Unit -3

Vector Differentiation: Gradient, Curl and Divergence - Problems.

Chapter 28: Sections : 28.7 - 28.51, 28.23, 28.26 - 28.33 and 28.36 - 28.43
(Pg.No. : 28.7 to 28.51, 28.23, 28.26 to 28.33 and 28.36 to 28.43) [21 Hours]

Unit -4

Line Integral - Surface Integral - Volume Integral - Simple Problems.

Chapter 29: Sections : 29.59 - 29.72 and 29.75 - 29.87.
(Pg. No. : 29.59 to 29.72 and 29.75 to 29.87). [20 Hours]

Unit -5

Green's theorem (without proof) - Simple Problems.

Chapter 29: Sections : 29.129 - 29.140
(Pg.No. : 29.129 to 29.140) [20 Hours]

Text Books:

Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.

Books for Reference :

1. Murray R. Spiegel, *Shaum's outline of theory and problem of vector analysis*
2. Murray R. Spiegel, *Shaum's outline of theory and problem of Laplace Transform.*

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UPS2A2	**Title**	**Batch :**	2020-2023
		ANCILLARY MATHEMATICS FOR PHYSICS-II	**Semester**	II
Hrs/Week	8		**Credits :**	4

Unit -1

Hyperbolic functions: Relations between circular and hyperbolic functions - Addition formula for hyperbolic functions - Problems.

Chapter 14: Sections : 14.1 - 14.37 and 14.40 - 14.57.
(Pg. No. : 14.1 to 14.37 and 14.40 to 14.57) [21 Hours]

Unit -2

Laplace Transforms: Definition - Laplace transform of elementary function - Linear Property - Shifting Property - Change of scale property - Laplace transform of derivatives - Laplace transform of integrals - Multiplication by t - Problems.

Chapter 27: Sections : 27.1 - 27.19. (Pg. No. : 27.1 to 27.19). [22 Hours]

Unit -3

Vector Differentiation: Gradient, Curl and Divergence - Simple Problems.

Chapter 28: Sections : 28.8 - 28.51. (Pg. No. : 28.8 to 28.51). [21 Hours]

Unit -4

Line Integral - Surface Integral - Volume Integral - Simple Problems.

Chapter 29: Sections : 29.59 - 29.72 and 29.75 - 29.87.
(Pg. No. : 29.59 to 29.72 and 29.75 to 29.87). [20 Hours]

Unit -5

Exponential series-simple problems.

Chapter 3 Sections :3.1 to 3.9 [20 Hours]
(Pg. No. : 3.1 to 3.9).

Text Book :

Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.

Books for Reference :

1. Murray R. Spiegel*, Shaum's outline of theory and problem of vector analysis.*
2. Murray R. Spiegel*, Shaum's outline of theory and problem of Laplace transform.*

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS305	**Title**	**Batch :**	2020-2023
		DYNAMICS	**Semester**	III
Hrs/Week	5		**Credits :**	4

Course Objective

This course provides a thorough knowledge about the characteristics of Projectiles, Energies during impact and Collision. Each topic involves problems to solve which develops the application skills and thinking process of the students.

Course Outcomes (CO)

On completion of this course, the students will be able to:

K1	CO1	remember the notions which were studied under Simple harmonic motion.
K2	CO2	clearly understand the concept of projectiles and its properties by solving some simple problems related to it.
K3	CO3	evaluate the law of forces in central orbit by applying the action of central forces.
K4	CO4	analyze the concept of impulse, impulsive forces and the collision of elastic bodies and able to solve the simple problems regarding it.

Unit -1

Projectiles - Simple problems.

Chapter 6 :Sections : 6.1 - 6.15. [13 Hours]

Unit -2

Simple Harmonic Motion - Simple problems.

Chapter 10: Sections : 10.6 - 10.11. [12 Hours]

Unit -3

Motion under the action of central forces - *Differential Equations of central orbits (Self study)* - Simple problems.

Chapter 11: Sections : 11.1 - 11.13. [14 Hours]

Unit -4

Impulsive forces - Simple problems.

Chapter 7:Sections : 7.1 - 7.6. [13 Hours]

Unit -5

Collision of elastic bodies -. *Compression and Restitution (Self study)* - Simple problems.

Chapter 8: Sections : 8.1 - 8.8. [13 Hours]

Seminar, Assignment.

Text Book:

Venkataraman M. K, *Dynamics*, Thirteenth Edition, Agasthiar publications, 2009.

Books for Reference :

1. Dharmapadam A. V, *Dynamics*, S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai, 1998.
2. Viswanath Naik K and Kasi M. S, *Dynamics*, Emerald Publishers, 1992.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	H	M	H
CO2	H	M	M	M	M
CO3	H	M	M	M	M
CO4	H	M	M	M	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS306	**Title**	**Batch :**	2020-2023
		NUMERICAL TECHNIQUES	**Semester**	III
Hrs/Week	4		**Credits :**	3

Course Objective

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non linear differential equations when ordinary analytical methods fail.

Course Outcomes (CO)

On successful completion of the course the students will be able to

K1	CO1	derive numerical methods for approximating the solution of the problems of algebraic and transcendental equations, ordinary and partial differential equations.
K2	CO2	implement a variety of numerical algorithms using appropriate technology
K3	CO3	get practical knowledge of polynomial interpolation. Also numerical algorithms are used in C++ for solving scientific problems.
K4	CO4	solve the ordinary differential equations by using the methods like Euler's, Runge Kutta, Modified Euler and Improved Euler.

Unit -1

The solution of Numerical Algebraic and Transcendental Equations: Introduction - The Bisection method - The iteration method - The method of false position (Regula Falsi Method) - Newton Raphson method.

Chapter 3: Sections: 1 - 5.

Simultaneous Linear Algebraic Equations:

Introduction – Gauss Elimination Method – Gauss Jordan Method – Computation of the inverse of a Matrix using Gauss's Elimination Method.

Chapter 4: Sections: 1 – 3. [11 Hours]

Unit -2

Simultaneous Linear Algebraic Equations:

Iterative Methods - Gauss-Jacobi Method – Gauss-Seidal Method – *Comparison of Gauss elimination and Gauss-Seidal Iteration methods (Self study).*

Chapter 4: Sections: 6, 7.

Interpolation: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values.

Chapter 6: Sections: 1 - 5. [10 Hours]

Unit -3

Numerical Differentiation: Introduction - Newton's forward difference formula to compute the derivatives - Newton's backward difference formula to compute the derivatives - Derivatives using Stirling's formula.

Chapter 9: Sections: 1 - 4.
Numerical Integration: The Trapezoidal rule - Romberg's method - Simpson's one third rule - Practical applications of Simpson's rule.
Chapter 9: Sections: 8 -10 and 12. [10 Hours]

Unit -4
Numerical Solution of Ordinary Differential Equations:
Solution by Taylor Series - Taylor Series method for higher order differential equations - Euler's method - Improved Euler's method - Modified Euler method - Runge Kutta method - Second order Runge Kutta Method - *Higher order Runge Kutta methods (Self study).*
Chapter 11: Sections: 6, 8, 10 - 15. [10 Hours]

Unit -5
Numerical Solution of Partial Differential Equations:
Elliptic equations – Solution of Laplace's equation by Iteration – Poisson's equation.
Chapter 12: Sections: 5, 6, 7. [11 Hours]

Seminar, Assignment.

Text Book:

Venkataraman M. K, *Numerical Methods in Science and Engineering*, The National Publishing Company, Madras, 2009.

Books for Reference :

Kandasamy P, Thilagavathy K and Gunavathi K, *Numerical Methods*, S. Chand company Ltd, 2012.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	H	H	L
CO2	H	H	M	H	M
CO3	H	M	H	M	M
CO4	M	M	M	H	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS3N1	**Title**	**Batch :**	2020-2023
		NME: QUANTITATIVE APTITUDE - I	**Semester**	III
Hrs/Week	1		**Credits :**	2

Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	remember the meaning of HCF and LCM of numbers.
K2	CO2	understand the concepts of odd man out & series.
K3	CO3	analyze the concepts of ratio & proportion.
K4	CO4	apply the concepts of profit & loss in real life problems.

Unit -1

Percentage: Introduction - Important facts and family - Concept of percentage - Simple problems.

Chapter 10. [3 Hours]

Simplification: Introduction - BODMAS rule - Simple problems.

Chapter 4.

.

Unit -2

Ratio and Proportion: Ratio - Proportion - Simple problems.

Chapter 12: [3 Hours]

Unit -3

Profit and loss: Introduction - Cost price - Selling price - Profit and loss - Simple Problems.

Chapter 11 . [2 Hours]

Unit -4

Permutations and Combinations: Factorial Notation – Permutations – Combinations.

Chapter 30 [2 Hours]

Unit – 5

Probability: Sample Space – Results on probability.

Chapter 34 [2 Hours]

Seminar, Assignment.

Text Book:

Aggarwal R. S, *Quantitative Aptitude,* S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	H	M	H
CO2	M	H	H	M	M
CO3	H	M	H	M	M
CO4	H	M	H	H	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS3N2	**Title**	**Batch :**	2020-2023
		NME ASTRONOMY- I	**Semester**	III
Hrs/Week	1		**Credits :**	2

Course Objective

This paper enables the learners to gain basic knowledge of the Solar System and the Milky Way.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	understand the concept of the Solar System.
K2	CO2	become familiar with the Double & Multiple stars.
K3	CO3	acquire the knowledge in the Milky Way.
K4	CO4	know the various constellations.

Unit -1

The Solar System: Introduction - The Sun - Mercury - Venus - Mars - Asteroids - Jupiter - Saturn - Uranus - Neptune.

Chapter 16: Sections: 316 - 326. Pg.No : 455 - 467 [3 Hours]

Unit -2

The Solar System: Comets - Meteors - Zodiacal light.

Chapter 16 Sections: 327 - 329. Pg.No : 467 - 472 [3 Hours]

Unit -3

Double And Multiple Stars: Introduction - Variables stars - Eclipsing Variables capheid variables - Long period variables - Irregular variables - Novae - Star clusters Nebulae - Constellations - Zodiacal Constellations.

Chapter 17: Sections: 339 - 345. Pg.No : 481 -489 [3 Hours]

Unit -4

The Milky Way: Introduction - Seasonal changes in the night sky - The winter Constellations - The spring Constellations.

Chapter 17: Sections: 346 - 347. Pg.No : 489 - 497 [2 Hours]

Unit -5

Constellations: Introduction - The summer Constellations - The autumn Constellations.

Chapter 17: Section: 347. Pg.No : 497 – 504 [2 Hours]

Seminar, Assignment.

Text Book:

Kumaravelu S and Susheela Kumaravelu, *Astronomy for degree classes*, 7th edition 1986.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	M	M	M
CO2	M	H	M	M	M
CO3	M	M	M	M	M
CO4	M	M	H	M	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS407	**Title**	**Batch :**	2020-2023
		STATICS	**Semester**	IV
Hrs/Week	4		**Credits :**	4

Course Objective

This course enables a deep knowledge about the concept of Forces, Moments, Friction, Gravity and resultant of more than one force acting on a surface. It also includes simple problems in each topic which develops the application skills of the students in solving them.

Course Outcomes (CO)

On completion of this course, the students will be able to:

K1	CO1	recollect the notions of friction and centre of gravity and deploy them in solving the respective problems.
K2	CO2	get a clear idea about the concepts of forces and moments.
K3	CO3	apply the concepts of forces in finding the resultant of more than one force acting on a surface.
K4	CO4	analyze the basics of coplanar forces and equilibrium of three forces acting on a rigid body and can solve the simple problems related to it.

Unit -1

Forces acting at a point - Simple problems.

Chapter 2: Sections : 5-16. [11 Hours]

Unit -2

Parallel forces - *Moments (Self study)* - Simple problems.

Chapter 3: Sections : 1 - 13. [11 Hours]

Unit -3

Couples - Simple problems

Chapter 4: Sections : 1-10. [10 Hours]

Unit -4

Equilibrium of three forces acting on a rigid body - *Coplanar forces (Self study)* - Simple Problems.

Chapter 5: Sections : 1 - 6, Chapter 6: Sections : 1 - 9. [10 Hours]

Unit -5

Friction and Centre of gravity – Simple problems.

Chapter 7: Sections : 1, 3-8, 10-12, Chapter 8: Sections : 1-6, 18. [10 Hours]

Seminar, Assignment.

Text Book:

Venkataraman M. K, *Statics,* Sixth Edition, Agasthiar publications, 2007.

Books for Reference :

1. Dharmapadam A. V, *Statics,* S. Viswanathan printers and Publishers Pvt. Ltd, 1993.
2. Duraipandian P and Laxmi Duraipandian, *Mechanics*, Ram Nagar, New Delhi, S. Chand & Co. Pvt. Ltd, 1985.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	M	H	L
CO2	M	H	M	M	M
CO3	H	H	M	M	M
CO4	H	M	M	M	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS408	**Title**	**Batch :**	2020-2023
		OPERATIONS RESEARCH - I	**Semester**	IV
Hrs/Week	5		**Credits :**	4

Course Objective

The prime objective of this paper is to introduce certain OR techniques such as LPP, Transportation problems, Assignment problems, Sequencing and Replacing models to help the students to develop logical reasoning for applying mathematical tools to managerial and real life oriented problems.

Course Outcomes (CO)

On successful completion of the course, the students will able to

K1	CO1	solve linear programming problem using Simplex Method.
K2	CO2	apply the notions of linear programming in solving transportation problems.
K3	CO3	acquire knowledge in formulating Assignment problem
K4	CO4	become familiar with some of the Queuing models.

Unit -1

Linear Programming Problem: **Mathematical formulation**: Introduction - Linear Programming Problem - Mathematical Formulation of the Problem – illustration on Mathematical formulation of LPP's.

Chapter 2: Sections: 2.1 - 2.4

Linear Programming Problem: **Graphical Solution and Extension:** Introduction - Graphical Solution Method – Some exceptional cases - General Linear Programming Problem - Canonical and Standard Forms of L.P.P.

Chapter 3: Sections: 3.1 - 3.5 [14 Hours]

Unit -2

Linear Programming Problem: **Simplex Method:** Introduction - The Computational Procedure – Use of Artificial Variables - Degeneracy in Linear Programming - Applications of Simplex Method.

Chapter 4: Sections: 4.1, 4.3 - 4.5. [13 Hours]

Unit -3

Duality in Linear Programming: Introduction – General Primal-Dual pair – Formulating a Dual problem - Primal-Dual pair in Matrix form- Duality Theorems – Duality and Simplex Method.

Chapter 5: Sections: 5.1 – 5.4, 5.5, 5.7(Excluding Two-phase method in 4.4.) [13 Hours]

Unit -4

Transportation Problem:

LP formulation of the Transportation Problem - Existence of Solution in TP - The Transportation Table - Loops in Transportation Tables - Finding an initial basic feasible solution - North West corner rule - Least cost Method - *Vogel's approximation Method (Self study)* -Test for Optimality - Determining the Net evaluations (The uv method) -

Transportation algorithm (MODI Method) - Some exceptional cases - Unbalanced Transportation Problem.
Chapter 10: Sections: 10.2, 10.3, 10.5, 10.6, 10.9, 10.10, 10.13, 10. 15. [13 Hours]

Unit -5

Assignment & Replacement Problem: Introduction - Mathematical Formulation of the Assignment Problem - Solution of Assignment Problem – Hungarian Assignment Method - Special cases in Assignment Problems – The Travelling Salesman problem – Introduction - Replacement of equipment / Assert that deteriorates gradually -Value of money does not change with time - Value of money changes with time - Selection of best equipment amongst two - Simple problems.
Chapter 11: Sections: 11.1- 11.3, 11.4, 11.7.
Chapter 18: Sections: 18.1, 18.2. [12 Hours]

Seminar, Assignment.

Text Book:

Kanti Swarup, Gupta P. K and Man Mohan, *Operations Research*, Sultan Chand & Sons, New Delhi, 2014.

Books for Reference:

1. Phillips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt Ltd, New Delhi, 2006.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	H	H	M
CO2	H	H	M	M	M
CO3	H	M	H	M	M
CO4	H	M	M	H	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS4N3	**Title**	**Batch :**	2020-2023
		NME: QUANTITATIVE APTITUDE - II	**Semester**	IV
Hrs/Week	1		**Credits :**	2

Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	remember the meaning of BODMAS rule.
K2	CO2	understand the concept of percentage on simple problems.
K3	CO3	analyze the problem on trains with solved examples.
K4	CO4	apply the concept of time and work on real life problems.

Unit -1

Problems on ages: Problems on ages - Simple problems.
Chapter 8.

[3 Hours]

Unit -2

Time and work: Time and work - Simple problems.
Chapter 15. [2 Hours]

Unit -3

Time and Distance : Time and Distance - Simple problems
Chapter 17. [2 Hours]

Unit -4

Problems on trains: Problems on trains with solved examples.
Chapter 18. [2 Hours]

Unit -5

Boats and Streams: Boats and Streams - Simple problems
Chapter 19. [2 Hours]

Seminar, Assignment.

Text Book:

Aggarwal R. S, *Quantitative Aptitude,* S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	M	H
CO2	H	H	H	M	H
CO3	M	M	H	H	M
CO4	H	H	M	M	H

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS4N4	**Title**	**Batch :**	2020-2023
		NME: ASTRONOMY - II	**Semester**	IV
Hrs/Week	1		**Credits :**	2

Course Objective

This paper enables the learners to learn about the Moon and Ellipses.

Course Outcomes (CO)

On successful completion of the course the students will be able to

K1	CO1	gain basic knowledge of the Moon.
K2	CO2	acquire the facts in Ellipses.
K3	CO3	know the concept of planetary Phenomena.
K4	CO4	find the application of Astronomical Instruments like sidereal clock and chronometer.

Unit -1

The Moon: Introduction - Sidereal month - Synodic month Elongation - Conjugation - Opposition - Quadratures Daily motion of the moon - Age of moon - Phase of moon.

Chapter 12: Sections: 228 - 238 [3 Hours]

Unit -2

The Moon: Moon exhibits the same side to the earth -Lunar Librations -summer and winter full moons path of the moon with respect to the sun - Perturbations of lunar orbit.

Chapter 12: Sections: 241 - 245 [3 Hours]

Unit -3

Eclipses: Introduction – Umbra and penumbra – Lunar eclipse – Solar eclipse – Length of earth's shadow

Chapter 13: Sections: 254 -257 and 264 [3 Hours]

Unit -4

Planetary Phenomena: Introduction – Bode's law – Elongation – Conjugation, opposition and quadratures – Heliocentric motion of a planet.

Chapter 14: Sections: 283,284 and 286 - 288 [2 Hours]

Unit -5

Astronomical Instruments: Sidereal clock – Chronometer – Gnomon Sundial – The sextant.

Chapter 15: Sections: 303-306 and 310 [2 Hours]

Seminar, Assignment.

Text Book:

Kumaravelu S and Susheela Kumaravelu, *Astronomy for degree classes*,7th edition 1986.

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Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	M
CO2	M	M	M	M	L
CO3	M	M	M	M	L
CO4	H	M	H	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS509	**Title**	**Batch :**	2020-2023
		MODERN ALGEBRA	**Semester**	V
Hrs/Week	6		**Credits :**	4

Course Objective

This course promotes a better understanding of algebra and provides an adequate foundation for further study in abstract algebra and its applications in various branches of mathematics.

Course Outcomes (CO)

On successful completion of the course the students will be able to

K1	CO1	recollect the concepts of sets, mappings, relations and work on several examples.
K2	CO2	understand and use the basic definitions and properties of groups, subgroups and find simple proofs for results in group theory.
K3	CO3	extend the results from group theory to study the properties of rings and fields and to possess the ability to work within their algebraic structures.
K4	CO4	apply the concepts of homomorphism and isomorphism for groups and rings.

Unit -1

Preliminary Notions: *Set Theory (Self study) - Mappings (Self study).*

Group Theory: Definition of a Group - Some Examples of Groups - Some preliminary Lemmas – Subgroups – A Counting Principle.

Chapter 1: In Section 1.1, Theorem 1.1.1 only

In Section 1.2, Lemma 1.2.1 onwards

Chapter 2: Sections: 2.1 - 2.5. [15 Hours]

Unit -2

Group Theory: Normal Subgroups and Quotient Groups - Homomorphisms.

Chapter 2: Sections: 2.6, 2.7. [16 Hours]

Unit -3

Group Theory: Automorphisms - Cayley's Theorem - Permutation Groups – Another Counting Principle.

Chapter 2: Sections: 2.8 - 2.11. [16 Hours]

Unit -4

Ring Theory: Definition and Examples of Rings - Some Special Classes of Rings - Homomorphisms - Ideals and Quotient Rings.

Chapter 3: Sections: 3.1 - 3.4. [16 Hours]

Unit -5

Ring Theory: More Ideals and Quotient Rings - The Field of Quotients of an Integral Domain - Euclidean Rings - A Particular Euclidean Ring.

Chapter 3: Sections: 3.5 - 3.8 [15 Hours]

Seminar, Assignment.

Text Book:

Herstein, I. N, *Topics in Algebra*, 2nd Edition, Wiley India Pvt. Ltd, New Delhi, 2010.

Books for Reference :

1. Bhattacharya. P. B, Jain S. K, *A first course in group theory*, Wiley Eastern Pvt. Ltd, 1972.
2. Herstein I. N, *Abstract Algebra*, Prentice-Hall international, inc, 1996.
3. Surjeetsingh, Qazizameeruddin, *Modern Algebra*, Vikas Publishing House Pvt. Ltd, Second Edition, 1975.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	H	H	M	M
CO2	M	M	M	M	M
CO3	M	M	M	M	L
CO4	M	M	M	M	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS510	**Title**	**Batch :**	2020-2023
		REAL ANALYSIS - I	**Semester**	V
Hrs/Week	6		**Credits :**	4

Course Objective

To enable the learner to get into basic concepts of Real Analysis and obtain a foundation for further study in analysis.

Course Outcomes (CO)

On successful completion of the course the students will be able to

K1	CO1	understand basic concepts of Real Analysis
K2	CO2	apply the concepts of continuity, convergent sequences and metric space.
K3	CO3	apply the limit to various function
K4	CO4	analyze the concepts of intersection theorem and covering theorems.

Unit -1

The Real and Complex number Systems: Introduction - The field axioms - The order axioms – Geometric representation of real numbers-Intervals - Integers - The unique factorization theorem for integers - Rational numbers - Irrational numbers - Upper bounds, maximum element, least upper bound - The completeness axiom - Some properties of the supremum - Properties of the integers deduced from the completeness axiom - The Archimedean property of the real number system- Absolute values and the triangle inequality - The Cauchy Schwarz inequality - Plus and minus infinity and the extended real number system R*.

Chapter 1: Sections: 1.1 - 1.20 (Except 1.15 - 1.17). [15 Hours]

Unit -2

Some Basic Notations of Set Theory: Ordered pairs - Cartesian product of two sets - Relations and functions - One to one functions and inverses - Composite functions - Sequences -Similar sets - Finite and infinite sets - Countable and uncountable sets - Unaccountability of the real number system - Set algebra - Countable collections of countable sets.

Chapter 2: Sections: 2.3 - 2.15 (Except 2.6). [16 Hours]

Unit -3

Elements of Point Set Topology: Euclidean space R^n - Open balls and open sets in R^n - The structure of open sets in R^1 - Closed sets - Adherent points, Accumulation points - Closed sets and adherent points - The Bolzano-Weierstrass theorem - The Cantor intersection theorem - Lindelof covering theorem - The Heine-Borel covering theorem - Compactness in R^n .

Chapter 3: Sections: 3.2 - 3.12. [16 Hours]

Unit -4

Elements of Point Set Topology: Metric spaces - Point set topology in metric spaces - Compact subsets of a metric space - Boundary of a set.

Limits and Continuity: Convergent sequences in a metric space - Cauchy sequences - Complete metric spaces - Limit of a function - Limits of vector valued functions.

Chapter 3: Sections: 3.13 - 3.16, Chapter 4: Sections : 4.2 - 4.5, 4.7. [16 Hours]

Unit -5

Limits and Continuity: Continuous function - Continuity of composite functions - Continuity and inverse images of open or closed sets - Connectedness - Uniform continuity - Uniform continuity and compact sets - Discontinuities of real valued functions - Monotonic functions.

Chapter 4: Sections: 4.8, 4.9, 4.12, 4.16, 4.19, 4.20, 4.22, 4.23. [15 Hours]

Seminar, Assignment.

Text Book:

Tom M. Apostal, *Mathematical Analysis*, Addison Wesley, Second Edition 2002.

Books for Reference :

1. Ralp P. Boas, *A primer of Real function*, The mathematical Association of America, 1960.
2. Walter Rudin, *Principles of Mathematical Analysis*, Third Edition, McGraw Hill Inter Editions, 1976.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	L
CO2	M	M	M	M	L
CO3	M	H	M	M	M
CO4	M	M	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc	**Programme Title :**	Mathematics	
Course Code:	20UMS511	**Title**	**Batch :**	2020-2023
		OPERATIONS RESEARCH -II	**Semester**	V
Hrs/Week	5		**Credits :**	4

Course Objective

The prime objective of this paper is to introduce certain OR techniques such as game theory, sequencing and networking models to help the students to develop logical reasoning for applying mathematical tools to managerial and other life oriented problems

Course Outcomes (CO)

On successful completion of the course the students will be able to

K1	CO1	understand the theory of games for solving simple games.
K2	CO2	explore various techniques to solve real life problems.
K3	CO3	apply the fundamental concept of inventory control.
K4	CO4	know distinction between PERT & CPM

Unit -1

Games and strategies: Two person zero sum games - Some basic terms - The Maximin - Minimax principle - Games without Saddle points - Mixed strategies - Graphical Solution of 2xn and mx2 games – Dominance Property.

Chapter 17: Sections: 17.1 - 17.7. [13 Hours]

Unit -2

Sequencing problems: Problem of Sequencing - Basic terms used in Sequencing - Processing n jobs through 2 machines - *Processing n jobs through k-machines (Self study)* processing 2 jobs through k-machines.

Chapter 12: Sections: 12.1 - 12.6. [13 Hours]

Unit -3

Queuing Theory: Introduction - Queuing System - Elements of a Queuing System - Operating characteristics of a Queuing system - Classification of Queueing Models – Definition of Transient and Steady States - Poisson Queuing System

Model I : (M/M/ 1): (∞/FIFO)
Model III : (M/M/ 1): (N/FIFO)
Model V : (M/M/ C): (∞/FIFO)
Model VI : (M/M/ C): (N/FIFO)(Self study) - Simple Problems.

Chapter 21: Sections: 21.1 - 21.4, 21.7, 21.8, 21.9. [14 Hours]

Unit -4

Inventory control: Introduction - Types of inventories - Reasons for carrying inventories- The inventory decisions - Costs associated with inventories - Factors affecting inventory control - The concept of EOQ - Deterministic inventory problems with no shortages.

Case (i) The fundamental Problem of EOQ

Case (ii) Problem of EOQ with finite replenishment (Production).

Deterministic inventory Problems with shortages

Case (i) Problem of EOQ with instantaneous Production and variable order cycle

Case (ii) Problem of EOQ with instantaneous Production and Fixed order cycle.

Case (iii) Problem of EOQ with finite replenishment (Production).

Problem of EOQ with price breaks

Case (i) Problem of EOQ with one price break

Case (ii) Problem of EOQ with more than one price break.

Chapter 19: Sections: 19.1 - 19.4, 19.6, 19.7, 19.9-19.12. [13 Hours]

Unit -5

Network scheduling by PERT/CPM: Network: Basic compounds - Logical Sequencing - Rules of Network constructions – Concurrent Activities - *Critical Path Method (CPM) (Self study)* - Probability considerations in PERT - Distinction between PERT & CPM - Simple Problems.

Chapter 25: Sections: 25.1 - 25.8. [12 Hours]

Seminar, Assignment.

Text Book:

Kanti Swarup, Gupta P.K. & Man Mohan, Operations Research (2014), Sultan Chand & Sons, New Delhi.

Books for Reference:

1. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice,* John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction,* Prentice Hall of India Pvt. Ltd, New Delhi, 2006.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	H	M	M
CO2	H	H	M	M	M
CO3	M	H	H	M	L
CO4	M	M	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B. Sc	**Programme Title :**	Mathematics	
Course Code:	20UMS512	**Title**	**Batch :**	2020-2023
		THEORY OF NUMBERS	**Semester**	V
Hrs/Week	5		**Credits :**	4

Course Objective

This course exposes the elementary basic theory of numbers and several famous functions, related theorems and some unsolved problems about primes to the students in order to enable them to deeper their understanding of the subject.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	understand the concepts of divisibility, congruence, greatest common divisor, prime and prime-factorization.
K2	CO2	analyze and solve linear Diophantine equations and congruences of various types and use the theory of congruences in applications.
K3	CO3	apply the properties of multiplicative functions such as the Euler phi-function and quadratic residues.
K4	CO4	Evaluate the unsolved problems about primes.

Unit -1

Basic Representation: Principles of Mathematical Induction - The Basis Representation Theorem.

The Fundamental Theorem of Arithmetic: Euclid's Division Lemma - Divisibility - The Linear Diophantine Equation - The Fundamental Theorem of Arithmetic.

Chapter 1: Sections: 1.1 -1. 2.

Chapter 2: Sections: 2.1 -2. 4. [12 Hours]

Unit -2

Combinational and Computational Number Theory: Permutations and Combinations - Fermat's Little Theorem (Statement only) - Wilson's Theorem (Statement only) – Generating Functions.

Fundamentals of Congruence's: *Basic Properties of Congruence's (Self study)* - Residue Systems.

Chapter 3: Sections: 3.1 - 3.4.

Chapter 4: Sections: 4.1-4.2. [12 Hours]

Unit -3

Solving Congruences: Linear Congruences - The Theorems of Fermat and Wilson Revisited - The Chinese Remainder Theorem - *Polynomial Congruences (Self study).*

Chapter 5: Sections: 5.1-5.4. [13 Hours]

Unit -4

Arithmetic Functions: Combinatorial Study of $\Phi(n)$ - Formulae For $d(n)$ and $\sigma(n)$ - Multiplicative Arithmetic Functions - The Mobius Inversion Formula.

Chapter 6: Sections: 6.1-6.4. [14 Hours]

Unit -5

Primitive Roots: Properties of Reduced Residue Systems - Primitive Roots Modulo P.

Prime Numbers: Elementary Properties of $\pi(x)$ - Tchebyshev's Theorem - Some Unsolved Problems About Primes.

Chapter 7: Sections: 7.1-7.2.

Chapter 8: Sections: 8.1-8.3. [14 Hours]

Seminar, Assignment.

Text Book:

George E. Andrews, *Number Theory*, HPS (India), 1992.

Books for Reference:

1. David M. Burten, *Elementary Number Theory*, McGraw- Hill, 1997.
2. Kumaravelu et al., *Elements of Number Theory*, Nagerkovil, SKV, 2002.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	H	H	M
CO2	H	M	M	M	L
CO3	M	H	M	H	M
CO4	H	M	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS5E1	**Title**	**Batch :**	2020-2023
		PROGRAMMING IN 'C'	**Semester**	V
Hrs/Week	4		**Credits :**	3

Course Objective

C is a general- purpose structured programming language that is powerful, efficient and compact. The programming language C finds a wide variety of applications in the development of software. This course provides the students with all the fundamental concepts of the C language with some practical experience. Also helps the students to develop their programming skills and to build large programs.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	understand the use of structured program development in C as applied to small programming projects.
K2	CO2	analyze the use of decision making statement and loop structures.
K3	CO3	gain a high level understanding of the structure of 'C' functions.
K4	CO4	acquire knowledge about arrays & pointers.

Unit -1

Overview of C: History of C - Importance of C - Basic Structure of C Programs - Programming Style.

Constants ,Variables and Data Types: Introduction - Character set - C Tokens - Keywords and identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining symbolic constants

Operators and Expressions: Introduction - Arithmetic operators - Relational operators - Logical operators - Assignment operators - increment and Decrement operators - conditional operators - Bitwise operators - Special operators - Arithmetic expressions - Evaluation of expressions - *Precedence of arithmetic operators (Self study)* - Type conversions in expressions - Operator precedence - Mathematical functions.

Chapter 1: Sections : 1.1,1.2,1.8, 1.9, Chapter 2: Sections : 2.1-2.8,2.10,2.11

Chapter 3: Sections : 3.1-3.12, 3.14-3.16 [11 Hours]

Unit -2-

Managing Input and Output Operations: Introduction - Reading a character - Writing a character - Formatted input - Formatted output.

Decision Making and Branching: Introduction - Decision making with if statement - Simple if statement - The If … else statement - Nesting of if … else statements - The else if ladder - The switch statement - The ?: operator - The Go to statement.

Decision Making and Looping: Introduction - The while statement - The do statement - The for statement - Jumps in loops - Simple programs.

Chapter 4: Sections: 4.1- 4.5, Chapter 5: Sections : 5.1-5.9 ,Chapter 6: Sections :6.1-6.5.

[11 Hours]

Unit -3

Arrays: Introduction - One dimensional arrays - Declarations of One dimensional arrays - Initializations of One dimensional arrays - Two dimensional arrays - Initializing Two dimensional arrays.

Arrays and Strings: Introduction - Declaring and initializing string variables - Reading strings from terminal - Writing strings to screen - Arithmetic operations on characters - Putting strings together - comparison of two strings - String handling functions - *Table of strings (Self study).*

Chapter 7 : Sections : 7.1 - 7.6 , Chapter 8: Sections : 8.1 - 8.9. [10 Hours]

Unit -4

User defined Functions: Introduction - Need for user defined functions - Multi- function Program - Elements of user defined functions - Definitions of functions - - Return values and their types - Function Calls - Function Declaration - Category of Functions - No arguments and no return values - Arguments but no return values - Arguments with return values - No arguments but returns a value - Functions that return multiple values - Nesting of functions - Recursion.

Chapter 9 :Sections : 9.1 - 9.16. [10 Hours]

Unit -5

Pointers: Introduction - Understanding pointers - Accessing the address of a variable - Declaring pointer variables - Initialization of pointer variables - Accessing a variable through its pointer - Chain of Pointers - Pointer expressions - Pointer increments and scale factor - Pointers and arrays - Pointers and characters strings - Array of Pointers - Pointers as function arguments - Functions returning Pointers - Pointers to Functions .

Chapter 11: Sections: 11.1-11.15. [10 Hours]

Seminar, Assignment.

Text Book:

Balagurusamy E, *Programming in ANSI C*, 7th Edition, Tata McGraw Hill Publishing Company Ltd, 2017.

Books for Reference :

1. Kernighan B. W and Ritchie D. M, *The C programming language,* Prentice Hall, 1997.
2. Kochan S. G, *Programming in C,* Hyden, 1983.
3. Venugopal, K. R and Prasad S. R, *Programming with C,* Tata McGraw Hill Publishing company ltd, 1997.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	M	H
CO2	M	H	H	M	M
CO3	M	M	H	M	M
CO4	M	M	M	M	L

H - High; M - Medium; L - Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B. Sc	**Programme Title :**	Mathematics	
Course Code:	20UMS5E2	**Title**	**Batch :**	2020-2023
		PROGRAMMING LAB IN 'C'	**Semester**	V
Hrs/Week	2		**Credits :**	2

Course Objective

The course is designed to provide a practical exposure to the students on 'C' language.

Course Outcomes (CO)

On completion of the course, the students will be able to

K3	CO1	build the logic and develop a solution for a problem statement in C- language.
K4	CO2	design algorithms for difficult problems
K5	CO3	implement the algorithms in practice.

List of programs:

1. Program to convert the given temperature in Fahrenheit to Celsius.
2. Program to convert days into months and days.
3. Program to find the solution of quadratic equation.
4. Program for finding Fibonacci sequence.
5. Program to sort a list and find its median.
6. Program to sort a list in ascending / descending order.
7. Program to calculate mean and standard deviation of a given series of numbers.
8. Program for finding the addition of two matrices.
9. Program for finding the multiplication of two matrices.
10. Program to find trace of a square matrix.
11. Program to sort a list of strings in alphabetical order.
12. Program to compute nCr value.
13. Program to check whether the number is prime or not.
14. Program to check whether the year is leap year or not.
15. Program to illustrate the use of pointers in one dimensional array.

Seminar, Assignment.

Text Book:

Balagurusamy E, *Programming in ANSI C*, 7th Edition, Tata McGraw Hill Publishing Company Ltd, 2017.

Books for Reference :

1. Kernighan B. W and Ritchie D. M, *The C programming language*, Prentice Hall, 1997.
2. Kochan S. G, *Programming in C*, Hyden, 1983.
3. Venugopal, K. R and Prasad S. R, *Programming with C*, Tata McGraw Hill Publishing company ltd, 1997

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	H	M	L
CO2	H	M	H	M	H
CO3	M	H	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS5S1	**Title**	**Batch :**	2020-2023
		Network and Information Security	**Semester**	V
Hrs/Week:	1		**Credits:**	2

Course Objective

To impart knowledge of Network security, Wi-Fi security, hackers, secure networking and password managers.

Course Outcomes (CO)

On completion of the course, the students will be able to

K1	CO1	remember the basic concepts of network
K2	CO2	understand the network hacking techniques
K3	CO3	deploy information and network security
K4	CO4	interpret the common threats today in computer network

Unit 1:

Basics of Network - Network Media - Various Operating Systems - Basics of Firewalls on all Platforms including Windows, MacOS and Linux. [3 Hours]

Unit 2:

Security Vulnerabilities across an entire network - Network Hacking techniques and Vulnerability scanning. [3 Hours]

Unit 3:

Configure and architect a small network for physical and wireless security - Firewalls configuration on Windows platform and Linux platform.
Network privacy issues. [2 Hours]

Unit 4:

Network monitoring to discover and identify potential hackers and malware using tools like WIRESHARK and SYSLOG. Online tracking by hackers. [2 Hours]

Unit 5:

Best methods of authentication including passwords, multifactor authentication including soft tokens and hard tokens. Best password managers to use - how passwords are cracked - how to mitigate the password attacks. [3 Hours]

Google classroom

Reference:

Course Materials will be made online through NGM Open source learning platforms.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	H
CO2	M	M	M	M	L
CO3	M	M	M	M	M
CO4	M	M	M	M	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS5S2	**Title**	**Batch :**	2020-2023
		Cyber security – Ethical Hacking	**Semester**	V
Hrs/Week:	1		**Credits:**	2

Course Objective

To understand the basics of cyber security and how ethical hacking is done on Cyber space and how to secure and protect them like security experts.

Course Outcomes (CO)

On completion of the course, the students will be able to

K1	CO1	remember the basic concepts of cyber security
K2	CO2	understand the knowledge about ethical hacking
K3	CO3	deploy the use of hacking tools
K4	CO4	analyze the details about internet connection

Unit 1:

To Understand how websites work, how to discover and exploit web application vulnerabilities and to gain full control over websites. Secure systems from all the known attacks. Secret tracking and hacking infrastructure. [3 Hours]

Unit 2:

Ethical hacking in Cyber space - its fields and the different types of hackers. Hack & secure both Wi-Fi & wired networks [2 Hours]

Unit 3:

Discover vulnerabilities & exploitation of hacking in cyber network servers. How secure systems are hacked using client-side and social engineering attacks. Use of hacking tools such as Metasploit, Aircrack-ng, SQLmap.....etc. [2 Hours]

Unit 4:

Network basics & how devices interact inside a network - Network Penetration. Control connections of clients in network by password cracking. Fake Wi-Fi network creation with internet connection and spy on clients. To Gather detailed information about clients and networks like their OS, opened ports ...etc. [2 Hours]

Unit 5:

Explore the threat landscape - Darknets, dark markets, zero day vulnerabilities, exploit kits, malware, phishing and much more. Master defenses against phishing, SMShing, vishing, identity theft, scam, cons and other social engineering threats. [3 Hours]

Google classroom

Reference:

Course Materials will be made online through NGM Open source learning platforms.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	M	H
CO2	M	M	M	M	M
CO3	M	M	M	M	M
CO4	M	M	M	M	L

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS613	**Title**	**Batch :**	2020-2023
		LINEAR ALGEBRA	**Semester**	VI
Hrs/Week	6		**Credits :**	4

Course Objective

This course will enable the students to study how to solve system of linear algebraic equations, basic concepts of an algebraic structure namely vector space and its properties of linear transformations on vector spaces and their relation between matrices.

Course Outcomes (CO)

On successful completion of the course, the students will able to

K1	CO1	solve systems of linear equations and to reduce the augmented matrix to echelon form or to row reduced echelon form.
K2	CO2	understand the basic ideas of vector spaces and the concepts of span, linear independence basis dimension and to apply these concepts to vector spaces and subspaces.
K3	CO3	find row space, column space ,null space ,rank and nullity of a matrix and to understand the relationship of these concepts to associated systems of linear equations.
K4	CO4	apply the principles of matrix algebra to linear transformations.

Unit -1

Linear Equations: Fields - Systems of Linear Equations - Matrices and Elementary Row Operations - Row Reduced Echelon Matrices - *Matrix Multiplication (Self study)* – Invertible Matrices.

Chapter 1: Sections: 1.1 - 1.6. [16 Hours]

Unit -2

Vector Spaces: Vector Spaces - Subspaces - Bases and Dimension - Coordinates - *Summary of Row Equivalence (Self study).*

Chapter 2: Sections: 2.1 - 2.5. [16 Hours]

Unit -3

Linear Transformations: Linear transformations - The Algebra of Linear Transformations - Isomorphism.

Chapter 3: Sections: 3.1 - 3.3. [16 Hours]

Unit -4

Linear Transformation: Representation of Transformations by Matrices - Linear Functionals.

Chapter 3: Sections: 3.4, 3.5. [15 Hours]

Unit -5

Linear Transformation: The Double Dual - The Transpose of a Linear Transformation.

Chapter 3: Sections: 3.6, 3.7. [15 Hours]

Seminar, Assignment.

Text Book:

Kenneth Hoffman and Ray Kunze, Linear *Algebra, Second* Edition, PHI Learning Pvt. Ltd, New Delhi, 2013.

Books for Reference:

1. Herstein I. N, *Topics in algebra*, Vikas Publishing House Pvt. Ltd, 1981.
2. Kumaresan S, *Linear Algebra*, Prentice Hall of India, 2001.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	M	M	M
CO2	H	M	M	M	L
CO3	H	M	M	M	L
CO4	H	H	H	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc	**Programme Title :**	Mathematics	
Course Code:	20UMS614	**Title**	**Batch :**	2020-2023
		REAL ANALYSIS - II	**Semester**	VI
Hrs/Week	6		**Credits :**	4

Course Objective

To equip the students for study in Real analysis by introducing further some of advanced topics in Real Analysis.

Course Outcomes (CO)

On successful completion of the course the students will be able to

K1	CO1	Understand the concept of derivatives, bounded variation.
K2	CO2	Get visualize bounded variation and rectifiable curves.
K3	CO3	Apply the total variation and step into Riemann Stieltjes Integral.
K4	CO4	Analyze the Riemann Integral in detail.

Unit -1

Derivatives: Introduction - Definition of derivative – Derivatives and continuity - Algebra of Derivatives – The chain rule – One sided Derivatives and infinite derivatives -Functions with nonzero derivative – Zero derivatives and local extrema - Rolle's theorem - The Mean Value Theorem for derivatives –Intermediate value theorem for derivatives - Taylor's formula with remainder.

Chapter 5 :Sections: 5.1 - 5.12. [15 Hours]

Unit -2

Functions of Bounded Variations: Introduction - Properties of monotonic functions - Functions of bounded variations - Total variations - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of increasing functions - Continuous functions of bounded variation.

Chapter 6 :Sections: 6.1 - 6.8. [16 Hours]

Unit -3

The Riemann-Stieltjes Integral: Introduction - Notation - The definition of Riemann-Stieltjes Integral - Linear properties - Integration by parts - Change of variable in Riemann-Stieltjes integral - Reduction to a Riemann integral - Step functions as integrators - Reduction of a Riemann-Stieltjes integral to a finite sum - Euler's summation formula.

Chapter 7 :Sections: 7.1 - 7.10 [16 Hours]

Unit -4

The Riemann-Stieltjes Integral: Monotonically increasing integrators - Upper and lower integrals - Additive and linearity properties of upper and lower integrals - Riemann's condition - Comparison theorems - Integrators of bounded variation - Sufficient conditions for existence of Riemann-Stieltjes integrals - Necessary conditions for existence of Riemann-Stieltjes integrals.

Chapter 7 :Sections: 7.11 - 7.17. [16 Hours]

Unit -5

The Riemann-Stieltjes Integral: Mean Value Theorems for Riemann-Stieltjes Integrals - The integral as a function of the interval - Second fundamental theorem of integral calculus - Change of variable in a Riemann integral - Second Mean-Value Theorem for Riemann integrals.

Chapter 7 :Sections: 7.18 - 7.22. [15 Hours]

Seminar, Assignment.

Text Book:

Tom M. Apostal, *Mathematical Analysis*, Narosa Publishing House, Second Edition 2002.

Books for Reference:

1. Goldberg R. R, *Methods of Real Analysis*, Oxford and IBH Publishing Co., 1973.
2. Soma Sundaram D, Choudhary B, *A first course in Mathematical Analysis*, Narosa Publishing House, 1996.
3. Walter Rudin, *Principles of Mathematical Analysis*, McGraw Hill Inc, Third Edition, 1976.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	M
CO2	M	M	M	M	M
CO3	M	H	M	M	L
CO4	M	M	M	M	L

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS615	**Title**	**Batch :**	2020-2023
		COMPLEX ANALYSIS	**Semester**	VI
Hrs/Week	5		**Credits :**	4

Course Objective

This course help the students to have an in depth knowledge of limits and continuity, analytic functions, uniform convergence and conformal mapping.

Course Outcomes (CO)

On successful completion of this paper, the students will be able to

K1	CO1	Perform basic algebraic manipulation with complex numbers.
K2	CO2	Get a chance to explore the concept of uniform convergence, conformal mapping.
K3	CO3	Evaluate integrals along a path in the complex plane and understand the concept of Cauchy's theorem.
K4	CO4	Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.

Unit -1

Introduction to the concept of analytic function: Limits and Continuity - Analytic functions - Polynomials - *Rational Functions. (Self study)*

Chapter 1: Sections: 1.1 - 1.4. [16 Hours]

Unit -2

Elementary theory of power series: Sequences - Series - Uniform Convergence - Power Series - Abel's Limit Theorem.

Chapter 2: Sections: 2.1 - 2.5. [16 Hours]

Unit - 3

The Exponential, Trigonometric Functions and Conformality : *The Exponential -The Trigonometric Functions (Self study)* - The periodicity – The Logarithm - Arcs and Closed Curves - Analytic Functions in Regions - Conformal Mapping.

Chapter 2: Sections: 3.1 - 3.4

Chapter 3: Sections: 2.1 - 2.3. [16 Hours]

Unit - 4

Fundamental Theorems : Line Integrals – Line Integrals as Function of Arcs – Cauchy's Theorem in a Rectangle - Cauchy's Theorem in a Disc – The Index of a Point with respect to a Closed Curve - Cauchy's Integral Formula.

Chapter 4 : Sections: 1.1, 1.3, 1.4, and 1.5.

Chapter 4: Sections: 2.1- 2.2. [15 Hours]

Unit - 5

Local Properties of Analytic functions: Removable Singularities, Taylor's Theorem – Zeros and Poles - The Local Mapping – The Maximum Principle.

Chapter 4 : Sections: 3.1- 3.4. [15 Hours]

Seminar, Assignment.

Text Book:

Lars V. Ahlfors (2013), Complex Analysis, MCGRAW HILL international Edition (Indian Edition).

Books for Reference:

1. Goyal & Gupta (2012), *Functions of a Complex Variable* – Pragati's Edition.
2. Ponnusamy S (2009), *Foundations of Complex Analysis* Narosa publishing house, Second Edition.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	M	H
CO2	M	H	M	H	L
CO3	M	M	M	H	L
CO4	M	H	M	H	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS6E3	**Title**	**Batch :**	2020-2023
		DISCRETE MATHEMATICS	**Semester**	VI
Hrs/Week	5		**Credits :**	5

Course Objective

In this course a set of topics that are of genuine use in computer science and elsewhere are identified and combined together in a logically coherent fashion, to enable the students to get a good training in these topics which will inevitably lead the students in the direction of clear thinking, sound reasoning and a proper attitude towards the applications of Mathematics in computer science and other related fields.

Course Outcomes (CO)

On successful completion of this paper, the students will be able to

K1	CO1	acquire knowledge about the basic concepts of Discrete Mathematics and its applications.
K2	CO2	apply logically valid forms of arguments to avoid logical errors by studying mathematical logic.
K3	CO3	understand abstract algebra, posets, lattices, Boolean algebra and their applications in the field of engineering and computer science.
K4	CO4	define the basic definitions of graph theory and a knowledge about types of graphs including isomorphic graphs , homeomorphic graphs, Eulerian graphs and Hamiltonian graphs.

Unit -1

Recurrence Relations and Generating functions: Recurrence - An Introduction - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite order Homogeneous (linear) Relations - Solution of Non-Homogeneous Relations - Generating Functions - Some Common Recurrence Relations.

Text Book 1: Chapter 5: Sections: 1 - 7. [14 Hours]

Unit -2

Logic: Tautology - Tautological Implications and Equivalence of Formulae - Replacement Process - Functionally Complete Sets of Connectives and Duality Law - Normal Forms - Principle Normal Forms – Theory of inference – open statements - Theory of inference for predicate calculus.

Text Book 1: Chapter 9: Sections: 8 - 14, 17. [13 Hours]

Unit -3

Lattices and Boolean Algebra: Lattices - Some Properties of Lattices -New Lattices - Modular and Distributive Lattices - Boolean Algebras

Text Book 1: Chapter 10: Sections: 1 - 5. [13 Hours]

Unit -4

Graph Theory: Introduction - Basic Terminology - Paths, Cycles and Connectivity - Subgraphs - Types of Graphs - Isomorpic Graphs - Homeomorphic Graphs – *Eulerian and Hamiltonian Graphs (Self study).*

Text Book 2: Chapter 9: Sections: 9.1 - 9.7 and 9.9. [12 Hours]

Unit -5

Language , Grammar and Automata: Introduction - Language - The Set Theory of Strings - Languages - Regular Expressions and Regular Languages - Grammar - Finite-State Machine - Finite State Automata.

Text Book 2: Chapter 15: Sections: 15.1 - 15.7. [13 Hours]

Seminar, Assignment.

Text Books:

1. Sharma J. K, *Discrete Mathematics*, Macmillan Publishers India Ltd, 2011.
2. Venkataraman M. K, Sridharan N and Chandrasekaran N, *Discrete Mathematics,* The National Publishing Company, 2000.

Books for Reference:

1. Ralph P.Grimaldi, *Discrete and Combinatoral Mathematics - An applied introduction*, Third Edition, Addison Wesley Publishing Company, 1994.
2. Tremblay J. P and Manohar R, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill, 2001.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	H	M	M	H	M
CO2	M	H	H	M	H
CO3	H	M	M	H	L
CO4	M	H	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS6E4	**Title**	**Batch :**	2020-2023
		OBJECT ORIENTED PROGRAMMING WITH C++	**Semester**	VI
Hrs/Week	4		**Credits :**	3

Course Objective

The aim of this course is to know all needed about C++ and object oriented programming and also to meet the global requirements in software industries.

Course Outcomes (CO)

On successful completion of the course, the students will able to

K1	CO1	gain the knowledge of classes and objects.
K2	CO2	analyze the use of operator overloading and type conversions.
K3	CO3	understand the practice of object oriented programming in the construction of robust maintainable programs which satisfy the requirements.
K4	CO4	give students experience in C++ programming and program development within an integrated development environment.

Unit -1

Beginning with C++: What is C++? - Applications of C++ - A Simple C++ Program - More C++ Statements - An Example with Class - Structure of C++ Program.

Tokens, Expressions and Control Structures: Introduction - *Tokens (Self study)* - Keywords - Identifiers and Constants - Basic Data Types - User-Defined Data Types - Storage Classes - Derived Data Types - Symbolic constants - Type Compatibility - Declaration of Variables - Dynamic Initialization of Variables - Reference Variables - Operators in C++ - Scope Resolution Operator - Member Dereferencing Operators - Memory Management Operators - Manipulators - Type Cast Operator - Expressions and Their Types - Special Assignment Expressions - Implicit Conversions - Operator Overloading - Operator Precedence - Control Structures.

Chapter 2: Sections: 2.1-2.6.

Chapter 3: Sections: 3.1- 3.25 [11 Hours]

Unit -2

Functions in C++: Introduction - The Main Function - Function Prototyping - Call by Reference - Return by Reference - Inline Functions -Default Arguments - const Arguments - Recursion - Function Overloading - Friend and Virtual Functions - Math Library Functions.

Classes and objects: Introduction - C Structures Revisited - Specifying a Class - Defining Member Functions - C++ Program with Class - Making an Outside Function Inline - Nesting of Member Functions - Private Member Functions - Arrays within a Class - Memory Allocation for Objects.

Chapter 4: Sections: 4.1-4.12

Chapter 5: Sections: 5.1-5.10. [10 Hours]

Unit -3

Classes and objects: Static Data Members - Static Member Functions - Array of Objects - Object as Function Arguments - Friendly Functions - Returning Objects - const Member Function - Pointers to Members - Local Classes.

Constructors and Destructors: Introduction - Constructors - Parameterized Constructors - Multiple Constructors in a Class - Constructors with Default Arguments - Dynamic Initialization of Objects - Copy Constructors - Dynamic Constructors - Constructing Two-Dimensional Arrays - const Objects - Destructors.

Chapter 5: Sections: 5.11-5.19.

Chapter 6: Sections: 6.1-6.11. [11 Hours]

Unit -4

Operator overloading and Type conversions: Introduction - Defining Operator Overloading - Overloading Unary Operator - Overloading Binary Operators - Overloading Binary Operators Using Friends - Manipulation of Strings Using Operators - Some Other Operator Overloading Examples - Rules for Overloading Operators - Type Conversions.

Inheritance: Extending Classes: Introduction - Defining Derived Classes - Single Inheritance - Making a Private Member Inheritable - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Abstract Classes - Constructors in Derived Classes - Member Classes: Nesting of Classes.

Chapter 7: Sections: 7.1-7.9

Chapter 8: Sections: 8.1-8.12. [10 Hours]

Unit -5

Pointers, Virtual Functions and Polymorphisms: Introduction - *Pointers (Self study)* Pointers to Objects - this Pointer - Polymorphism - Pointers to Derived Classes - Virtual Functions - Pure Virtual Functions.

Chapter 9: Sections: 9.1-9.8. [10 Hours]

Seminar, Assignment.

Text Book:

Balagurusamy E, (2018), *Object Oriented Programming with C++*, Seventh Edition, Tata Mc Graw Hill Publishing Company, New Delhi

Books for Reference:

1. Bjarne Stroustroup, (1991), *The C++ Programming language,* Addison Wesley.
2. Herbert Schildt Osborne. (1994), *Teach You C++*, Mc Graw Hill Publishing Company.
3. Robert Lafore. (1992), *Object Oriented Programming in turbo C++*, Waite group.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	H	M	H
CO2	H	H	H	M	M
CO3	H	M	M	M	M
CO4	M	H	M	M	L

H - High; M - Medium; L – Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS6E5	**Title**	**Batch :**	2020-2023
		PROGRAMMING LAB IN OOP WITH C++	**Semester**	VI
Hrs/Week	2		**Credits :**	2

Course Objective

This course is designed to provide a practical knowledge to the students on C++.

Course Outcomes (CO)

On completion of the course, the students will be able to

K3	CO2	gain the knowledge about array of object and object as argument.
K4	CO3	access various types of inheritance.
K5	CO4	implement the runtime polymorphism by using objects.

List of programs:

1. Program to find the Mean and variance
2. Program to find the largest of two numbers using nesting of member functions
3. Program to illustrate the use of array of objects
4. Program to illustrate the use of objects as arguments
5. Program to swap private data of classes using friend function
6. Program to illustrate overloaded constructors
7. Program to illustrate matrix multiplication
8. Program to illustrate the use of 'new' in constructors
9. Program to illustrate overloading + operators
10. Program to explain single inheritance
11. Program to illustrate multilevel inheritance
12. Program to explain hybrid inheritance
13. Program to illustrate the use of initialization lists in the base and derived constructors
14. Program to illustrate the use of pointers to objects
15. Program to illustrate runtime polymorphism

Seminar, Assignment.

Text Book:

Balagurusamy E, (2018), *Object Oriented Programming with C++*, Tata Mc Graw Hill Publishing Company, New Delhi.

Books for Reference :

1. Bjarne Stroustroup, (1991), *The C++ Programming language*, Addison Wesley.
2. Herbert Schildt Osborne. (1994), *Teach Yourself C++*, McGraw Hill Publishing Company.
3. Robert Lafore. (1992), *Object Oriented Programming in turbo C++*, Waite group.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	M	H
CO2	M	M	M	M	M
CO3	M	M	M	M	M

H - High; M - Medium; L - Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B. Sc	**Programme Title :**	Mathematics	
Course Code:	20UMS6S3	**Title**	**Batch :**	2020-2023
		MATHEMATICS FOR FINANCE	**Semester**	VI
Hrs/Week	1		**Credits :**	2

Course Objective

The objective of this paper is to introduce the concepts of financial statement analysis which help the students to develop their financial skills.

Course Outcomes (CO)

On completion of the course, the students will be able to

K1	CO1	recollect the concept of ratio analysis.
K2	CO2	get the idea of liquidity ratio and capital structure ratio.
K3	CO3	implement the concepts of return on investments.
K4	CO4	analyze the basic concept of financial statement analysis.

Unit -1

Financial statement analysis: Introduction - Ratio analysis -Meaning and Rationales - Basis of comparison.

Chapter 4 : Sections: 4.1, 4.2. [3 Hours]

Unit -2

Financial statement analysis: Types of ratios - Liquidity ratio - Net working capital - Current ratios - Acid test/Quick ratios.

Chapter 4 :Sections: 4.3, 4.4. [3 Hours]

Unit -3

Financial statement analysis: Turnover ratio – Defensive - Interval ratio - Leverage/Capital structure ratio – Debt - Equity Ratios - Debt to total capital ratio.

Chapter 4: Sections: 4.5. [3 Hours]

Unit -4

Financial statement analysis: Coverage ratios - Profitability ratios - profitability ratios related to sales - Profit margin - Expenses ratio.

Chapter 4 :Sections: 4.6, 4.7. [2 Hours]

Unit -5

Financial statement analysis: Profitability ratios related to investments: Return on investment - Importance of ratio analysis.

Chapter 4: Section: 4.9. [2 Hours]

Seminar, Assignment.

Text Book:

Khan M.Y and Jain P. K, *Financial Management*, Tata McGraw Hill Publishing Company Ltd, New Delhi, 1990.

Books for Reference:

1. Aswath Damodaran, *Corporate Finance, Theory and Practice*, John Wiley and Sons, Inc, 2007.
2. Prasanna Chandra, *Managing Investment*, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1998.

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	M	M
CO2	H	M	H	M	M
CO3	M	M	M	M	L
CO4	M	H	M	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE

Programme Code:	B.Sc.	**Programme Title :**	Mathematics	
Course Code:	20UMS6S4	**Title**	**Batch :**	2020-2023
		ACTUARIAL MATHEMATICS	**Semester**	VI
Hrs/Week	1		**Credits :**	2

Course Objective

The objective of this syllabus is to make the students to get the idea of interest and force of mortality.

Course Outcomes (CO)

On completion of the course, the students will be able to

K1	CO1	remember basics of probability.
K2	CO2	understand the concept of theory of interest.
K3	CO3	implement computational illustration in splus.
K4	CO4	analyze the comparison of forces of morality.

Unit -1

Basics of Probability and Interest: Probability.

Chapter 1 :Section: 1. 1 [3 Hours]

Unit -2

Theory of Interest: Variable Interest Rates, Continuous-time Payment Streams.

Chapter 1 :Sections: 1.2 - 1.4 [3 Hours]

Unit -3

Interest and Force of Mortality: More on Theory of Interest, Annuities and Actuarial Notation, Loan Amortization and Mortgage Refinancing, Illustration on Mortgage Refinancing.

Chapter 2: Sections: 2.1(2.1.1 - 2.1.3) [3 Hours]

Unit -4

Interest and Force of Mortality: Computational Illustration in Splus, Coupon and Zero Coupon Bonds.

Chapter 2: Sections: 2.1 (2.1.4 & 2.1.5) [2 Hours]

Unit -5

Interest and Force of Mortality: Force of Mortality and Analytical Models, Comparison of Forces of Mortality.

Chapter 2 : Sections: 2.2 [2 Hours]

Seminar, Assignment.

Text Book:

Eric V. Slud, *Actuarial Mathematics and Life-Table Statistics*, Department of Mathematics, University of Maryland, College Park, 2001.

Books for Reference:

1. Charles L. Trowbridge, *Fundamental Concepts of Actuarial Mathematical Science*, Actuarial Education and Research Fund, Revised Edition, 1989.
2. Jerry Alan Veeh, *Lecture Notes on Actuarial Mathematics, (e-notes)*, 2006.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	M	M
CO2	H	M	M	M	M
CO3	M	M	M	M	L
CO4	M	M	H	M	M

H- High; M- Medium; L- Low

Course Designed by	Verified by HOD	Checked by CDC	Approved by COE