

PG & RESERACH DEPARTMENT OF MATHEMATICS

B.Sc. MATHEMATICS PROGRAMME

SCHEME OF EXAMINATIONS (2017-2018 onwards)

Part No.	Subject Code	Subject Title	Lecture + Practical Hours/Week	Duration of Exam Hrs	Max. Marks			Credit points
					CIA	ESE	TOTAL	
SEMESTER – I								
I	17UTL101	Tamil / Hindi Paper-I	6	3	25	75	100	3
II	17UEN101	English Paper-I	5	3	25	75	100	3
III	17UMS101	CORE I: Classical Algebra	5	3	25	75	100	4
III	17UMS102	CORE II: Calculus	6	3	25	75	100	5
III	17UMS1A1	ALLIED I:Mathematical Statistics I	6	3	25	75	100	5
IV	17UHR101	Human Rights in India	1	2	--	50	50	2
IV	17UEC101	Human Excellence: Personal values and sky yoga practice -I	1	2	-	50	50	1
V	–	Extension Activities NCC/NSS/Sports and Games	--	--	--	--	--	--
		Total					600	23
SEMESTER – II								
I	17UTL202	Tamil / Hindi Paper- II	6	3	25	75	100	3
II	17UEN202	English Paper –II	5	3	25	75	100	3
III	17UMS203	CORE III: Trigonometry ,Vector Calculus and Fourier Series	5	3	25	75	100	4
III	17UMS204	CORE IV: Analytical Geometry 2D and 3D	5	3	25	75	100	4
III	17UMS2A2	ALLIEDII:Mathematical Statistics II	6	3	25	75	100	5
IV	17EVS201	Environmental Studies	2	3	--	50	50	2
IV	17HEC202	Human Excellence: Family values and sky yoga practice-II	1	2	-	50	50	1
V	–	Extension Activities NCC/NSS/Sports and Games	--	--	--	--	--	--
		Total					600	22

SEMESTER – III								
I	17UTL303	Tamil / Hindi Paper- III	5	3	25	75	100	3
II	17UEN303	English Paper –III	6	3	25	75	100	3
III	17UMS305	CORE V: Dynamics	5	3	25	75	100	4
III	17UMS306	CORE VI: Numerical Techniques	4	3	25	75	100	3
III	17UMS3A1	ALLIED III: Physics for Mathematics and Chemistry-I	8	3	25	75	100	4
IV	17UMS3N1/ 17UMS3N2	NME - Quantitative Aptitude - I / Astronomy- I	1	3	--	50	50	2
IV	17HEC303	Human Excellence: Professional values and sky yoga practice-III	1	2	-	50	50	1
V	–	Extension Activities NCC/NSS/Sports and Games	--	--	--	--	--	--
		Total					600	20

SEMESTER – IV								
I	17UTL404	Tamil / Hindi Paper - IV	5	3	25	75	100	3
II	17UEN404	English Paper - IV	6	3	25	75	100	3
III	17UMS407	CORE VII: Statics	4	3	25	75	100	4
III	17UMS408	CORE VIII: Operation Research-I	5	3	25	75	100	4
III	17UMS4A2	ALLIED IV: -Physics for Mathematics and Chemistry-II	8	3	25	75	100	4
III	17UMS4A3	ALLIED PRACTICAL: Physics lab for Mathematics and Chemistry	--	3	40	60	100	2
IV	17UMS4N3/ 17UMS4N4	NME - Quantitative Aptitude - II/ Astronomy -II	1	3	--	50	50	2
IV	17HEC404	Human Excellence: Social values and sky yoga practice-IV	1	2	--	50	50	1
V	17UNC401/ 17UNS402/ 17USG403	Extension Activities NCC/NSS/Sports and Games	--	--	--	-	50	1
		Total					750	24

SEMESTER-V								
III	17UMS509	CORE IX: Modern Algebra	6	3	25	75	100	4
III	17UMS510	CORE X: Real Analysis-I	6	3	25	75	100	4
III	17UMS511	CORE XI: Operation Research-II	5	3	25	75	100	4
III	17UMS512	CORE XII: Theory of Numbers	5	3	25	75	100	4
III	17UMS513	ELECTIVE-I- Programming in C	4	3	25	75	100	3
III	17UMS514	ELECTIVE PRACTICAL - Programming lab in C	2	3	20	30	50	2
IV	17UMS5S1/ 17UMS5S2	SBE: Mathematics for finance-I/ Actuarial Mathematics-I	1	2	--	50	50	2
IV	17GKL501	General Knowledge and General Awareness	SS	2	--	50	50	2
IV	17HEC505	Human Excellence: National values and sky yoga practice :V	1	2	--	50	50	1
		Total					700	26

SEMESTER – VI								
III	17UMS615	CORE XIII: Linear Algebra	6	3	25	75	100	4
III	17UMS616	CORE XIV: Real Analysis-II	6	3	25	75	100	4
III	17UMS617	CORE XV: Complex Analysis	5	3	25	75	100	4
III	17UMS618	ELECTIVE-II- Discrete Mathematics	5	3	25	75	100	5
III	17UMS619	ELECTIVEIII- OOP with C++	4	3	25	75	100	3
III	17UMS620	ELECTIVE PRACTICAL- Programming lab in OOP with C++	2	3	20	30	50	2
IV	17UMS6S3/ 17UMS6S4	SBE - Mathematics for Finance -II /Actuarial Mathematics-II	1	2	--	50	50	2
IV	17HEC606	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.

Bloom's Taxonomy Based Assessment Pattern

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

1. Part I, II & III - Theory: 75 Marks

TEST- I & II and ESE:

Knowledge Level	Section	Marks	Description	Total
K1 Q:1-10	A(Answer all) 1-5 MCQ 6-10 Define/ Short Answers	10x1=10	MCQ/Define	75
K2 Q:11-15	B(Either or Pattern)	5x5=25	Short Answers	
K3 Q:16-21	C(Answer 4 out of 6)	4x10=40	Descriptive/Detailed	

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

2. Part IV - Theory: 50 Marks

Knowledge Level	Section	Marks	Description	Total
K1	A(Answer all)	10x1=10	MCQ/Define	50
K2,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	CIA Total
CA 1	75	$\frac{75 + 75 + 25}{7}$	25
CA 2	75		
Assignment/Seminar	25		

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.

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS101	Title	Batch :	2017-2020
		CLASSICAL ALGEBRA	Semester	I
Hrs/Week	5		Credits :	4

Course Objective

This paper 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	find the roots of a polynomial function.
K2	CO2	formulate the mathematical equation.
K3	CO3	effectively apply the Binomial theorem, Exponential theorem to summation of series.
K4	CO4	solve the system of equation using matrices.

Unit -1

Binomial theorem for rational index (Statement only) - Application of Binomial theorem to summation of series - Exponential theorem (Statement only) - Summation of series - The logarithmic series - Summation.

Text Book 1 : Chapter 3: Sections 5, 6,7, 8, 10.

Chapter 4: Sections 2,3,1,5, 6,7,9.1 (No derivations). [14 Hours]

Unit -2

Theory of equations - Roots of an equation (Simple problems and Results only) - Relation between roots and coefficients - Symmetric functions of the roots of an equation

Text Book 1 : Chapter 6: Sections 1,2,3,4,5,6,7,8. (Only results),

Sections 9,10,11,12. [13 Hours]

Unit -3

Newton's theorem on sum of the powers of the roots (Statements and problems only) - Transformation of equations - Reciprocal equation

Text Book 1:Chapter 6:Sections 14,15,16.

[13 Hours]

Unit -4

To increase or decrease the roots of a given equation by a given quantity - Removal of terms - *Descartes rule of signs (Self study).*

Text Book 1: Chapter 6: Sections 17,18,19,24.

[12 Hours]

Unit -5

Matrices - Special types of Matrices - Characteristic roots, Characteristic vectors - Diagonalization of a matrix.

[13 Hours]

Text Book 2: Chapter 1,Chapter 4.

Seminar, Assignment.

Books for Study:

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS102	Title	Batch :	2017-2020
		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 with constant co-efficient (Self study)* - Special methods of finding particular integral - Linear equations with variable coefficients.

Text Book 2 : Chapter 2: Sections 1,4 & 8.

[15 Hours]

Unit -2

Derivation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Different integrals of partial differential equations - Standard types of first order equations (*Type IV - Self study*) - Lagrange's equation.

Text Book 1 : Chapter 4: Sections 1-6.

[16 Hours]

Unit -3

Multiple integrals - Definition of double integral - Evaluation of double integral - Double integral in polar co-ordinates - Triple integrals.

Text Book 2 : Chapter 5: Sections 1-4.

[15 Hours]

Unit -4

Change of variables - Jacobian - Transformation from Cartesian to polar co-ordinates - Transformation from Cartesian to spherical polar co-ordinates - Beta

and Gamma functions - Applications of Gamma functions to multiple integrals.

Text Book 2 : Chapter 6: Sections 1.1,1.2,2.1-2.4.

Chapter 7: Sections 2.1-6

[16 Hours]

Unit -5

Laplace Transforms - Definition - Transform of $f(t)$, e^{at} , $\cos at$, $\sin at$ and t^n when n is an integer - Laplace transforms to solve ordinary differential equation with constant coefficients - Inverse Laplace transforms.

Text Book 1 : Chapter 5: Sections 1,2,4,5,6,7&8.

[16 Hours]

Seminar, Assignment.

Books for Study :

1. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - II*, S. Viswanathan Pvt. Ltd, 2007.
2. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - III*, S. Viswanathan Pvt. Ltd, 2007.

Books for Reference :

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, 2009.

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS1A1	Title	Batch :	2017-2020
		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

Mathematical Expectation - Properties - Addition and Multiplication Theorem - Simple problems. Definition of Covariance - Chebychev's inequality - Simple problems.

Chapter 6: Sections 6.1-6.6 & 7.5

[16 Hours]

Unit -2

Moment Generating Function (MGF) – Definition - Properties - Cumulants - Relation between Cumulant and central moment - *Characteristic Function (Self study)* - Definition - Properties - Simple problems.

Chapter 7: Sections 7.1.1-7.3.1

[15 Hours]

Unit -3

MGF of Binomial distribution - Finding mean and variance - Additive property - Recurrence relation - MGF of Poisson distribution - Finding mean and variance - Additive property - Recurrence relation - Simple problems.

Chapter 8: Sections 8.4-8.4.2, 8.4.6, 8.4.7, 8.5-8.5.2 ,8.5.4, 8.5.5, 8.5.8

[16 Hours]

Unit -4

Normal distribution: Properties - Uses - MGF of Normal distribution about its origin and about arithmetic mean - Recurrence relation - *Additive property (Self study)* - Rectangular distribution - Definition - MGF - Finding mean and variance - Simple problems.

Chapter 9: Sections 9.1-9.2.2, 9.2.5, 9.2.7, 9.2.8, 9.3-9.3.4.

[15 Hours]

Unit -5

Gamma Distribution: MGF of Gamma distribution and finding the central moments - Additive property of Gamma varieties. Beta distributions of first and second kind: Definition - Finding mean and variance. Exponential distribution: Definition - MGF- Finding mean and variance.

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.

Books for Study:

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

Books for Reference:

1. Vital P. R, *Mathematical Statistics*, Margham publications, 2004.
2. Hogg R.V. and Craigh A. G, *Introduction to Mathematical Statistics*, Pearson Education publications, 2004.

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UCY1A1	Title	Batch :	2017-2020
		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]

Books for Study :

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*.

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UPS1A1	Title	Batch :	2017-2020
		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]

Books for Study :

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*.

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS203	Title	Batch :	2017-2020
		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	solve the hyperbolic and inverse hyperbolic functions.
K2	CO2	find the Fourier co-efficient for Periodic functions.
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 of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ - Examples on formation of equations - Expansions of $\cos^n \theta$ and $\sin^n \theta$ - Expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ .

Text Book 1, Chapter 3 Sections : 1 to 5.

[14 Hours]

Unit -2

Hyperbolic functions - Inverse hyperbolic functions - Separation of real and imaginary parts of $\sin(\alpha+i\beta)$, $\cos(\alpha+i\beta)$, $\tan(\alpha+i\beta)$, $\sinh(\alpha+i\beta)$, $\cosh(\alpha+i\beta)$, $\tanh(\alpha+i\beta)$ and $\tan^{-1}(\alpha+i\beta)$. Text Book 1, Chapter 4 Sections : 1 to 2. [13 Hours]

Unit -3

Fourier Series: Definition - Finding Fourier co-efficient for given periodic functions with period 2π - Even and odd functions - Half range series. Text Book 2, Chapter 6 Sections : 1 to 5.2. [13 Hours]

Unit -4

Vector differentiation: Scalar and vector point functions - Level surface - Gradient of a scalar point function - Directional of a scalar point function - Theorems (only statement) - *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 (only statement) - Surface and Volume integrals - Gauss Divergence theorem - Stoke's theorem - Green's theorem in plane.

Text Book 3, Chapter 2.

[13 Hours]

Seminar, Assignment.

Books for Study :

1. Narayanan S. and Manicavachagom pillay T. K, *Trigonometry*, Viswanathan S, Pvt. Ltd, 2012.
2. S. Narayanan, Manicavachagom Pillay T. K, S. Viswanathan, *Calculus Volume III*, (Printers & Publishers), Pvt. Ltd, 2010.
3. P. R. Vittal, V. Malini, *Vector Analysis*, Margham publication.

Books for Reference :

1. Mittal S. C, Pragathi prakasan, *Trigonometry*, 1969.
2. Gupta R, *Vector Calculus*, Firewall media.

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS204	Title	Batch :	2017-2020
		ANALYTICAL GEOMETRY 2D AND 3D	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 rectangular Cartesian co-ordinates.
K3	CO3	apply the concept of skew lines in evaluating the shortest distance between them.
K4	CO4	analyze the concepts of right circular cone, enveloping cone, General quadric cone and their properties.

Unit -1

Polar Co-ordinates: Polar Co-ordinates - Relation between polar and rectangular Cartesian co-ordinates - Equation of a circle - Equation of a conic.

Text book 1, Chapter 9 Sections : 9.1 to 9.4 and 9.6. [13 Hours]

Unit -2

Straight Lines: Co-planarity of two lines - Shortest distances between two skew lines - Feet of the common perpendicular.

Text book 2, Chapter 4 Sections : 4.2 and 4.6. [13 Hours]

Unit -3

Sphere: Equation of a sphere - Results based on properties of a sphere - Tangent plane to a sphere - Equations of a circle - *Equation of smallest sphere through the circle (Self study)*.

Text book 2, Chapter 5 Sections : 5.1, 5.3, 5.4, 5.6, 5.7. [13 Hours]

Unit -4

Cone: Equation of a cone - Cone whose vertex is at the origin - Quadratic cone with vertex at the origin - *General quadratic cone (Self study)* - Intersection of a cone by a plane. Text book 2, Chapter 6 Sections : 6.1 to 6.5. [14 Hours]

Unit -5

Cone: Right circular cone - Enveloping cone. Cylinder: Equation of a cylinder- Right circular cylinder.

Text book 2, Chapter 6 Sections: 6.6, 6.7, 6.11.

[12 Hours]

Seminar, Assignment.

Books for Study :

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.

Books for Reference :

1. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I two dimensions*, S. Viswanathan printers & publishers Pvt. Ltd, 2010.
2. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I three dimensions*, S. Viswanathan printers & publishers, Pvt. Ltd, 2010.

3. Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS2A2	Title	Batch :	2017-2020
		MATHEMATICAL STATISTICS – II	Semester	II
Hrs/Week	6		Credits :	5

Course Objective

The objective of this paper is to introduce the concepts about 2D random variables, correlation, regression, sample theory and sampling distributions.

Course Outcomes (CO)

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

K1	CO1	understand the concepts of two dimensional random variables and its distribution functions and 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

Two Dimensional Random Variables: 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. Moments of Bivariate Probability Distributions - Conditional Expectation and Conditional Variance - Simple problems.

Chapter 5 Sections: 5.5, 5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.5.

Chapter 6 Sections: 6.8, 6.9.

[15 Hours]

Unit -2

Karl Pearson's co-efficient of Correlation: Limits for Correlation Coefficient - Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution. Rank Correlation: Spearman's Rank Correlation Coefficient - problems only (no derivations). Linear Regression: Regression Coefficients - Properties of Regression Coefficients- *Angle between two Lines of Regression (Self study)* - Simple Problems.

Chapter 10 Sections: 10.4, 10.4.1, 10.5, 10.7, 10.7.1.

Chapter 11 Sections: 11.2, 11.2.1, 11.2.2, 11.2.

[16 Hours]

Unit -3

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

1. Single Proportion,
2. Difference of Proportions - Simple Problems.

Sampling of Variables: Test of significance for

1. Single Mean,
2. Difference of Means (Self study)- Simple Problems.

Chapter 14 Sections: 14.3, 14.3.1, 14.3.2, 14.4.1, 14.4.2, 14.4.3, 14.4.4, 14.4.5, 14.5, 14.6, 14.7, 14.7.1, 14.7.2, 14.8, 14.8.3, 14.8.4. [16 Hours]

Unit -4

Applications of χ^2 Distribution: Inferences about a Population Variance - Goodness of Fit Test - Test of Independence of Attributes - 2x2 Contingency Table only - Simple Problems.

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

Unit -5

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]

Seminar, Assignment.

Books for Study :

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

Books for Reference :

1. Vital P. R, *Mathematical Statistics*, Margham publications, 2004.
2. Hogg R. V and Craigh A. G, *Introduction to Mathematical Statistics*, Pearson Education publications, 2004.

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UCY2A2	Title	Batch :	2017-2020
		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 to 14.37 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]

Books for Study :

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.*

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UPS2A2	Title	Batch :	2017-2020
		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

Logarithm of complex number - Simple Problems.

Chapter 14 Sections : 14.61 - 14.72. (Pg. No. : 14.61 to 14.72). [20 Hours]

Books for Study :

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*.

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS305	Title	Batch :	2017-2020
		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 to 6.15

[13 Hours]

Unit -2

Simple Harmonic Motion - Simple problems.

Chapter 10 Sections : 10.1 to 10.7.

[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 to 11.13.

[14 Hours]

Unit -4

Impulsive forces - Simple problems.

Chapter 7 Sections : 7.1 to 7.6.

[13 Hours]

Unit -5

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

Chapter 8 Sections : 8.1 to 8.8.

[13 Hours]

Seminar, Assignment.

Books for Study :

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS306	Title	Batch :	2017-2020
		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 to 5.

[11 Hours]

Unit -2

Interpolation: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values. Chapter 6 Sections : 1 to 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 - *Remarks on numerical differentiation (Self study)* - *Maxima and minima of a tabulated function (Self study)*.

Chapter 9 Sections : 1 to 6.

[11 Hours]

Unit -4

Numerical Integration: The Trapezoidal rule - Romberg's method - Simpson's one third rule - Practical applications of Simpson's rule.

Chapter 9 Sections : 8 to 10 and 12.

[10 Hours]

Unit -5

Numerical Solution of Ordinary 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 : 10 to 15.

[10 Hours]

Seminar, Assignment.

Books for Study :

Venkataraman M. K, *Numerical Methods in Science and Engineering*, The National Publishing Company, Madras, 2006.

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	S	H	S	S	S
CO2	S	S	H	S	S
CO3	S	H	S	H	M
CO4	M	H	M	S	H

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS3N1	Title	Batch :	2017-2020
		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

Operation on numbers: Introduction - Face value - Place value - Various types of numbers - Simple problems.

Chapter 1 Sections: 1 to 6. [3 Hours]

Unit -2

HCF and LCM of numbers: Factors and multiples - HCF and GCD - Factorization method - Division method - Simple problems.

Chapter 2 Sections: 1 and 2. [3 Hours]

Unit -3

Ratio and Proportion: Ratio - Proportion - Simple problems.

Chapter 12 Sections: 1 and 2. [3 Hours]

Unit -4

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

Chapter 11 fully. [2 Hours]

Unit -5

Odd man out and Series: Directions for odd man out and series.

Chapter 35 fully. [2 Hours]

Seminar, Assignment.

Books for Study :

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS3N2	Title	Batch :	2017-2020
		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. [3 Hours]

Unit -2

The Solar System: Comets - Meteors - Zodiacal light.

Chapter 16 Sections: 327 - 329. [3 Hours]

Unit -3

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

Chapter 17 Sections: 339 - 345. [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. [2 Hours]

Unit -5

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

Chapter 17 Section: 347. [2 Hours]

Seminar, Assignment.

Books for Study:

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS407	Title	Batch :	2017-2020
		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 : 1 - 15.

[11 Hours]

Unit -2

Parallel forces and *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 - 13.

[10 Hours]

Unit -5

Friction and Centre of gravity – Simple problems.

Chapter 7 Sections : 1-13, Chapter 8 Sections : 1-18.

[10 Hours]

Seminar, Assignment.

Books for Study :

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

Books for Reference :

1. Dharmapadam A. V, *Statics*, Chennai, 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	S	H	H	S	S
CO2	H	S	M	H	S
CO3	S	S	H	M	H
CO4	S	H	M	H	S

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS408	Title	Batch :	2017-2020
		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 Queueing models.

Unit -1

Linear Programming Problem: Introduction - Mathematical Formulation of the Problem - Graphical Solution Method - General Linear Programming Problem - Canonical and Standard Forms of L.P.P.

Chapter 2 Sections: 2.1 - 2.4

Chapter 3 Sections: 3.1 - 3.5.

[14 Hours]

Unit -2

Linear Programming Problem: Simplex Method :Introduction - The Computational Procedure - Use of Artificial Variables - Big M-method - Degeneracy in Linear Programming - Applications of Simplex Method.

Chapter 4 Sections: 4.1, 4.3 – 4.5, 4.8.

[13 Hours]

Unit -3

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 - *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 -4

Assignment & Replacement Problem: Mathematical Formulation of the Assignment Problem - Solution of Assignment Problem - Hungarian Assignment method - Replacement of equipment / Asset that deteriorates gradually

Case (i) Value of money does not change with time

Case (ii) Value of money changes with time

Selection of best equipment amongst two - Simple problems.

Chapter 11 Sections: 11.1- 11.3,

Chapter 18 Sections: 18.1 - 18.2.

[13 Hours]

Unit -5

Queueing Theory: Queueing System - Elements of a Queueing System - Operating characteristics of a Queueing system - Poisson Queueing 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, 21.9.

[12 Hours]

Seminar, Assignment.

Books for Study:

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

Books for Reference:

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS4N3	Title	Batch :	2017-2020
		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

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

Chapter 10. [3 Hours]

Unit -2

Simplification: Introduction - BODMAS rule - Modulus of a real number - Simple problems.

Chapter 4. [3 Hours]

Unit -3

Problems on ages: Problems on ages - Simple problems.

Chapter 8. [3 Hours]

Unit -4

Time and work: Time and work - Simple problems.

Chapter 15. [2 Hours]

Unit -5

Problems on trains: Problems on trains with solved examples.

Chapter 18. [2 Hours]

Seminar, Assignment.

Books for Study :

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS4N4	Title	Batch :	2017-2020
		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: 303,304,305,306 and 310

[2 Hours]

Seminar, Assignment.

Books for Study:

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS509	Title	Batch :	2017-2020
		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

Set theory (Self study) - Mappings (Self study) - Definition of a Group - Some Examples of Groups - Some preliminary Lemmas - Subgroups.

Chapter 1 Sections : 1.1, 1.2, Chapter 2 Sections : 2.1 - 2.4. [15 Hours]

Unit -2

A Counting principle - Normal Subgroups and Quotient Groups - Homomorphisms.

Chapter 2 Sections : 2.5 - 2.7. [16 Hours]

Unit -3

Automorphisms - Cayley's Theorem - Permutation Groups.

Chapter 2 Sections : 2.8 - 2.10. [16 Hours]

Unit -4

Definition and Examples of Rings - Some Special Classes of Rings - Homomorphism - Ideals and Quotient Rings.

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

Unit -5

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.

Books for Study :

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

Books for Reference :

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS510	Title	Batch :	2017-2020
		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	keep in mind some basic concepts of Real Analysis
K2	CO2	understand 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 - 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 - Absolute values and the triangle inequality - The Cauchy Schwartz inequality - Plus and minus infinity and the extended real number system $\mathbb{R}^*$.

Chapter 1 Sections : 1.1 - 1.20 (Except 1.15 - 1.17).

[15 Hours]

Unit -2

Some Basic Notations of Set Theory: Notations - 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 - Uncountability of the real number system - Set algebra - Countable collections of countable sets.

Chapter 2 Sections : 2.1 - 2.15 (Except 2.6).

[16 Hours]

Unit -3

Elements of Point Set Topology: Euclidean space $\mathbb{R}^n$ - Open balls and open sets in $\mathbb{R}^n$ - The structure of open sets in $\mathbb{R}^1$ - 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 $\mathbb{R}^n$.

Chapter 3 Sections : 3.1 - 3.12.

[16 Hours]

Unit -4

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 : 4.1 - 4.5, 4.7. [16 Hours]

Unit -5

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.

Books for Study :

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

Books for Reference :

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc	Programme Title:	Mathematics	
Course Code:	17UMS511	Title	Batch :	2017-2020
		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 $2 \times n$ and $m \times 2$ games.

Chapter 17 Sections: 17.1 - 17.6.

[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

Inventory control: Types of inventories - Reasons for carrying inventories- The inventory decisions - Cost 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).

Chapter 19 Sections: 19.1 - 19.4, 19.6, 19.7, 19.9, 19.10.

[14 Hours]

Unit -4

Inventory control: 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: 19.11, 19.12.

[13 Hours]

Unit -5

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

Chapter 25 Sections: 25.1 - 25.4, 25.6 - 25.8.

[12 Hours]

Seminar, Assignment.

Books for Study:

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

Books for Reference:

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc	Programme Title:	Mathematics	
Course Code:	17UMS512	Title	Batch :	2017-2020
		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	define and interpret the concepts of divisibility, congruence, greatest common divisor, prime and prime-factorization.
K2	CO2	solve linear Diophantine equations and congruences of various types and use the theory of congruences in applications.
K3	CO3	prove and apply properties of multiplicative functions such as the Euler phi-function and quadratic residues.
K4	CO4	solve 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 and 2. [12 Hours]

Unit -2

Combinational and Computational Number Theory: Permutations and Combinations - Fermat's Little Theorem (Statement only) - Wilson's Theorem (Statement only). Fundamentals of Congruences: *Basic properties of Congruences (Self study)* - Residue systems.

Chapter 3 Sections : 3.1 - 3.3, 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. [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.

[14 Hours]

Unit -5

Primitive Roots : Properties of Reduced Residue Systems - Primitive Roots

Modulo P. Prime Numbers: Elementary properties of $\pi(x)$ - Tchebychev's theorem - Some unsolved problems about primes.

Chapter 7 and 8.

[14 Hours]

Seminar, Assignment.

Books for Study :

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

Books for Reference :

1. David M. Burton, *Elementary Number Theory*, McGraw- Hill, 1997.
2. Kumaravelu et al., *Elements of Number Theory*, Nagerkovil, SKV, 2002.
3. Telang, *Number theory*, Tata McGraw-Hill publishing Company Ltd, 1984.

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS513	Title	Batch :	2017-2020
		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

History of C - Importance of C - Character set - Keywords - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining symbolic constants - Arithmetic, Relational, Logical, Assignment, increment, Decrement and conditional operators-Arithmetic expressions - Evaluation of expressions - *Precedence of arithmetic operators (Self study)* - Type conversions in expressions - Operator precedence - Mathematical functions - Reading a character - Writing a character - Formatted input and output.

Chapter 1 Sections : 1.1-1.9

Chapter 2 Sections : 2.1-2.12

Chapter 3 Sections : 3.1-3.16

Chapter 4 Sections : 4.1-4.5.

[11 Hours]

Unit -2

Simple if statement - If ... else statement - Nesting of if ... else statements - else if ladder - switch statement - go to statement - while statement - do while statement - for statement - Jumps in loops - Simple programs.

Chapter 5 and 6 Sections : 5.1-5.9 and 6.1-6.5.

[11 Hours]

Unit -3

One dimensional arrays - Two dimensional arrays - 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)* - Simple programs.

Chapter 7 and 8 Sections : 7.1 - 7.6 and 8.1 - 8.9.

[10 Hours]

Unit -4

Need for user defined functions - The form of C functions - Return values and their types - Calling a function - No arguments and no return values - Arguments but no return values - Arguments with return values - Handling of non integer functions - Functions returning nothing Nesting of C functions - Recursion - Functions with arrays - Simple programs.

Chapter 9 Sections : 9.1 - 9.16.

[10 Hours]

Unit -5

Understanding pointers - Accessing the address of a variable - Declaring and initializing pointers - Accessing a variable through its pointer - Pointer expressions - Pointer increments and scale factor - Pointers and arrays - Pointers and characters strings - Pointers as function arguments - Pointers to functions - Simple programs.

Chapter 11 Sections : 11.1-11.16.

[10 Hours]

Seminar, Assignment.

Books for Study :

Balagurusamy E, *Programming in ANSI C*, Third Edition, Tata McGraw Hill Publishing Company Ltd, 2004.

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	S	S	H	M	S
CO2	H	S	S	H	S
CO3	H	H	S	M	H
CO4	M	H	H	M	S

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc	Programme Title:	Mathematics	
Course Code:	17UMS514	Title	Batch :	2017-2020
		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.

Books for Study :

Balagurusamy E, *Programming in ANSI C*, Third Edition, Tata McGraw Hill Publishing Company Ltd, 2004.

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	S	H	S	M	S
CO2	S	H	S	M	S
CO3	H	S	H	M	H

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc	Programme Title:	Mathematics	
Course Code:	17UMS5S1	Title	Batch :	2017-2020
		MATHEMATICS IN FINANCE-I	Semester	V
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

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

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

Coverage ratios - Profitability ratios - profitability ratios related to sales - Profit margin - Expenses ratio.

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

Unit -5

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

Chapter 4 Section: 4.9. [2 Hours]

Seminar, Assignment.

Books for Study :

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	H	S	H	H	M
CO2	S	H	S	M	H
CO3	M	H	H	M	M
CO4	H	S	H	M	M

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS5C2	Title	Batch :	2017-2020
		ACTUARIAL MATHEMATICS-I	Semester	V
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.

Existing Syllabus

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 Section: 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 Section: 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 Section: 2.2 [2 Hours]

Seminar, Assignment.

Books for Study :

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

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS615	Title	Batch :	2017-2020
		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 transformation: Linear transformations - The algebra of linear Transformations - Isomorphism.

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

Unit -4

Representation of transformations by matrices - Linear functionals.

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

Unit -5

The double dual - The transpose of a linear transformation.

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

Seminar, Assignment.

Books for Study:

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

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc	Programme Title:	Mathematics	
Course Code:	17UMS616	Title	Batch :	2017-2020
		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	keep in mind 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 to 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 to 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 to 7.10

[16 Hours]

Unit -4

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 to 7.17.

[16 Hours]

Unit -5

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.

Chapter7 Sections : 7.18 to 7.22.

[15 Hours]

Seminar, Assignment.

Books for Study :

Tom M. Apostol, *Mathematical Analysis*, Narosa Publishing House, Second Edition 1990.

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

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS617	Title	Batch :	2017-2020
		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.

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 - Arcs and Closed Curves - Analytic Functions in Regions - Conformal Mapping - Length and Area.

Chapter 2 Sections: 3.1, 3.2, Chapter 3 Sections: 2.1 - 2.4. [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, 3.2, 3.3, and 3.4. [15 Hours]

Seminar, Assignment.

Books for Study:

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

Books for Reference:

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS618	Title	Batch :	2017-2020
		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	use 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 to 7.

[14 Hours]

Unit -2

Logic:Introduction - TF-statements – Connectives - Atomic and Compound Statements - Well Formed (Statement) Formulae -The Truth table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae - Replacement Process - Functionally Complete Sets of Connectives and Duality Law - Normal Forms - Principal Normal Forms.

Text Book 1, Chapter 9 Sections : 1 to 12. [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 to 5. [13 Hours]

Unit -4

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

Text Book 2, Chapter 9 Sections : 9.1 to 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 to 15.7. [13 Hours]

Seminar, Assignment.

Books for Study :

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

Books for Reference :

1. Ralph P.Grimaldi, *Discrete and Combinatorial 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

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS619	Title	Batch :	2017-2020
		OBJECT ORIENTED PROGRAMMING WITH C++	Semester	VI
Hrs/Week	2		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++ - *Tokens (Self study)* - Expressions and Control structures

Chapter 5 Sections : 5.1-5.19. [11 Hours]

Unit -2

Functions in C++ - Constructors and Destructors.

Chapter 4 Sections : 4.1- 4.12

Chapter 6 Sections : 6.1-6.11. [10 Hours]

Unit -3

Classes and objects.

Chapter 5 Sections : 5.1-5.19. [11 Hours]

Unit -4

Operator overloading and Type conversions, *Pointers(Self study)*, Virtual Functions and Polymorphism

Chapter 7 Sections : 7.1-7.9

Chapter 8 Sections : 8.1-8.11 [10 Hours]

Unit -5

Inheritance: Extending classes.

Chapter 9 Sections : 9.1-9.7 [10 Hours]

Seminar, Assignment.

Books for Study :

Balagurusamy, E. (2009), *Object Oriented Programming with C++*, Tata Mc Graw Hill Publishing Company, New Delhi

Books for Reference :

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

Mapping

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS620	Title	Batch :	2017-2020
		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.

Books for Study :

Balagurusamy, E. (2009), *Object Oriented Programming with C++*, Tata Mc Graw Hill Publishing Company, New Delhi.

Books for Reference :

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	17UMS6S2	Title	Batch :	2017-2020
		MATHEMATICS IN FINANCE-II	Semester	VI
Hrs/Week	1		Credits :	2

Course Objective

The main objective of this paper is to introduce the concepts of capital budgeting.

Course Outcomes (CO)

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

K1	CO1	gain the basic knowledge of the meaning of capital budgeting.
K2	CO2	understand the basic knowledge of cash flows.
K3	CO3	execute average rate of return method and payback method.
K4	CO4	analyze the concept of net present value method.

Unit -1

Capital budgeting principle and techniques: Nature of capital budgeting-Importance-Difficulties-Rationale-Kinds.

Chapter 5 Section: 5.1,5.2. [3 Hours]

Unit -2

Data requirement: Identifying relevant cash flows: Accounting profit and cash flows-Incremental cash flow- Effect of taxes-Conventional & non-conventional cash flows.

Chapter 5 Section: 5.3 [3 Hours]

Unit -3

Cash flow estimates-Determination of relevant cash flows-Single proposal-Replacement situations-Mutually exclusive situations.

Chapter 5 Section: 5.4,5.5. [3 Hours]

Unit -4

Evaluations techniques: Unsophisticated or traditional-Average rate of return method-Payback method

Chapter 5 Section: 5.6,5.7. [2 Hours]

Unit -5

Sophisticated or time –adjusted- net present value method- internal rate of return method.

Chapter 5 Section: 5.8. [2 Hours]

Seminar, Assignment.

Books for Study :

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

Books for Reference :

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low

Programme Code:	B.Sc	Programme Title:	Mathematics	
Course Code:	17UMS6C2	Title	Batch :	2017-2020
		ACTUARIAL MATHEMATICS -II	Semester	VI
Hrs/Week	1		Credits :	2

Course Objective

This paper enables the learners to gain basic knowledge of life table statistics.

Course Outcomes (CO)

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

K1	CO1	know the knowledge of binomial variables
K2	CO2	get the idea of expectation of discrete random variables.
K3	CO3	implement the rules for manipulating expectations.
K4	CO4	acquire the knowledge of some special integrals.

Existing Syllabus

Unit -1

Probability and Life tables: Interpreting Force of Mortality, Interpolation Between Integer Ages.

Sections- 3.1, 3.2 [3 Hours]

Unit -2

Binomial variables and Law of Large Numbers, Exact Probabilities, Bounds and Approximations.

Sections- 3.3, 3.3.1 [3 Hours]

Unit -3

Simulation of Life Table Data, Expectation for Discrete Random Variables.

Section- 3.4, 3.4.1 [3 Hours]

Unit -4

Rules for Manipulating Expectations.

Section- 3.4.2 [2 Hours]

Unit -5

Some Special Integrals.

Section- 3.5 [2 Hours]

Seminar, Assignment.

Books for Study :

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

Books for Reference:

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

Mapping

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

S - Strong; H- High; M- Medium; L- Low