Vellalar College for Women (Autonomous), Erode - 12.

Bachelor of Science in Mathematics

Course Content and Scheme of Examinations (CBCS & OBE Pattern)

2018 – 2019 and 2019 – 2020 Onwards

Semester I

Part	Study Components	Subject Code	Title of the Paper	Inst. Hrs./ Week	Exam. Dur. Hrs.	Max. Marks			Credits
						CIA	ESE	Total	
I	Language I	18TAMU101/ 18HINU101	Tamil / Hindi	6	3	25	75	100	3
II	Language II	18ENLU101	English	6	3	25	75	100	3
III	Core	18MSUC101/ 18MCUC101	Classical Algebra©	4	3	25	75	100	4
		18MSUC102/ 18MCUC102	Calculus©	5	3	25	75	100	4
	Allied I	18MSUA101/ 19MCUA101	Statistics for Mathematics - I ©	5	3	20	55	75	4
		18MSUAP01/ 19MCUAP01	Allied Practical - Mathematical Software - I ©	2	3	-	25	25	1
IV	Foundation Course A	18FOCU1ES	Environmental Studies	2	3	-	100	100	2
Total								**600**	**21**

Semester II

I	Language I	18TAMU202/ 18HINU202	Tamil / Hindi	6	3	25	75	100	3	
II	Language II	18ENLU202	English	6	3	25	75	100	3	
III	Core	18MSUC203/ 18MCUC203	Differential Equations & Laplace Transforms©	4	3	25	75	100	4	
		18MSUC204/ 19MCUC204	Trigonometry , Vector Calculus & Fourier Series©	3	3	20	55	75	3	4
		18MSUCP01/ 19MCUCP01	Core Practical - Mathematical Software - II ©	2	3	-	25	25	1	
	Allied I	18MSUA202/ 19MCUA202	Statistics for Mathematics - II ©	7	3	25	75	100	5	
IV	Foundation Course B	18VEDU2HR	Value Education & Human Rights	2	3	-	100	100	2	
Total								**600**	**21**	

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Semester III									
I	Language I	18TAMU202/ 18HINU202	Tamil / Hindi	6	3	25	75	100	3
II	Language II	18ENLU202	English	6	3	25	75	100	3
III	Core	18MSUC305	Analytical Geometry	3	3	25	75	100	4
		18MSUC306	Foundation Course in Mathematics	3	3	25	75	100	4
IV	Allied II	18PHUA303	Allied Physics-I	7	3	20	55	75	4
	Skill Based Subject I	18MSUSP01/ 18MCUSP01	SBS -Practical LaTeX (Cafeteria system)©	3	3	40	60	100	3
	Basic Tamil				-	100	-		
	Advanced Tamil			2	3	25	75		
	Non-Major Elective I	18MSUN301	Mathematics for Data Science		3	-	100	100	2
Total								**675**	**23**
Semester IV									
I	Language I	18TAMU202/ 18HINU202	Tamil / Hindi	6	3	25	75	100	3
II	Language II	18ENLU202	English	6	3	25	75	100	3
III	Core	18MSUC407	Linear Algebra	3	3	25	75	100	4
		18MSUC408	Real Analysis I	3	3	25	75	100	4
	Allied	18PHUA404	Physics – II (Theory)	4	3	20	55	75	4 / 6
		18PHUAP01	Physics – II (Practical)	3	3	20	30	50	2
IV	Skill Based Subject II	15MSUC402/ 15MCUC402	Multiskill Development Paper©	3	1	40	60	100	3
	Basic Tamil			2	-	100	-	100	2
	Advanced Tamil				3	25	75		
	Non-Major Elective II	18MSUN402	Mathematics for All		3	-	100		
Total								**725**	**25**
© - Common Syllabus for B.Sc., (Mathematics) and B.Sc., (Mathematics with Computer Applications)									

SKILL BASED SUBJECT			
S.No	**Subject Code**	**Title of the Paper**	**Credits**
1	18MSUSP01/18MCUSP01	SBS - Practical LaTeX (Practical) (Cafeteria System)	3
2	15MSUC402/15MCUC402	Multiskill Development Paper (Online exam - Ext : 60)	3
BASIC TAMIL/ADVANCED TAMIL/ NON-MAJOR ELECTIVES			
1	14TMLU301	Basic Tamil *	2
	14TMLU402		2
2	14ADTU301	Advanced Tamil **	2
	14ADTU402		2
3	18MSUN301	Mathematics for Data Science	2
4	18MSUN402	Mathematics for All	2

SELF- LEARNING PAPERS (Optional)					
S.No	**Subject Code**	**Title of the Paper**	**Exam. Dur.Hrs.**	**Max.Marks**	**Credits**
1	18MSUSL02	Astronomy	3	100	5
2	15MSUSL15	Scilab (Online exam)	1	100	5

MOOCs Non-ranking Compulsory Credit Course will be introduced in Part V for UG from the Academic Year 2019-20 and onwards

B.Sc., (Mathematics) and B.Sc., (Mathematics with CA)

Bloom's Taxonomy Based Assessment Pattern

Components of CIA Marks

Tests (I & II)	Assignment / Seminar / Subject Viva	Model Examination	Total
10	5	10	25
8	4	8	20

CIA

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	30
K1, K2	B	Either / Or	2 x 5 = 10	
K2, K3	C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	75
K1, K2	B	Either / Or	5 x 5 = 25	
K2, K3,K4	C	Open Choice (5 out of 8)	5 x 8 = 40	

SEMESTER I

CODE	COURSE TITLE
18MSUC101/ 18MCUC101	CLASSICAL ALGEBRA

Category	CIA	ESE	L	T	P	Credit
Core	25	75	56	4	-	4

Preamble

- To acquire complete knowledge of summation and approximation through Binomial, Exponential and Logarithmic series
- To understand concepts and improve problem solving skills on theory of equations
- To gain knowledge in theory of numbers

Prerequisite

- Knowledge in basic concepts of series, equations and types of equations

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Find the sum of finite and infinite Binomial, Exponential and Logarithmic series	K1
CO2	Solve equations using various techniques	K2
CO3	Find the approximate roots of an equation by Newton's method and Horner's method	K3
CO4	Gain knowledge in number theory	K2
CO5	Study the concept of congruences and its properties	K2

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	L	M	M
CO2	M	S	M	S	S
CO3	S	S	M	S	S
CO4	M	S	M	M	S
CO5	S	S	L	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(12 hrs.)**

Binomial, Exponential and Logarithmic Series: Theorems – Statements without proofs – Emphasize on their Immediate Application to Summation and Approximation.

UNIT II **(12 hrs.)**

Theory of Equations: Roots of an Equation – Relations Connecting the Roots and Coefficients - Symmetric Function of Roots – Transformations of Equations – Reciprocal Equations – Character and Position of Roots – Descarte's Rule of Signs.

UNIT III **(12 hrs.)**

Theory of Equations: Rolle's Theorem – Multiple Roots – Newton's Method of Approximation for Finding Positive Roots upto Two Decimal Places – Horner's Method upto Two Decimal Places.

UNIT IV **(12 hrs.)**

Theory of Numbers: Prime and Composite Numbers – the Sieve of Eratosthenes – Divisors of a Given Number N – Euler's Function $\phi(N)$ - Integral Part of a Real Number – the Highest Power of a Prime pContained in n! - the Product of r Consecutive Integers is Divisible by r! – Congruences.

UNIT V **(12hrs.)**

Theory of Numbers: Properties of Congruences – Numbers in Arithmetical Progression – Theorem – Fermat's Theorem – Generalization of Fermat's Theorem – Wilson's Theorem – Lagrange's Theorem.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	T. Natarajan, T.K. ManicavachagomPillay&K.S.Ganapathy	Algebra – Vol. I (Units I, II & III) and Vol. II (Units IV & V)	S.Viswanathan Printers and Publishers Pvt., Ltd.,Chennai.	Vol. I , 2014-2015 Vol. II, 2012-2013

Unit	Chapter	Sections
I	3	5 – 10, 14
	4	1 – 3, 5 – 9.1, 11(without limit)
II	6	1 – 12, 14 – 19, 21, 24
III	6	25, 26, 30
IV	5	1 - 12
V	5	13 – 18

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	R.M. Khan	Algebra - Classical, Modern, Linear & Boolean	New central Book Agency(P) Ltd.,Kolkata	Reprint 2016
2	H.S. Hall &S.R.Knight	Higher Algebra	AITBS Publishers, India	Reprint 2014
3	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley & Sons, United States	2012, 9th Edition

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar and Subject Viva

Web Resources

1. http://nptel.ac.in/courses/106105162/18
2. http://nptel.ac.in/courses/111106083/33
3. https://www.khanacademy.org/math/algebra2/polynomial-functions/fundamental-theorem-of-algebra/v/possible-real-roots

4. http://www.math.kent.edu/~white/FCA/text/jan09ed.pdf

5. http://www.gutenberg.org/files/29785/29785-pdf.pdf?session_id=1888afffae379b4647cad5675a6b169d2543f267

- Question paper setters are asked to confine to the above **text books** only.

SEMESTER I

CODE	COURSE TITLE
18MSUC102/ 18MCUC102	CALCULUS

Category	CIA	ESE	L	T	P	Credit
Core	25	75	70	5	--	4

Preamble

- To focus on conceptual understanding
- To explore fundamental concepts of differential and integral calculus
- To explore the solutions of problems from a mathematical perspective, and
- To prepare students to succeed in upper level math, science, engineering and other courses which require calculus

Prerequisites

- Students must know the different types of functions and deriving new functions from given functions
- Students must know the integration of all basic types of functions

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the meaning of differentiation using limits	K1, K2
CO2	Construct n^{th} derivatives of different functions	K3
CO3	Compute radius and centre of curvature	K2
CO4	Evaluate integration of trigonometric functions	K2
CO5	Apply calculus concepts to solve real-world problems such as finding areas and volumes	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	M
CO2	M	M	S	S	S
CO3	S	M	M	M	S
CO4	M	S	M	S	S
CO5	S	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(15 hrs.)**

Differentiation – Definition – Standard Forms – Logarithmic Differentiation – Differentiation of Implicit Functions – Differentiation of one Function with respect to Another – Successive Differentiation – Leibnitz Formula for n^{th} Derivative of a Product (Statements and Problems only)

UNIT II **(15 hrs.)**

Envelopes – Radius of Curvature in Cartesian and Polar Forms – Centre of Curvature – Evolutes and Involutes – Pedal Equations

UNIT III **(15 hrs.)**

Integration of the types $dx/(ax^2+bx+c)$, $lx+m/(ax^2+bx+c)$, $1/\sqrt{ax^2+bx+c}$, $(px+q)/\sqrt{ax^2+bx+c}$, $\frac{1}{a\cos x+b}$, $\frac{1}{a\sin x+b}$ and $\frac{1}{\left(a^2\cos^2 x+b^2\sin^2 x\right)}$ – Integration by parts – Reduction formulae – Problems – Bernoulli's formula – Problems

UNIT IV **(15 hrs.)**

Multiple Integrals : Evaluation of Double and Triple Integrals Problems only – Applications to Calculation of Areas and Volumes – Jacobians – Change of Variables in Double and Triple Integrals

UNIT V **(15 hrs.)**

Improper Integrals: Infinite Integrals – Simple Problems – Beta and Gamma Integrals – Their Properties – Relation between them – Evaluation of Multiple Integrals using Beta and Gamma Functions

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	S. Narayanan and T.K.ManicavachagomPillay	Calculus, Vol. I (Units I, II)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	2015
2	S. Narayanan and T.K.ManicavachagomPillay	Calculus, Vol. II (Units III, IV, V)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	2015

Unit I	Chapter II & III
Unit II	Chapter X
Unit III	Chapter I Sec. 7.3 Rule (b) Type (i) & (ii) Sec. 8 Case (i) & (ii) Sec. 9, 12, 13, 15
Unit IV	Chapter IV 2.2, 4, 5.3, 5.4, 6.3 Chapter VI 1.1, 1.2, 2.1 – 2.4
Unit V	Chapter VII

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Tom M.Apostol	Calculus Vol.1 and Vol.2	John Wiley & Sons United States	2016, 2nd Edition
2	James Stewart	Calculus: Early Transcendentals	Thomson Brooks/Cole, USA	2008, 6th Edition

Pedagogy

Lecture, PPT, Subject Viva, Seminar, RBPT and Videos

Web Resources

1. http://nptel.ac.in/courses/111104085/29
2. https://www.khanacademy.org/math/calculus-home
3. https://ocw.mit.edu/courses/mathematics/18-01-single-variable-calculus-fall-2006/video-lectures/
4. http://www.math.odu.edu/~jhh/Volume-1.PDF
5. http://www.math.odu.edu/~jhh/Volume-2.PDF

- Question paper setters are asked to confine to the above **text books** only.

SEMESTER I

CODE	COURSE TITLE
18MSUA101	STATISTICS FOR MATHEMATICS – I

Category	CIA	ESE	L	T	P	Credit
Allied	20	55	70	5	-	4

Preamble

- To acquire knowledge in the fundamentals of statistics such as random variables, distribution of the discrete and continuous types, bivariate distributions and functions of random variables

Prerequisite

- Must know the concepts in probability theory such as properties of probability, independent events, conditional probability and Baye's theorem

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the concept of random variables	K1
CO2	Exercise the problem solving ability in statistics	K3
CO3	Study the characteristics of discrete and continuous distributions	K2
CO4	Acquire knowledge in of bivariate distributions	K2
CO5	Make use of random variables to find the distributions of functions of random variables	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	S	S	M	S	M
CO3	M	S	M	S	M
CO4	M	S	S	S	S
CO5	M	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(15 hrs.)**

Discrete Distributions : Random Variables of the Discrete Type – Mathematical Expectation – Special Mathematical Expectation – Binomial Distribution – Negative Binomial Distribution - The Poisson Distribution

UNIT II **(15 hrs.)**

Continuous Distributions : Random Variables of Continuous Type – Exponential, *Gamma* and χ^2 Distributions – Normal Distribution

UNIT III **(15 hrs.)**

Bivariate Distributions: Bivariate Distributions of the Discrete type – Correlation Coefficient - Conditional Distributions – Bivariate Distributions of the Continuous Type – The Bivariate Normal Distributions

UNIT IV **(15 hrs.)**

Distributions of Functions of Random Variables: Functions of One Random Variable – Transformations of Two Random Variables – Several Random Variable– The Moment Generating Function Technique

UNIT V **(15 hrs.)**

Distributions of Functions of Normal Random Variables: Random Functions Associated With Normal Distributions – The Central Limit Theorem – Approximation for Discrete Distributions - Chebyshev's Inequality – Convergence in Probability

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Robert V. Hogg, Elliot A. Tanis, Dale L.Zimmerman	Probability and Statistical Inference	Pearson Education Inc. UK	2015, 9th Edition

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	PrasannaSahoo	Probability and Mathematical Statistics	University of Louisville, USA	2013
2	Barbara Illowsky, Susan Dean	Introductory Statistics	Rice University, Texas	2014 , Last Edition

3	Robert V. Hogg, Joseph W. McKean, Allen T. Craig	Introduction to Mathematical Statistics	Pearson Education Inc. UK	2018, 8th Edition
4	S.C. Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons,New Delhi	2014

Pedagogy

Lecture, PPT, Seminar, Subject Viva and Videos

Unit	Chapter	Sections	Page No.
I	2	2.1 to 2.6	41-72, 79-85
II	3	3.1 to 3.3	87-113
III	4	4.1 to 4.5	125-153
IV	5	5.1 to 5.4	163-179, 187-191
V	5	5.5 to 5.8	192-216

Web Resources

1. http://nptel.ac.in/courses/102106051/4
2. http://nptel.ac.in/courses/108106083/lecture30_CLT.pdf
3. https://www.khanacademy.org/math/statistics-probability/random-variables-stats-library/modal/v/discrete-and-continuous-random-variables
4. http://www.e-booksdirectory.com/details.php?ebook=10166
5. https://www.probabilitycourse.com/
6. http://mason.gmu.edu/~jgentle/books/MathStat.pdf

- Question Paper setters are asked to confine to the above **text book only**

SEMESTER I

CODE	COURSE TITLE
18MSUAP01	MATHEMATICAL SOFTWARE – I

Category	CIA	ESE	L	T	P	Credit
Allied Practical	--	25	--	--	30	1

Preamble

- To apply the statistical knowledge acquired through the theory course

Prerequisite

- To be familiar with the basic statistical concepts of measures of central tendency, measures of dispersion, descriptive statistics, correlation, regression & testing of hypothesis.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Be equipped with the professional competency through learning Free Open Source Software - R	K3
CO2	Create the database, visualizing and analyzing the data using R	K2
CO3	Make inferences through the results obtained	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	S	S	M	S	S

S- Strong; M-Medium; L-Low

List of practicals

1. Use R as a calculator using basic Commands in R
2. Data entry, manipulation and retrieval
3. Creating frequency and relative frequency distribution in R
4. Creating data frame, matrices
5. Descriptive statistics, Graphics - pie diagram, box plot, histogram, bar plot
6. Creating functions

7. To find mean, median, geometric mean, harmonic mean of numerical data and edit the output
8. To determine standard deviation, variance and checking the consistency of the given data and edit the output
9. Bivariate data- scatter plot, correlation co-efficient, fitting linear regression line and interpreting the result
10. Multiple linear regression models
11. Computation of probabilities in various distributions.(Binomial, Poisson, Normal)
12. Drawing the graph of probability mass and density functions
13. One and two sample'*t*' test and paired' *t*test
14. One way and two way Analysis of Variance tests

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	W. John Braun and Duncan J. Murdoch	A First Course in Statistical Programming with R	Cambridge University Press, Newyork	2007
2	J H Maindonald	Using R for Data Analysis and Graphics: Introduction, Code and Commentary	https://cran.r-project.org/doc/contrib/usingR.pdf	2008
3	Kim Seefeld and Ernst Linder	Statistics Using R with Biological Examples	https://cran.r-project.org/doc/contrib/Seefeld_StatsRBio.pdf	online

SEMESTER II

CODE	COURSE TITLE
18MSUC203/ 18MCUC203	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

Category	CIA	ESE	L	T	P	Credit
Core	25	75	56	4	-	4

Preamble

- To promote conceptual knowledge and problem solving skills of ordinary differential equations and partial differential equations
- To understand the evaluation of different functions through Laplace Transformation

Prerequisite

- Must know the basic formulae of differentiation and problem solving techniques

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Solve the first order differential equations through various techniques	K1 & K2
CO2	Learn the methods of solving second order ODE for different functions of x	K2
CO3	Evaluate the partial differential equations of first order using different methods	K2
CO4	Apply Laplace transformation to solve differential equations	K3
CO5	Make use of inverse Laplace transforms to solve the ordinary differential equations and system of differential	K3

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	L	S	S
CO2	M	S	M	S	S
CO3	M	S	M	S	S
CO4	S	M	L	M	S
CO5	S	M	M	M	S

Mapping with Programme Outcomes

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(12 hrs.)**

First order ODEs: First Order Higher Degree Equations– Solvable for x, y, p - Clairaut's form – Simultaneous Differential Equations of the Form (i) $f_1(D)x + f_2(D)y = h_1(t)$, $g_1(D)x + g_2(D)y = h_2(t)$where f_1, f_2, g_1 and g_2 Are Rational Functions of $D = d/dt$ with Constant Coefficients, h_1 and h_2 are Explicit Functions of t (ii) $dx / P = dy / Q = dz / R$ – Conditions of Integrability

UNIT II **(12 hrs.)**

Second order ODEs: Particular Integral of Equations of Second Order with Constant Co-efficients for xe^{mx} – Higher Order Equations when F(D) is easily Factorizable – Linear equations with Variable Co-efficients (Reducible to Quadratic form)

UNIT III **(12 hrs.)**

Partial Differential Equations: Formation of Equations by Eliminating Arbitrary Constants and Arbitrary Functions – Definition of General, Particular and Complete Solutions – Singular and General Solutions of First Order Equations in the Standard Forms (i) $f(p,q) = 0$, (ii) $f(z,p,q) = 0$, (iii) $f(x,p) = g(y,q)$, (iv) $z = px + qy + f(p,q)$ – Lagrange's Method of Solving Linear Differential Equations $Pp + Qq = R$

UNIT IV **(12 hrs.)**

Laplace transforms: Definition – Laplace Transforms of e^{at}, cos*at*, sin*at*and t^n where *n* is an Integer - First Shifting Theorem – Laplace Transforms of e^{at} cos*bt*, e^{at} sin*bt* and $e^{at}\,t^n$ – Theorems of $L\{f'(t)\}, L\{f''(t)\}, L\{f^n(t)\}$.

UNIT V **(12 hrs.)**

Inverse Laplace Transforms: Definition – Solution of Differential Equations with Constant Coefficients using Laplace Transformation – Solving System of Linear Differential Equations using Laplace Transformation

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	S. Narayanan &T.K.ManicavachagomPillay	Calculus Vol. III	S. Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2015

Unit	Chapter	Sections
I	1	5 – 7.3
	3	1 –6
II	2	1 – 4, 8, 9
III	4	1 – 6
IV	5	1 – 5
V	5	6 – 9

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	M.D.Raisinghania	Ordinary and Partial Differential Equations	S.Chand& Sons, New Delhi	2016, 18th Edition
2	Erwin Kreyszig	Advanced Engineering Mathematics	Wiley & Sons, United States	2012, 9th Edition
3	B.S.Grewal	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2014, 43rd Edition

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar and Subject Viva

Web Resources

1. http://nptel.ac.in/courses/111105035/22
2. http://nptel.ac.in/courses/103103037/5
3. https://ocw.mit.edu/courses/mathematics/18-03sc-differential-equations-fall-2011/unit-iii-fourier-series-and-laplace-transform/laplace-transform-basics/
4. http://www.math.ust.hk/~machas/differential-equations.pdf
5. https://www.math.psu.edu/shen_w/PDF/NotesPDE.pdf

- Question paper setters are asked to confine to the above **text book** only.

SEMESTER II

CODE	COURSE TITLE
18MSUC204	TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES

Category	CIA	ESE	L	T	P	Credit
Core	20	55	42	3	--	3

Preamble

- To focus on conceptual understanding
- To introduce logarithm of a complex quantity
- To prepare students to succeed in upper level math, science, engineering and other courses which require trigonometry and vector calculus
- To impart the application of sine and cosine functions in signals using Fourier series

Prerequisite

- Students must know the basics of trigonometric identities, complex number system and the difference between scalars and vectors

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Expand sines and cosines of multiples of theta and powers of theta	K2
CO2	Find logarithm of a complex number and summation of trigonometric series	K1
CO3	Understand the relation between directional derivative, gradient, divergence and curl	K1
CO4	Make use of theorems to study relation between line, surface and volume integrals	K3
CO5	Evaluate line, surface and volume integrals	K3

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	M	S	L	M	S
CO2	M	M	M	M	S
CO3	M	M	L	S	S
CO4	S	S	M	S	S
CO5	S	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

Expansions: Expansion of $\cos n\phi$, $\sin n\phi$, $\cos^n \phi$, $\sin^n \phi$ – **Hyperbolic functions** – Separation of real and imaginary parts of $\sin(\alpha + i\beta)$, $\cos(\alpha + i\beta)$, $\tan(\alpha + i\beta)$, $\sinh(\alpha + i\beta)$, $\cosh(\alpha + i\beta)$, $\tanh(\alpha + i\beta)$, $\tan^{-1}(\alpha + i\beta)$

UNIT II **(9 hrs.)**

Logarithm of a Complex Number and Summation of Series: Logarithm of a Complex Number – Summation of Trigonometric Series – Method of Differences – When Angles are in A.P.

UNIT III **(9 hrs.)**

Scalar and Vector Point Functions– Directional Derivative, Gradient, Divergence, Curl – Summation notation for Divergence and Curl – Laplacian Differential Operator – Problems

UNIT IV **(9 hrs.)**

Integration of Vectors : Line, Surface and Volume Integrals – Theorems of Gauss, Green, Stokes (Statements only) – Verification

UNIT V **(9 hrs.)**

Fourier Series : Definition – Finding Fourier Coefficients for a Given Periodic Function with Period 2π – Odd and Even Functions – Half Range Series

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	S. Narayanan and T.K.ManicavachagomPillay	Trigonometry (Units I, II)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	2015
2	P.Duraipandian, LaxmiDuraipandian	Vector Analysis (Units III, IV)	Emerald Publishers, Chennai	2014
3	S. Narayanan and T.K.ManicavachagomPillay	Calculus, Vol. III (Unit V)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	2015

UNIT I	Chapter III	Sec. 1 & Sec. 4
	Chapter IV	Sec. 1 & Sec. 2
UNIT II	Chapter V	Sec. 5
	Chapter VI	Sec. 1 & Sec. 2
UNIT III	Chapter II	2.1 – 2.8
UNIT IV	Chapter III	3.1, 3.5 – 3.7
	Chapter IV	4.1 – 4.6
UNIT V	Chapter VI	Sec. 2, 3 & 4

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Robert E Moyer, Frank Ayres JR	Schaum's Outlines Trigonometry	Tata McGraw Hill Publishing Company, New Delhi	2013, 5th Edition
2	M.D.Raisinghania, H.C.Saxena, H.K.Dass	Trigonometry	S.Chand& Sons, New Delhi	2002
3	James Stewart	Calculus: Early Transcendentals	Thomson Brooks/Cole, USA	2008, 6th Edition

4	Peter V.O'Neil	Advanced Engineering Mathematics	Cengage Learning India Pvt. Ltd., New Delhi	2012, 7th Edition

Pedagogy

Lecture, PPT, Subject Viva, Seminar, RBPT and Videos

Web Resources

1. http://nptel.ac.in/courses/122101003/downloads/Lecture-44.pdf
2. https://www.khanacademy.org/math/multivariable-calculus/integrating-multivariable-functions/line-integrals-vectors/v/line-integrals-and-vector-fields
3. https://www.intmath.com/fourier-series/3-fourier-even-odd-functions.php
4. https://www.khanacademy.org/science/electrical-engineering/ee-signals/ee-fourier-series/v/ee-fourier-coefficients-cosine
5. https://www.pdfdrive.net/calculus-early-transcendentals-8th-ed-2015pdf-e27097109.html
   Search → (https://www.pdfdrive.net/)→ (Academic and Education) → (Engineering)

- Question paper setters are asked to confine to the above **text books** only

SEMESTER II

CODE	COURSE TITLE
18MSUCP01	MATHEMATICAL SOFTWARE – II

Category	CIA	ESE	L	T	P	Credit
Core Practical	--	25	--	--	30	1

Preamble

- To give hands-on experience in the Free Open Source Software SageMath which will be highly useful for future teachers and researchers
- To visualize the mathematical concepts for better understanding

Prerequisites

- Students must know the basic concepts of number theory, calculus, theory of equations and differential equations

Course Outcomes

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

	CO Statement	Knowledge Level
CO1	Use Geogebra to draw geometrical shapes	K2
CO2	Use SageMath as a calculator	K3
CO3	Solve number theory problems	K3
CO4	Make use of theoretical concepts to solve problems and visualize the output	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S

S- Strong; M-Medium; L-Low

List of Practicals – SAGEMATH

1. Use SageMath as a calculator – A Financial Example
2. Use Sage for Trigonometry
3. Use Sage to Graph 2-Dimensionally
4. Superimposing Multiple Graphs in One Plot
5. Making Own Functions and Plotting in Sage
6. Solving Linear and Non-Linear Systems of Equations
7. Use Sage as a Numerical Solver

8. Use Sage to find Derivatives & Plot $f(x)$ and $f\,'(x)$ Together and find Higher-Order Derivatives
9. Use Sage to Calculate Integrals
10. Labeling the Axes of Graphs
11. Graphing an Integral
12. Parametric 2D Plotting
13. Vector Field Plots, Gradients and Vector Field Plots
14. Working with the Integers and Number Theory
15. Combinations and Permutations

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Gregory V. Bard	Sage for Undergraduates	online version	--

1. p.6
2. p.7 – 8
3. p.8 – 11
4. p.14
5. p.30
6. p.39 – 40
7. p.43
8. p.49 – 50
9. p.51 – 58
10. p.91 – 94
11. p.95 – 97
12. p.112 – 114
13. p.114 – 115
14. p.145 – 147
15. p.153

SEMESTER II

CODE	COURSE TITLE
18MSUA202	STATISTICS FOR MATHEMATICS – II

Category	CIA	ESE	L	T	P	Credit
Allied	25	75	100	5	-	5

Preamble

- To learn the theory of estimation and testing of statistical hypothesis

Prerequisite

- Must have the basic knowledge about the characteristics of statistical measures

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the theory of estimation	K1
CO2	Acquire knowledge about confidence intervals	K2
CO3	Formulate the statistical hypothesis	K3
CO4	Enhance the statistical knowledge by applying the techniques learned in testing of statistical hypothesis	K2
CO5	Analyze and draw inferences based on the results of the testing of hypothesis	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	M	S	M	S	M
CO3	S	S	S	S	S
CO4	M	S	M	S	S
CO5	S	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(21 hrs.)**

Point Estimation : Maximum likelihood estimation – A simple regression problem – Sufficient Statistics –.Descriptive Statistics

UNIT II **(21 hrs.)**

Interval Estimation : Confidence Intervals for Means – Confidence Intervals for the Difference of Two Means – Confidence Intervals of Proportions– Sample Size.

UNIT III **(21 hrs.)**

Test of Statistical Hypothesis : Tests About One Mean – Tests of the Equality of Two Means – Tests About Proportions – Power of a Statistical Test – Best Critical Regions.

UNIT IV **(21 hrs.)**

Some more Parametric Tests : Chi-Square Goodness of Fit – Contingency Tables – Tests Concerning Regression – Correlation.

UNIT V **(21 hrs)**

Analysis of Variance : One – Factor Analysis of Variance – Two Way Analysis of Variance.

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Robert V. Hogg, Elliot A. Tanis, Dale L. Zimmerman	Probability and Statistical Inference	Pearson Education Inc, UK	2015, 9th Edition.

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	PresannaSahoo	Probability and Mathematical Statistics	University of Louisville, USA	2013
2	Barbara Illowsky, Susan Dean	Introductory Statistics	Rice University,Texas	2014 , Last Edition
3	Robert V. Hogg, Joseph W. McKean, Allen T. Crag	Introduction to Mathematical Statistics	Pearson Education Inc, UK	2018, 8th Edition
4	S.C. Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons, New Delhi	2014

Pedagogy

Lecture, PPT, Seminar, Subject Viva and Videos

Unit	Chapter	Sections	Page No.
I	6	6.1, 6.4, 6.5, 6.7	256 – 266
II	7	7.1 to 7.4	301– 315,324 – 331
III	8	8.1 to 8.3, 8.5, 8.6	355 – 371, 392 – 406
IV	9	9.1, 9.2, 9.6	415 – 435, 462 – 467
V	9	9.3 to 9.4	435 – 455

Web Resources

1. http://nptel.ac.in/courses/103106120/
2. http://nptel.ac.in/courses/110104085/5

3. https://www.khanacademy.org/math/statistics-probability/inference-categorical-data-chi-square-tests/modal/v/goodness-of-fit-example
4. http://www.e-booksdirectory.com/details.php?ebook=11787
5. http://www.math.louisville.edu/~pksaho01/teaching/Math662TB-09S.pdf
6. http://homepages.math.uic.edu/~rgmartin/Teaching/Stat411/Notes/411notes.pdf

- Question paper setters are asked to confine to the above **text book only**

SEMESTER – III

CODE	COURSE TITLE
18MSUC305	**ANALYTICAL GEOMETRY**

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	42	3	--	4

Preamble

- To focus on conceptual and practical understanding
- To discuss the ideas of polar equations
- To illustrate the shapes sphere, cone and cylinder through conceptually and problematically
- To introducethe concepts of quadric cones

Prerequisites

- Students must know the basics of geometry and equations of geometrical figures in both Cartesian and Polar forms

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO6	Develop the polar form of straight lines, circle and conic sections and also to understand their properties	K2
CO7	Gain more profound knowledge on straight lines	K2
CO8	Analyze the characteristics of sphere	K4
CO9	Demonstrate the fundamental concepts of cone and cylinder	K1
CO10	Integrate the concepts of cone and straight line	K3

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5
CO6	S	S	S	S	S
CO7	M	S	S	S	S
CO8	S	S	S	S	S
CO9	S	S	M	S	S
CO10	S	S	S	S	S

S-Strong; M-Medium; L-Low

Syllabus

UNIT I **(10 hrs.)**

Polar Equations: Polar co-ordinates–Distance between the points $(r_1, \theta_1)$and (r_2, θ_2)– Transformation of polar co-ordinates into Cartesian co-ordinates and vice –versa–Area of a triangle when the polar co-ordinates of the angular points are known– Equation of a straight line– Parallel straight lines–Perpendicular straight lines–The chord joining the points whose vectorial angles are $\theta_1 \; and \; \theta_2$on the circle $r = 2a \; cos\theta$– Polar equation of a conic –Tracing the conic$\frac{l}{r} = 1 + e \; cos\theta$–

The equation of the chord of the conic$\frac{l}{r} = 1 + e \; cos\theta$ joining the points whose vectorial angles are $\alpha - \beta \; and \; \alpha + \beta$ – The asymptotes of the conic $\frac{l}{r} = 1 + e \; cos\theta$ – Equation of the normal at a point P whose vectorial angle is α– Some properties of the general conic – The equation of the polar of any point $(r_1, \theta_1)$with respect to the conic $\frac{l}{r} = 1 + e \; cos\theta$–The equation of the pair of tangents drawn from the point $(r_1, \theta_1)$with respect to the conic $\frac{l}{r} = 1 + e \; cos\theta$.

UNIT II **(8 hrs.)**

Straight line:A Straight line may be determined as the intersection of two planes –Symmetrical form of the equations of a line –Equations of a straight line passing through two given points – The plane and the straight line– Coplanar lines–Interpretations of equations –Loci–The intersection of three planes – Volume of Tetrahedron.

UNIT III **(9 hrs.)**

Sphere: Definition – Equation of a sphere when the centre and radius are given – The length of the tangent circle on a sphere – The plane section of sphere is a circle – Intersection of two spheres is a circle –The equation of the tangent plane to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at a point (x_1, y_1, z_1).

UNIT IV **(9 hrs.)**

Cone and Cylinder: The equation of a surface–Cone – Right Circular cone – Intersection of a straight line and a quadratic cone – Tangent plane and normal– Condition for the plane $lx+my+nz=0$to touch the quadratic cone$ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$– The angle between the lines in which the plane $ux+vy+wz=0$ cuts the cone – Cylinder – Enveloping cylinder.

UNIT V **(9 hrs.)**

Central Quadrics: Definition – The intersection of a line and a quadric – Tangents and tangent planes – The condition for the plane $lx+my+nz=0$to touch the quadratic cone$ax^2+by^2+cz^2=1$ – Polar planes and polar lines – Normal at the point $(x_1, y_1, z_1)$to the conicoid $ax^2+by^2+cz^2=1$.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	T.K.ManicavachagomPillay and T.Natarajan	Analytical Geometry (Part- I – Two Dimensions) (Unit I)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2014
2.	T.K.ManicavachagomPillay and T.Natarajan	Analytical Geometry (Part- II – Three Dimensions) (Units II,III,IV,V)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2016

Units	Chapter	Sections
I	9	1–15
II	3	1–11
III	4	1 – 8
IV	5	1 – 8.3
V	5	9 – 13

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	P.Duraipandian KayalalPachaiyappa	Analytical Geometry 2–D	Muhilan Publishers, Chennai.	Reprint 2010
2	P.Duraipandian KayalalPachaiyappa	Analytical Geometry 3–D	Muhilan Publishers, Chennai.	Revised edition 2009

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

Web Resources

1. https://www.khanacademy.org/math/basic-geo/basic-geo-lines/parallel-perp/v/parallel-and-perpendicular– lines-intro.
2. http://sigc.edu/department/maths/studymet/AnalyticalGeometry3D
3. https://www.brainkart.com/article/Three-Dimensional-Analytical-Geometry_6453/
4. https://www.whitman.edu/mathematics/calculus/calculus_01_Analytic_Geometry.pdf

- Question paper setters are asked to confine to the above **text books** only.

B.Sc., (Mathematics)

ANALYTICAL GEOMETRY

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
10	5	10	25

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	30
K1, K2	B	Either / Or	2 x 5 = 10	
K2, K3	C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	75
K1, K2	B	Either / Or	5 x 5 = 25	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 8 = 40	

SEMESTER III

CODE	COURSE TITLE
18MSUC306	FOUNDATION COURSE IN MATHEMATICS

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	42	3	-	4

Preamble

- To focus on conceptual understanding
- To strengthen the fundamental knowledge of mathematical concepts
- To introduce the concept of statements and logic, sets and functions, relations and basic principleswith due clarity

Prerequisite

- To imbibe the ability in the students to understand, visualize and express mathematics with requisite rigour
- To train the students in problem solving skills

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire the knowledge of Quantifier Statements, Compound statements and some proofs in mathematics	K2
CO2	Apply the concept of basic terminologies, family of sets, power sets and Cartesian product of sets	K3
CO3	Demonstrate the basic definitions of functions, composition of functions and inverse image of subsets under functions	K4
CO4	Analyze the relations on sets and types of relations	K4
CO5	Evaluate the concepts of induction principles, well-ordering principle and equivalence of the three principles	K5

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	S	M	S
CO3	S	S	M	M	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S – Strong; M – Medium; L–Low

Syllabus

UNIT I **(8 hrs.)**

Statements and Logic: Statements – Statements with Quantifiers – Compound Statements – Implications – Proofs in mathematics.

Unit II **(8 hrs.)**

Sets: Basic terminologies – Operations on sets – Family of sets – Power sets – Cartesian product of sets.**Unit III**

Unit III **(10 hrs.)**

Functions: Basic definitions – One-one, Onto functions and Bijections – Composition of functions – Inverse of a function – Image of subsets under functions – Inverse image of subsets under functions.

Unit IV **(9 hrs.)**

Relations: Relations on sets – Types of relations – Equivalence relations – Equivalence classes and partitions of a set.

Unit V **(10 hrs.)**

Induction principles: The Induction Principle – The Strong Induction Principle – The Well – Ordering Principle – Equivalence of the three Principles.

Text Book

S. No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Ajit Kumar, S. Kumaresan & Bhaba Kumar Sarma	A Foundation Course in Mathematics	Narosa Publishing House Pvt. Ltd.,	First Reprint 2018

Unit	Chapter	Section
I	1	1.1-1.5
II	2	2.1-2.5
III	3	3.1-3.6
IV	4	4.1-4.4
V	5	5.1-5.4

Referenc Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Ajit Kumar and S. Kumaresan	A Basic Course in Real Analysis	CRC Press	Reprint 2017
2	James Munkres	Topology	Pearson Education (India)	2001, 2nd Edition
3	Robert G. Bartle and Donald R. Sherbert	Introduction to Real Analysis	Wiley Student Edition	Reprint 2011

Pedagogy

- Lecture, PPT, Quiz, Group Discussion and Seminar

Web resources

1. http://mtts.org.in/expository-articles
2. https://nptel.ac.in/courses/111105098/
3. https://www.class-central.com/course/nptel-introductory-course-in-real-analysis-7941
4. https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/cc-8th-function-intro/v/relations-and-functions

- Question paper setters confine to the above **text book** only.

B.Sc., (Mathematics)

FOUNDATION COURSE IN MATHEMATICS

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
10	5	10	25

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	30
K1, K2	B	Either / Or	2 x 5 = 10	
K2, K3	C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	75
K1, K2	B	Either / Or	5 x 5 = 25	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 8 = 40	

SEMESTER-III

CODE	COURSE TITLE
18MSUSP01	**LATEX**

Category	CIA	ESE	L	T	P	Credit
SBS-Practical	40	60	-	-	45	3

List of Practicals

1) Write a passage and make footnote, margin note and end notes using LaTex.

2) Draw the various table structure for the end semester results.

3) Type any n × n matrix when n = 1,2, 3, 4.

4) Type your Bio-Data [Affix your photocopy at the right corner]

5) Draw the graph of $y = x^2$, $y = \cos x$, $y = \sin x$.

6) Type the following expressions using Latex

(i) $(x + y).(x - y) = x^2 - y^2$

(ii) $(x - y)^2 = x^2 - 2xy + y^2$

(iii) $(x + a)^n = x^n + nC_1 x^{n-1} a + nC_2 x^{n-2} a^2 + \ldots + nC_r x^{n-r} a_r$

(iv) $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots + \frac{x^r}{r!}$

(v) $\log(1 + x) = x - \frac{x^2}{2!} + \frac{x^3}{3!} - \cdots + (-1)^n \frac{x^n}{n!} + \cdots$

7) Type the following expressions:

(i) $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

(ii) $lim_{x \to 0} \frac{\sin x}{x} = 1$

(iii) $\Delta x,\ \Delta^2 y,\ \nabla x,\ \nabla^2 y$

(iv) $\frac{f(x + \Delta x) - f(x)}{\Delta x}$

8) Create a balance sheet as on current date.

9) Write an expression for nested roots.

10) Draw a simple RLC circuit subject to a voltage input.

11) Express the following equations:

(i) $\frac{dy}{dx}, \frac{d^2y}{dx^2}, Dy, y', \dot{y}, \ddot{y}$

(ii) $\frac{\partial w}{\partial x}, \frac{\partial^2 w}{\partial t^2}, \frac{\partial^2 w}{\partial x \partial y}$

(iii) $x^2 \frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = x \ log\ x$

(iv) $\frac{\partial^2 z}{\partial x^2} - 5z\frac{\partial z}{\partial x} + 6z = 12x$

12) Express the following integrals:

(i) $\Gamma(x) = \int_0^t e^{-t} t^{x-1} dt, \ \ Re(x) > 0$

(ii) $\iint_s F(x,y)dxdy$ *and* $\iiint_v F(x,y,z)dxdydz$

(iii) $\oint F.dr = \iint_s (\Delta \times F)ds$

(iv) $x^n J_n(x) = \int x^n J_{n-1}(x)dx$

13) Type the following

(i) $\sum|x_i y_i| \leq (\sum|x_i|^p)^{\frac{1}{p}} (\sum|y_i|^q)^{\frac{1}{q}}$

(ii) $\sum_{n=1}^{\infty} x_i$

(iii) $(A \cup B)' = A' \cap B'$

(iv) $\prod_{j=0}^{J} K_j$

(v) $|u.v| \leq ||u||\ ||v||$

14) Construct a circle with given centre and radius.

15) Prepare a model question paper as per your department pattern.

16) Type a given article.

17) Make your department conference invitation using Latex.

18) Make a PowerPoint presentation of your own topic of interest.

B.Sc., (Mathematics)

LaTex

Components of Internal marks

Test (I & II)	Average of CIA I & II	Model Examinations	Total
40	20	20	40

SEMESTER – III

CODE	COURSE TITLE
18MSUN301	MATHEMATICS FOR DATA SCIENCE

Category	CIA	ESE	L	T	P	Credit
Non-Major Elective I	-	100	27	3	-	2

Syllabus

UNIT I **(6 hrs.)**

Matrix Algebra: Matrices - Vectors – Addition and Scalar Multiplication – Determinants – Eigen Values – Eigen Vectors.

UNIT II **(6 hrs.)**

Data Analysis: Data representation – Average – Spread – Permutations and Combinations

UNIT III **(5 hrs.)**

Probability Theory: Experiments – Outcomes – Events – Probability

UNIT IV **(7 hrs.)**

Data Interpretation: Percentage – Calendar – Average – Simplification –Ratio and proportion – Profit and loss – Problems on trains – Problems on ages – Numbers – Time and work – Time and distance –Banker's discount – Volume and surface area.

UNIT V **(6 hrs.)**

Set Theory: Definition – Notations – Methods of description of sets – Types of sets – Venn diagram – Set operations – Laws and properties of sets – Number of elements – Cartesian product**.**

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Erwin Kreyszig	Advanced Engineering Mathematics (Units I,II,III)	John Wiley & Sons Inc.	2011, 9th Edition
2.	PA.Navnitham	Business Mathematics and Statistics (Unit V)	Jai Publishers, Trichy	2012, 1stedition

Units	Chapters	Sections
I	1	7.1, 7.2, 7.7 & 8.1
II	24	24.1 & 24.4
III	24	24.2& 24.3
IV	Problems from Web resources	-
V	3	1 – 9

Reference Book

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	P.R.Vittal	Statistics	MarghamPublishers,Chennai	2012, 6th Edition

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

Web Resources

1.https:/nptel.ac.in/courses/122107036/28
2.https:/nptel.ac.in/courses/101108057/downloads/Lecture-27.pdf
3.http://nptel.ac.in/courses/105107129/module10/lecture2/lecture2.pdf
4.https://www.indiabix.com
5.https://www.btechguru.com/CAT-algebra-and-geometry-set-theory-venn-diagrams-problem-using-venn-diagrams-video-lecture- -5842- -8- -54.html .

- Question paper setters are asked to confine to the above **text books** only.

SEMESTER – III

NON MAJOR ELECTIVE I – MATHEMATICS FOR DATA SCIENCE

Question Paper Pattern

Model and End Semester Examinations

Choice	Marks	Total
Open Choice (5 out of 8)	5 x 20 = 100	100

SEMESTER – IV

CODE	COURSE TITLE
18MSUC407	LINEAR ALGEBRA

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	42	3	--	4

Preamble

- To acquaint students with the fundamental and important topics of linear algebra
- To inculcate and instill the concepts of vector spaces with illustrated examples.
- To emphasize the symbiotic relationship between linear transformations and matrices and
- To impart the concepts of inner product and norms.

Prerequisites

- Students must know the basics of vector algebra and matrices.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept of vector spaces	K1
CO2	Identify the linear transformation and integrate it with matrices	K2
CO3	Take a look at isomorphism, invertibility and dual spaces	K2
CO4	Apply the ideology of matrices into systems of linear equations	K3
CO5	Get aware of the concepts of inner product spaces	K1

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S

CO2	S	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	S	S	M
CO5	S	S	S	S	S

S-Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs.)**

Vector spaces: Vector spaces – Subspaces –Linear Combinations and Systems of Linear Equations – Linear Independence and Linear dependence – Bases and Dimension – Maximal Linearly Independent subsets.

UNIT II **(10 hrs.)**

Linear transformations: Linear transformations, Null spaces andRanges – The matrix representation of a linear transformation – Composition of linear transformation and matrix multiplication.

UNIT III **(8 hrs.)**

Isomorphism and Dual Spaces: Invertibility and Isomorphisms – The change of coordinate matrix – Dual spaces.

UNIT IV **(10 hrs.)**

Elementary Matrix Operations: Elementary Matrix Operations and Elementary matrices – The rank of a matrix and matrix inverse – Systems of Linear Equations – Theoretical aspects – Systems of Linear Equations – Computational aspects.

UNIT V **(8 hrs.)**

Inner product spaces: Inner products and norms – Gram-Schmidt orthogonalization process and Orthogonal complements.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Stephen H.Friedberg, Arnold J. Insel, Lawrence E.Spence	Linear Algebra	Pearson Education India;	2015, 4th Edition

Units	Chapter	Sections
UNIT I	Chapter I	1.1-1.7

UNIT II	Chapter II	2.1-2.3
UNIT III	Chapter II	2.4-2.6
UNIT IV	Chapter III	3.1-3.4
UNIT V	Chapter VI	6.1-6.2

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Kenneth M.Hoffman, Ray Kunze	Linear Algebra	Prentice Hall India Learning Private Limited	2015, 2nd Edition

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

Web Resources

1. http:// faculty .atu.edu./mfinan/algebra2.pdf
2. https://www.math.ucdavis.edu /~linear/linear -guest.pdf
3. http://joshua .smcvt.edu/linear algebra/book.pdf

- Question paper setters are asked to confine to the above **text book** only.

B.Sc., (Mathematics)

LINEAR ALGEBRA

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
10	5	10	25

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	30
K1, K2	B	Either / Or	2 x 5 = 10	
K2, K3	C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	75
K1, K2	B	Either / Or	5 x 5 = 25	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 8 = 40	

SEMESTER IV

CODE	COURSE TITLE
18MSUC408	**REAL ANALYSIS - I**

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	42	3	-	4

Preamble

- To study both aspects of analysis, as a qualitative as well as quantitative study of functions
- To study about the order relation, real number system and sequences and their convergence and also to work comfortably with continuity
- To make the students to understand the concept and notion of pure Mathematics in a logical fashion
- To Soak the rudiments of mathematical thinking to the students

Prerequisite

- Knowledge in real numbers, convergence and continuity at basic level

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of partial and total orders, bounds and maximal elements, axiom of choice and its equivalents	K2
CO2	Determine the real number system concept, LUB, Absolute value and Triangle inequality	K3
CO3	Analyze the sequences and their convergence, Cauchy and monotone sequences and sandwich lemma	K4
CO4	Evaluate some important limits and diverging sequence	K4
CO5	Apply the concept of continuity	K5

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	S
CO2	S	S	M	S	M
CO3	M	S	S	M	S
CO4	S	M	M	M	S
CO5	M	S	S	S	M

S – Strong; M – Medium; L–Low

Syllabus

Unit I **(10 hrs.)**

Order Relation: Partial and Total orders–Chains, Bounds and Maximal elements–Axiom of choice and its equivalents.

Unit II **(9 hrs.)**

Real Number System: Algebra of the real number system –Upper and lower bounds–LUB property and its applications–Absolute value and Triangle Inequality.

Unit III **(8 hrs.)**

Sequences and their Convergence: Sequences and their convergence–Cauchy Sequences–Monotone sequences–Sandwich lemma.

Unit IV **(9 hrs.)**

Sequences and their Convergence: Limits–Sequence Diverging to $\pm\infty$–Subsequences–Sequences defined recursively.

Unit V **(9 hrs.)**

Continuity: Continuous Function $-\in -\delta$ Definition of Continuity–Intermediate Value Theorem–Extreme Value Theorem

Text Book:

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Ajit Kumar, S. Kumaresan & Bhaba Kumar Sarma	A Foundation course in Mathematics (UNIT I)	Narosa Publishing House Pvt. Ltd.,	First Reprint 2018
2	Ajit Kumar, S. Kumaresan	Basic Course in Real Analysis (UNIT II to V)	CRC Press, Taylor and Francis Group	Reprint 2017

Unit	Chapter	Section
I	7	7.1-7.3
II	1	1.1-1.4
III	2	2.1-2.4
IV	2	2.5-2.8
V	3	3.1-3.4

Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	James Munkres	Topology	Pearson Education (India)	2001, 2nd Edition
2	Robert G. Bartle and Donald R. Sherbert	Introduction to Real Analysis	Wiley Student Edition	Reprint 2011
3	Tom M.Apostol	Mathematical Analysis	Addition – Wesley Publishing Company	20th Reprint 2002

Pedagogy

- Lecture, PPT, Quiz, Group Discussion and Seminar

Web resources

1. http://main.mtts.org.in/expository -articles
2. https://nptel.ac.in/courses/111105098/
3. https://math.stackexchange.com/questions/593303/online-course-for-real-analysis
4. https://www.youtube.com/watch?v=_5t1IkCkdW0

- Question Paper Setters Confine to the above **text books** only.

B.Sc., (Mathematics)

REAL ANALYSIS - I

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
10	5	10	25

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	30
K1, K2	B	Either / Or	2 x 5 = 10	
K2, K3	C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	75
K1, K2	B	Either / Or	5 x 5 = 25	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 8 = 40	

SEMESTER – IV

CODE	COURSE TITLE
15MSUS402/ 15MCUC402	MULTISKILL DEVELOPMENT PAPER

Category	CIA	ESE	L	T	P	Credit
SBS II	40	60	30	-	15	3

Objectives:

On successful completion of this course,

- The students will learn the document writing calculations, creation and manipulation of tables and power point slide shows using Libre Office
- The students will be confident enough to write competitive examinations and attend interview

Syllabus

UNIT I **(9hrs)**

Communication: Question tag – Gerund and Infinitives – Spotting the errors – Vocabulary – Synonyms – Antonyms – Prepositions – Articles – One word substitution – Sentence completion.

UNIT II **(9hrs.)**

Numerical Aptitude : Problems on numbers - Problems on Ages – Percentage – Profit and loss Ratio& Proportion – Time & Work – Time & Distance – Simple Interest – Compound Interest.

UNIT III **(9hrs.)**

Critical Reasoning : Logical Inference Questions and Syllogism.

Analytical Reasoning : Arrangement problems – Family / Blood Relation Qualms – Sense of Directions – Age Doubts.

Verbal Reasoning : Verbal Analogy (Letter series and number series only) – Coding and Decoding.

Practicals - Libre Office (Units IV & V)

UnitIV **(9hrs.)**

1. Use the style inspector to insert a picture, header and footer of text. Align the paragraph with a picture at the right side of the text
2. Create a table and fit the contents to the cells. Convert the given text to table and table to text. Apply Borders & Shading.
3. Illustrate the mail merge concept to apply for a suitable job for at least 5 companies
4. Build a worksheet to perform correlation and regression coefficients using formulae and check the answer with built – in functions.
5. Worksheet preparation for electricity bill preparation.
6. Create a Pivot Table and Chart.

Unit V **(9hrs.)**

7. Prepare a power point presentation using cropping & sizing options. Use all the slide transition facilities and Rehearse timings.
8. Prepare an organizational chart for a college environment using power point presentation.
9. Create a table with the given data using Libre Access (use adding & deleting data options).
10. Create a Report & Form with the given data by adding controls.

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Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	R.S. Aggarwal	A Modern Approach to Non-Verbal Reasoning (Fully Solved)	S.Chand Company Limited, New Delhi	Reprint 2011
2	R.S. Aggarwal	Quantitative Aptitude	S.Chand Company Limited, New Delhi	Reprint 2015
3	R.S. Aggarwal	Objective General English	S.Chand Company Limited, New Delhi	online

SEMESTER – IV

CODE	COURSE TITLE
18MSUN402	MATHEMATICS FOR ALL

Category	CIA	ESE	L	T	P	Credit
Non-Major Elective II	-	100	27	3	-	2

Syllabus

UNIT I **(6 hrs.)**

Binomial Theorem: Introduction – Binomial Theorem – General Term of $(a+x)^n$ – Middle terms of $(a+x)^n$ – Additional Examples.

UNIT II **(6hrs.)**

Simple &Compound Interest: Simple Interest – Compound Interest – Interest Compounded Continuously – Amount at the Changing Rates of Interest – Nominal and Effective Rate of Interest – Growth and Depreciation – Simple Problems

UNIT III **(6 hrs.)**

Annuities: Immediate Annuity and Ordinary Annuity –Annuity Due – Deferred Annuity – Perpetuity – Amortisation–Sinking Fund

UNIT IV **(6 hrs.)**

Interpolation: Finite Differences – Differences of a polynomial function - Newton's Forward Interpolation Formula

UNIT V **(6 hrs.)**

Interpolation: Newton's Backward Interpolation Formula – Lagrange's Interpolation Formula – Inverse Interpolation

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	N.G.Das&J.K.Das	Business Mathematics and Statistics	McGraw Hill Education	2017, 1st Edition

Units	Chapter	Sections
I	6	6.1 – 6.4 and 6.8
II	7	7.1-7.9
III	8	8.1-8.11
IV	18	18.1-18.4
V	18	18.5-18.8

Reference Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	P.R.Vittal	Statistics	MarghamPublications,Chennai.	2012, 6th Edition

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

Web Resources

1.https://nptel.ac.in/courses/122103012/18

2.https://study.com/academy/lesson/compounding-interest-formulas-calculations-examples.html

3.https://swayam.gov.in/courses/5761-numerical-analysis

4.https://onlinecourses.nptel.ac.in/noc16_hs24

- Question paper setters are asked to confine to the above **text book** only.

SEMESTER – IV

NON MAJOR ELECTIVE II –MATHEMATICS FOR ALL

Question Paper Pattern

Model and End Semester Examinations

Choice	Marks	Total
Open Choice (5 out of 8)	5 x 20 = 100	100

SEMESTER – III

CODE	COURSE TITLE
18MSUA3P3	MATHEMATICS FOR PHYSICS – I

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	70	5	--	4

Preamble

- To gain knowledge about different types of series like binomial, exponential and logarithmic series
- To study the fundamental concepts of ordinary differential equations and to solve
- To set forth a platform to solvefirst and higher order differential equations
- To acquire knowledge of Laplace Transforms
- To prepare students to demonstrate their understanding on applying Laplace transforms to solve ordinary differential equations

Prerequisites

- Students must know the basics of algebra, modeling, differentiation and integration

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Set forth the idea of infinite series and to apply them in real life problems	K2, K3 & K4
CO2	Study the mathematical models of physical problems and solve them	K1
CO3	Learn the concepts of partial differential equations and apply them	K1, K3& K4
CO4	Introduce the concepts of Laplace transforms	K1 & K3
CO5	Apply Laplace transforms to solve differential equations	K2 & K4

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	M	S	S	M
CO3	M	S	S	S	S
CO4	S	S	S	M	S
CO5	S	S	S	S	M

S-Strong; M-Medium; L-Low

Syllabus

UNIT I **(15 hrs.)**

Algebra: Binomial, Exponential and *Logarithmic Series* – Approximations obtained by Binomial Theorem – Summation related to Binomial, Exponential andLogarithmic Series.

UNIT II **(14 hrs.)**

Ordinary Differential Equations (ODEs) : Basic Concepts, Modeling – Geometry Meaning of $y' = f(x, y)$– Direction fields – Separable ODEs , Modelling – Exact ODEs – *Integrating factors.*

UNIT III **(16 hrs.)**

Partial Differential Equations: Formation of Partial Differential Equations by eliminating Arbitrary Constants and Arbitrary Functions – Solutions of Standard Types of First Order Equations $f(p,q) = 0$, $f(x,p,q) = 0$, $f(y,p,q) = 0$, $f(z,p,q) = 0$, $f_1(x,p) = f_2(y,q)$; $z = px + qy + f(p,q)$*Lagrange's Method* of solving LinearPartial Differential Equation$Pp + Qq = R$ (Problems only).

UNIT IV **(15 hrs.)**

Laplace Transforms : Laplace Transform – Inverse Transform – Linearity – *s*-shifting – Transforms of Derivatives and Integrals, ODEs – Unit Step function – *t*-shifting – Short impulses – *Dirac delta function* - Partial Fractions**.**

UNIT V **(15 hrs.)**

Convolution and Solving ODEs : Convolution, Integral equations – Differentiation and Integration of Transforms – Systems of ODEs – *Application Problems*.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	S.Narayanan, R.HanumanthaRao and T.K.ManicavachagomPillay	Ancillary Mathematics,Book – I (Unit I)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2015
2.	Erwin Kreyszig	Advanced Engineering Mathematics (Unit II, IV, V)	John Wiley & Sons Inc.	2011, 9th Edition
3.	S.NarayananandT.K.Manica vachagomPillay	Calculus Vol.III (Unit III)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2013

Units	Chapter	Sections
I	2 & 3	All sections
II	1	1.1-1.4
III	6	All sections
IV	6	6.1 – 6.4
V	6	6.5 – 6.8

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Tom M.Apostol	Calculus Vol.1 and Vol.2	John Wiley & Sons United States	2016, 2nd Edition
2.	Dr. B.S.Grewal	Higher Engineering Mathematics	Khanna Publishers	2012 ,42nd Edition

Pedagogy

- Lecture, PPT, CAS projects, Quiz, Group Discussion, Seminar

Web Resources

1. https://study.com/academy/lesson/binomial-theorem-applications-examples.html
2. https://www.cliffsnotes.com/study-guides/differential-equations/first-order-equations/exact
3. https://nptel.ac.in/courses/122104018/node63.html
4. http://lpsa.swarthmore.edu/LaplaceXform/FwdLaplace/LaplaceProps.html
5. https://users.math.msu.edu/users/sen/Math_235/Lectures/lec_14s.pdf
6. http://hyperphysics.phy-astr.gsu.edu/hbase/Math/lnseries.html
7. https://www.brainkart.com/article/Partial-Differential-Equations_6484/
8. http://www.site.uottawa.ca/~remi/ode.pdf
9. http://www.sosmath.com/diffeq/first/intfactor/intfactor.html

- Question paper setters are asked to confine to the above **text books** only.

B.Sc., (Mathematics)

MATHEMATICS FOR PHYSICS – I

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
8	4	8	20

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	20
K1, K2	B	Either / Or	2 x 3 = 6	
K2, K3	C	Open Choice (2 out of 4)	2 x 5 = 10	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	55
K1, K2	B	Either / Or	5 x 3 = 15	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 6 = 30	

SEMESTER – III

CODE	COURSE TITLE
18MSUAPP1	LATEX AND SAGEMATH

Category	CIA	ESE	L	T	P	Credit
ALLIED	--	25	--	--	30	1

Preamble

- To give hands-on experience in the Free Open Source Software LaTex and SageMath which will be useful for teaching and research
- To visualize the mathematical concepts

Prerequisites

- Students must know the basic concepts of calculus, matrices and differential equations

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Use LaTex to create a document	K1
CO2	Use SageMath as a calculator	K1
CO3	Solve mathematical problems and to plot using SageMath	K2
CO4	Encode LaTex command in SageMath and to insert SageMath graph in a LaTex document	K3

Mapping with Programme Outcomes

CO_S	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	S	S	M	S	M
CO3	M	S	M	S	M
CO4	M	S	S	S	S
CO5	M	S	M	S	S

S-Strong; M-Medium; L-Low

List of Practicals

1. Creating a LaTex document with date, title and sections
2. Defining different font sizes and spacing in a LaTex document.
3. Creating equations using math packages for a given mathematical expression.
4. Creating a table in a LaTex document.
5. Using SageMath as a calculator and defining own function.
6. Declaring variables and solving single and multivariable problems in SageMath.
7. Plotting functions with advanced techniques in SageMath, including scatter plots.
8. Finding first and higher derivatives of a given function and plotting the together using SageMath.
9. Finding partial derivatives of a given function using SageMath.
10. Solving Ordinary Differential equations
11. Evaluating single and multiple integrals.
12. Defining matrices, performing algebraic operations and finding inverses of the matrices.
13. Finding Laplace transform of given functions using SageMath and to encode it into LaTex.
14. Inserting a graph from SageMath into a LaTex document.

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Gregory V.Bard	Sage for undergraduates	Online version	-

SEMESTER - III

CODE	COURSE TITLE
18MSUA3C3	MATHEMATICS FOR CHEMISTRY – I

Preamble

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	70	5	--	4

- To focus on conceptual understanding
- To explore fundamental concepts of differential and integral calculus
- To study the basic concepts of matrices and the application of matrix theory

Prerequisites

- Students must know the different types of functions and deriving new functions from given functions
- Students must have the basic knowledge in integration
- Must know the basic formulae of differentiation and problem solving techniques

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of matrices	K1, K2
CO2	solve the system of linear equation using matrix concepts	K2
CO3	Understand the meaning of differentiation using limits	K3
CO4	Evaluate integration of trigonometric functions	K2
CO5	Apply calculus concepts to solve real-world problems such as finding areas and volumes	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	S	M	S	S
CO3	S	M	S	M	S
CO4	S	S	S	S	S
CO5	S	S	M	S	S

S-Strong; M-Medium; L-Low

Syllabus

UNITI **(14 hrs.)**

Linear Algebra: Determinants, Matrices: Introduction – Determinants-Properties of determinants-matrices-Matrices operations - Related matrices - Rank of a matrix - Partition

method of finding the inverse - Solution of linear system of equations - Consistency of Linear system of Equations.

UNIT II **(16 hrs.)**

Linear Algebra: Determinants, Matrices: Linear transformations - Vectors- Eigen values- Properties of eigen values- Cayley – Hamilton theorem- Reduction to Diagonal form – Reduction of Quadratic form to Canonical form – Nature of a Quadratic Form.

UNIT III **(14 hrs.)**

Differentiation – Definition – Standard forms – Logarithmic Differentiation – Differentiation of Implicit Functions – Differentiation of one such Function with respect to Another – Successive Differentiation

UNIT IV **(16 hrs.)**

Integration of the types $dx/(ax^2+bx+c)$, $lx+m/(ax^2+bx+c)$, $1/\sqrt{ax^2+bx+c}$, $(px+q)/\sqrt{ax^2+bx+c}$, $\frac{1}{a\cos x+b}$, $\frac{1}{a\sin x+b}$, $\frac{\mathbf{1}}{\boldsymbol{a^2\cos^2 x+b^2\sin^2 x}}$ – Integration by parts- Reduction Formulae- Problems – Bernoulli's Formula – Problems.

UNIT V **(15 hrs.)**

Multiple Integrals : Evaluation of Double and Triple Integrals (Problems only) – Applications to multiple integrals (Problems only).

Text Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	B.S.Grewal	Higher Engineering Mathematics (Unit I, II)	Khanna Publishers	2012, 42nd Edition
2	S. Narayanan and T.K.Manicavachagom Pillay	Calculus, Vol.I (Unit III)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2015
3	S. Narayanan and T.K.Manicavachagom Pillay	Calculus, Vol. II (Units IV, V)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2017

Unit	Chapter	Sections
I	2	2.1-2.10

II	2	2.11-2.18
III	2	1-7
	3	1.1-1.6
IV	1	7.3 (Rule (b) Type (i) & (ii) 8 Case (i) & (ii) 9,12,13,15
V	5	2.1-5.4

Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Tom M.Apostol	Calculus Vol.1 and Vol.2	John Wiley & Sons, USA	2016, 2nd Edition
2	James Stewart	Calculus: Early Transcendentals	Thomson Brooks/Cole, USA	2008 , 2nd Edition
2	Erwin Kreyszig	Advanced Engineering Mathematics	John Wiley & Sons, USA	2012, 9th Edition

Pedagogy

- Lecture, PPT, Subject Viva, Seminar, RBPT and Videos

Web Resources

1. https://ocw.mit.edu/courses/mathematics/18-01-single-variable-calculus-fall-2006/video-lectures/
2. http://www.math.odu.edu/~jhh/Volume-1.PDF
3. http://www.math.odu.edu/~jhh/Volume-2.PDF
4. https://www.khanacademy.org/math/algebra-home/alg-system-of-equations/alg-equivalent-systems-of-equations/v/solving-systems-of-equations-by-elimination
5. https://www.youtube.com/watch?v=SJOTtb1FTfs
6. https://www.khanacademy.org/math/linear-algebra/alternate-bases/eigen-everything/v/linear-algebra-introduction-to-eigenvalues-and-eigenvectors

- Question paper setters are asked to confine to the above **text books** only.

II B.Sc., (Chemistry)

MATHEMATICS FOR CHEMISTRY – I

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
8	4	8	20

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	20
K1, K2	B	Either / Or	2 x 3 = 6	
K2, K3	C	Open Choice (2 out of 4)	2 x 5 = 10	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	55
K1, K2	B	Either / Or	5 x 3 = 15	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 6 = 30	

SEMESTER – III

CODE	COURSE TITLE
18MSUAPC1	SAGE MATH & OCTAVE

Category	CIA	ESE	L	T	P	Credit
Allied Practical	--	--	--	--	30	1

Preamble

- To give hands-on experience in the Free Open Source Software SageMath and Octave which will be highly useful for future teachers and researchers
- To visualize the mathematical concepts for better understanding
- To inculcate the mathematical concepts through Free Math open software SageMath and Octave

Prerequisites

- Students must know the basic concepts of matrices,differentiation and integration

Course Outcomes

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

COs	CO Statement	Knowledge Level
CO1	Use SageMath as a calculator	K3
CO2	Solve the problems on matrices	K3
CO3	Make use of theoretical concepts to solve problems and visualize the output	K3
CO4	To visualize the geometry through these software	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S

S-Strong; M-Medium; L-Low

List of Practical

1. Use SageMath as a calculator – A financial example
2. Solve quadratic equations
3. Define 3×3 matrix and find the transpose of a given matrix
4. Find the matrix multiplication for $n \times n$, $n=1,2,3$
5. Evaluate the determinant and find the inverse of a given matrix
6. Find the eigenvalues and eigenvectors of a given matrix
7. Solve the linear system of equations with single variable
8. Solve the system of equations using 3 variables
9. Find the root of a polynomial
10. Find the surface area using double integral
11. Find the volume using triple integral
12. Use Sage to calculate definite integral and plot
13. Use Sage to calculate indefinite integral
14. Apply Sage to balance the chemical reaction using matrices
15. Find the area of circle
16. Use Sage to find derivatives & plot f (x) and f ’(x) Together and find Higher-Order Derivatives

Text Book

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Gregory V. Bard	Sage for Undergraduates	American Mathematical Society, Providence, Rhode Island	2015, edition

SEMESTER - III

CODE	COURSE TITLE
18MAUA303	MATHEMATICS FOR COMMERCE

Category	CIA	ESE	L	T	P	Credit
Allied	25	75	80	10	-	5

Preamble

- To develop the basic knowledge and skills in mathematics to deal with business problems

Prerequisite

- Must know about all types of number systems, their properties and about logarithms and basic algebraic operations with numbers

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn about HCF, LCM, Progressions and about Ratios and Proportion.	K1, K2
CO2	Study the concept of matrices and applying it to solve simultaneous linear equations	K2
CO3	Acquire knowledge about mathematics of finance	K3
CO4	Know the concept of differentiation and its application to business problems.	K2, K3
CO5	Learn the concept of integration and its application in business economics.	K2

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO6	M	S	L	S	M
CO7	S	S	L	S	S
CO8	S	S	M	S	S
CO9	S	S	M	M	S
CO10	M	S	M	M	S

S-Strong; M-Medium; L-Low

Syllabus

UNIT I (18 hrs.)Number System : Introduction – Natural Number System – Highest Common Factor – Least Common Multiple – Progression – Arithmetic Progression–Arithmetic mean–Geometric Progression – Geometric Mean – Ratios – Proportion – Mixtures.

Unit II **(17 hrs.)**

Matrices : Introduction – Types of matrices – Algebra of matrices – Transpose of a matrix – Determinants – Inverse of a matrix – Solution of simultaneous equations –Rank of a matrix.

Unit III **(18 hrs.)**

Mathematics of Finance : Simple Interest – Compound Interest – Effective and Nominal Rate of Interest – Depriciation – Annuities

Unit IV **(18 hrs.)**

Discounting of Bills : Sinking fund – Amortization table –Discounting – Banker's Discount– True Discount – Banker's Gain – Cash Value – Actual Rate of Interest – Equated Due Date.

Unit V **(19 hrs.)**

Applications of Differentiation : Introduction to Differentiation – Elasticity – Elasticity of Demand – Elasticity of Supply – Marginal Cost and Marginal Revenue – Relation between Marginal Revenue & Elasticity of Demand – Maxima and Minima.

Applications of Integration: Introduction to Integration – Calculation of Cost function –Calculation of Revenue function.

Case Studies:

- Calculate Secondary overhead distribution summary using Simultaneous Equations method
- Preparation of Bank statement
- Applications of matrix in Business Problems
- Develop an Amortization table for Loan amount – EMI calculation
- Obtain the revenue function for***x*** units of sales & find the marginal revenue

Text Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	M.Wilson	Business Mathematics(Units I, II and V)	Himalaya Publishing House, Mumbai	Reprint 2016
2	P.A. Navnitham	Business Mathematics & Statistics (Units III and IV)	Jai Publishers, Trichy	Reprint2017

Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	B.C.Mehta and G.M.K. Madnani	Mathematics for Economists	Sultan Chand &Sons, New Delhi	Reprint 2004

Pedagogy

- Lecture, PPT, Subject Viva, Seminar, Case Studies and Videos

Web Resources

1. https://www.youtube.com/watch?v=Bdrwcjg8W_w&t=36s
2. https://www.youtube.com/watch?v=rS9AwyRbB7g
3. https://www.youtube.com/watch?v=NvVKOO1pY5g&t=37s
4. https://www.youtube.com/watch?v=7Nz06RhcA8Y&t=64s
5. https://www.youtube.com/watch?v=gEpYrtKCgt8

- Question paper setters are asked to confine to the above **text books** only

II B.Com

MATHEMATICS FOR COMMERCE

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
10	5	10	25

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	30
K1, K2	B	Either / Or	2 x 5 = 10	
K2, K3	C	Open Choice (2 out of 3)	2 x 8 = 16	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	75
K1, K2	B	Either / Or	5 x 5 = 25	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 8 = 40	

SEMESTER – IV

CODE	COURSE TITLE
18MSUA4P4	**MATHEMATICS FOR PHYSICS – II**

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	70	5	--	4

Preamble

- To introduce multiple integrals and learn their applications
- To put forth the concepts of application of multiple integrals and to evaluate improper integrals
- To acquire the knowledge of Fourier series to various wave forms
- To assimilate the concepts of Fourier integrals

Prerequisites

Students must know the basic mathematical concepts at higher secondary level.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Introduce the concepts of vectors and to apply in physical problems	K1 & K3
CO2	Evaluate multiple integrals in both Cartesian and polar coordinates	K1
CO3	Apply multiple integrals to find area under a given curve and to evaluate improper integrals	K1 ,K3 & K4
CO4	Find the Fourier series to various functions	K2
CO5	Learn the Fourier integrals for odd and even functions	K1

Mapping with Programme Outcomes

CO_S	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	S	S	S	S
CO3	S	S	S	S	M
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S-Strong; M-Medium; L-Low

Syllabus

UNIT I **(15 hrs.)**

Vector Calculus : Vectors in 2-Space and 3-Space – Inner Product – Vector product – Vector and Scalar Functions and Fields – *Derivatives* – Curvature - Torsion - Gradient of a Scalar Field – Directional Derivative – Divergence of a Vector Field – Curl of a Vector Field – *Simple Problems.*

UNIT II **(16 hrs.)**

Integration: Multiple Integrals – Evaluation of Double Integrals (Excluding Changing the Order of Integration) – Double Integrals in Polar coordinates – *Evaluation of Triple Integrals*

UNIT III **(14 hrs.)**

Application of Integration:*Application of Double integral in Evaluating Area Between Curves*– Jacobian of Two and Three Variables – Beta and Gamma Functions – Relation – Evaluation of Double and Triple Integrals using Beta and Gamma Functions.

UNIT IV **(16 hrs.)**

Fourier Series : Fourier Series – Functions of any Period $p=2L$ – Even and Odd Functions, *Half –Range Expansions*.

Fourier Integral : Fourier Integral – Fourier Cosine and Sine Transforms – *Simple Problems*.

UNIT V **(14 hrs.)**

Numerical Integration : Introduction – General QuadratureFormula for Equidistant Ordinates – Trapezoidal Rule – Simpson's One-Third Rule – *Simpson's Three – Eighth's rule*

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Erwin Kreyszig	Advanced Engineering Mathematics (Units I, III, V)	John Wiley & Sons Inc.	2011, 9th Edition
2.	S.Narayanan&T.K.M.Pillay	Calculus Vol.II (Units I, II)	Viswanathan, S., Printers & Publishers Pvt. Ltd., Chennai	2012, edition

3.	G.ShankerRao	Numerical Analysis (Unit IV)	New Age International Publishers, New Delhi	2018, 5th edition

Units	Chapters	Sections
I	9	9.1 – 9.5 & 9.7 – 9.9
	5	2.1,2.2,3.1,3.2,4
II	5,6 and 7	5.1-5.4,1.1&1.2 and2.1-2.3,3,4,5,6
III	11	11.1 – 11.3 & 11.7 – 11.8
IV	9	9.1 – 9.5
V	9	9.1 – 9.5 & 9.7 – 9.9

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	B.S.Grewal	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2014, 43rd Edition
2.	K.F.Riley, M.P.Hobson & S.J.Bence	Mathematical Methods for Physics and Engineering	Cambridge University Press	2018 ,3rd Edition

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

Web Resources

- https://betterexplained.com/articles/category/math/vector-calculus/
- https://www.whitman.edu/mathematics/calculus_online/chapter15.html
- https://courses.lumenlearning.com/boundless-calculus/chapter/multiple-integrals/
- https://study.com/academy/lesson/gamma-function-properties-examples.html
- http://w.astro.berkeley.edu/~jrg/ngst/fft/comms.html
- https://www.youtube.com/watch?v=tp_MdKz3fC8
- https://www.youtube.com/watch?v=DYsv6L-VcsQ
- http://www.damtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/integration.htm
- https://en.wikibooks.org/wiki/Numerical_Methods/Numerical_Integration

- Question paper setters are asked to confine to the above **text books** only.

B.Sc., (Mathematics)

MATHEMATICS FOR PHYSICS – II

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
8	4	8	20

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	20
K1, K2	B	Either / Or	2 x 3 = 6	
K2, K3	C	Open Choice (2 out of 4)	2 x 5 = 10	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	55
K1, K2	B	Either / Or	5 x 3 = 15	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 6 = 30	

SEMESTER – IV

CODE	COURSE TITLE
18MSUAPP2	OCTAVE

Category	CIA	ESE	L	T	P	Credit
ALLIED	--	25	--	--	30	1

Preamble

- To give hands-on experience in the Free Open Source Software Octave which is an excellent tool for teaching and research
- To visualize the mathematical concepts in 2D and 3D

Prerequisites

- Students must know the basic concepts of calculus, matrices, differential equations, statistical tools and number theory.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Use Octave as a calculator	K1
CO2	Plot graphs to improve presentations	K2
CO3	Visualize the mathematical concepts through 3D plots	K2
CO4	Learn looping concept to various mathematical problems	K3

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	S	S	M	S	M
CO3	M	S	M	S	M
CO4	M	S	S	S	S
CO5	M	S	M	S	S

S–Strong; M–Medium; L–Low

List of Practicals

1. Using octave as a calculator and learning built-in functions.
2. Defining vectors and matrices and performing basic algebraic operations.
3. Plotting 2D graphs and editing.
4. Plotting 3D graphs for any given functions.
5. Solving simultaneous linear equations.
6. Finding mean, median, mode, range, standard deviation and variance of a given data.
7. Defining sets and performing various set operations.
8 Solving differential equations of first and second order.
9 Finding arithmetic Progression and Geometric Progression.
10 Finding sum of *n* natural numbers and sum of square of *n* natural numbers

SEMESTER – IV

CODE	COURSE TITLE
18MSUA4C4	MATHEMATIS FOR CHEMISTRY – II

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	70	5	-	4

Preamble

- To acquire complete knowledge of summation and approximation through Binomial, Exponential and Logarithmic series
- To understand concepts and improve problem solving skills on theory of equations
- To provide basic knowledge about statistics and its applications and interpreting the results obtained

Prerequisite

- Knowledge in basic concepts of series, equations and types of equations
- Must have a knowledge about collection of data, classification and tabulation

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Find the sum of finite and infinite Binomial, Exponential and Logarithmic series	K1
CO2	Solve equations using various techniques	K2
CO3	To learn about various measures of central tendencies and their appropriate usage	K3
CO4	To study the measures of dispersion	K3
CO5	To understand the relationship between the variables under consideration	K2

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	M	M	S	S
CO5	M	M	M	S	S

S-Strong; M-Medium; L-Low

Syllabus

UNIT I **(13 hrs.)**

Binomial, Exponential and Logarithmic Series: Theorems – Statements without proofs – Emphasize on their Immediate application to Summation and Approximation. (Problems only)

UNIT II **(16 hrs.)**

Theory of Equations: Roots of an Equation – Relations Connecting the Roots and Coefficients -– Transformations of Equations –– Descarte's Rule of Signs, Horner's Method upto Two Decimal Places

UNIT III **(16 hrs.)**

Diagrams and Measures of Central tendency : Diagrammatic Presentation – Bar and Pie Diagrams – Graphic presentation –Graph of Frequency Distribution.Measures of Central Tendency – Averages – Simple and Weighted – Mean, Median, Mode, Geometric Mean and Harmonic Mean – Their– Computation Properties and Uses (Problems only)

UNIT IV **(14 hrs.)**

Measures of Dispersion : Range, Coefficient of Range, Quartile Deviation, Coefficient of Quartile Deviation – Mean Deviation, Coefficient of Mean Deviation, Standard Deviation and Coefficient of Variation. (Problems only)

UNIT V **(16 hrs.)**

Correlation and Regression: Correlation – Meaning and Definition – Scatter Diagram – Pearson's Coefficient of Correlation – Rank Correlation – Computation and interpretation – Regression – Properties of Regression Coefficient – Meaning of Regression – Regression Equations – Mathematical properties of Regression coefficient – Uses of Regression (Problems only)

Case Studies

- Effect of Hardness of water
- Total dissolved solids
- Chloride content in water sample
- Waste disposal in your locality
- How to identify the pesticides present in fruits, vegetables and beverages
- Effect of ammonia in cosmetics (For e.g. Hair dye, Shampoo, etc.,)
- Effect of pH in toilet soap and bath soap

Text Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	T. Natarajan, T.K. Manicavachagom Pillay &	Algebra –Vol. I (Units I, II)	S.Viswanathan Printers and Publishers Pvt.,	Reprint 2015

	K.S.Ganapathy		Ltd., Chennai.	
2	R.S.N Pillai, Bagavathi	Statistics: Theory and Practice (Unit III to V)	Sultan Chand & Co., New Delhi	Reprint 2015

Unit	Chapter	Sections
I	3	1,5 – 6,10
	4	1,2,3,5,6
II	6	1-11,15-15.3,24,30
III	7,9	All Sections
IV	10	All Sections
V	12,13	All Sections

Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	R.M. Khan	Algebra - Classical, Modern, Linear & Boolean	New central Book Agency(P) Ltd., Kolkata	Reprint 2016
2	H.S. Hall & S.R.Knight	Higher Algebra	AITBS Publishers, India	Reprint 2014
3	Erwin Kreyszig	Advanced Engineering Mathematics	John Wiley & Sons, USA	2012, 9th Edition
4	PA. Navnitham	Business Mathematics & Statistics	Jai Publishers, Trichy	Reprint 2017
5	P.R.Vittal	Business Mathematics & Statistics,	Margham Publications, Chennai	Reprint 2002

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar and Subject Viva

Web Resources

1. http://nptel.ac.in/courses/106105162/18
2. http://nptel.ac.in/courses/111106083/33
3. https://www.khanacademy.org/math/algebra2/polynomial-functions/fundamental-theorem-of-algebra/v/possible-real-roots
4. http://www.math.kent.edu/~white/FCA/text/jan09ed.pdf

5. http://www.gutenberg.org/files/29785/29785-pdf.pdf?session_id=1888afffae379b4647cad5675a6b169d2543f267

- Question paper setters are asked to confine to the above **text books** only

II B.Sc., (Chemistry)

MATHEMATICS FOR CHEMISTRY – II

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
8	4	8	20

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	20
K1, K2	B	Either / Or	2 x 3 = 6	
K2, K3	C	Open Choice (2 out of 4)	2 x 5 = 10	

Model and End Semester Examinations

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	55
K1, K2	B	Either / Or	5 x 3 = 15	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 6 = 30	

SEMESTER IV

CODE	COURSE TITLE
18MSUAPC2	**R SOFTWARE**

Category	CIA	ESE	L	T	P	Credit
Allied Practical	--	25	--	--	15	1

Preamble

- To apply the statistical knowledge acquired through the theory course

Prerequisite

- To be familiar with the basic statistical concepts of measures of central tendency, measures of dispersion, descriptive statistics, correlation, regression and basic computer knowledge.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Be equipped with the professional competency through learning Free Open Source Software – R	K3
CO2	Create the database, visualizing and analyzing the data using R	K2
CO3	Make inferences through the results obtained	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	S	S	M	S	S

S-Strong; M-Medium; L-Low

List of practicals

1. Using R software as a calculator
2. Data entry, manipulation and retrieval (Notepad, Excel sheet)
3. Data frame, creating matrices and operations with matrices
4. To calculate mean,median, Standard deviation, Variance
5. To determine a confidence interval for the populations' mean
6. To calculate the correlation between amount of fertilizers and yield of crops
7. To create a histogram for the mean in an interval of 30 days and interpret result with normal probability plot
8. To create different types of bar chart of the daily nutritional requirements
9. To create a piechart of pH values in different kinds of bath soap andin different kinds ofdetergent cake
10. To create a box plot of amount of citric acid content in various soft drinks
11. Fitting of linear regression line and plot
12. To find multiple linear regression and partial correlation between the pH level of soil, amount of fertilizer used and yield of crops

Reference Books

S .No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Sarah Stowell	Using R for Statistics	Apress, USA	2014, 1st Edition
2	Getting Started with R	Paul Tetor	O'Reilly Media, Inc., Sebastopol, CA	Reprint April 2016
3	Kim Seefeld and Ernst Linder	Statistics Using R with Biological Examples	*https://cran.r-project.org/doc/contrib/Seefeld_StatsRBio.pdf*	online

SEMESTER IV

CODE	COURSE TITLE
18MAUA404	**STATISTICS FOR COMMERCE**

CATEGORY	CIA	ESE	L	T	P	Credit
ALLIED	25	55	56	4	-	4

Preamble

- To provide basic knowledge about statistics and its applications and interpreting the results obtained.

Prerequisite

- Must possess knowledge about collection of data, classification and tabulation.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn about various measures of central tendencies and their appropriate usage.	K2, K3
CO2	Study the measures of dispersion.	K3
CO3	Understand the relationship between the variables under consideration.	K3
CO4	Find the missing values in the given data using interpolation.	K3
CO5	Know the concepts of index numbers and time series analysis	K2

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	M	M	S	S
CO5	M	M	M	S	S

S-Strong; M-Medium; L-Low

Syllabus

UNIT I **(11 hrs.)**

Diagrams and Measures of Central Tendency : Diagrammatic Presentation – Bar and Pie Diagrams – Graphic presentation –Graph of Frequency Distribution.Measures of Central Tendency – Averages – Simple and Weighted – Mean, Median, Mode, Geometric Mean and Harmonic Mean – Their Computation – Properties and Uses.

UNIT II **(13 hrs.)**

Measures of Dispersion : Range, Coefficient of Range, Quartile Deviation, Coefficient of Quartile Deviation – Mean Deviation, Coefficient of Mean Deviation, Standard Deviation and Coefficient of Variation.

UNITIII **(12 hrs.)**

Correlation and Regression: Correlation – Meaning and Definition – Scatter Diagram – Pearson's Coefficient of Correlation – Rank Correlation – Computation and interpretation – Regression – Properties of Regression Coefficient – Meaning of Regression – Regression Equations – Mathematical properties of Regression coefficient – Uses of Regression.

UNIT IV(12 hrs.)

Index Numbers and Interpolation : Index Numbers – Meaning – Uses – Methods of Construction – Aggregative and Relative Types – Tests of consistency of index Number – Consumer price index Number – Methods of Construction– Interpolation – Binomial method – Method of advancing differences – Newton's method of backward differences – Lagrange Method .

UNIT V **(12 hrs.)**

Analysis of Time Series: Meaning – Time series Components – Models – Measurement of Secular Trend – Measurement of Seasonal Variation.

Case Studies:

- Collect marks scored by 150 students in an examination and make a frequency distribution table, subject wise and class wise.
- Collect data relating to prices of shares of two companies for ten days and ascertain stability of share prices.
- Select 10 items of daily consumed products and collect base year quantity, base year price and current year price in your street/place. Calculate Cost of Living Index.
- Fit a straight line trend for the production of a company for 10 years & forecast the future trend.
- Collect the sales & profit of 10 items in a shop and find the correlation between sales and profit.

Text Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	R.S.N Pillai, Bagavathi	Statistics Theory and Practice	Sultan Chand & Co., New Delhi	Reprint 2015

Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	PA. Navnitham,	Business Mathematics & Statistics	Jai Publishers, Trichy	Reprint 2017
2	P.R.Vittal	Business Mathematics & Statistics	Jai Publishers, Trichy,	Reprint 2004

Pedagogy

- Lecture, PPT, Subject Viva, Seminar, Case Studies and Videos

Web Resources

1. https://www.youtube.com/watch?v=JPK0LFsu18g

2.https://www.youtube.com/watch?v=_ntErigkhEA

3.https://www.youtube.com/watch?v=xTpHD5WLuoA&t=135s

4.https://www.youtube.com/watch?v=jd_KUEUt4Dg

5.https://www.youtube.com/watch?v=d4Sn6ny_5LI

- Question paper setters are asked to confine to the above **text book** only.

II B. Com

STATISTICS FOR COMMERCE

Bloom's Taxonomy Based Assessment Pattern

Components of CIA marks

Test (I & II)	Assignment / Seminar / Subject viva	Model Examination	Total
8	4	8	20

Continuous Internal Assessment I & II

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	2 x 2 = 4	20
K1, K2	B	Either / Or	2 x 3 = 6	
K2, K3	C	Open Choice (2 out of 4)	2 x 5 = 10	

Model and End Semester Examination

Bloom's Category	Section	Choice	Marks	Total
K1	A	Compulsory	5 x 2 = 10	55
K1, K2	B	Either / Or	5 x 3 = 15	
K2, K3, K4	C	Open Choice (5 out of 8)	5 x 6 = 30	

SEMESTER IV

CODE	COURSE TITLE
18MAUAP01	**STATISTICAL SOFTWARE R**

Category	CIA	ESE	L	T	P	Credit
Allied Practical	--	25	--	--	15	1

Preamble

- To apply the statistical knowledge acquired through the theory course

Prerequisite

- To be familiar with the basic statistical concepts of measures of central tendency, measures of dispersion, descriptive statistics, correlation, regression and basic computer knowledge.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Be equipped with the professional competency through learning Free Open Source Software – R	K3
CO2	Create the database, visualizing and analyzing the data using R	K2
CO3	Make inferences through the results obtained	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	S	S	M	S	S

S-Strong; M-Medium; L-Low

List of practicals

1. Using R software as a calculator.
2. Data entry, manipulation and retrieval (Notepad, Excel sheet).

3 Data frame, creating matrices and operations with matrices.

4. Descriptive statistics, Graphics - pie diagram, box plot, histogram, bar plot.
5. Object orientation, defining functions.

6. Find mean, median, geometric mean, harmonic mean of numerical data and edit the output.

7. Determine standard deviation, variance and checking the consistency of the given data and edit the output.

8. Find the range and skewness for the given data.

9. Bivariate data- scatter plot, correlation co-efficient, fitting linear regression line.

10. Multiple linear regression models.

11. Analysis of Variance (ANOVA).

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	W. John Braun and Duncan J. Murdoch	A First Course in Statistical Programming with R	Cambridge University Press, NewYork	2007, edition
2	J H Maindonald	Using R for Data Analysis and Graphics: Introduction, Code and Commentary	*https://cran.r-project.org/doc/contrib/usingR.pdf*	2008, edition
3	Kim Seefeld and Ernst Linder	Statistics Using R with Biological Examples	*https://cran.r-project.org/doc/contrib/Seefeld_StatsRBio.pdf*	online

SEMESTER IV

CODE	COURSE TITLE
18MSUSL02	ASTRONOMY

Syllabus

Category	CIA	ESE	L	T	P	Credit
Self Learning	-	100	-	-	-	5

UNIT I Introduction – Telescopes–Binoculars -The Solar System – The Sun –The Moon.

UNIT II Planets – The Inner Planets – The Outer Planets – Comets, Meteors and Meteorites.

UNIT III Eclipses and Occultation – Eclipses and Occultation – Heavenly Lights.

UNIT IV The Stars – Nebulae – Galaxies**.**

UNIT V Professional Observatories – Amateur Observatories – Making your own Observatory – Recording Observations – Astrophotography – Making a Simple Astrophotography Mount.

Text Book

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Brian Jones	The Beginner's guide to Astronomy	Artists House, London.	1991, 1St Edition

Units	Page No.
I	7-21
II	22-27
III	28-31
IV	32-47
V	96-107

Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	S.Kumaravelu and Susheela Kumaravelu	Astronomy	Muruga Bhavanam, Chidhambaranagar, Nagercoil - 629 002	1995, edition
2.	Patrick Moore	The Guinness Book of Astronomy	Guinness Superlatives Limited	1983, 2nd Edition
3.	Valerie Illingworth	Macmillan Dictionary of Astronomy	Macmillan Press London	1985, 2nd Edition

Web Resources

1. *https://*www.timeanddate.com/eclipse/binoculars-telescope-projector.html
2. *http://*www.sun.org/encyclopedia/asteroids-meteoroids-meteors-meteorites-comets
3. *http*s://www.britannica.com/science/eclipse/solar -eclipse-phenomena
4. *http*s://www.britannica.com/science/nebula
5. *https://*astrobackyard.com/beginner-astrophotography/

- Question Paper Setters are asked to confine to the above **text book** only