SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

(Affiliated to Bharathidasan University)

(Accredited with "A" Grade by NAAC; An ISO 9001:2015 Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI – 614016.

TAMILNADU, INDIA.

B.Sc., MATHEMATICS COURSE STRUCTURE UNDER CBCS

(For the candidates admitted in the academic year 2020–2021)

ELIGIBILITY: A Pass in 10+2 with Mathematics as one of the core subject

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Inst. Hours /Week	Credit	Exam Hours	Marks		Total
								CIA	ESE	
I	I	Language Course (LC)-I-Tamil*/Other Languages ** #	20LC101	Ikkala Ilakkiyam	6	3	3	25	75	100
	II	English Language Course(ELC) – I	20ELC101	Language through Literature I (Prose and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) – I	20MA101	Differential Calculus and Trigonometry	5	4	3	25	75	100
		Core Course (CC) – II	20MA102	Integral Calculus	4	4	3	25	75	100
		First Allied Course (AC) – I	20APY101	Allied Physics – I	4	3	3	25	75	100
		First Allied Course (AP) – II	20APY102P	Allied Physics Practical – I	3	2	3	40	60	100
	IV	Value Education	18UGVED	Value Education	2	2	3	25	75	100
		TOTAL			**30**	**21**				**700**
II	I	Language Course (LC) –II-Tamil*/Other Languages ** #	20LC201	Idaikkala lakkiyamum Pudhinamum	6	3	3	25	75	100
	II	English Language Course (ELC) – II	20ELC201	Language through Literature II (Poetry and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) – III	20MA203	Probability & Statistics	4	4	3	25	75	100
		Core Course (CC) – IV	20MA204	Analytical Geometry 3D	5	4	3	25	75	100
		First Allied Course (AC) – III	20APY203	Allied Physics – II	4	3	3	25	75	100
		First Allied Course (AP) – IV	20APY204P	Allied Physics Practical – II	3	2	3	40	60	100
	IV	Environmental Studies	19UGCES	Environmental Studies	2	2	3	25	75	100
		TOTAL			**30**	**21**				**700**
III	I	Language Course (LC) -III Tamil*/Other Languages ** #	20LC301	Kaapiyamum Naadakamum	6	3	3	25	75	100
	II	English Language Course(ELC)-III	20ELC301	Language through Literature III (Drama and Communication Skills)	6	3	3	25	75	100
	III	Core Course (CC) – V	20MA305	Algebra and Theory of Numbers	4	4	3	25	75	100
		Core Course (CC) – VI	20MA306	Differential Equations	5	4	3	25	75	100
		Second Allied Course (AC) – I	20ACS301	Introduction of Computers & Office Automation	4	4	3	25	75	100
		Second Allied Course (AP) – II	20ACS302P	Office Automation Lab	3	2	3	40	60	100
	IV	Non Major Elective - I			2	2	3	25	75	100
		TOTAL			**30**	**22**				**700**

Sem.	Part	Nature of the Course	Course Code	Title of the Course	Inst. Hours /Week	Credit	Exam Hours	Marks		Total
								CIA	ESE	
IV	I	Language Course (LC) -IV - Tamil* /Other Languages ** #	20LC401	Sanga Ilakkiyam	6	3	3	25	75	100
	II	English Language Course(ELC) -IV	20ELC401	Language through Literature IV (Short stories and Communication Skills)	6	3	3	40	60	100
	III	Core Course (CC) – VII	20MA407	Sequences and Series	4	4	3	25	75	100
		Core Course (CC) – VIII	20MA408	Laplace Transform, Inequalities & Fourier Series	4	4	3	25	75	100
		Second Allied Course (AC) – III	20ACS403	Fundamentals of C Programming	3	2	3	25	75	100
		Second Allied Course (AP) – IV	20ACS404P	Computer Programming Lab using C	3	2	3	40	60	100
	IV	Non Major Elective II			2	2	3	25	75	100
		Skill Based Elective – I			2	2	3	25	75	100
		TOTAL			**30**	**22**				**800**
V	III	Core Course (CC) – IX	20MA509	Vector Calculus and Matrices	6	4	3	25	75	100
		Core Course (CC) – X	20MA510	Real Analysis	6	5	3	25	75	100
		Core Course (CC) – XI	20MA511	Numerical Methods with MATLAB Programming	5	4	3	25	75	100
		Core Practical (CP) – I	20MA512P	Numerical Methods with MATLAB Programming (P)	2	2	3	40	60	100
		Major Based Elective – I	20MBEMA1:1/ 20MBEMA1:2	Graph Theory / Mathematical Modelling	5	5	3	25	75	100
	IV	Skill Based Elective – II			2	2	3	25	75	100
		Skill Based Elective – III			2	2	3	25	75	100
		Soft Skill Development	RUGSDC	Soft Skill Development	2	2	3	25	75	100
		TOTAL			**30**	**26**				**800**
VI	III	Core Course (CC) – XII	20MA613	Modern Algebra	6	5	3	25	75	100
		Core Course (CC) – XIII	20MA614	Complex Analysis	6	5	3	25	75	100
		Core Course (CC) – XIV	20MA615	Mechanics	6	5	3	25	75	100
		Major Based Elective – II	20MBEMA2:1/ 20MBEMA2:2	Operations Research / Stochastic Processes	5	5	3	25	75	100
		Core Course (CC) – XV	20MAPW	Group Project	6	6	-	-	-	100
	V	Gender Studies	UGGS	Gender Studies	1	1	3	25	75	100
		Extension Activities		Extension Activities	-	1	-	-	-	-
		SWAYAM (EXTRA)				4				
		TOTAL			**30**	**28**				**600**
	GRAND TOTAL				**180**	**140**				**4300**

CURRICULAM DESIGN

LIST OF ALLIED COURSES

ALLIED COURSE I - PHYSICS **ALLIED COURSE II - COMPUTER SCIENCE**

Subject	No. of Courses	Total Credits
Language Part – I	4	12
English Part –II	4	12
Core Course	14	60
Core Practical	1	02
Allied Course	4	12
Allied Practical	4	08
Non-Major Elective	2	04
Skill Based Elective	3	06
Major Based Elective	2	10
Project	1	06
Environmental Studies	1	02
Value Education	1	02
Soft Skill Development	1	02
Gender Studies	1	01
Extension Activities	-	01 (Credit only)
Total	**43**	**140**

* For those who studied Tamil upto 10^{th} +2 (Regular Stream);

\+ Syllabus for other Languages should be on par with Tamil at degree level;

those who studied Tamil upto 10^{th} +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV;

** Extension Activities shall be outside instruction hours.

Note:

	CIA	ESE
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for CIA and ESE

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for ESE shall be 40% out of 75 marks[i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]
The passing minimum for ESE shall be 40% out of 60 marks [i.e. 24 marks]

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Nature of the Course	Course Code	Title of the Course
III		NME -I	20NMEMA31	Business Mathematics - I
IV		NME -II	20NMEMA42	Business Mathematics – II

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TAMILNADU, INDIA.

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

(For the candidates admitted in the academic year 2020–2021)

Question Paper Pattern- (Theory)

Max time: 3 Hours **Max Marks: 75**

Section – A (10 x 2 = 20)

Answer all the questions

Answer in One or Two sentences each

1.
2. } Unit I
3.
4. } Unit II
5.
6. } Unit III
7.
8. } Unit IV
9.
10. } Unit V

Section – B (5 x 5 = 25)

Answer all the questions

Each answer should not exceed 500 words

11. a (or)
    b } Unit I
12. a (or)
    b } Unit II
13. a (or)
    b } Unit III
14. a (or)
    b } Unit IV
15. a (or)
    b } Unit V

Section – C (3 x 10 = 30)

Answer any <u>THREE questions</u> in 1200 words

16. Unit I
17. Unit II
18. Unit III
19. Unit IV
20. Unit V

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS), SUNDARAKKOTTAI, MANNARGUDI – 614 016.

DEPARTMENT OF MATHEMATICS
B.Sc., MATHEMATICS

Semester: I – CC – I: DIFFERENTIAL CALCULUS & TRIGONOMETRY

Ins. Hrs. /Week : 5 **Course Credit: 4** **Course Code :**

OBJECTIVES :

- To inculcate the basics of differentiation and their applications.
- To introduce the notion of curvature and polar coordinates.
- To understand the basic concepts of Trigonometry

UNIT I

Methods of Successive Differentiation – Leibnitz's Theorem and its applications – Increasing & Decreasing functions – Maxima and Minima of function of two variables -Concavity, Convexity, Points of Inflection.

UNIT II

Curvature – Radius of curvature in Cartesian and in Polar Coordinates – Centre of curvature.

UNIT III

Expansions of sin (nx), cos (nx), tan (nx) – Expansions of $\sin^n x$, $\cos^n x$ – Expansions of sin (x), cos (x), tan (x) in powers of x.

UNIT IV

Hyperbolic functions – Relation between hyperbolic & Circular functions – Inverse hyperbolic functions.

UNIT V

Logarithm of a complex number – Summation of Trigonometric series – Difference method – Angles in arithmetic progression method.

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Learn the basics of differentiation and their applications.

2. Learn about the notion of curvature and polar coordinates.
3. Learn about the expansions of trigonometric functions.
4. Learn the Hyperbolic and Inverse hyperbolic functions.
5. Learn about the logarithm of a complex number, Summation and angles.

TEXT BOOK(S) :

1. S. Narayanan and T.K. Manicavachagam Pillai, Calculus Volume I, S. Viswanathan Pvt. Ltd., Chennai – 2011.
2. S. Arumugam & others, Trigonometry and Fourier Series, New Gamma Publications – 1999.

UNIT – I Chapter III : Sec. 1.1 to 2.2,
Chapter IV : Sec. 2.1, 2.2 &
Chapter V : Sec. 1.1 to 1.5, Sec. 2 of [1]
UNIT – II Chapter X : Sec. 2.1 to 2.4 & 2.6 of [1]
UNIT – III Chapter 1 : Sec. 1.1 to 1.4 of [2]
UNIT – IV Chapter 2 : Sec. 2.1 & 2.2 of [2]
UNIT – V Chapter 3 : Sec. 3.1 & Chapter 4 : Sec. 4.1, 4.2 of [2]

REFERENCE BOOK(S) :

1.U.P.Singh, R.J.Srivastava, N.H.Siddiqui, Calculus, Dominant publishers and Distributors, New Delhi-2003.
2. S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan Pvt. Ltd.-2004.

E_RESOURCES :

1. https://www.slideserve.com/jerod/hyperbolic-functions?fitview=true#ssShare
2. https:// www.slideshare.net/informaticaacademy/ successive differentiation

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DEPARTMENT OF MATHEMATICS
B.Sc., MATHEMATICS

Semester : I – CC – II : INTEGRAL CALCULUS

Ins. Hrs. /Week : 4 **Course Credit: 4** **Course Code :**

OBJECTIVES :

- To inculcate the basics of integration and their applications.
- To study some applications of definite integrals.
- To understand the concepts of Beta and Gamma functions.

UNIT I

Revision of Integral models – Simple Problems.

UNIT II

Integration of rational algebraic functions - Integration of Irrational functions -integral of type $\int \frac{dx}{a+bcosx}$.

UNIT III

Definite integrals -Integration by Parts - Reduction Formula.

UNIT IV

Double integrals – Changing the order of Integration –Triple Integrals.

UNIT V

Beta & Gamma functions and the relation between them – Integration using Beta & Gamma functions.

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Understand the basic concepts of integration.
2. Solve problems using various methods in integration.

3. Learn about the concepts of definite integrals.
4. Learn about the double and triple integrals.
5. Understand the concepts of Beta and Gamma functions.

TEXT BOOK(S) :

1.S.Narayanan and T.K.Manicavachagam Pillai, Calculus Volume II, S.Viswanathan (Printers & Publishers) Pvt. Limited, Chennai-2011.

UNIT- I Chapter 1 : Sec. 1 to 6
UNIT – II Chapter 1 : Sec. 7 to 9
UNIT - III Chapter 1 : Sec. 11, 12 & 13
UNIT - IV Chapter 5 : Sec. 2.1, 2.2 & 4
UNIT - V Chapter 7 : Sec. 2.1 to 2.5

REFERENCE BOOK(S) :

1.M.L. Khanna, Integral Calculus, Jai Prakash Nath & Co. Meerut, 19th Edition, 1994.

E_RESOURCES :

1. http://www.math.odu.edu/~jhh/counter10.html
2. https://ocw.mit.edu/ans7870/resources/Strang/Edited/Calculus/Calculus.pdf

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DEPARTMENT OF MATHEMATICS
B.Sc., MATHEMATICS

Semester : II – CC – III : PROBABILITY AND STATISTICS

Ins. Hrs. /Week : 4 **Course Credit: 4** **Course Code :**

OBJECTIVES :

- To introduce the idea of random variables, Probability distributions including Discrete and Continuous Probability Distributions.
- To create the idea about correlation and regression.
- To learn the properties of Expectation and Variance.

UNIT I

Theory of probability - Definition of probability - Theorems on Probability - Conditional Probability- Independence of events - Some problems.

UNIT II

Random variables and Distribution functions - Discrete & Continuous Random variables -Two Dimensional Random Variables.

UNIT III

Expectation and its Properties –Variance and its Properties - Covariance.

UNIT IV

Discrete Probability Distributions – Binomial and Poisson distributions - Moment generating functions of these distributions - Additive properties of these distributions-Recurrence relations for the moments for the Binomial and Poisson distributions.

UNIT V

Correlation & regression – Properties of correlation & regression coefficients -Problems for finding correlation and regression co-efficient.

COURSE OUTCOME :

After the completion of the course the students will be able to
1. Understand the axiomatic formulation of Probability theory.
2. Understand the key concept of discrete and continuous random variables
3. Acquire knowledge of expectation and variance
4. Learn the concept of Regression and correlation
5. Understand the concept of Binomial and Poisson distributions.

TEXT BOOK(S) :

[1]. Gupta.S.C & Kapoor.V.K, Fundamentals of Mathematical statistics, Sultan chand sons, New Delhi -2002 edition

UNIT - I Chapter 3 : Sec. 3.1 to 3.5,3.9,3.9.1,3.10 to 3.13
UNIT - II Chapter 5 : Sec. 5.1 to 5.5
UNIT - III Chapter 6 : Sec. 6.1 to 6.6
UNIT - IV Chapter 8 : Sec. 8.4 to 8.4.7, Sec. 8.5 to 8.5.8
UNIT - V Chapter 10 : Sec. 10.1 to 10.4
Chapter 11 : Sec. 11.1 & 11.2

REFERENCE BOOK(S) :

1. Murray. R., Theory and Problems of Probability and Statistics, Mc Graw –Hill, INC, 1996
2. Gupta. S.P., Statistical Methods, Sultan chand & sons, 1993

E_RESOURCES :

1. http://www.utstat.toronto.edu/mikevans/jeffrosenthal/book.pdf
2. https://www.pdfdrive.com/an-introduction-to-probability-and-statistics-wiley-series-in-probability-and-statistics-d168585572.html

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DEPARTMENT OF MATHEMATICS
B.Sc., MATHEMATICS

Semester : II – CC – IV : ANALYTICAL GEOMETRY 3D

Ins. Hrs. /Week : 5 **Course Credit: 4** **Course Code :**

OBJECTIVES :

- To study the equations of plane and angle between Planes.
- To study the equations of Surface area of cone, Sphere and its properties.
- To enable the students to develop their skill in three dimensional Geometry.

UNIT I

PLANES: General equation –passing through three points – angle between the planes - line of intersection – length of the perpendicular – plane bisecting the angle between the Plane.

UNIT II

STRAIGHT LINES: Symmetrical form – passing through two points – plane and straight line – Angel between the Plane and the Line.

UNIT III

Coplanar lines – shortest distance between two lines – Intersection of three Planes.

UNIT IV

THE SPHERE: Equation of a sphere- length of tangent to the sphere- plane section of spheres- intersection of two spheres- Tangent plane to the sphere.

UNIT V

CONE AND CYLINDER: Equation of a cone– Intersection of a straight line and a quadric cone – tangent plane and normal – Cylinder – Right circular cylinder – Equation of an Enveloping cylinder.

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Understand more about three dimensions using planes
2. Learn straight lines and its symmetrical forms
3. Understand the concept of straight lines using coplanar and shortest distance between the lines.
4. Assimilate the concept associated with the sphere, Solve the problems using a sphere.
5. Learn about three dimensions using cone and cylinder.

TEXT BOOK(S) :

1. T.K.Manicavachagam Pillay & T. Natarajan, Analytical Geometry, Part II-Three Dimensions, S.Viswanathan Printers & Publishers Pvt. Ltd. Chennai, 2013.

UNIT – I	Chapter 2	: Sec. 1 to 11
UNIT – II	Chapter 3	: Sec. 1 to 6
UNIT – III	Chapter 3	: Sec. 7, 8, 10
UNIT – IV	Chapter 4	: Sec. 1 to 8
UNIT – V	Chapter 5	: Sec. 2 to 6 & Sec. 8, 8.1 to 8.3

REFERENCE BOOK(S):

1. Shanti Narayan, Dr.P.K.Mittal, Analytical Solid Geometry, S.Chand and Company Pvt. limited, New Delhi,2016.
2.Shalini Singh, Three Dimensional Geometry, Published by Sarup & sons, 2000.

E_RESOURCES :

1. https://kupdf.net/download/analytical-geometry-2d-and-3d-p-r-vittal 58ddb8c6dc0d60560e8970ec_pdf
2. http://fhscastormath.weebly.com/uploads/1/2/4/7/12476962/chapter11_precal.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS), SUNDARAKKOTTAI, MANNARGUDI – 614 016.

DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – I
(For Physics & Chemistry)

Semester : I – AC – I : CALCULUS

Ins. Hrs. /Week : 4 **Course Credit: 3** **Course Code :**

OBJECTIVES :

- To learn the basic need for their major concepts.
- To train the students in the basic Integrations.
- To introduce the notion of curvature, radius and centre of curvature.

UNIT I

Successive Differentiation – n^{th} derivative of standard functions (Derivation not needed) - Leibnitz Theorem (proof not needed) and its applications - Simple problems in all these.

UNIT II

Total differential coefficients (proof not needed) - Curvature and radius of curvature in Cartesian only (proof not needed) – Centre of curvature (proof not needed) - Simple problems in all these.

UNIT III

Evaluation of integrals of types

1) $\int \frac{px+q}{ax^2+bx+c}\,dx$ 2) $\int \frac{px+q}{\sqrt{ax^2+bx+c}}\,dx$ 3) $\int \frac{dx}{(x+p)\sqrt{ax^2+bx+c}}$

4) $\int \frac{dx}{a+bcosx}$ 5) $\int \frac{dx}{a+bsinx}$

Integration by trigonometric substitution

1) $\int \sqrt{a^2-x^2}\,dx$ 2) $\int \sqrt{a^2+x^2}\,dx$ 3) $\int \sqrt{x^2-a^2}\,dx$

UNIT IV

General properties of definite integrals- Integration by parts -
Reduction formula (when n is a positive integer) for

1) $\int e^{ax}x^n\,dx$ 2) $\int x^n\,cosax\,dx$ 3) $\int sin^n x\,dx$

4) $\int cos^n x\,dx$ 5) $\int_0^x e^{ax}\,x^n\,dx$ 6) $\int_0^{\frac{\pi}{2}} sin^n x\,dx$

7) Without proof $\int_0^{\frac{\pi}{2}} sin^m x\ cos^n x\ dx$ – and illustrations

UNIT V

Double integrals – Changing the order of integration – Triple integrals (Cartesian only).

COURSE OUTCOME :

After the completion of the course the students will be able to
1. Understand the concept of successive Differentiation.
2. Learn the notation of curvature and radius of curvature.
3. Solve the problems in integration using various methods.
4. Understand the concept of properties of definite integrals, integration by parts and reduction formulae.
5.Understand the concept of double and triple integrals.

TEXT BOOK(S) :

1. S.Narayanan and T.K. Manichavasagampillai, Calculus, Volume I, S.Viswanathan Pvt. Limited, 2003.
2. S.Narayanan and T.K. Manichavasagampillai, Calculus, Volume II, S.Viswanathan Pvt, Limited, Chennai 2011.

UNIT - I	Chapter 3	:	Sec. 1.1 to 1.6, 2.1, 2.2 of [1]
UNIT - II	Chapter 8	:	Sec. 1.3 to 1.5 &
	Chapter 10	:	Sec. 2.1 to 2.4 of [1]
UNIT - III	Chapter 1	:	Sec. 7.3, 7.4, 8, 9 of [2]
UNIT - IV	Chapter 1	:	Sec. 11, 12, 13.1 to 13.5 of [2]
UNIT - V	Chapter 5	:	Sec. 2.1, 2.2, 4 of [2]

REFERENCE BOOK(S) :

1.Hari Krishnan, Calculus, Atlantic publishers & distributions (P) Ltd, 2013.
2. U.P.Singh, R.J.Srivastava, N.H.Siddiqui, Calculus, Dominant publishers and Distributors, New Delhi-2003

E_RESOURCES :

1.file:///C:/Users/ELCOT/Downloads/AnElementaryTreatiseontheDifferentialandIntegralCalculus_10449393.pdf
2. http://djm.cc/library/Elements_Differential_Integral_Calculus_Granville_edited_2.pdf

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DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – II
(For Physics & Chemistry)

Semester : I – AC – II : ALGEBRA AND ANALYTICAL GEOMETRY (3D)

Ins. Hrs. /Week : 3 **Course Credit: 2** **Course Code :**

OBJECTIVES :

- To inculcate the basics concept of Algebra.
- To give depth knowledge of matrices and inculcate habit of problem solving.
- To enable the students to develop their skill in three dimensions.

UNIT I

Binomial and Exponential Series (Proof not needed) Only- Summation and Approximation of the series (related problems Only)

UNIT II

Non-Singular, Symmetric, Skew symmetric, Orthogonal, Hermitian, Skew Hermitian and Unitary matrices – Characteristic equation , Eigen values, Eigenvectors– Cayley Hamilton's Theorem (proof not needed) related problems only.

UNIT III

Standard equation of a plane – Intercept form – Equation of the Plane Passing through the points – Angle between the planes.

UNIT IV

Symmetrical form of straight line – Straight line passing through two points – Angle between the plane – Coplanar lines – Shortest distance between two lines.

UNIT V

Equation of a sphere – Equation of a sphere Passing through a circle – Intersection of two spheres is a circle – Tangent plane to the Sphere.

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Learn the binomial theorem and its summation and approximations.
2. Understand the types of matrices and its definitions and compute the eigen value and eigen vectors.
3. Learn the angle between planes, bisector planes, perpendicular distance from a point to a plane and intersection of two lines.
4. Compute the angle between a line and a plane, length of perpendicular from a point to a line.
5. Understand the equation of a plane passing through the circle and tangent of the plane.

TEXT BOOK(S) :

1. T.K.Manicavachagam Pillai, T.Natarajan, K.S.Ganapathy, Algebra,Vol. I, S.Viswanathan Pvt Limited, Chennai,2007.
2.T.K.Manicavachagam Pillai, T.Natarajan, K.S.Ganapathy, Algebra, Vol. II, S.Viswanathan Pvt Limited, Chennai, 2012.
3.T.K.Manicavachagam Pillai, T.Natarajan, Analytical Geometry(3D), S.Viswanathan Pvt Limited, Chennai, 2008.

UNIT- I	Chapter 3 : Sec. 10 and 14 & Chapter 4: Sec. 2,3 of [1]
UNIT- II	Chapter 2 : Sec. 1 to 14 and 16.2 to 16.3 of [2]
UNIT-III	Chapter 2 : Sec. 1 to 9 of [3]
UNIT- IV	Chapter 3 : Sec. 1 to 4, 7, 8 of [3]
UNIT- V	Chapter 4 : Sec. 1 to 8 of [3]

REFERENCE BOOK(S) :

1. Sannu Rahi, Algebra, Tata McGraw Hill Publishing Company Limited, New Delhi, 2009.
2. Shanti Narayan, Dr. P.K.Mittal, Analytical Solid Geometry, S.Chand & company Private limited New Delhi, 2016.

E_RESOURCES :

1. https://www.google.com/amp/s/dokumen.tips/amp/documents/free-download-here-manickavasagam-pillai-volume-1pdf-free-download-here-algebra.html
2. https://www.academia.edu/19646465/Analytical_solid_geometry_Shanti_Narayan

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DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – III
(For Physics & Chemistry)

Semester : II – AC – III : TRIGONOMETRY AND FOURIER SERIES

Ins. Hrs. /Week : 3 **Course Credit: 2** **Course Code :**

OBJECTIVES :

- To inculcate the basic concept of Trigonometry.
- To acquaint problem solving skills to the students in Fourier series.
- To learn the Fourier series expansion of periodic function with the period of 2π.

UNIT I

Expansion of sin nθ, cos nθ, tan nθ (n being a positive integer) – Expansion of $\sin^n\theta$, $\cos^n\theta$ – Expansion of sin θ, cos θ and tan θ in terms of powers of θ (only problems in all the above)

UNIT II

Hyperbolic functions– Relation between Hyperbolic and Circular functions –Expansion of Inverse Hyperbolic functions –Separation of real and imaginary parts

UNIT III

Logarithm of a complex number – Summation of a series – Difference Method – Angles in Arithmetic Progression method.

UNIT IV

Fourier Series Definition – Fourier Series Expansion of Periodic Functions with period 2π – Odd and Even Functions.

UNIT V

Half range sine and cosine series-Definition and Problems – Change of Interval

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Learn the expansion of sin nθ and cos nθ and its related problems.
2. Understand the hyperbolic functions and its relation between hyperbolic and circular functions.
3. Understand the summation of series and its methods.
4. Understand the concept of fourier series and familiarizes with odd, even fourier series with their periodic functions.
5. Analyse the half range sine and cosine functions and its change of interval.

TEXT BOOK(S) :

1. S.Arumugam, A. Thangapandi Issac and A.Somasundaram, Trigonometry and Fourier series, New Gamma Publications, 1999.
2. S. Narayanan and T.K.Manicavachagam Pillay, S. Viswanathan, Calculus Volume III - Private limited, 2014.

UNIT- I	Chapter 1: Sec. 1.2 to 1.4 of [1]
UNIT- II	Chapter 2 : Sec. 2.1 and 2.2 of [1]
UNIT-III	Chapter 3 & Chapter 4 : Sec. 4.1 to 4.3 of [1]
UNIT- IV	Chapter 6: Sec. 1 to 3 of [2]
UNIT- V	Chapter 6: Sec. 4 to 6 of [2]

REFERENCE BOOK(S):

1. K.S.Rawat, Trigonometry, Sarup and Sons, New Delhi, 2005.
2. S.K.Jain, Fourier Series and Fourier Transforms, Sarup and Sons, New Delhi, 2001.

E_RESOURCES :

1.https://www.google.com/url?sa=t&source=web&rct=j&url=http://www.uobabylon.edu.iq/eprints/publication_7_16606_477.pdf&ved=2ahUKEwiEm__xwKbtAhX8xzgGHYcXBkEQFjAFegQIChAB&usg=AOvVaw1E_Pm2tIK4fJsAiuQJmwr2

2.https://www.google.com/url?sa=t&source=web&rct=j&url=http://www.iitg.ac.in/physics/fac/charu/courses/ph405/FourierTransform.pdf&ved=2ahUKEwinktHFsaXtAhXQfX0KHaaaAtAQFjAMegQIDxAB&usg=AOvVaw066vJTVNV2fz-BAT4YWaDb

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS), SUNDARAKKOTTAI, MANNARGUDI – 614 016.

DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – IV
(For Physics & Chemistry)

Semester : II – AC – IV : ODE, PDE AND LAPLACE TRANSFORMS

Ins. Hrs. /Week : 4 **Course Credit: 3** **Course Code :**

OBJECTIVES :

- To learn the basic concepts of ODE and PDE.
- To train the students in problem solving skills of PDE and Laplace Transforms.
- To learn the concept of linear equation with constant coefficient.

UNIT I

Ordinary Differential Equation of first order but of higher degree –Equations solvable for x, solvable for dy/dx, Clairaut's form (simple cases only)

UNIT II

Linear equations with constant coefficients – Finding Particular integrals in the cases of e^{kx}, sin(kx),cos(kx) (where k is a constant), x^k where k is a positive integer and $e^{kx}f(x)$ where f(x) is any function of x (only problems in all the above-No proof needed for any formula).

UNIT III

Formation of Partial differential equations by eliminating constants and by elimination of arbitrary functions – Definition of general, particular & complete solutions – Singular integral (geometrical meaning not required) –Solutions of first order equations in the standard forms - 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 = xp+yq+f(p,q) - Lagrange's Equations and simple problems.

UNIT IV

Laplace Transform – Definition – $L(e^{at})$, L(cos at), L (sin at), $L(t^n)$, where n is a positive integer. Basic theorems & formula only - $L[e^{-st}\cos bt]$, $L[e^{-st}\sin bt]$,$L[e^{-st}f(t)]$– L[f(t)], L[f'(t)], L[f''(t)].

UNIT V

Inverse Laplace Transforms related to the above standard forms – Solving Second Order ODE with constant co - efficients using Laplace Transforms.

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Learn the order and degree of the ODE's.
2. Identify some specific methods and solve them.
3. Understand the formation of PDE by eliminating constants and arbitrary functions.
4. Learn the Laplace Transforms and its related problems.
5. Understand the Inverse Laplace Transforms and solving second order ODE with constant Co-efficients.

TEXT BOOK(S) :

1.S. Narayanan, T.K. Manicavachagam Pillai, Calculus Volume- III, S.Viswanathan Pvt. Limited,2014.

UNIT – I Chapter – 1 : Sec. : 5, 6
UNIT – II Chapter – 2 : Sec. :1 to 4
UNIT – III Chapter – 4 : Sec. : 1, 2, 3, 5 [5.1 to 5.4], 6
UNIT – IV Chapter – 5 : Sec. : 1, 2, 4, 5
UNIT – V Chapter – 5 : Sec. : 6 to 11

REFERENCE BOOK(S) :

1. M.L.Khanna, Differential Equation, Jaiprakashnath & Meerut, 1994.
2. K.S.Rauat, Differential Equation, Swarup and Sons, New Delhi, 2003.

E_RESOURCES :

1.https://www.researchgate.net/publication/267487772_Differential_Equations_and_Their_Applications
2.https://www.google.com/url?sa=t&source=web&rct=j&url=http://www.personal.psu.edu/wxs27/250/NotesLaplace.pdf&ved=2ahUKEwjXmraOw6btAhX0zzgGHeHeD8MQFjABegQIEhAB&usg=AOvVaw1mHmdFf0ghr6_ToFjy7Bzq

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS), SUNDARAKKOTTAI, MANNARGUDI – 614 016.

DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – I
(For CS & BCA)

Semester : I – AC – I : ALGEBRA AND CALCULUS

Ins. Hrs. /Week : 4 **Course Credit: 3** **Course Code :**

OBJECTIVES :

- To learn the basic concept in the integration.
- To train the students to solve the problems in Theory of Equations.
- To introduce the basic concept of Theory of equations, Matrices and Differentiation.

UNIT I

Theory of Equations: Relation between roots & coefficients – Transformations of Equations – Diminishing, Increasing & multiplying the roots by a constant.

UNIT II

Matrices : Singular matrices – Inverse of a non-singular matrix using adjoint method - Rank of a Matrix – Consistency - Characteristic equation, Eigenvalues, Eigen vectors – Cayley Hamilton's Theorem (proof not needed) –Simple applications only.

UNIT III

Differentiation: Maxima & Minima – Concavity , Convexity – Points of inflexion- Partial differentiation – Euler's Theorem - Total differential coefficients (proof not needed) – Simple problems only.

UNIT IV

Evaluation of Integrals of Types,

$$1]\int \frac{px+q}{ax^2+bx+c}dx \qquad 2]\int \frac{px+q}{\sqrt{ax^2+bx+c}}dx$$

$$3]\int \frac{dx}{a+bcosx} \qquad 4]\int \frac{dx}{a+bsinx}$$

Evaluation using Integration by parts – Properties of definite integrals –Reduction formula

$$1]\int x^n e^{ax}dx \qquad 2]\int cos^n xdx \qquad 3]\int sin^n xdx.$$

UNIT V

Differential Equations: Linear equations – Second order of types $(aD^2 + bD + c)\, y = F(x)$ where a,b,c are constants and F (x) is one of the following types (i) e^{ax} (ii) sin (ax) or cos (ax) (iii) x^n, n being an integer (iv)e^{ax} f(x)

COURSE OUTCOME :

After the completion of the course the students will be able to
1. Find solutions of transformation of equation by increasing and decreasing roots.
2. Acquire the Knowledge of pertaining to consistency of equations of matrices and Eigen value and Eigen vector.
3. Understand the concept of maxima and minima and partial differential equation.
4. Understand the different types of Integral Equations and their properties.
5. Do the problems in different methods of Differential Equation.

TEXT BOOK(S) :

1.T.K.Manickavasagam Pillai & others, Algebra, Volume I & II, S.V Publications,1985 Revised Editions.
2.S.Narayanan, T.K.Manicavachagam Pillai, Calculus, Vol.I & II, S. Viswanathan Pvt. Limited,2003.
3.S.Narayanan,T.K.Manicavachagam Pillai, Differential Equations, S.Viswanathan Pvt. Limited, 2003.

UNIT-I	Chapter 6 :	Sec. 11, 15 and 17 of [1].
UNIT- II	Chapter 2 :	Sec. 1 to 16 of [1].
UNIT -III	Chapter 5 :	Sec. 1, 2 of [2].
	Chapter 8 :	Sec. 1.1,1.3 and 1.6 of [2].
UNIT -IV	Chapter 1 :	Sec. 7.3, 8,9, 11, 12, 13.1, 13.3, 13.4 of [2].
UNIT -V	Chapter 5 :	Sec. 1, 2, 3 and 4 of [3].

REFERENCE BOOK(S) :

1.M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut-2004.

E_RESOURCES :

1.https://www.pdfdrive.com/calculus-volume-1-d33472743.html.
2.https://www.computer-pdf.com/amp/download-672

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS), SUNDARAKKOTTAI, MANNARGUDI – 614 016.

DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – II
(For CS & BCA)

Semester : I – AC – II : NUMERICAL ANALYSIS

Ins. Hrs. /Week : 3 **Course Credit: 2** **Course Code :**

OBJECTIVES :

- To introduce the basic concept of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation.
- To acquaint the student with an understanding of numerical techniques of differentiation and integration.

UNIT I

The Solution of Algebraic and Transcendental Equations – Bisection method – Iteration method – Newton Raphson method

UNIT II

Interpolation – Finite differences – Newton's forward and backward Interpolation – Lagrange's Interpolation formula

UNIT III

Numerical Differentiation – Numerical Integration: Trapezoidal Rule – Simpson's 1/3 Rule

UNIT IV

Gauss Elimination Method – Gauss Jacobi Method –Gauss Seidal method

UNIT V

Numerical Solution of Ordinary Differential Equations – Solution by Taylor's Series – Euler's method – Runge Kutta second and fourth order method.

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Understand the numerical techniques to find the roots of linear and non-linear equations.
2. Understand the difference operators and use of interpolation.
3. Understand numerical differentiation and integration.
4. Understand the methods of solutions of linear equations.
5. Understand the concept of numerical solutions of ordinary differential equations.

TEXT BOOK(S) :

1.S. S. Sastry, Introductory Methods of Numerical Analysis, 4thEdition, Prentice Hall of India, New Delhi, 2005.

UNIT- I	Chapter 2:	Sec. 2.2,2.4, 2.5
UNIT -II	Chapter 3:	Sec. 3.3 (3.3.1 & 3.3.2), 3.6, 3.9.1
UNIT -III	Chapter 5:	Sec. 5.2.1, 5.4 (5.4.1 & 5.4.2)
UNIT -IV	Chapter 6:	Sec. 6.3.2, 6.4
UNIT -V	Chapter 7:	Sec. 7.2, 7.4, 7.5

REFERENCE BOOK(S):

1.M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited,2001.
2.David Kincaid, Ward Cheney, Numerical Analysis, Books/cole Publishing company, Calfifornia.

E_RESOURCES :

1. http://www.math.iitb.ac.in/~baskar/book.pdf
2. http://spartan.ac.brocku.ca/~jvrbik/MATH2P20/notes.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS), SUNDARAKKOTTAI, MANNARGUDI – 614 016.

DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – III
(For CS & BCA)

Semester : II – AC – III : STATISTICS

Ins. Hrs. /Week : 3 **Course Credit: 2** **Course Code :**

OBJECTIVES :

- To train the students to workout statistical problems.
- To analyse the data graphically using frequency distributions.
- To analyse the data using measure of central tendency.

UNIT I

Introduction -Origin and development of statistics-scope-limitations- Frequency distribution - graphical representation.

UNIT II

Measures of central tendency: Arithmetic Mean – Geometric Mean – Harmonic Mean - Median - Mode

UNIT III

Measures of dispersion: Range-Quartile deviation-Mean deviation- Standard deviation- Coefficient of dispersion

UNIT IV

Correlation and Regression–Properties of Simple Correlation and regression coefficients – Simple Problems only.

UNIT V

Binomial distribution: Moments- Recurrence relations for the Moments-Moment generating functions-simple problems-Additive property.

COURSE OUTCOME :

After the completion of the course the students will be able to

1. Understand the basic concept of statistics.
2. Acquire knowledge of measures of central tendency.
3. Understand the concept of measures of dispersion.
4. Understand the concept of correlation and regression.
5. Gain Knowledge about binomial distribution and its properties.

TEXT BOOK(S) :

1. Gupta.S.C & Kapoor.V.K, Fundamentals of Mathematical Statistics, Sultan Chand & sons, New Delhi-2002.

UNIT -I	Chapter 1 : Sec. 1.1 to 1.4
	Chapter 2 : Sec. 2.1 to 2.3
UNIT -II	Chapter 2 : Sec. 2.4 to 2.9
UNIT -III	Chapter 2 : Sec. 2.13 to 2.14
UNIT-IV	Chapter10 : Sec. 10.1 to 10.4 & Chapter 11: Sec. 11.1, 11.2 (11.2.1 to 11.2.3)
UNIT -V	Chapter 8 : Sec. 8.4 (8.4.1, 8.4.2, 8.4.6,8.4.7 only)

REFERENCE BOOK(S) :

1.Gupta.S.P , Statistical Methods, Sultan Chand & sons, NewDelhi-1994.
2.Kapil Sharma, Statistical Methods, ABO Publishers, Jaipur, India.

E_RESOURCES :

1. https://www.math.arizona.edu/~jwatkins/statbook.pdf
2. http://www.cimt.org.uk/cmmss/S1/Text.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS), SUNDARAKKOTTAI, MANNARGUDI – 614 016.

DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
ALLIED COURSE – IV
(For CS & BCA)

Semester : II – AC – IV : OPERATIONS RESEARCH

Ins. Hrs. /Week : 4 **Course Credit: 3** **Course Code :**

OBJECTIVES :

- To train the students to solve Assignment problems, Transportation problems.
- To train the students in Network problems.
- To impart knowledge in concepts and tools of Operations Research.

UNIT I

Operations Research: Introduction - Basics of OR – OR & decision making – Role of OR - Linear programming formulations & graphical solution of two variables – Canonical & standard forms of LPP.

UNIT II

Simplex Method: Simplex Method for < , = , > constraints –Big M-method.

UNIT III

Transportation Problem: Transportation algorithm –Degeneracy algorithm – Degeneracy in Transportation Problem, Unbalanced Transportation problem-Assignment algorithm – Unbalanced Assignment problem.

UNIT IV

Sequencing Problem: Processing of n jobs through two machines – Processing of n jobs through 3 machines – Processing of two jobs through n machines.

UNIT V

Networks: Network – Fulkerson's rule - Measure of activity – PERT computation – CPM computation - Resource scheduling.

COURSE OUTCOME :

After the completion of the course the students will be able to
1. Understand the advantages and limitations of operation research
2. Understand the LPP and to know methods of solving problems
3. Understand the concepts of transportation and assignment problems
4. Learn about the sequencing problems
5. Assimilate the concept of Network scheduling by CPM and PERT

TEXT BOOK(S) :

1. S.Kalavathy, Operations Research, Fourth Edition, Vikas Publishing House Pvt. Ltd.

UNIT - I	Chapter 1
	Chapter 2 : Sec. 2.1, 2.2
	Chapter 3
UNIT -II	Chapter 4
	Chapter 5 : Sec. 5.1, 5.2
UNIT -III	Chapter 8 : Sec. 8.1 to 8.5
	Chapter 9 : Sec. 9.3 to 9.5
UNIT -IV	Chapter 1 :Sec. 14.1 to 14.3, 14.5
UNIT -V	Chapter 15 :Sec. 15.1 to 15.8

REFERENCE BOOK(S) :

1. P. K Gupta and Manmohan, Operations Research, Sultan Chand and sons Educational publishers, New Delhi.
2. Hamdy A. Taha, Operations Research, 7th Edn., Prentice Hall of India Private Limited, New Delhi, 2005.

E_RESOURCES :

1.http://ebooks.lpude.in/commerce/bcom/term_5/DCOM303_DMGT504_OPERATION_RESEARCH.pdf
2.http://www.ggu.ac.in/download/class-note14/operation%20research07.04.14.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester : III-CC-V: Algebra and Theory of Numbers

Ins. Hrs./Week: 4 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To lay a good foundation for the study of the Theory of Equations
- To train the students in operative algebra
- To define and interpret the concepts of divisibility, congruence, greatest common divisor, prime & prime factorization

UNIT – I : Theory of Equations (13 Hours)

Introduction of Polynomials - In an equation with real coefficients, imaginary roots occur in pairs - In an equation with rational coefficients, irrational roots occur in pairs –Relation between roots & coefficients of Equations.

UNIT- II : Theory of Equations Continued (12 Hours)

Symmetric functions of the roots – Sum of the Powers of the Roots of an equation – Newton's theorem on the sum of the powers of the roots.

UNIT – III : Theory of Equations Continued (12 Hours)

Transformations of Equations – Roots with signs changed – Roots multiplied by a given number – Reciprocal roots – Diminishing, Increasing & Multiplying the roots by a constant - Reciprocal equations – Standard form of reciprocal equations – A reciprocal equation of the standard form can always be depressed to another of half the dimensions - To increase or decrease the roots of the equation by a given quantity.

UNIT – IV : Theory of Equations Continued (12 Hours)

Form of the quotient and remainder – Removal of terms – To form an equation whose roots are any power – Transformation in general – Descartes rule of signs – Descartes rule of signs for Positive roots – Descartes rule of signs for negative roots.

UNIT – V : Theory of Numbers (11 Hours)

Prime & Composite numbers – Divisors of a given number N – Euler's Function $\emptyset(N)$ and its value – The highest power of a prime P contained in n! – Congruences– Fermat's, Wilson's & Lagrange's Theorems and using in solved Problems.

Total Lecture Hours- 60

COURSE OUTCOME

The students will be able to

1. Learn the relation between the roots and coefficients of the polynomial equation.
2. Understand the Sum of the Powers of the Roots of an equation.
3. Learn the transformation of equations.
4. Understand the concept of Descartes rule of sign.
5. Gain knowledge of prime numbers and congruences.

TEXT BOOKS

1. Manickavasagam Pillai.T.K., Natarajan.T and Ganapathy.K.S. 2007. Algebra Volume I. Viswanathan. S Publications Pvt. Ltd., Chennai.
2. Manickavasagam Pillai.T.K and others. 2014. Algebra, Volume II. Viswanathan S. Publications Pvt. Ltd., Chennai.

UNIT- I Chapter 6 : Sec. 9, 10 & 11 of (1)
UNIT- II Chapter 6 : Sec. 12, 13 & 14 of (1)
UNIT- III Chapter 6 : Sec. 15,16 & 17 of (1)
UNIT- IV Chapter 6 : Sec. 18,19, 20,21 & 24 of (1)
UNIT-V Chapter 5: Sec. 1 to 18 of (2)

REFERENCE BOOK(S)

1. Arumugam.S and Thangapandi Isaac. A. 2012. Modern Algebra. SciTech Publications (India) Pvt. Ltd., Chennai.
2. Hall.H.S and Knight.S.R. 2005. Higher Algebra. Prentice Hall of India, New Delhi.
3. Hall.H.S and Knight.S.R. 1948. Higher Algebra. McMillan and Co., London.
4. John B. Fraleigh, 1999. A First Course in Abstract Algebra, Fifth Edition. Addison-Wesley Publication, England.
5. Roger Cooke. 2008. Classical Algebra - Its Nature, Origins, and Uses. A John Wiley & Sons, Inc., Publication, Canada.

E_RESOURCES

1. https://Download.E-Bookshelf.De/Download/0000/5710/63/L-G-0000571063-0002357534.Pdf
2. https://Www.Maths.Ed.Ac.Uk/~V1ranick/Papers/Borevich.Pd
3. https://Kkhsou.Ac.In/Eslm/Eslm_Main/1st%20sem/Bachelor%20degree/Mathematics/Block%20i/Book.Pdf
4. Http://Www.Freebookcentre.Net/Maths-Books-Download/Topics-In-Classical-Algebraic Geometry-Pdf.Html
5. https://www.buecher.de/shop/sonstige-themen/classical-algebra-ebook-pdf/cooke- roger-l-/products_products/detail/prodid/37291551/

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester : III-CC- VI: Differential Equations

Ins. Hrs./Week: 5 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To understand the first order higher degree Differential Equations
- To train the students in problem solving skills in Ordinary Differential Equations and Partial Differential Equations
- To understand the linear equation with constant coefficient

UNIT-I : Differential Equations of the First Order (15 Hours)

Equations of the first order, higher degree differential equations solvable for dy/dx - Equations solvable for y - Equations solvable for x – Clairaut's Form –Conditions of Integrability of M dx + N dy = 0 - Exact Differential Equation – Related problems.

UNIT –II : Linear Differential Equations with Constant coefficients (14 Hours)

Linear differential equations with constant coefficients– Particular Integral– Finding Particular integrals in the cases of e^{kx}, sin(kx), cos(kx) (where k is a constant), x^k (where k is a positive integer), and e^{kx}f(x) (where f(x)is any function of x) – Related problems.

UNIT–III : First Order Partial Differential Equations (17 Hours)

Formation of Partial Differential Equations by eliminating constants - Formation of Partial Differential Equations by eliminating arbitrary functions – Definition of general, particular & Complete solutions – Singular integral - Solutions by Direct Integration – First order Partial Differential Equations –Type - I f(p , q)= 0 -Type – II z = xp + yq + f(p,q).

UNIT-IV : First Order Equations in Standard Forms (14 Hours)

Solutions of First Order Equations in the standard forms – Type - III f(z , p , q) = 0 - Type – IV f_1(x, p)= f_2(y , q) - Equations Reducible to Standard Forms – Lagrange's Equation – Simple Problems.

UNIT–V : Partial Differential Equation of Second Order (15 Hours)

Partial Differential Equation of Second Order Homogeneous Equation with constant coefficients – Particular Integral – Finding the Particular Integrals of the forms e^{ax+by}, sin(ax + by), cos(ax + by), x^r, y^s and e^{ax+by}f(x,y) – Simple Problems.

Total Lecture Hours - 75

COURSE OUTCOME

The students will be able to

1. Learn the order and degree of the Ordinary Differential Equations.
2. Identify some specific methods to solve Differential Equations.
3. Formulate Partial Differential Equations by eliminating constants and arbitrary functions.
4. Understand the Equations reducible to standard Forms, Lagrange's Equation.
5. Learn the Partial Differential Equations of second order Homogeneous equation and Particular Integrals.

TEXT BOOKS

1. Arumugam S, Thangapandi Issac A and Somasundaram A. 2003. Engineering Mathematics, Volume – III. Scitech Publications Pvt. Ltd., Chennai.
2. Narayanan. S and Manicavachagam Pillai. T.K. 2014. Calculus Volume – III. Viswanathan S. Pvt. Ltd., Chennai.

UNIT-I Chapter 1 : Sec 3.1 to 3.3, 5 and 6 of [2]
UNIT-II Chapter 2 : Sec 1 to 4 of [2]
UNIT-III Chapter 4 : Sec 4.1 to 4.7 of [1]
UNIT-IV Chapter 4 : Sec 4.8 to 4.11 of [1]
UNIT-V Chapter 4 : Sec 4.12 of [1]

REFERENCE BOOK(S)

1. Braun. M. 1975. Differential Equations and their Applications. Springer Science, Business Media LLC, London.
2. Kapoor. N.M. 2006. A Text Book of Differential Equations. Pitambar Publishing Company Pvt. Ltd., New Delhi.
3. Khanna. M.L. 1994. Differential Equation. Jai Prakash Nath Publications, Meerut.
4. Raisinghania. M.D. 2013. Ordinary and Partial Differential Equations. S.Chand and Co. Ltd., New Delhi.
5. Viorel Barbu. 2016. Differential Equation. Springer International Publishing, Switzerland.

E-RESOURCES

1. https://www.math.ust.hk/~machas/differential-equations.pdf
2. http://mdudde.net/pdf/study_material_DDE/M.Sc.MAthematics/DIFFERENTIAL%EQUATIONS.pdf
3. https://www.researchgate.net /publication/267487772_Differential_Equations_and Thier_Applications
4. http://www.math.toronto.edu/selick/B44.pdf
5. https://www.researchgate.net /publication/332863667_ PROBLEMS_SET_ DIFFERENTIAL_EQUATION

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

NON MAJOR ELECTIVE

Semester : III-NME - I : Business Mathematics - I

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**:

OBJECTIVES

- To understand the basic concepts of Mathematics
- To have a proper understanding of Mathematical applications in Economics, Commerce and Management
- To solve the business problems independently

UNIT – I : Logical Statement and Truth Table (6 Hours)

Logical statement - Truth Tables - Negation - Compounding - Negation of Compound Statements - Tautologies and Fallacies - Propositions - Algebra of Propositions - Conditional Statements - Biconditional Statements.

UNIT – II : Theory of Sets (6 Hours)

A Set - Elements of a set - Methods of Describing a Set - Types of Sets - Venn diagrams - Operations on sets - Intersection and Union of Sets - Complement of a set - De- Morgan's Law.

UNIT – III : Logarithms (6 Hours)

Introduction of Logarithms - Laws of Operations - Logarithmic Tables - Operations with Logarithms.

UNIT-IV : Arithmetic Progression (6 Hours)

Arithmetic Progression - Sum of a series in A.P - Arithmetic Mean.

UNIT – V : Geometric Progression (6 Hours)

Geometric Progression - Sum of a series in G.P - Geometric Mean.

Total Lecture Hours- 30

COURSE OUTCOME

The students will be able to

1. Understand the concept of logical statement, truth table, negation, negation of compound statements, arguments and joint denial.
2. Extrapolate the sets, algebra of sets and its properties.
3. Learn Logarithms and Calculate Compound Interest.
4. Get the knowledge about permutations and combinations.
5. Find the arithmetic and Geometric Mean.

TEXT BOOKS

1. Sancheti. D.C and Kapoor.V.K. 2014.Business Mathematics, Revised Edition. Sultan Chand & Sons, Educational Publishers, New Delhi.

UNIT I	Chapter 1	: Sec. 1.1 to 1.10
UNIT II	Chapter 2	: Sec. 2.1 to 2.10
UNIT III	Chapter 7	: Sec. 7.1 to 7.3
UNIT IV	Chapter 12	: Sec. 12.1 to 12.3
UNIT V	Chapter 12	: Sec. 12.4 to 12.6

REFERENCE BOOK(S)

1. Gupta, Saxena and Dr.Sinha. 2019. Business Mathematics. SBPD Publication, Agra.
2. Mariappan.P. 2015. Business Mathematics, First Edition. Pearson Education Publisher, India.
3. Rayarikar.A.V and Dixit.P.G. 2017. Business Mathematics. Niraliprakashan Publisher, Mumbai.
4. Shuka. S.M. 2019. Business Mathematics, Revised Edition. Sahitya Bhawan Publications, Agra.
5. Vittal. P.R. 2018. Mathematics Foundation, Re-Edition. Margham Publications, Chennai.

E_RESOURCES

1. https://www.whitman.edu/mathematics/higher_math_/section01.01.html
2. https://www.researchgate.net/publication/297319798_Set_theory
3. https://www.researchgate.net/publication/50315356_APPLICATION_OF_THE_PRINCIPLES_OF_PERMUTATION_AND_COMBINATION_IN_MATHEMATICS_IN_TELECOMMUNICATIONS
4. https://www.onlinemathlearning.com/geometric-sequences-nth-term.html
5. https://www.toppr.com/ask/content/concept/arithmetico-geometric-progressions-207710/

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester : IV-CC-VII : Sequences and Series

Ins. Hrs./Week: 4 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To identify the different kinds of sequences
- To develop the Mathematical analysis to understand sequences and series
- To study about convergence and divergence of sequences and series of real numbers.

UNIT-I : Sequences **(13 Hours)**

Introduction - Sequences –Bounded Sequences –Monotonic Sequences – Convergent Sequences – Divergent Sequences – Oscillating sequences – Definitions with Examples - Theorems - Problems.

UNIT-II : Algebra of Limits and Monotonic functions **(12 Hours)**

The Algebra of limits - Theorems related to limits of sequences – Problems – Behaviour of monotonic sequences – Theorems and Problems.

UNIT-III : Theorems on Limits and Subsequences **(13 Hours)**

Cauchy's first limit theorem – Cesaro's theorem - Cauchy's second limit theorem –Some theorems on limits – Subsequences – Peak point – Definition with examples – Theorems and Problems.

UNIT-IV : Series of Positive terms and Comparison Test **(11 Hours)**

Series – Infinite series – Definition with examples - Cauchy's general principle of convergence –Problems - Comparison Test - Test of convergence using Comparison test (statement only).

UNIT-V : Series of Arbitrary Terms **(11 Hours)**

Test of convergence using D'Alembert's ratio test - Test of convergence using Cauchy's Root test – Problems - Alternating Series –Test of convergence using Leibnitz's test – Absolute Convergence (Statement only for all Tests)

Total Lecture Hours- 60

COURSE OUTCOME

The students will be able to

1. Understand the definitions of limits and convergence in the context of sequences and series of real numbers.
2. Get Knowledge of some simple techniques for testing the convergence of sequences and series.
3. Familiarize with a variety of well-known sequences and series, with a developing intuition about the behaviour of new ones.
4. Compute limits of sequences involving elementary functions.
5. Prove simple statements involving convergence arguments.

TEXT BOOKS

1. Arumugam. S and Thangapandi Isaac. A. 2002. Sequences and Series. New Gamma Publishing House, Palayamkottai.

UNIT I Chapter 3 : Sec. 3.0 to 3.5
UNIT II Chapter 3 : Sec. 3.6, 3.7
UNIT III Chapter 3 : Sec. 3.8 ,3.9
UNIT IV Chapter 4 : Sec. 4.1 , 4.2
UNIT V Relevant part of Chapter 4 and Chapter 5 : Sec. 5.1 & 5.2

REFERENCE BOOK(S)

1. Arumugam. S, Thangapandi Isaac. A and Somasundaram. S. 2019. Sequences and Series.Yes Dee Publishing Pvt. Ltd., Chennai.
2. Francis Raj. M.I. 2004. Algebra. Margham Publications, Chennai.
3. Manicavachagam Pillay. T.K, Natarajan. T and Ganapathy. K.S. 2007. Algebra, Volume-I. Viswanathan S. Pvt. Ltd., Chennai.
4. Surya Narayan Iyer. S. 2002. Algebra..Margham Publications, Chennai.
5. Ileana Toma, Valerica Mosneguta and Stefania Constantintinescu. 2018. Sequence and Series, Second Edition. Create space Independent Publishing Platform, United States.

E-RESOURCES

1. https://sites.math.northwestern.edu/~mlerma/courses/b17-99f/seq.pdf
2. https://booksite.elsevier.com/9780123846549/Chap_Series
3. https://www.math.ksu.edu/~vlnewberry/Seriesandsequences.pdf
4. https://www.esaral.com/sequence-and-series-class-11-notes/#
5. https://ms.mcmaster.ca/~ppoudel/Teaching/Spring%2015/Homework/Summary%20-%20Series%20and%20Sequences.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester : IV-CC-VIII : Laplace Transform, Inequalities & Fourier Series

Ins. Hrs./Week: 4 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To understand the concept of Laplace transforms
- To Solve algebraic inequalities using a combination of the properties of inequality
- To know about Fourier Series and its applications

UNIT-I : Laplace Transforms **(12 Hours)**

Introduction to Laplace Transforms - Definition-Laplace Transform of some standard functions-Laplace Transform of derivatives -Laplace transform of Heavisides unit step function- Inverse Laplace Transform-Solved Problems.

UNIT-II : Differential Equations **(12 Hours)**

Laplace Transform of Periodic Functions - Solutions of Differential Equations Using Laplace Transforms- Solved Problems.

UNIT-III : Inequalities **(12 Hours)**

Introduction to Inequalities- Elementary Principles-Square of real number is Positive-Geometric and Arithmetic means - Solved Problems.

UNIT-IV : Fourier Series **(12 Hours)**

Introduction to Fourier Series-Definition-Fourier Series expansion of Periodic Functions Convergence of Fourier Series- Functions having arbitrary periods - Solved Problems.

UNIT-V : Half Range Fourier Series **(12 Hours)**

Introduction to Half Range Fourier Series - Definition- Half range in Cosine series and in sine series – Parsevel's Theorem – Solved Problems.

Total Lecture Hours - 60

COURSE OUTCOME

The students will be able to

1. Learn the basic properties of Laplace and Inverse Laplace transforms.
2. Solve Differential Equations using Laplace Transforms.
3. Define and use key terms related to inequalities
4. Gain the knowledge about Fourier series for periodic signals.
5. Learn the development of Fourier Series in Cosine and sine series.

TEXT BOOKS

1. Arumugam S, Thangapandi Isaac. A and Somasundaram A. 2003. Engineering Mathematics Volume –III. Scitech Publications (India) Pvt. Ltd., Chennai.
2. Manicavachagam Pillay. T. K. Natarajan. T and Ganapathy. K. S. 2014. Algebra Volume II. Viswanathan. S Publishers Pvt. Ltd., Chennai.

UNIT –I Chapter 1 : Sec.1.1 & 1.2 of [1]
UNIT– II Chapter 1 : Sec. 1.3 & 1.4 of [1]
UNIT – III Chapter 4 : Sec. 1 to 8 of [2]
UNIT – IV Chapter 2 : Sec.2.1 to 2.3 of [1]
UNIT – V Chapter 2 : Sec. 2.4 & 2.5 of [1]

REFERENCE BOOK(S)

1. Ken Stroud, Dexter Booth. 1970. Engineering Mathematics. Macmillan, New York.
2. Manicavachagam Pillay. T.K and Narayanan. S. 1996. Differential Equations. Viswanathan.S Publishers Pvt. Ltd., Chennai.
3. Narayanan. S and Manicavachagam Pillai. T. K. 2014. Calculus, Volume III. Viswanathan.S Pvt. Ltd. and Vijay Nicole Imprints Pvt. Ltd., Chennai.
4. Sergei Suslov. 2003. An Introduction to Basic Fourier Series. Springer, New York.
5. Tolstov. G.P. 2012. Fourier Series. Dover Publications, U.S.A.

E_RESOURCES

1. https://www.iit.edu/sites/default/files/2021-02/laplacetransformiit.pdf
2. https://www.math.lsu.edu/system/files/FourierSeriesSolOdd.pdf
3. http://dsp-book.narod.ru/TAH/ch05.pdf
4. https://www.researchgate.net/publication/312479467_Inequalities_related_to_the_arithmetic_geometric_and_harmonic_means
5. https://www.researchgate.net/publication/245063369_Fourier_series_of_halfrange_functions_by_smooth_extension

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

NON MAJOR ELECTIVE

Semester: IV-NME - II : Business Mathematics - II

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**:

OBJECTIVES

- To understand the basic concepts of Mathematics
- To have a proper understanding of mathematical applications in Economics, Commerce and Management
- To solve business problems independently

UNIT – I : Co-ordinate Geometry (6 Hours)

Introduction – Directed Line – Quadrants and Coordinates – Coordinates of Mid-Points – Distance between two points – Section Formula – External Division – Coordinates of Centroid – Area of a Triangle – Collinearity of Three Points – Area of a Quadrilateral.

UNIT – II : Straight Line (6 Hours)

The Straight Line – Slope or Gradient of a Straight line – Different forms of equations of a straight line – General equation of a straight line – Intersecting Lines – Concurrent Lines – Angle between two straight lines – Tangent and Normal.

UNIT – III : Circle (6 Hours)

Circle – Equation of circle – Different forms of Circle – General equation of Circle – Equation of tangent to Circle – Equation of a Normal to Circle - Equation of tangent to Circle in slope form.

UNIT – IV: Vector Algebra (6 Hours)

Vectors – Types of Vectors – Operations on Vectors – Addition – Properties of Operation of Addition – Subtraction – Multiplication by a Scalar – Orthonormal Bases – Product of two Vectors – Scalar Product or Dot Product of two vectors – Properties of scalar product – Vector Product or Cross Product – Properties of Vector product.

UNIT- V : Matrix Algebra (6 Hours)

Introduction – Definition – Types of Matrices – Scalar Multiplication of a Matrix – Equality of Matrices – Addition and Subtraction – Multiplication – Properties – Transpose of a Matrix.

Total Lecture Hours – 30

COURSE OUTCOME

The students will be able to

1. Solve the problems by using the knowledge of different forms of straight lines and their applications.
2. Apply the knowledge of Circle, Tangent and its properties in real world.
3. Solve problems based on the concepts of addition, subtraction, scalar product and vector product.
4. Apply the knowledge of matrix and Inverse of a matrix in solving problems.
5. Understand the concept of determinants.

TEXT BOOKS

1. Sancheti. D.C and Kapoor. V.K. 2014. Business Mathematics, Revised Edition. Sultan Chand & Sons Educational Publishers, New Delhi.

UNIT –I Chapter 15 : Sec. 15.1 to 15.11
UNIT – II Chapter 15 : Sec. 15.13 to 15.21
UNIT - III Chapter 15 : Sec. 15.22 to 15.27
UNIT - IV Chapter 19 : Sec. 19.1 to 19.13
UNIT - V Chapter 20 : Sec. 20.1 to 20.10

REFERENCE BOOK(S)

1. Gupta, Saxena and Sinha. 2019. Business Mathematics. SBPD Publication, Agra.
2. Mariappan P. 2015. Business Mathematics, First Edition. Pearson Education Publisher, India.
3. Rayarikar A.V and Dixit P.G. 2017. Business Mathematics. Niraliprakashan Publisher, Mumbai.
4. Shuka S.M. 2019. Business Mathematics, Revised Edition. Sahitya Bhawan Publications, Agra.
5. Vittal P.R. 2018. Mathematics Foundation, Re-Edition. Margham Publications, Chennai.

E_RESOURCES

1. https://www.academia.edu/40468313/Business_Mathematics1stedition
2. https://www.coursehero.com/file/35285098/BASIC-MATHEMATICS-Coordinate-Geometrypdf/
3. https://www.academia.edu/10235680/BUSINESS_MATHEMATICS
4. https://bnmjjwinf292.com/mk3ngxw9g?key=0f22c1fd609f1 3cb7947c8cabfe1a90d&submetric=14961611
5. https://www.researchgate.net/publication/281838644_An_Introduction_to_Business_Mathematics

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2022)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: V-CC-IX: Vector calculus and Matrices

Ins. Hrs./Week: 6 **Course Credit**: 4 **Course Code**:

OBJECTIVES

- To provide the basic knowledge of vector differentiation and vector integration
- To solve the vector differentiation and integration problems
- To provide the basic concepts and skills in matrix algebra

UNIT-I: Vector Differentiation (19 Hours)

Vector Valued functions of a single scalar variable - Differential operators; Definitions - The vector Differential operator ∇ - The operator a.∇ - The Gradient (or slope) of a scalar point function - simple problems.

UNIT –II: Vector Integration (18 Hours)

Line integrals - Conservative field - irrotational - Normal surface integral - Flux across a surface - Solenoidal vector - Volume integral - Simple problems.

UNIT–III: Theorems of Vector Calculus (17 Hours)

Gauss Divergence Theorem - Green's Theorem - Stokes' Theorem - Simple problems and Verification of the theorems for simple problems.

UNIT-IV: Matrices (17 Hours)

Introduction - Algebra of matrices - Types of matrices - Column matrix - Diagonal matrix – Scalar matrix - Upper triangular matrix - Lower triangular matrix - Symmetric - Skew Symmetric - Hermitian matrix - Skew Hermitian matrix - Orthogonal - Hermitian - Skew Hermitian & Unitary Matrices - The inverse of a matrix - Determinants - Elementary Transformations.

UNIT–V: Linear Algebra and Matrices (19 Hours)

Rank of a matrix - Simultaneous linear equations - Augmented matrix - Consistency -The characteristic equation and Cayley Hamilton's Theorem (Statement only) - Eigenvalues – Eigenvectors - Simple problems.

Total Lecture Hours- 90

COURSE OUTCOME

The students will be able to

1. Learn vector differentiation.
2. Determine gradient vector fields and find potential functions.
3. Learn verifications of the theorems for simple problems.
4. Learn the principles of matrix algebra.
5. Find the Rank of matrix, eigenvalues and solve simple problems.

TEXTBOOKS

1. Khanna.M.L.1986. Vector Calculus, 8th Edition. Jai Prakash Nath & Co. Educational Publishers, Meerut (U.P.).
2. Arumugam. S and Thangapandi Isaac. A.2015. Modern Algebra. SciTech Publications (India) Pvt.Ltd., Chennai.

UNIT – I Chapter 1: Section 1
Chapter 2: Section. 1, 2, 3, 4
UNIT – II Chapter 3: Section. 1, 2, 3, 4 of [1]
UNIT – III Chapter 3: Section. 5 & 6 of [1]
UNIT – IV Chapter 7: Section. 7.0 to 7.4 of [2]
UNIT – V Chapter 7: Section. 7.5 to 7.8 of [2]

REFERENCEBOOK(S)

1. Gene H. Golub and Charles F. Van Loan, 2013. Matrix Computations, Fourth Edition. Johns Hopkins University Press, Maryland.
2. Jerrold Franklin. 2020. Understanding Vector Calculus. Dover Publications, New York.
3. Miroslav Lovric. 2007. Instructor's Solutions Manual to Vector Calculus, Wiley & Sons, Inc., United States.
4. Duraipandian P and Laxmi Duraipandian.1986. Vector Analysis. Emerald Publishers, Chennai.
5. Manicavachagam Pillay T.K, Natarajan T and Ganapathy K.S. 2008. Algebra VolumeII. Viswanathan.S Pvt. Ltd., Chennai.

E-RESOURCES

1. www.whitman.edu
2. www.ppup.ac.in
3. http://ppup.ac.in/e-Content/_edetails.php?id=682
4. http://ksuweb.kennesaw.edu/~plaval/math3260/elemmat.pdf
5. http://thewaythetruthandthelife.net/index/2_background/2-1cosmological/math/2-1-11-03_math.htm

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SENGAMALA THAYAAR EDUCATIONALTRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: V- CC-X : Real Analysis

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To introduce the concept of real number system and countable sets.
- To determine whether a function is continuous, discontinuous uniformly continuous or not.
- To calculate limit inferior and limit superior.

UNIT-I : Real Numbers **(19 Hours)**

Introduction to Real Number System -Field axioms - Theorems on field properties - Order relation in R- Absolute value of a real number and its properties- Completeness- Supremum & Infimum – Examples – Order Completeness - Some important subsets of R – Intervals- Countable & Uncountable Sets.

UNIT-II : Neighbourhoods and Limits **(17 Hours)**

Introduction – Neighbourhoods - Open sets – Closed sets - Limit point of a Set -Definitions and theorems - Limit of a function – Definitions - Examples – Theorems - One sided limits - Limit as x approaches c - Algebra of limits - Definitions and Theorems - Infinite limits - Examples.

UNIT-III : Continuous Functions **(18 Hours)**

Continuous functions – Definitions - Theorems - Types of discontinuity – Examples - Algebra of continuous functions - Boundedness of continuous functions – Theorems - Intermediate value theorem.

UNIT-IV: Derivability **(16 Hours)**

Introduction - Derivability on an open interval - Derivability on closed interval - Derivability & Continuity - Algebra of derivatives - Chain rule - Inverse Function theorem on derivatives - Darboux's theorem on derivatives.

UNIT-V: Mean Value Theorems **(20 Hours)**

Rolle's theorem – Examples on Rolle's theorem - Lagrange's Mean value theorem - Examples on Lagrange's Mean Value theorem - Cauchy's Mean value theorem - Taylor's Theorem with Lagrange form of remainder - Taylor's theorem with Cauchy form of remainder.

Total Lecture Hours- 90

COURSE OUTCOME

The students will be able to

1. Acquire knowledge about basic properties of real number system.
2. Gain knowledge on Neighbourhood and limit of a function.
3. Enhance knowledge about the concept of continuous and discontinuous functions.
4. Develop the knowledge of derivability.
5. Assimilate the concept of Mean value theorems.

TEXT BOOKS

1. Singhal M.K and Asha Rani Singhal. 2011. A First Course in Real Analysis. R. Chand & Co., New Delhi.

UNIT-I	Chapter 1 : Sec. 1 to 10
UNIT-II	Chapter 2 : Sec.2 to 5 & Chapter 5 :Sec.1(1.1 to 1.6)
UNIT -III	Chapter 5 : Sec. 2 to 6
UNIT -IV	Chapter 6 : Sec. 1 to 5
UNIT-V	Chapter 7 : Sec. 1 to 4

REFERENCE BOOK(S)

1. Apostol. T.M. 1973. Mathematical Analysis. Narosa Publishing House, Kolkata.
2. Malik and Arrora. 1992. Mathematical Analysis. Wiley Eastern Ltd, New Delhi.
3. Shanthi Narayan. 1995. A Course of Mathematical Analysis. Chand & Co., New Delhi.
4. Sunil K. Mittal. 2013. Real Analysis. Pragathi Pragasam Publications, Meerut, Uttar Pradesh.
5. Walder Rudin. 1976. Principles of Mathematical Analysis. McGraw Hill book Company, India.

E- RESOURCES

1. https://www.math.ucdavis.edu/~hunter/intro_analysis_pdf/intro_analysis.pdf
2. http://pdvpmtasgaon.edu.in/uploads/dptmaths/Real_AnalysisBySizweMabizela.pdf
3. https://www.math.ucla.edu/~awertheim/Bootcamp/Notes/Real%20Analysis%20Lectupdf
4. http://pdvpmtasgaon.edu.in/uploads/dptmaths/Real_AnalysisBySizweMabizela.pdf
5. https://www.jirka.org/ra/realanal.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: V-CC-XI : Numerical Methods with MATLAB Programming

Ins.Hrs./Week:5 **Course Credit** : 4 **Course Code**:

OBJECTIVES

- To enable the students to learn many MATLAB commands, and as to how to use them in programming
- To develop fluency in working with Numerical problems.
- To inculcate the students to learn the skill MATLAB Programming.

UNIT – I : Solving Problems in MATLAB (14 Hours)

MATLAB Environment: Getting Started – Student edition of MATLAB – MATLAB Windows – Solving Problems in MATLAB – Variables – Working with Matrices – Scalar Operations – Array Operations – Scientific Notation – Display Format - Saving your work – Saving Variables – Script M- Files - Predefined MATLAB Functions – Using Predefined Functions – Elementary Math Functions – Trigonometric Functions – Data Analysis Functions – Simple Analysis – Maximum and Minimum – Mean and Median – Sums and Products – Random Numbers – Uniform Random Numbers – Gaussian Random Numbers – Computational Limitations - Special Values and Functions.

UNIT –II : Plotting (15 Hours)

Introduction to Plotting – Two Dimensional Plots – Basic Plotting – Annotating Plots – Other Types of Two Dimensional Plots – Polar Plots – Logarithmic Plots – Bar Graphs and Pie Charts – Histograms – Subplots - Three Dimensional Plotting – Three Dimensional Line Plot – Surface Plots – Mesh Plots – Surf Plots – Contour Plots - Editing Plots from the Menu Bar – Programming in MATLAB: Introduction – Problems with two Variables – Input /Output – User defined Input – Output Options – Formatted Output – Functions – Syntax – Local Variables – Naming Function M-files – Rules for Writing and Using FunctionM-files.

UNIT – III : Differentiation and Integration (14 Hours)

Introduction to Differentiation and Integration – Differentiation – Integration - Numerical Integration – Trapezoidal Rule and Simpson's Rule – MATLAB Quadrature Functions - Numerical Differentiation – Difference Expressions – Differential Function.

UNIT – IV : Algebraic and transcendental equations (16 Hours)

Curve Fitting - Linear and parabolic curves by the method of least squares principle – Solving algebraic and transcendental equations – False position method and Newton Raphson method – Solving simultaneous algebraic equations – Gauss Seidel method Gauss elimination method – Solved Problems.

UNIT –V : Interpolation **(16 Hours)**

Interpolation – Newton's forward and backward difference formulae – Lagrange's interpolation formulae - Numerical integration using Trapezoidal and Simpson's one – Third rules – Solution of ODE'S – Euler method and Runge – Kutta fourth order method - Solved Problems.

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to

1. Understand the basic properties of MATLAB, its environment and programming.
2. Learn the concepts of Plotting and types of plots.
3. Understand the concepts of Numerical Differentiation and Integration.
4. Solve the algebraic and transcendental equations.
5. Learn the Interpolation formulae and rules.

TEXT BOOKS

1. Delores M. Etter, David C. Kuncicky and Holly Moore. 2009. Introduction to MATLAB 7, Published by Dorling Kindersley (India) Pvt. Ltd., Licenses of Pearson Education, South Asia.
2. Venkatraman M. K. 2001. Numerical Methods in Science and Engineering, Fifth Edition. National Publisher Company, Chennai.

UNIT I Chapter 2 : Sec. 2.1 to 2.3 and Chapter 3 : Sec. 3.1, 3.3, 3.4 of [1]
UNIT II Chapter 4 : Sec. 4.1 to 4.3 and Chapter 5 : Sec. 5.1 to 5.3 of [1]
UNIT III Chapter 7 : Sec. 7.3. and Chapter 8 : Sec. 8.4 & 8.5 of [1]
UNIT IV Chapter 1 : Sec. 1.7 &1.8; Chapter 3 : Sec. 4 & 5 and Chapter 4 : Sec. 2, 6 of [2]
UNITV Chapter 6 : Sec. 3,4; Chapter 8 : Sec. 4 Chapter 9 : Sec. 8, 10 &
Chapter 11 : Sec. 10, 16 of [2]

REFERENCE BOOK(S)

1. Amos Gilat. 2014. Matlab : An Introduction with Applications. Fifth Edition. John Wiley Publications. NewYork.
2. George Lind field and John Penny. 2018. Numerical Methods: Using Matlab. Fourth Edition. Academic Press, U.S.
3. Rudra Pratap. 1996. Getting Started with MATLAB. South Asia Edition. OXFORD University Press, England.
4. Sankara Rao. K. 2004. Numerical Methods for Scientists and Engineers, Second Edition. Prentice-Hall of India Pvt. Ltd, New Delhi.
5. Saumyen Guha and Rajesh Srivastava. 2010. Numerical Methods: For Engineering and Science. OXFORD University Press, England.

E-RESOURCES

1. http://www.uop.edu.pk/ocontents/A%20Guide%20to%20MATALB.pdf
2. http://mayankagr.in/images/matlab_tutorial.pdf
3. https://www.mathworks.com/help/pdf_doc/matlab/matlab_prog.pdf
4. https://perhuaman.files.wordpress.com/2014/07/metodos-numericos.pdf
5. https://www.coursehero.com/file/28550858/numerical-analysis-1pdf

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: V- CP – I : Numerical Methods with MATLAB Programming (P)

Ins. Hrs / Week : 2 **Course Credit** : 2 **Course Code**:

OBJECTIVES

- To impart the knowledge to the students with MATLAB software.
- To introduce the basic operations of MATLAB
- To enable the students to find solution to some of the problems in Numerical Methods using MATLAB Programming.

LIST OF PRACTICALS

1. Linear Interpolation
2. Lagrange's Method of Interpolation
3. Curve Fitting
4. Trapezoidal Rule of Integration
5. Simpson's 1/3 Rule of Integration
6. Newton-Raphson Method of solving equations
7. False Position Method of solving equations
8. Gauss-Seidel Method of solving simultaneous equations
9. R-K fourth order method of solving differential equations
10. Euler's Method of solving differential equations

COURSE OUTCOME

The students will be able to

1. Learn features of MATLAB as a programming tool.
2. Familiarize with all the features of MATLAB software and easily handle the software.
3. Develop programming skills and techniques to solve mathematical problems.
4. Learn graphic features of MATLAB and they can use this feature effectively in various applications.
5. Work as a 'MATLAB programmer' in the industry because of the hands on practical sessions and this job oriented course will help the students to get the jobs in future.

REFERENCE BOOK(S)

1. Amos Gilat. 2014. Matlab : An Introduction with Applications. Fifth Edition. John Wiley Publications. NewYork.
2. George Lind field and John Penny. 2018. Numerical Methods: Using Matlab. Fourth Edition. Academic Press, U.S.
3. Rudra Pratap. 1996. Getting Started with MATLAB. South Asia Edition. OXFORD University Press, England.
4. Yang & Cao and Chung & Morris. 2007. Applied Numerical Methods using Matlab, First Edition. John Wiley Publications. NewYork.
5. Abdelwahab Kharab and Ronald B. Guenther. 2019. An Introduction to Numerical Methods : A MATLAB Approach, Fourth Edition. CRC Press, Chennai.

E-RESOURCES

1. https://www.mccormick.northwestern.edu/documents/students/undergraduate/introduction-to-matlab.pdf
2. https://www.mathworks.com/help/pdf_doc/matlab/matlab_prog.pdf
3. https://web.stanford.edu/class/ee254/software/using_ml.pdf
4. https://www.mn.uio.no/astro/english/services/it/help/mathematics/matlab/getstart.pdf
5. http://www.uop.edu.pk/ocontents/A%20Guide%20to%20MATALB.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: V-MBE- I (1) : Graph Theory

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To introduce the notion of graph theory and its applications
- To study the operations on a graph and the properties
- To understand directed graphs and their properties

UNIT –I : Graphs and Subgraphs (17 Hours)

Graphs and Subgraphs : Definitions – Graph – Adjacent Points – Adjacent Lines – Loop – Multigraph – Pseudo Graph – Complete Graph – Null Graph – Bigraph – Complete Bigraph – Degrees – Isolated Point – End Point – Related Theorems and Corollaries – Definitions – Regular Graph – Cubic Graph – Subgraphs: Definitions – Subgraph – Super Graph – Spanning Subgraph – Induced Subgraph – Removal of the Point – Addition of the Line –Isomorphism - Automorphism – Complement $\overline{G}$ – Self Complementary Graph –Independent Sets and Coverings – Independence Number – Covering Number – Line Covering Number – Line Independence Number.

UNIT –II : Connectedness (15 Hours)

Matrices – Adjacency Matrix – Incidence Matrix - Operations on Graphs – Union, Sum, Product and Composition –Connectedness: Walks, Trails, Paths and Cycles – Related Theorems and Problems – Connectedness and Components – Definitions – Connected – Disconnected – Components Cut point Bridge – Related Theorems – Eulerian Graphs: Definitions - . Eulerian Graphs – Arbitrarily Traversable Graph.

UNIT–III : Trees (14 Hours)

Hamiltonian Graphs: Definition – Hamiltonian Cycle – Hamiltonian Graph – Theta Graph – Closure – Related Theorems and Corollaries (Omit Chavatal Theorem 5.10) – Related Problems. Trees: Characterization of Trees – Definition – Acyclic Graph – Tree – Forest – Related Theorems and Corollaries– Centre of a Tree – Definition – Eccentricity – Radius Central Point – Centre – Related Theorem.

UNIT-IV : Planarity (15 Hours)

Planarity: Definition and Properties – Planar Graph – Non Planar Graph– Plane Graph – Faces – Exterior Face – Boundary – Steriographic Projection – Polyhedral – Characterization of Planar Graphs – Maximal Planar Graph – Geometric Dual – Contractible – Euler Formula – Related Problems – Thickness, Crossing and Outer Planarity: Definition – Crossing Number – Outer Planar – Maximal Outer Planar – Genus.

UNIT–V: Directed Graphs (14 Hours)

Directed Graphs: Definitions and Basic Properties – Directed Graph – Indegree – Outdegree – Degree Pair – Subdigraph – Induced Subdigraph – Underlying Graph – Converse Digraph – Complete Digraph – Functional Digraph – Related Theorems – Some Applications: Connector Problem – Weighted Graph - Kruskal's Algorithm - Shortest Path Problem – Dijkstra's Algorithm.

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to

1. Understand the basic definitions of graphs and their applications.
2. Recognize the Characteristics of graph.
3. List and relate special graphs
4. Learn about Planar and Non Planar Graphs.
5. Understand the concepts of graph theory as an application of mathematics in information technology and its related fields.

TEXT BOOKS

1. Arumugam.S and Ramachandran. S. 2006. Invitation to Graph Theory. SCITE Publications (India) Pvt. Ltd., Chennai.

UNIT – I Chapter 2 : Sec. 2.1, 2.2, 2.3, 2.4, 2.6
UNIT – II Chapter 2 : Sec. 2.8, 2.9 ; Chapter 4 : Sec. 4.1, 4.2 ; Chapter 5 : Sec. 5.1
UNIT - III Chapter 5 : Sec. 5.2 and Chapter 6 : Sec. 6.1, 6.2
UNIT - IV Chapter 8 : Sec. 8.1, 8.2, 8.3
UNIT – V Chapter 10 : Sec. 10.1 and Chapter 11 : Sec. 11.1, 11.2

REFERENCE BOOK(S)

1. Balakrishnan. R and Ranganathan. K. 2000. A Textbook of Graph Theory. Springer – Verlog, New York.
2. Bondy.J.A and Murthy. U.S.R. 1976. Graph Theory with Applications. MacMillan, London and Elsevier, New York.
3. Gary Chartrand and Ping Zhang. 2004. Introduction to Graph Theory. Tata McGraw-Hill Publishing Company Ltd., New Delhi.
4. Narsingh Deo. 2004. Graph Theory with applications to Engineering and Computer Science. Prentice Hall of India, New Delhi.
5. Robin Wilson. J. 1996. Introduction to Graph Theory, Fourth Edition. Addison Wesley Longman Limited, England.

E-RESOURCES

1. https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf
2. https://logic.pdmi.ras.ru/~gravin/storage/GT_Bondy_Murty_3.pdf
3. http://meskc.ac.in/wp-content/uploads/2018/12/A-Textbook-of-Graph-Theory-R.-Balakrishnan-K.Ranganathan.pdf
4. https://www.zib.de/groetschel/teaching/WS1314/BondyMurtyGTWA.pdf
5. https://www.math.kit.edu/iag6/lehre/graphtheo2015w/media/lecture_notes.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester:V-MBE- I (2) : Mathematical Modelling

Ins. Hrs./Week: 5 **Course Credit** : 5 **Course Code**:

OBJECTIVES

- To understand the mathematical modeling system
- To find out the different mathematical models using different equations
- To ascertain graph theoretical models

UNIT-I : Modelling through ODE of first order (16 Hours)

Mathematical Modelling through Difference Equations - Linear Growth and Decay Models – Non Linear Growth and Decay Models – Compartment Models – Mathematical Modelling in Dynamics through ODE of first order - Mathematical Modelling of Geometrical Problems through ODE of first order.

UNIT-II : Modelling through systems of ODE of first order (15 Hours)

Mathematical Modelling in Population Dynamics – Mathematical Modelling of Epidemics through Systems of ODE of first order – Compartment Models through Systems of ODE – Mathematical Modelling in Economics through Systems of ODE – Mathematical Models in Medicine, Arms Race, Battles and International Trade in terms of Systems of ODE.

UNIT-III : Modelling through ODE of Second Order (14 Hours)

Mathematical Modelling of Planetary Motions – Mathematical Modelling of Circular Motion - Motion of Satellites – Mathematical Modelling through Linear Differential Equations of second order.

UNIT-IV: Modelling through Difference Equations (16 Hours)

Some Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients –Mathematical Modelling through Difference Equations in Economics and Finance – Mathematical Modelling through Difference Equations in Population Dynamics and Genetics.

UNIT-V: Modelling through Graphs (14 Hours)

Situations that can be modeled through Graphs – Mathematical Models in Terms of Directed Graphs - Mathematical Models in Terms of Signed Graphs - Mathematical Models in Terms of Weighted Digraphs.

Total Lecture Hours- 75

COURSE OUTCOME

The students will be able to

1. Study the mathematical models in first and second order ODE, and their applications.
2. Know some models in the part of economics and finance.
3. Learn about Mathematical Modelling through Linear Differential Equations.
4. Obtain imperative models on Epidemics.
5. Learn about Solutions that can be modelled through Graphs.

TEXT BOOKS

1. Kapur. J.N.2003. Mathematical Modelling. New Age International (P) Ltd., New Delhi.

UNIT – I Chapter 2: Sec.2.1 to 2.6
UNIT – II Chapter 3: Sec.3.1 to 3.5
UNIT – III Chapter 4: Sec.4.1 to 4.3
UNIT – IV Chapter 5: Sec.5.1 to 5.4
UNIT – V Chapter 7: Sec.7.1 to 7.4

REFERENCE BOOK(S)

1. Giordano. P.R, Fox. W.P and Horton. S.B. 2014. A First course in Mathematical Modelling. Cengage Learning India Pvt. Ltd., New Delhi.
2. Kapur. J.N. 1988. Mathematical Modelling. Wiley Eastern Ltd., New Delhi.
3. Kapur. J.N. 1999. Mathematical Models in Biology and Medicine. Affiliated East–West Press Pvt. Ltd., New Delhi.
4. Meerschaert. M.M. 2013. Mathematical Modelling, Fourth Edition. Elsevier Science Publications, Chennai.
5. Mayer Humi. 2016. Introduction to Mathematical Modelling. Taylor & Francis (Publisher), London.

E- RESOURCES

1. https://www.simiode.org/resources/4016/download/ChapterNine-Mathematical_Models_with_DEs.pdf
2. https://jvanderw.une.edu.au/Lecture1_IntroToMathModelling.pdf
3. https://people.maths.bris.ac.uk/~madjl/course_text.pdf
4. http://www.mtm.ufsc.br/~daniel/matap/IntMatMod.pdf
5. https://www.math.colostate.edu/~gerhard/MATH331/331book.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: VI-CC-XII : Modern Algebra

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To lay the foundations of modern abstract algebra.
- To introduce the concept of Group theory and Rings.
- To learn the concept of Vector Space.

UNIT – I : Groups **(16 Hours)**

Groups : Definition (only) - Permutation Groups – Cycle - Transposition – Subgroups – Centre–Normaliser - Cyclic Groups – Generator – Order of an Element – Cosets and Lagrange's Theorem; Left coset – Right coset – Index – Euler's theorem – Fermat's theorem.

UNIT – II : Groups Continued **(17 Hours)**

Normal Subgroups and Quotient Groups - Isomorphism – Cayley's theorem – Automorphism – Inner automorphism – Homomorphism; Canonical homomorphism – Epimorphism – Monomorphism – homomorphic image – Endomorphism – Kernel – Fundamental theorem of homomorphism.

UNIT – III : Rings **(18 Hours)**

Definitions and Examples of ring - Elementary properties of rings – Boolean ring – Isomorphism - Types of rings: Commutative ring – Ring with identity – Unit – Skew field – Field – Zero divisor – Integral domain - Characteristic of a ring – Subrings – Subfield – Ideals – Left ideal – Right ideal – Principal ideal domain - Quotient rings.

UNIT – IV: Rings & Vector Space **(20 Hours)**

Maximal and Prime Ideals - Homomorphism of rings; Epimorphism – Monomorphism – Endomorphism – Natural homomorphism – Kernel - Fundamental theorem of homomorphism - Vector spaces : Definition and examples – Subspaces - Linear transformation; Monomorphism – Epimorphism – Isomorphism – linear functional – Kernel - Fundamental theorem of homomorphism – Span of a set; Linear combination – Linear span.

UNIT –V : Vector Space Continued **(19 Hours)**

Linear independence: Finite dimensional – Linearly independent- Linearly dependent –Basis and Dimension - Maximal linearly independent set – Minimal generating set – Rank and Nullity**.**

Total Lecture Hours- 90

COURSE OUTCOME

The students will be able to

1. Learn the concept of Groups and Subgroups.
2. Understand, construct, and write proofs for formal statements.
3. Explore a wide variety of examples.
4. Gain knowledge of the important mathematical concepts in abstract algebra such as definition of a group, order etc.,
5. Understand the concept of Normal Subgroups.

TEXT BOOKS

1. Arumugam.S and Thangapandi Isaac. A. 2014. Modern Algebra. SciTech Publications (India) Pvt. Ltd., Chennai.

UNIT- I Chapter 3 : Sec. 3.1, 3.4 to 3.8
UNIT- II Chapter 3 : Sec. 3.9 to 3.11
UNIT-III Chapter 4 : Sec. 4.1 to 4.8
UNIT-IV Chapter 4 : Sec. 4.9 & 4.10, Chapter 5 : Sec. 5.1 to 5.4
UNIT-V Chapter 5 : Sec. 5.5 to 5.7

REFERENCE BOOK(S)

1. Herstein. I.N. 2012. Topics in Algebra, Second Edition. Wiley Eastern Limited, New Delhi.
2. John B. Fraleigh. 1999. A First Course in Abstract Algebra, Fifth Edition. Addison-Wesley Publishing Company, England.
3. Serge Lang. 2002. Algebra, Eleventh Edition. Springer Publications,Verlag.
4. Shanti. 1992. A Text Book of Modern Abstract Algebra, Fifth Edition. S. Chand & Company, Chennai.
5. Sharma. A.K. 2010. Group Theory, Second Edition. Discovering Publishing Pvt. Ltd., New Delhi.

E_RESOURCES

1. https://www.math.stonybrook.edu/~aknapp/download/b2-alg-inside.pdf
2. http://www.freebookcentre.net/Mathematics/Abstract-Algebra-Books.html
3. https://www.freebookcentre.net/Mathematics/Algebra-Books-Download.html
4. http://www.cmat.edu.uy/~marclan/TM/Algebra%20i%20-%20Bourbaki.pdf
5. http://home.ustc.edu.cn/~liweiyu/documents/Algebra,%20Second%20Edition,%20Michael%20 Artin.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: VI-CC-XIII: Complex Analysis

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To lay the foundation for the study of Complex Analysis
- To describe basic properties of complex integration and having the ability to compute such integrals
- To learn about elementary transformation concepts in complex variable

UNIT- I : Analytic Functions **(20 Hours)**

Functions of a Complex variable – Rational Function – Complex Valued Function - Limits – Theorems on Limits – Continuous Functions – Differentiability – Cauchy-Riemann Equations – C-R Equations in polar coordinates - Analytic Functions – Harmonic functions – Milne-Thompson Method.

UNIT - II : Bilinear Transformations **(16 Hours)**

Introduction - Elementary Transformations –Translation – Rotation – Magnification – Inversion – Bilinear Transformations – Cross Ratio – Fixed Points of Bilinear Transformation – Some Special Bilinear Transformations – Related Theorems and Problems in all these.

UNIT – III : Complex Integration **(18 Hours)**

Complex Integration – Definite Integral – Cauchy's Theorem – Cauchy's Theorem for Simply Connected Regions - Cauchy's Theorem for Multiply Connected Regions- Cauchy's Integral Formula – Maximum Modulo Theorem – Circular Disc - Higher Derivatives – Cauchy's Inequality Theorem – Liouville's Theorem – Morera's Theorem.

UNIT – IV: Series Expansion **(17 Hours)**

Series Expansion – Taylor's Series – Maclaurin's Series - Laurant's Series – Zeroes of an Analytic Functions –Singularities – Isolated Singularity - Removable Singularity – Poles – Essential Singularity – Meromorphic Function - Riemann's Theorem - Related Theorems and Problems in all these.

UNIT – V: Calculus of Residues **(19 Hours)**

Residues – Lemma on Residues - Cauchy's Residue Theorem – Argument Theorem – Rouchy's Theorem - Fundamental Theorem of Algebra - Evaluation of Definite Integrals - Related Theorems and Problems in all these.

Total Lecture Hours- 90

COURSE OUTCOME

The students will be able to

1. Understand the function of complex variables, continuity and differentiation of complex variable function
2. Understand the concept of a simple and multiple connected regions.
3. Decide as to when and where a given function is analytic and be able to find it series development.
4. Know about complex integral functions with Cauchy's Theorem, power series expansions of Taylor's and Laurant's series
5. Analyze Cauchy's Residue theorem.

TEXT BOOKS

1. Arumugam S., Thangapandi Issac A. and Somasundaram A. 2002. Complex Analysis. New Sci Tech Publications Pvt. Ltd., India.

UNIT I Chapter 2 : Sec. 2.1 to 2.8
UNIT II Chapter 3 : Sec. 3.1 to 3.5
UNIT III Chapter 6 : Sec. 6.1 to 6.4
UNIT IV Chapter 7 : Sec. 7.1 to 7.4
UNIT V Chapter 8 : Sec. 8.1 to 8.3

REFERENCE BOOK(S)

1. Joseph Bak and Donald J. Newman 2010. Complex Analysis, Third Edition. Springer Publications, Verlag.
2. Karunakaran V. 2005. Complex Analysis, Second Edition. Narosa Publishing House Pvt. Ltd., Kolkata.
3. Lars V. Ahlfors. 1979. Complex Analysis, Third Edition. Mc Graw-Hill Book Company, Tokyo.
4. Manickavachaagam Pillai T.K. 1994. Complex Analysis. Viswanathan S Publishers Pvt. Ltd., Chennai.
5. Sharma J.N. 1997. Functions of a Complex Variable, 13th Edition. Krishna Prakasan Media (P) Ltd., Meerut (U.P).

E_RESOURCES

1. http://www.maths.lth.se/matematiklu/personal/olofsson/CompHT06.pdf
2. https://www.math.ucla.edu/~honda/math520/notes.pdf
3. https://www.freebookcentre.net/Mathematics/ComplexAnalysis -Books-Download.html
4. http://www.math.chalmers.se/Math/Grundutb/CTH/mve025/1415/Dokument/komplexbokBeck.pdf
5. https://www.math.ucla.edu/~honda/math520/notes.pdf

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: VI-CC- XIV: Mechanics

Ins. Hrs./Week: 6 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To understand the concept of equilibrium of forces and related problems.
- To study equilibrium of strings and application to a Catenary.
- To develop a working knowledge to handle practical problems.

UNIT-I : Force **(18 Hours)**

Newton's Laws of Motion: Introduction - Forces – Types of forces, Resultant of Two Forces on a Particle: Resolution of a force into its components – Component of a Force in a given direction - Related Problems - Resultant of three forces related to a triangle acting at a point – Resultant of several forces acting on a particle.

UNIT–II : Virtual Work **(17 Hours)**

Virtual Work: Introduction – Definitions -Related Problems – Virtual Displacement - Principle of Virtual Work - Related Problems.

UNIT–III : Hanging Strings **(18 Hours)**

Equilibrium of a Uniform Homogeneous String - Related Problems – Vertex and Directrix – List of Results – Results Pertaining to tension - Related Problems – Span – Sag – Suspension Bridge - Related Problems.

UNIT-IV: Rectilinear Motion Under Varying Force **(18 Hours)**

Simple Harmonic Motion – Harmonic Motion – Projection of a particle having a uniform Circular Motion – Composition of two Simple Harmonic Motions - Simple Harmonic Motion along a Horizontal Line - Simple Harmonic Motion along a Vertical Line - Related Problems.

UNIT–V: Projectiles **(19 Hours)**

Forces on a Projectile: Displacement as a combination of vertical and horizontal displacements- Nature of trajectory – Results pertaining to the motion of a projectile – Maximum horizontal range for a given velocity – Two Trajectories with a given speed and range – Projectile projected horizontally- Projectile - Projected on an Inclined Plane - Maximum Range on an Inclined Plane - Related Problems.

Total Lecture Hours-90

COURSEOUTCOME

The students will be able to

1. Learn the types of forces and its examples.
2. Understand the Equilibrium and limiting equilibrium of a particle.
3. Learn to recognize the path of a projectile and its simple problems.
4. Understand the equilibrium of strings, virtual work and simple harmonic motion for their skill development.
5. Understand a basic knowledge on projectile and evaluation of its characteristics.

TEXTBOOKS

1. Duraipandian.P. 2010. Mechanics. S. Chand & Company Ltd., New Delhi.

UNIT–I Chapter 2 : Sec 2.1 to 2.2
UNIT–II Chapter 8
UNIT – III Chapter 9
UNIT – IV Chapter 12 : Sec. 12.1 to 12.3
UNIT –V Chapter 13 : Sec. 13.1 to 13.2

REFERENCEBOOK(S)

1. Kaushal Kumar Singh. 2011. Textbook of Dynamics. PHI Learning Pvt. Ltd., New Delhi.
2. Raisinghania M.D. 2013. Dynamics. S. Chand & Company Pvt. Ltd., New Delhi.
3. Ray M and Sharma G.C. 2006. A Textbook on Dynamics. S. Chand & Company Pvt. Ltd., New Delhi.
4. Venkataraman M.K. 2003. Statics. Agasthiar Publications, Trichy.
5. Venkataraman M.K. 2008. Dynamics. Agasthiar Publications, Trichy.

E-RESOURCES

1. https://www.fisica.net/mecanicaclassica/introduction_to_statics_and_dynamics_by_rudra_pratap.pdf
2. http://ruina.tam.cornell.edu/Book/RuinaPratap-Jan-20-2015.pdf
3. https://www.academia.edu/36036711/Statics_and_Dynamics_11th_Edition_Jhonston
4. http://aghababaie.usc.ac.ir/files/1506464236211.pdf
5. https://www.researchgate.net/publication/334443002_Lectures_on_Engineering_Mechanics_Statics_and_Dynamics.

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester : VI-MBE- II (1) : Operations Research

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**:

OBJECTIVES:

- To introduce various techniques of Operations Research.
- To inculcate the students to solve real life problems.
- To impart knowledge in concepts and tools of Operations Research.

UNIT –I: Linear Programming Problem (15 Hours)

Introduction to Operations Research - Linear Programming Formulations – Advantages of Linear Programming – Limitations of Linear Programming - General Linear Programming Problem - Mathematical Formulation – Illustrations on Mathematical Formulation - Formulation and Characteristics of Canonical and Standard forms – Conversion of the given Linear Programming Problem into Canonical and Standard forms – Graphical Solution Method - Some exceptional cases – Simplex method – Algorithm – Related Problems.

UNIT –II : Big-M and Two Phase Method (15 Hours)

Algorithm for Big M Method – To find the optimal solutions for the given linear programming problem using Big M Method - Algorithm for Two Phase Method – To find the optimal solutions for the given linear programming problem using Two Phase Method – Duality in Linear Programming - General primal-dual pair - Formulating a Dual problem - Primal-dual pair in matrix form - Dual simplex method.

UNIT –III : Transportation and Assignment Problem (15 Hours)

Transportation Model : Introduction to the Model – Definition of the Transportation Model - Mathematical formulation of Transportation Model – Formulation and solution of Transportation Model - To Find the Basic Feasible solution using (i) North West Corner Method (ii) Least Cost Method and (iii) Vogel's Approximation Method – To find the optimum solution using Modified Distribution (MODI) Method - Unbalanced Transportation Problem – Degeneracy in Transportation Problem – Maximization in Transportation Problem.

Assignment Model : Definition of the Assignment Model – Mathematical Representation of the Assignment Model - Algorithm – Formulation and solution of Assignment Models - Special cases in assignment problem.

UNIT – IV: Sequencing and Queuing Problem (15 Hours)

Introduction to Sequencing Problems – Assumptions in Sequencing Problems - Processing of n jobs through one machines – Processing of n jobs through two machines - Processing of n jobs through K machines – Related Problems

Queuing Theory – Queuing system – classification of Queuing models - Poisson Queuing system Model I (M/M/1) : (∞/FIFO) – Model II (M/M/1) : (∞/SIRO) - Model III (M/M/1) : (N/FIFO) – Model IV (Generalized Model).

UNIT – V: PERT and CPM **(15 Hours)**

Project Planning – Project Scheduling – Project Controlling – Network Logic – Immediate Predecessor - Immediate Successor – Dummy activity –Network Techniques – Programme Evaluation and Review Technique (PERT) and Critical Path Method (CPM) - Fulkerson's rule to numbering the events – Construction of Network – To find Critical Path to the Network - PERT computation – Earliest Time – Latest Time - Total Float – Free Float – Independent Float.

Total Lecture Hours – 75

COURSE OUTCOME

The students will be able to

1. Identify and develop operational research models from the verbal description of the real system.
2. Solve Linear Programming problems using simplex method.
3. Find the minimum cost for transportation model and assignment schedule for assignment model.
4. Use CPM and PERT techniques, to plan, schedule and control project activities.
5. Develop a report that describes the model and solving technique.

TEXT BOOKS

1. Kanti Swarup, Gupta. P.K and Man Mohan. 2007. Operations Research, 13th Edition. Sultan Chand and Sons, New Delhi.

UNIT–I Chapter 2 : Sec. 2.1 to 2.4 ; Chapter 3: Sec. 3.1 to 3.5
Chapter 4 : Sec.4.1, 4.3
UNIT–II Chapter 4 : Sec. 4.4; Chapter 5 : Sec. 5.1 to 5.4, 5.9
UNIT – III Chapter 10 : Sec. 10.1, 10.2, 10.8, 10.9, 10.12, 10.13
Chapter 11 : Sec. 11.1 to11.4
UNIT – IV Chapter 12 : Sec. 12.1 to 12.6 ; Chapter21 : Sec. 21.1 to 21.9
UNIT–V Chapter 25 : Sec. 25.1 to 25.4, 25.6, 25.7

REFERENCE BOOK(S)

1. Gupta P.K and Man mohan. 2010. Operations Research. Sultan Chand & sons. Educational Publishers, New Delhi.
2. Hamdy A. Taha. 2005. Operations Research, 7th Edition. Prentice Hall of India Pvt. Ltd., New Delhi.
3. Kalavathy S. 2007. Operations Research, Fourth Edition. Vikas Publishing House Pvt. Ltd, Coimbatore.
4. Sundaresan V, Ganapathy Subramanian K.S. and Ganesan K. 2017. Resource Management Techniques. A.R. Publications, Chennai.
5. Taha. H.A. 2002. Operations Research: An introduction, 7th Edition. Pearson Prentice Hall, South Asia.

E_RESOURCES

1. https://www.researchgate.net/publication/333748649_Chapter_-01_Operations_Research
2. https://www.researchgate.net/publication/297715752_Linear_Programming
3. https://www.gatexplore.com/transportation-problem-study-notes/
4. https://www.researchgate.net/publication/325223720_An_Assignment_Problem_and_Its_Application_in_Education_Domain_A_Review_and_Potential_Path
5. http://ndl.ethernet.edu.et/bitstream/123456789/90288/6/operations%20research%20handout.pdf

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2020 – 2021)

DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

Semester: VI-MBE- II (2) : Stochastic Processes

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**:

OBJECTIVES

- To understand the concept of Stochastic Processes
- To identify the Markov Chains
- To identify the Poisson Process, Birth and Death Process

UNIT-I : Laplace Transforms **(15 Hours)**

Introduction to Generating Function – Probability Generating Function: Mean and Variance – Generating Function of Bivariate Distribution - Laplace Transforms – Inverse Laplace Transforms - Laplace Transforms of a probability distribution function – Solved Problems.

UNIT-II : Markov Chains **(15 Hours)**

Introduction to Stochastic Processes – Stochastic Processes: Some Notions – Specification of Stochastic Processes - Markov Chains – Definition and examples – Higher transition probabilities – Solved Problems.

UNIT-III : Classification of States and Chains **(15 Hours)**

Classification of states and chains – Transient and Persistent states – Theorems - Determination of higher transition probabilities - Stability of a Markov System – Limiting Behaviour – Finite Irreducible Chains.

UNIT-IV : Poisson Process **(15 Hours)**

Introduction to Poisson Process – Poisson Process and related distributions – Generalization of Poisson Process – Birth and death process.

UNIT-V: Queuing Theory **(15 Hours)**

Applications in Stochastic models - Queuing systems: General Concepts – Queuing Models – Steady State Behaviour – Transient Behaviour - Birth and Death processes in Queuing Theory - Non-Markovian Queuing Models – Solved Problems.

Total Lecture Hours – 75

COURSE OUTCOME

The students will be able to

1. Learn the concept of Laplace Transforms of the Probability functions.
2. Learn about Markov chains.
3. Understand the concept of Poisson process.
4. Understand the concepts of queuing and reliability.
5. Learn the concepts of birth and death process.

TEXT BOOKS

1. Medhi J. 2017. Stochastic Processes, Fourth Edition. New Age International Publishers, New Delhi.

UNIT–I Chapter 1 : Sec. 1.1 to 1.3
UNIT –II Chapter 1 : Sec. 1.5 ; Chapter 2 : Sec. 2.1 & 2.2
UNIT –III Chapter 2 : Sec. 2.4 to 2.6
UNIT –IV Chapter 3 : Sec. 3.1 to 3.4
UNIT–V Chapter 10 : Sec. 10.1 to 10.3

REFERENCEBOOK(S)

1. Mario Lefebvre. 2005. Applied Stochastic Processes. Springer Publications, New York.
2. Narayan Bhat U, Gregory K and Miller. 2002. Elements of Applied Stochastic Processes, Third Edition. Wiley Publishing House, U.S.
3. Samuel Karlin. 2014. A First Course in Stochastic Processes. Academic Press, U.S.
4. Srinivasan and Mehata. Stochastic Processes, Second Revised Edition. TATA Mc Graw Hill, New York.
5. Stroock Daniel. W. 1984. An Introduction to Markov Processes. Springer Publications, New York.

E_RESOURCES

1. https://ocw.mit.edu/courses/mathematics/18-s096-topics-in-mathematics-with-applications-in-finance-fall-2013/lecture-notes/MIT18_S096F13_lecnote5.pdf
2. http://www.ru.ac.bd/stat/wpcontent/uploads/sites/25/2019/03/305_03_00_Medhi_Stochastic-Processes.pdf
3. http://www.math.tifr.res.in/~publ/ln/tifr24.pdf
4. https://people.math.osu.edu/husen.1/teaching/571/markov_1.pdf
5. https://arxiv.org/pdf/1307.2968.pdf

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