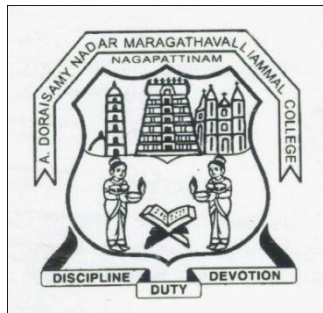


A.D.M. COLLEGE FOR WOMEN,(Autonomous)
NAGAPATTINAM
(RE- ACCREDITED WITH 'A' GRADE BY NAAC)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS



UG MATHEMATICS
(2019-20 onwards)

A.D.M.College for Women (Autonomous), Nagapattinam
B.Sc Programme

(Applicable to the candidates admitted from the academic year 2019 - 2020 onwards)

PROGRAMME OBJECTIVES

1. To gain knowledge in foundational areas of Mathematics and to develop the mathematical thinking.
2. To provide the highest level of education in Mathematics and to produce competent and creative mathematicians.
3. To enable the students to solve mathematical problems using mathematical techniques.
4. To communicate mathematics accurately, precisely and effectively.
5. To inculcate the mathematical concepts, intellectual skills, courage and integrity, sensitivity to the needs and aspiration of the society among the students.

B.Sc., 2019 - 2022
STRUCTURE OF THE PROGRAMME

Part	Title of the Part	No. of Papers	Hours	Credits
I	Language – Tamil	4	24	12
II	English	4	24	12
III	Core Course	14	72	67
	Allied	4	27	18
	Major Based Elective	3	16	13
IV	Skill Based Elective	3	6	6
	Non- Major Elective	2	4	4
V	Extension Activities	-	-	1
	Value Education	1	2	2
	Environmental Studies	1	2	2
	Soft Skill Development	1	2	2
	Gender Studies	1	1	1
	Total	38	180	140

Passing Minimum:

A candidate shall be declared to have passed in each course if she secures not less than 40% marks out of 75 marks (i.e., 30 marks) in the End Semester examination (SE) and 40% out of 25 ,marks (i.e., 10 marks) in the Continuous Internal Assessment (CIA).

PG & Research Department of Mathematics

Mark Allocation for Theory Papers

CIA	-	25 Marks
SE	-	<u>75 Marks</u>
		<u>100 Marks</u>

CIA Component:

Test	-	10 Marks
Assignment	-	2 Marks
Seminar	-	3 Marks
Quiz/Group Discussion	-	5 Marks
Attendance	-	<u>5 Marks</u>
		<u>25 Marks</u>

Pattern of question Paper (Theory):

Section – A	10 x 2	= 20 Marks (No Choice)
Section – B	5 x 5	= 25 Marks (Either or)
Section – C	3 x 10	= <u>30 Marks</u> (Any three out of 5)
Total		<u>75 Marks</u>

Programme Outcomes (POs)

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

Knowledge domain: Demonstrate an understanding of the basic concepts in mathematics, statistics, operations research and their importance in the solution of some real- world problems.

Problem analysis: Analyze and solve the well-defined problems in mathematics statistics, and operations research. Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decision. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

Presentation and Interpretation of Data: Demonstrate the ability to manipulate and visualize data and to compute standard statistical summaries.

Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources and computing tool such as MATLAB, SPSS etc with an understanding of the limitations.

Programme Specific Outcome :

Identify the applications of mathematics in other disciplines and society.

Formulate and develop mathematical arguments in a logical manner.

Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.

Understand, formulate and use quantitative models arising in social science, business and other contexts.

On completion of the program the students are well poised to pursue careers in academia, industry and the other areas of Mathematics.

A.D.M.COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM
PG & RESEARCH DEPARTMENT OF MATHEMATICS

B.Sc Programme

Course structure under CBCS

(Applicable to the candidates admitted from the academic year 2019 - 2020 onwards)

Sem.	Part	Course	Title	Instrn Hours	Credit	Exam Hours	Marks		Total marks
							I.A	A.E	
I	I	Language I	Tamil I	6	3	3	25	75	100
	II	Language II	English I	6	3	3	25	75	100
	III	Core Course I	Differential Calculus and Trigonometry	5	5	3	25	75	100
		Core Course II	Classical Algebra	4	4	3	25	75	100
		Allied Course I	Physics- I	4	4	3	25	75	100
		Allied Course- II(P)	Physics- II (P)	3	-	-	-	-	-
	IV	Value Education	Value Education	2	2	3	25	75	100
Total				30	21				600
II	I	Language I	Tamil II	6	3	3	25	75	100
	II	Language II	English II	6	3	3	25	75	100
	III	Core Course III	Integral Calculus	5	4	3	25	75	100
		Core Course IV	Analytical Geometry of Three Dimensions	4	4	3	25	75	100
		Allied Course II (P)	Physics II(P)	3	3	3	40	60	100
		Allied Course III	Physics III	4	2	3	25	75	100
	IV	EVS	Environmental Studies	2	2	3	25	75	100
Total				30	21				700

Sem.	Part	Course	Title	Instrn · Hours	Credit	Exam hours	Marks		Total Marks
							I.A	A.E	
III	I	Language I	Tamil III	6	3	3	25	75	100
	II	Language II	English III	6	3	3	25	75	100
		Core Course V	Differential Equations and Laplace Transforms	4	4	3	25	75	100
	III	Core Course VI	Vector Calculus and Fourier Series	5	5	3	25	75	100
		Allied Course IV	Mathematical Statistics – I	4	4	3	25	75	100
		Allied Course - (P)	Mathematical Statistics – II (P)	3	-	-	-	-	-
	IV	Non Major Elective - I	Mathematics for Competitive Examinations - I	2	2	3	25	75	100
Total				30	21				600
IV	I	Language I	Tamil IV	6	3	3	25	75	100
	II	Language II	English IV	6	3	3	25	75	100
	III	Core Course VII	Sequences and Series	4	4	3	25	75	100
		Core Course VIII	Number Theory	4	4	3	25	75	100
		Allied Course V(P)	Mathematical Statistics – II (P)	3	3	3	40	60	100
		Allied Course VI	Mathematical Statistics – III	3	2	3	25	75	100
	IV	SBE- I	Statistical Programming using computational Packages	2	2	3	25	75	100
		Non Major Elective II	Mathematics for Competitive Examinations – II	2	2	3	25	75	100
	Total				30	23			

V	III	Core Course IX	Algebra	6	6	3	25	75	100
		Core Course X	Real Analysis	6	5	3	25	75	100
		Core Course XI	Mechanics	6	5	3	25	75	100
		MBE - I	Operations Research	6	5	3	25	75	100
	IV	SBE- II	Quantitative Aptitude	2	2	3	25	75	100
		SBE- III	Numerical Methods with Programming Techniques	2	2	3	25	75	100
		SSD	Soft Skill Development	2	2	3	25	75	100
Total			30	27				700	
VI	III	Core Course XII	Complex Analysis	6	6	3	25	75	100
		Core Course XIII	Numerical Methods with C Programming	5	4	3	25	75	100
		Core practical XIII(P)	Numerical Methods with C Programming Practicals	2	2	3	40	60	100
		Core Course XIV	Astronomy	6	5	3	25	75	100
		Major Based Elective II	Stochastic Processes	5	4	3	25	75	100
		Major Based Elective III	Graph Theory/ Mathematical Modelling	5	4	3	25	75	100
	IV	GS	Gender Studies	1	1	3	25	75	100
			Extension Activities	-	1	-	-	-	-
	Total			30	27				700
Grand Total			180	140				4100	

CORE COURSE I
DIFFERENTIAL CALCULUS AND TRIGONOMETRY

Internal : 25	Semester : I
External: 75	No. of Hours/Week : 5
Exam Hours : 3	Credit : 5

COURSE OBJECTIVES:

- To inculcate the basics of differentiation and their applications.
- To introduce the notion of curvatures, Evolutes & Involutives and polar co-ordinates.
- To develop conceptual understanding and fluency with Trigonometric functions.
- To acquire the basic knowledge of circular and hyperbolic functions of complex variables.
- To develop skill in summing up infinite trigonometric series using appropriate method.

UNIT I Methods of Successive Differentiation – Leibnitz,'s Theorem and its applications- Increasing & Decreasing functions.

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT II Curvature – Radius of curvature in Cartesian and in Polar Coordinates – Jacobians.

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT III Centre of Curvature – Evolutes & Involutives – Maxima and Minima of function of two variables.

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT IV Hyperbolic functions – Relation between Hyperbolic functions- Relations between Hyperbolic Functions corresponding to relations between Circular functions - Inverse hyperbolic functions

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT V Logarithm of a complex number –Summation of Trigonometric series – Difference method- Angles in arithmetic progression method –Gregory's series.

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

TEXT BOOKS:

1. T.K.Manickavachagam Pillai, S.Narayanan (2011),Calculus Volume I, S.V Publications, Chennai.
2. S. Narayanan, T.K.Manickavachagam Pillai (2004), Trigonometry, S.Viswanathan Pvt. Ltd and Vijay Nicole Imprints Pvt. Ltd,
Unit I: Chapter III: Sec 1.1 – 2.2, Chap. IV: Sec. 2.1-2.2
Unit II: Chap. X : Sec. 2.1-2.3 and Sec.2.6
Unit III: Chap.X: Sec. 2.4, 2.5 & Chap. V: Sec. 1.1-1.4
Unit IV: Chap. II: Sec. 2.1, 2.2
Unit V: Chap. III & Chap. IV: Sec. 4.1, 4.2 & 4.4

REFERENCE BOOKS:

1. S.Arumugam and Isaac (1991), Calculus, Volume I, New Gamma Publishing House.
2. S.Arumugam, Isaac , Thangapandi (1999), Trigonometry and Fourier series, New Gamma Publications, Revised Edition.

COURSE OUTCOMES:

- To apply Leibnitz's Theorem for finding n^{th} derivative of product of functions.
- To sketch curves in Cartesian polar coordinate systems.
- To calculate the limit and examine the continuity of the function at a point.
- To understand the relation between circular and Hyperbolic functions.
- To find summation of infinite trigonometric series using appropriate method.

CORE COURSE II CLASSICAL ALGEBRA

Internal : 25
External: 75
Exam Hours : 3

Semester : I
No. of Hours/Week : 4
Credit : 4

COURSE OBJECTIVES:

- To lay a good foundation for the study of Theory of Equations
- To train the students in operative algebra
- To understand the concepts of transformation and formation of equations.
- To know the applications of Maxima and Minima.
- To know all types of matrices and to find its inverse.

UNIT I Forming the equations with the given roots - Relation between the roots and coefficients -Symmetric functions - Sum of the n^{th} powers of the roots- Newton's theorem on the sum of the powers of the roots (Problems only).

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT II Transformation of equations - Reciprocal equations- Diminishing, Increasing, Multiplying the roots - Descarte's rule of signs – Simple problems.

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT III Inequalities - Elementary Principles - Geometric and Arithmetic means - Weirstrass inequalities - Cauchy's inequality - Applications to Maxima and Minima

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT IV Types of Matrices - Symmetric, Skew- symmetric, Orthogonal, Hermitian, Skew-Hermitian and Unitary matrices – The Inverse of the matrix(Except theorem 7.22)- Rank of the matrix(Definitions and Simple problems).

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT V Simultaneous linear equations (except proof of the theorems) – Characteristic equation and Cayley Hamilton's theorem(Statement only)- finding inverse of matrix using Cayley Hamilton's Theorem- Eigen values and Eigen vectors- Properties of Eigen values(without proof)- Simple problems.

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

TEXT BOOKS:

1. T. K. M. Pillai and S. Narayanan (2015) , “Algebra Vol I”, (Units I and II), S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
2. T. K. M. Pillai and S. Narayanan (2015), “Algebra Vol II”, (Unit III), S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
3. S.Narayanan, R.Hanumantha Rao & T.K.M.Pillai (2007), ‘Ancillary Mathematics Vol I’ (Units IV & V), S. Viswanathan (Printers & Publishers) Pvt. Ltd.,
Unit I : Chapter 6; Sec. 9- 14
Unit II : Chapter 6: Sec. 15 – 18 & Sec. 24
Unit III: Chapter 4
Unit IV: Sec: 7.2, 7.3 and 7.5
Unit V : Sec: 7.6, 7.7 & 7.8

REFERENCE BOOKS:

1. M. L. Khanna (1974), ‘Algebra’, Jai Prakash Nath & Co.
2. K. Balakrishnan and N. Ramabathran (1978), ‘Text Book of Modern Algebra’, Vikas Publishing House Pvt. Ltd

COURSE OUTCOMES:

The students are able

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

- To know the aspects of classical algebraic structures.
- To know the limitations on existing knowledge and the need of further development.
- To solve the problems formulated in the language of school mathematics.
- To find the rank of a matrix.
- To find the inverse of a matrix using Cayley- Hamilton's theorem.

**CORE COURSE III
INTEGRAL CALCULUS**

Internal : 25
External: 75
Exam Hours : 3

Semester : II
No. of Hours/Week : 5
Credit : 4

COURSE OBJECTIVES:

- To inculcate the basics of integration.
- To study some applications of definite integrals.
- To know the techniques for integration.
- To find area under plane curves using integration.
- To understand the consequences of Beta and Gamma function.

- UNIT I** Revision of all integral models – simple problems.
(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)
- UNIT II** Definite integrals - Integration by Parts , Reduction formula, Bernoulli's Formula.
(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)
- UNIT III** Geometric Application of Integration-Area under plane curves: Cartesian co-ordinates - Area of a closed curve - Examples - Areas in polar co-ordinates.
(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)
- UNIT IV** Double integrals – Changing the order of Integration – Triple Integrals.
(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)
- UNIT V** Beta & Gamma functions and the relation between them – Integration using Beta & Gamma functions.
(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

TEXT BOOK:

1. S.Narayanan and T.K.Manickavasagam Pillai (2011), 'Calculus Volume II', S.Viswanathan (Printers & Publishers) Pvt Limited, Chennai.

- UNIT I** : Chapter 1 sections 1 to 7.4
UNIT II : Chapter 1 sections 11,12,13 & 15.1
UNIT III : Chapter 2 section 1.1, 1.2, 1.3 & 1.4
UNIT IV : Chapter 5 section 2.1, 2.2 & Sec 4
UNIT V : Chapter 7 section 2.1 to 2.5

REFERENCE BOOK:

1. Shanti Narayan (1962), Differential & Integral Calculus, 10th Revised Edition, S.Chand & Co. Ltd.

COURSE OUTCOMES:

This course will enable the students

- To find the solutions of the integral.
- To solve the integration by parts.
- To find the area of plane curves using Cartesian and polar coordinates
- To find the area by changing the given order of integration
- To understand the concepts of Beta, Gamma functions

CORE COURSE IV
ANALYTICAL GEOMETRY OF THREE DIMENSIONS

Internal : 25
External: 75
Exam Hours : 3

Semester : II
No. of Hours/Week : 4
Credit : 4

COURSE OBJECTIVES:

- To familiarize with different three dimensional surfaces and their properties.
- To study 3 dimensional objects in Cartesian Co-ordinates system
- To develop their analytical skills in handling line, plane, sphere, cone and cylinder.
- To analyze given data to solve problems in Geometry.
- To apply the knowledge of 3D in real life problems.

UNIT I Coordinates in Space-Direction cosines of a line in space-Angle between lines in space -Equation of a plane in normal form-Angle between planes – Distance of a plane from a point. **(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)**

UNIT II Straight lines in space – line of intersection of planes – plane containing a line-Coplanar lines – Skew lines and shortest distance between skew lines- length of the perpendicular from point to line. **(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)**

UNIT III General equation of a sphere- Section of sphere by plane- tangent planes – condition of tangency-system of spheres generated by two spheres - System of spheres generated by a sphere and plane. **(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)**

UNIT IV Equation of a Cone with a conic as guiding curve – Quadric Cones with vertex at origin- Condition that the general equation of the second degree should represent a cone- The tangent lines and tangent plane at a point. **(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)**

UNIT V Equation of a Cylinder – Enveloping cylinder – the right circular cylinder – equation of a right circular cylinder. **(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)**

TEXT BOOK :

Shanthi Narayanan and Mittal P.K (2016), Analytical Solid Geometry, 16th Edition, S.Chand & Co., New Delhi.

Unit I : Chapter I : Sec 1.5 to 1.9, Chapter II : Sec 2.1 to 2.8

Unit II : Chapter III; Section 3.1 - 3.7

Unit III : Chapter VI : Sec. 6.1 to 6.6

Unit IV : Chapter VII : Sec.7.1.1, 7.1.3, 7.2 & 7.4.1

Unit V : Chapter VII : Sec. 7.7.1, 7.7.2, 7.8 &7.8.2

COURSE OUTCOMES:

This course enables the students

- To understand co-ordinates in space, angle between lines and planes and their distance
- To understand coplanar lines, skew lines and to find shortest distance between them.
- To formulate equation of sphere and understand their properties.
- To formulate equation of cone and understand their properties.
- To formulate equation of cylinder and understand their properties.

CORE COURSE V
DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

Internal : 25
External: 75
Exam Hours : 3

Semester : III
No. of Hours/Week : 4
Credit : 4

COURSE OBJECTIVES:

- To solve second order and higher order linear differential equations with constant coefficients and variable coefficients.
- To sense the essential difference between ODE and PDE.
- To acquire the knowledge of complete, singular and particular integrals of PDE .
- To compute solutions of Lagrange's equations and to find solution of PDEs using Charpits method.
- To gain the basic knowledge of Laplace transforms and its inverse with applications.

UNIT I Linear Differential equations with constant coefficients – Evaluation of particular integral of e^{ax} , $\cos ax$, $\sin ax$, x^k , where k is a positive integer ,and $e^{ax} f(x)$ where $f(x)$ is any function of x . (Chapter 2: Sections 1 to 4).

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT II Linear Equations with variable Coefficients: to find the particular integral – Equations reducible to linear homogeneous equation- method of variation of parameters. (Chapter 2: Sections 8 to 10)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT III Partial Differential Equations: Formation of equations by elimination of constants and arbitrary functions -General, particular, complete and singular integral (Geometrical meaning not expected) - Solutions of first order equations of the standard forms.(Chapter 4: Sections 1 to 3 and 5.1- 5.4)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT IV Equations reducible to the standard forms- Lagrange's equation – Charpit's method (Chapter 4: Sections 5.5, 6, 7)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT V Laplace Transforms - Standard formulae – Some general Theorems (statement only)and Simple Applications - Inverse Laplace transforms (problems only) - Application to the solution of Second order ordinary differential equations with constant coefficients. (Chapter 5 : Sections: 1,2,4,6,7,8)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

TEXT BOOK:

T.K. Manickavasagam Pillai and S. Narayanan (2004), Calculus Vol III, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.

REFERENCE BOOKS:

1. M.L.Khanna, Differential equations.
2. M.K.Venkatraman ,Engineering Mathematics (Vol II) .

COURSE OUTCOMES:

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

- Find the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.
- Solve differential equations by using method of variation of parameters.
- Find solutions of first order partial differential equations of the standard forms.
- Solve the PDE's using Charpit method.
- Apply the technique of Laplace transform and inverse Laplace transform to solve Second order ordinary differential equations with constant coefficients.

CORE COURSE VI
VECTOR CALCULUS AND FOURIER SERIES

Internal : 25
External: 75
Exam Hours : 3

Semester : III
No. of Hours/Week : 5
Credit : 5

COURSE OBJECTIVES:

- To understand the fundamental concepts of vector differentiation.
- To develop the knowledge of vector integration..
- To acquire the interpretation of curl of a vector field.
- To inculcate the basic concepts of Fourier series.
- To know about half range sine and cosine series.

UNIT I Vector differentiation –velocity & acceleration-Vector & scalar fields –Gradient of a vector - Unit vector normal to the surface - Directional derivative – divergence & curl of a vector - Solenoidal & irrotational vectors .- Formula involving operator ∇ - Operators involving ∇ twice and problems.

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT II Vector integration : Line integral - conservative field – volume integral -surface integral-(problems and theorem statement only).

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT III Gauss Divergence Theorem –Green’s theorem- Stoke’s Theorem (Statements Only) – Simple Problems(verification of theorem).

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT IV Fourier series – Definition – Fourier series expansion of periodic functions with period 2π .

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT V Even and odd functions definition-properties-use of these functions in fourier series Half range Fourier series.-Development in cosine series-Development in sine series.

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

TEXT BOOK:

1. **For units I, II and III** : T.K.Manickavasagam Pillai and S.Narayanan, Vector Algebra and Analysis, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
2. **For units IV and V** : T.K. Manickavasagam Pillai and S. Narayanan (2004), Calculus Volume III, S.Viswanathan Printers and Publishers Pvt. Ltd.,Chennai.

REFERENCES:

1. M.L. Khanna, Vector Calculus.
2. M.K.Venkatraman, Engineering Mathematics.

COURSE OUTCOMES:

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

- Explain the concepts of differentiation of vector field.
- Integrate the vector functions over curves and surfaces.
- Compute integrals using Green's theorem, Stoke's theorem and the Divergence theorem.
- Solve the wave equations, Laplace equations using Fourier series.
- Apply the Fourier techniques to a periodic signals.

**NON MAJOR ELECTIVE I
MATHEMATICS FOR COMPETITIVE EXAMINATIONS I**

Internal : 25
External: 75
Exam Hours : 3

Semester : III
No. of Hours/Week : 2
Credit : 2

COURSE OBJECTIVES :

- To learn the problems solving techniques for aptitude problems.
- To enable the students prepare themselves for various competitive examinations.
- To enable the students prepare for Interviews and Entrance Examinations.
- To enhance the employability skills of students.
- To improve the basic mathematical skills.

UNIT I Series Completion: Number Series - Alphabet Series. (P. No. 139 – 159)

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT II Coding – Decoding: Letter Coding – Number Coding – Matrix Coding.

(P. No. 169 – 192)

(Contents – 4 Hrs, Assessment – 2 Hrs) (6hrs)

UNIT III Blood Relation: Deciphering jumbled up descriptions – Relation Puzzle – Coded Relations.(P.No. 220 – 241).

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT IV Puzzle Test: Seating / Placing arrangements – Comparison Test.(P.No. 253 – 278)

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT V Direction Sense Test – Logical Venn Diagram.

(P.No. 324 – 333 , 348 – 366).

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

TEXT BOOK:

R.S. Agarwal, A modern approach to Verbal and Non-Verbal Reasoning, S.Chand & Company Ltd, New Delhi- 55.

COURSE OUTCOMES:

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

- Solve problems in number and alphabet series.
- Write Coding and Decoding.
- Decipher jumbled up descriptions.
- Solve puzzles using comparing test and Venn Diagrams.
- Crack competitive examinations.

SEMESTER IV
CORE COURSE VII - SEQUENCES AND SERIES

Internal : 25
External: 75
Exam Hours : 3

Semester : IV
No. of Hours/Week : 4
Credit : 4

COURSE OBJECTIVES:

- To lay a good foundation for classical analysis.
- To study the behaviour of series and its convergence.
- To find the convergence of series using different tests.
- To learn about the Binomial Theorem, Exponential series and Logarithmic series.
- To acquire the knowledge of summing of series.

UNIT I Sequences: Limit of a sequence – Convergence Theorems on limits – Cauchy's first Theorem on limit – Upper and lower bounds of an aggregate – Bounded sequences – Upper and lower limits of a sequence - Cauchy's general principle of convergence – Monotonic sequence – Monotonic sequence always tends to a limit finite or infinite.
(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT II Infinite series: Sum to infinity – Definition of convergence, divergence and oscillation – convergence of Geometric series – some general theorems on infinite series Series of positive terms - Comparison tests – Convergence of $\sum \frac{1}{n^p}$ - D' Alembert's ratio test — Raabe's test – Simple Problems.
(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT III Cauchy's Condensation test – Cauchy's root test - Simple problems – Alternating series with problems. (Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT IV Binomial Theorem for a rational index – Exponential and Logarithmic series – Summation of series – Approximations using these theorems.
(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT V General summation of series including successive difference and recurring series. (Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

TEXT BOOK:

T.K.Manickavasagam Pillai, T. Natarajan and K.S. Ganapathy (2004) , Algebra Vol I, S.Viswanathan Printers & Publishers Pvt. Ltd., Chennai.

REFERENCES:

1. M.K. Singal & Asha Rani Singal, A first Course in Real Analysis.
2. S. Arumugam and Thangapandi Isaac, Sequence and Series.

COURSE OUTCOMES:

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

- Calculate the limits of sequences and to work with the infinite sequences.
- Interpret the concepts of series as the sum of a sequence.
- Apply the various techniques in testing the convergence of the series.
- Find the missing term and the greatest term of a series using Binomial expansion.
- Evaluate the summation of some difference series.

**CORE COURSE VIII
NUMBER THEORY**

Internal : 25
External: 75
Exam Hours : 3

Semester : IV
No. of Hours/Week : 4
Credit : 4

COURSE OBJECTIVES:

- To interpret the concepts of divisibility, prime number and prime-factorization.
- To learn some kind of number theoretic functions such as Greatest integer function, Mobius function.
- To know about famous conjectures in number theory.
- To acquire the knowledge of congruences, residue classes and solutions of linear congruences.
- To study the methods to classify numbers as quadratic residues and quadratic non-residues.

UNIT I Prime and composite numbers - Coprimes-Sieve of Eratosthenes Euclid's theorem- Unique factorization-Fundamental theorem of Arithmetic-Positional representation of integers-Number of divisors-Sum of divisors-Symbols $d(n), \sigma(n)$ -Arithmetic functions. (Chapter 4: 77 to 97)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT II Perfect number-Greatest integer function-Mobius function $\mu(n)$ -Inversion formula and its converse.(Chapter 4: 98 to 103,109-128)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT III Distribution of Primes-Fermat conjecture-Fermat numbers-Gold Bach's conjecture- Mersenne numbers Gap theorem-Infinity of primes.(Chapter 5)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT IV Congruence - Definition – Residue classes - Complete and least residue system-Linear congruences - Solution of congruences - Chinese remainder theorem. (Chapter 6: 155 to 174,183-190)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT V Quadratic reciprocity-Quadratic residues and non residues-Eulers Criterion-Primitive roots is a quadratic non residues-Legendre symbol-Gauss lemma-Quadratic reciprocity law. (Chapter 10: 255 to 278)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

TEXT BOOK :

Prof. S.Kumaravelu and Susheela Kumaravelu, Elements of Number Theory , Raja Sankar off set Printers ,Sivakasi,2002.

REFERENCE BOOKS:

1. David M. Burton, Elementary Number Theory (1989), W.M.C. Brown Publishers, Dubuque, Iowa.
2. George Andrews, Number Theory (1994), Courier Dover Publications.

COURSE OUTCOMES:

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

- Find the prime factorization and divisor, sum, product of a given natural number.
- Understand the concept of Mobius function, Mobius Inversion formula and Mobius pair.
- Gain knowledge about Famous conjectures in number theory .
- Solve System of linear congruences using the well-known Chinese Remainder theorem.
- Apply the Law of Quadratic Reciprocity and other methods to classify numbers as quadratic residues and quadratic non-residues
- Learn methods and techniques used in number theory.

**NON MAJOR ELECTIVE II
MATHEMATICS FOR COMPETITIVE EXAMINATIONS II**

Internal : 25
External: 75
Exam Hours : 3

Semester : IV
No. of Hours/Week : 2
Credit : 2

COURSE OBJECTIVES:

- To learn the problems solving techniques for aptitude problems.
- To enable the students prepare themselves for various competitive examinations.
- To develop and maintain problem solving skills.
- To train them by conducting aptitude test based on verbal and quantitative skills.
- To enhance the employability skills of students.

UNIT I Number, Ranking and Time Series Test: Number Test – Ranking Test – Time sequence Test .(P. No. 417 – 432)

(Contents – 3 Hrs, Assessment – 3 Hrs) (6hrs)

UNIT II Mathematical Operations: Problem Solving by Substitution – Interchange of signs and numbers – Deriving the appropriate conclusion. (P. No. 432 – 454)

(Contents – 3 Hrs, Assessment – 3 Hrs) (6hrs)

UNIT III Arithmetical Reasoning: Calculation based Problem – Data based question – Problem on ages – Venn diagram based questions. (P. No. 459 – 474)

(Contents – 3 Hrs, Assessment – 3 Hrs) (6hrs)

UNIT IV Inserting the Missing character. (P. No. 475 – 492)

(Contents – 3 Hrs, Assessment – 3 Hrs) (6hrs)

UNIT V Data sufficiency – Logical Sequence of Words – Logical Reasoning.

(P. No. 495 – 506, 455 – 458, Part II 1 - 14)

(Contents – 3 Hrs, Assessment – 3 Hrs) (6hrs)

TEXT BOOK:

R.S. Agarwal, A modern approach to Verbal and Non-Verbal Reasoning,,S.Chand & Company Ltd, New Delhi- 55.

COURSE OUTCOMES:

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

- Understand the basic concept of quantitative ability.
- Understand the knowledge of mathematical operations.
- Decipher arithmetical reasoning.
- Solve logical reasoning.
- Crack competitive examinations.

CORE COURSE IX

ALGEBRA

Internal : 25
External: 75
Exam Hours : 3
Objectives

Semester : V
No. of Hours/Week : 6
Credit : 6

- Students learn the meaning and application of Algebraic structure, definition of Group with examples and simple properties.
- Learn about the Normal Sub groups and Quotient groups
- To write precise and accurate mathematical objects in Rings theory and to understand the concepts like ideals and quotient rings
- Important concepts of Vector Spaces such as independent, basis, dimension , Orthogonality etc.
- Learn the concepts of dimension and how to use the rank plus nullity theorems.

UNIT I Groups: Subgroups – Cyclic groups – Order of an element – Cosets and Lagrange’s Theorem (Sections 3.5 to 3.8)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT II Normal subgroups and quotient groups – Finite groups and Cayley’s theorem – isomorphism and homomorphism (Sections 3.9 to 3.12).

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT III Rings and Fields: Definition and examples – Elementary properties of rings –Types of rings – Characteristics of rings – Subrings – Ideals – Quotient rings – Homomorphism of rings – Isomorphism of Rings (Sections 4.1 to 4.8 & 4.10).

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT IV Vector spaces - Definition and examples – Subspaces – Linear transformation- Span of a set – Linear independence. (Sections 5.1 to 5.5).

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT V Basis and dimension – Rank and Nullity – Matrix of a linear transformation – Inner product space (Sections 5.6 to 5.8 & Chapter 6)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

TEXT BOOK:

“Modern Algebra” by S. Arumugam and A. Thangapandi Isaac., New Gamma Publishing House, Revised Edition, Palayamkottai.

REFERENCE BOOKS: 1. Modern Abstract Algebra – Shanthi Narayan

2. Modern Algebra – K. Sivasubramanian.

3. Modern Algebra – R.Balakrishnan & N.Ramapathran

COURSE OUTCOME:

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

- Gain the knowledge about concepts of sets, mapping , relations and some basic definitions of groups and subgroups.
- Understand the notion of Normal Subgroups and determine whether a given subgroup is normal.
- Analyze the concepts of homomorphism and isomorphism for groups, rings and field.
- Recognize the mathematical concepts in Vector Product Space, Quotient space Direct sum, linear span and linear independence, Basis and Inner Product Space
- To determine the dimension of the image and kernel of a given linear transformation.

SEMESTER V
CORE COURSE X- REAL ANALYSIS

Internal : 25
External: 75
Exam Hours : 3

Semester : V
No. of Hours/Week : 6
Credit : 5

Course Objectives:

- To introduce Real Number System
- To explore the concepts of neighborhoods and its related parameters.
- To define continuous functions
- To define Derivative and algebra of derivatives
- To derive mean value theorems

UNIT I Real number system: Absolute value of a real number and its properties – Supremum and Infimum of a set – Order Completeness Property – Countable and Uncountable sets. (Sections: 1.5 - 1.7 & 1.10)

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT II Continuity of Functions – Types of discontinuous functions – Algebra of Continuous functions – Intermediate value Theorem – Inverse function theorem and Uniform continuity of a function. (Sections: 5.3, 5.4, 5.6 to 5.8)

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT III Derivability and continuity – Algebra of derivatives – Inverse function theorem – Darboux's theorem.(Sections: 6.1 to 6.5)

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT IV Rolle's Theorem – Mean value theorems on derivatives - Taylor's theorem with remainder. (Sections: 8.1 to 8.5)

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT V

Riemann integration: Definition – Darboux's theorem –Conditions of Integrability – Integrability of continuous and monotonic functions – Properties of Integrable functions – Integral functions – Continuity and derivability of Integral functions – The first Mean value Theorem – fundamental theorem of integral calculus. (Chapter 6) **(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)**

TEXT BOOKS:

1. For units I to IV - M.K. Singal and Asha Rani Singal (1998) , “ A first course in Real Analysis ” , 20th edition , R. Chand and Co., New Delhi.
2. For unit V – Shanthi Narayan (1962) ,“A Course of Mathematical Analysis”, S. Chand and Co., New Delhi.

REFERENCES:

- A First course in Real Analysis – Walter Rudin.
- Real Analysis – Shanthi Narayan.

COURSE OUTCOMES:

On completing the syllabus, Learners will be able to

- state the nature of number system and field axioms
- define open sets, closed sets, limit points, closure and interior of a set, compactness and connectedness.
- differentiate continuous and discontinuous functions, uniform continuous functions.
- state derivative function and Darboux's theorem
- prove intermediate value theorems

CORE COURSE XI

MECHANICS

Internal : 25
External: 75
Exam Hours : 3

Semester : V
No. of Hours/Week : 6
Credit : 5

Course Objectives

- To make the students to know the importance of this subject in the field of Mechanics.
- To provide the basic knowledge of Equilibrium of a particle and Rigid bodies.
- To learn the effect of Hanging strings and Suspension bridge.
- To help the students to study about the Impact, Impulsive forces and to about the Central Objects and the basics of Moment of Inertia.
- To develop a working knowledge to handle practical problems.

UNIT I Equilibrium of a Particle – Triangle of Forces – Lami's Theorem – Moment of a Force – General Motion of a Rigid Body – Parallel Forces – Varignon's Theorem – Forces along the sides of a triangle - Couples. (Chapter 3: Section 3.1, Chapter 4: Sections 4.1, 4.2, 4.4, 4.5, 4.6)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT II Hanging strings – Equilibrium of a uniform homogeneous strings – Suspension bridge – Simple Problems. (Chapter 9: Sections 9.1 & 9.2)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT III Rectilinear motions under varying force – Simple Harmonic Motion S.H.M along a horizontal line – S.H.M. along a vertical line – Projectiles – Forces on a Projectiles – Projectile projected on an inclined plane – enveloping Parabola.

(Chapter 12: sections 12.1 to 12.3 & 13.1 to 13.3)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT IV Impact – Impulsive force – Impact of Spheres – Impact of two smooth spheres - Impact of a smooth sphere on a plane – Oblique impact of two smooth spheres. (Chapter 14: Sections 14.1 to 14.5)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT V Central orbits – General orbits – Central orbit – Conic as a centered orbit - Moment of Inertia – Perpendicular and Parallel axes theorems.

(Chapter 16: Sections 16.1, 16.2, 16.3 & Chapter 17 : 17.1)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

TEXT BOOK:

P.Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam (2005),
Mechanics, Published by S. Chand and Company, New Delhi.

REFERENCE BOOKS:

1. Dynamics - M.K. Venkatraman.
2. Statics - M.K. Venkatraman.

COURSE OUTCOMES

On completing the syllabus, Learners will be able to

- At the end of the course students will understand and demonstrate the Equilibrium of a particle in static and dynamic.
- They will demonstrate and understands about the clear concept of Hanging strings and suspension bridge.
- They will have a clear clarification in the Impact of spheres and Impulsive forces.
- They require good knowledge and understanding in the Central Orbit and Moment of Inertia.
- Students must be in a positive analysis and solve the practical problems of static and dynamic.

SEMESTER V
MAJOR BASED ELECTIVE I – OPERATIONS RESEARCH

Internal : 25
External: 75
Exam Hours : 3

Semester : V
No. of Hours/Week : 6
Credit : 5

Course Objectives

- To find the solution of the LPP using graphical method
- To understand different types of LPP
- To solve Transportation Problem using various methods
- To introduce Assignment Problem and solve it
- To explore the concepts of Network Analysis and rules of network construction

UNIT I Linear Programming Problem – Mathematical Formulation of L.P.P – Graphical Solution – Introduction – Graphical Solution method – Some exceptional cases – General Linear Programming Problem – Canonical and Standard form of LPP – Simplex method – Introduction - The computational Procedure. (Excluding Theorems); (Sections 2.1 , 2.2 , 3.1 to 3.5 , 4.1 , 4.3)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT II Use of Artificial Variables – Two – Phase Method – Duality in Linear Programming problem – Introduction – General primal–Dual Pair–Formulating a dual Problem – Duality and Simplex Method–Dual Simple Method.(Excluding Theorems); (Sections: 4.4, 5.1 to 5.3, 5.7, 5.9)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT III Transportation Problem – Introduction – General Transportation problem – Finding Initial Basic feasible Solution – Test for Optimality – Transportation Algorithm (MODI Method); (Sections: 10.1 , 10.11)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT IV Assignment problem : Mathematical formulation of an AP – The Assignment algorithm – The Traveling Salesman Problem.(Sections: 11.1 to 11.3 & 11.6)
(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT V Network Scheduling by PERT / CPM – Network and Basic Components – Rules of Network Construction – Time Calculations in Networks – Critical Path Analysis – PERT Calculations. (Sections 21.1 to 21.7)

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

TEXT BOOKS:

Kanti Swarup , P.K. Gupta and Man Mohan (2004) , “ Operations Research ”, Sultan Chand and Sons , Educational Publishers , New Delhi .

REFERENCE BOOKS:

- 1 Operations Research - S. Dharani Venkatakrisnan.
- 2 Operations Research - Gupta and Hira.
- 3 Operations Research (6th edition)- Hamdy A. Taha

COURSE OUTCOMES

On Completing the syllabus, Learners will be able to

- Analyse and solve linear programming models of real life situations.
- Understand the problem solving method of Simplex and Big M Method.
- Learn the applications of Transportation Problem.
- Learn to solve Assignment problems.
- Use PERT and CPM in solving Network Analysis problems.

SKILL BASED ELECTIVE COURSE II
QUANTITATIVE APTITUDE

Internal : 25
External: 75
Exam Hours : 3

Semester : V
No. of Hours/Week : 2
Credit : 2

Course Objectives:

- To learn the problems solving techniques for aptitude problems
- To enable to students prepare themselves for various competitive examinations.
- To enhance the problem solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations.
- Arithmetic ability test helps measure one's numerical ability.
- quantitative aptitude questions includes ranking from pure numeric calculations to critical arithmetic reasoning.

UNIT I Blood Relation - Puzzle Test (P. No. 220 – 241, 253 – 278)
(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT II Number, Ranking and Time Series Test - Mathematical Operations
(P. No. 417 – 432, 432 – 454) **(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)**

UNIT III Arithmetical Reasoning (P. No. 459 – 474)
(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT IV Inserting the Missing character (P. No. 475 – 492)
(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT V Data sufficiency – Logical Sequence of Words. (P. No. 495 – 506, 455 – 458)
(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

TEXT BOOK:

R.S.Agarwal, “A modern approach to Verbal and Non-verbal Reasoning” , S.Chand & Company Ltd, Delhi.

COURSE OUTCOMES:

On Completing the syllabus, Learners will be able to

- solve the problems based on numbers.
- understand the concept of number and alphabet series and analogy
- solving problems on coding and blood relations.
- solving problems on sequential output tracing and direction sense test.
- solving puzzle problems.

SKILL BASED ELECTIVE COURSE III
INTRODUCTION TO FUZZY MATHEMATICS

Internal : 25
External: 75
Exam Hours : 3

Semester : V
No. of Hours/Week : 2
Credit : 2

Course Objectives:

- To introduce the fundamental of Fuzzy Set Theory and its connection with Fuzzy Logic.
- Particular emphasis is given to a comprehensive coverage of operations on fuzzy sets.
- Analyse the various types of Fuzzy Arithmetic Operations.
- To introduce the various relations of fuzzy Relations.
- The concept of fuzzy measure is introduced.

UNIT I Crisp sets and Fuzzy sets – Crisp sets: an over view – The notion of Fuzzy sets – Basic concepts of Fuzzy sets. (Sections 1.2-1.4)

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT II Operations on Fuzzy sets: General discussion – Fuzzy complement – Fuzzy Union (Sections 2.1 – 2.3) **(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)**

UNIT III Fuzzy Intersection – Combinations of Operations (Sections 2.4, 2.5)

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT IV General Aggregation Operations – Crisp and Fuzzy relations – Binary Relations. (Sections 2.6, 3.1, 3.2)

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT V Binary relations on a single set – Equivalence and Similarity relations - Compatibility and tolerance relations – Orderings. (Sections 3.3 - 3.6)

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

TEXT BOOK:

George J.Klir and Tina A. Folger (2006), 'Content and treatment as in Fuzzy Sets, Uncertainty and Information', by, Prentice Hall of India, New Delhi.

REFERENCE(S)

1. H.J. Zimmermann (1991), Fuzzy Set Theory and its Applications, Allied Publishers Limited, New Delhi.
2. G.J. Klir and B. Yuan (1995), Fuzzy Sets and Fuzzy Logic, Prentice Hall of India, New Delhi.

COURSE OUTCOMES:

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

- understand the concept of fuzzy theory and its application in real life problems.
- construct the appropriate fuzzy numbers corresponding to uncertain and imprecise collected data.
- handle the problems having uncertain and imprecise data.
- find the optimal solution of mathematical programming problems having uncertain and imprecise data.
- Deal with the fuzzy logic problems in real world problems.

SOFT SKILL DEVELOPMENT

Internal : 25
External: 75
Exam Hours : 3

Semester : V
No. of Hours/Week : 2
Credit : 2

Objective :

To impart knowledge Self development through inter personal relation, Communication and self presentation.

UNIT I Know Thyself / Understanding Self Introduction to Self Skills – Self discovery – Developing positive attitude - Improving perception – Forming values.

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT II Interpersonal Skills \ Working with Others Developing interpersonal relationship – Team building – group dynamics - Net working – improving work relationship.

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT III Communication Skills \ Working with Others Art of listening – Art of reading – Art of Speaking – Art of Writing – Art of Writing E – mails –E mail etiquette.

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT IV Corporate Skills \ Working with Others Developing body language – Practising etiquette and mannerism – Time Management – Stress Management.

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

UNIT V Selling Self\ Job Hunting Writing resume\cv – interview skills – discussed – Mock interview – Mock GD – Goal setting – Career planning.

(Contents – 4 Hrs, Assessment –2Hrs) (6hrs)

(Theory only)

Text Book

Dr.K.Meena & Dr.V.Ayothi - A book on development of Soft Skills.

Dr.K.Alex - Soft Skills. S.Chand & Company Ltd. Ram Nagar, New Delhi -110055

Books for Reference

1. Developing the leader within you John C Maxwell
2. Good to Great by jim Collins
3. The seven habit of highly effective people Stephen Covey
4. Emotional Intelligence Daniel Goleman
5. You can win shive Khera
6. Principal centred leadership Stephen

CORE COURSE XII
COMPLEX ANALYSIS

Internal : 25
External: 75
Exam Hours : 3

Semester : VI
No. of Hours/Week : 6
Credit : 6

Course objectives

- To provide the knowledge about analytic functions.
- To acquire the Knowledge in elementary and bilinear transformations.
- To explore the Complex Integration.
- To develop the series expansions
- To find the residues using poles

UNIT I Analytic Functions: Functions of complex variable – C.R. Equations – Analytic functions - Harmonic functions. (Sections 2.1, 2.6 to 2.8)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT II Bilinear Transformations: Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of bilinear transformations. (Sections 3.1 to 3.4)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT III Complex Integration: Definite integral – Cauchy’s theorem – Cauchy’s integral formula – Higher derivatives. (Sections 6.1 to 6.4)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT IV Series Expansions: Taylor’s series – Laurent series – zeros of analytic functions – Singularities. (Sections 7.1 to 7.4)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT V Calculus of Residues: Residues – Cauchy’s residue theorem – Evaluation of definite integrals. (Sections 8.1 to 8.3)

(Contents - 15 Hrs, Assessment - 3 Hrs) (18 hrs)

TEXT BOOK:

S.Arumugam , A.Thankapandi Issac, A.Somasundaram (1992) ,“Complex Analysis” , New Gamma Publishing House, Palaymkottai.

REFERENCE BOOKS:

- 1 Complex Analysis - P.Duraipandian.
- 2 Complex VARIABLES - T.K. Manikavachangam pillai

COURSE OUTCOMES

On completion of the course, students will be able to

- Understand the basic concepts of complex numbers and Cauchy-Riemann equations in Cartesian and polar coordinates.
- Know the analytic functions, harmonic functions ,elementary and bilinear transformation concepts.
- Understand the applications of complex integrations.
- Understand the series expansions of Taylor's and Laurent's series.
- Solve the definite integrals using the concepts of residues.

CORE COURSE XIII
NUMERICAL METHODS WITH 'C' PROGRAMMING

Internal : 25
External: 75
Exam Hours : 3

Semester : VI
No. of Hours/Week : 4
Credit : 4

Course Objectives:

- Logics, variables, constants, expressions and operators which will help them to create programs, applications in C.
- Learning the basic programming construction and functions to modify the programs in programming in C.
- Programming skills to use conditional statements, user defined functions, arrays.
- The objective of the course is to familiarize the students about different numerical techniques.
- Solving algebraic and transcendental equations, large linear system of equations, differential equations, approximating functions by polynomials upto a given desired accuracy, finding approximate value of definite integrals of functions etc. and to solve numerical problems using C.

UNIT I Structure of C programs-Constants, Variables and Data types-Operators and Expressions- Mathematical functions-Input and output operators.

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT II Decision making and Branching-IF statements-GOTO statement-Decision making and looping - WHILE, DO, FOR statements-Arrays

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT III Handling of character strings - Arithmetic operations on characters - String handling functions - User defined functions - Recursion.

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT IV Bisection method, false position method and Newton Raphson method - Solving simultaneous algebraic equations - Gauss-Seidel method - Gauss elimination method.

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

UNIT V

Interpolation – Newton’s forward and backward difference formulae - Lagrange’s interpolation formula - Numerical integration using Trapezoidal and Simpson’s one-third rules - solution of ODE’s - Euler method and Runge-Kutta fourth order method.

(Contents – 9 Hrs, Assessment – 3 Hrs) (12hrs)

TEXT BOOKS:

1. E. Balagurusamy (2012), Programming in ANSI C, Sixth edition, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi. (For Units I, II and III).

2. M.K.Venkatraman (2001), Numerical methods in Science and Engineering, National Publisher Company, Fifth Edition. (For Units IV and V).

Unit 1: Chapters 1-4 of [1] - Unit 2: Chapters 5-7 of [1] - Unit 3: Chapters 8-9 of [1]

Unit 4: Chapter 1, Sections 1.7-1.8, Chapter 3, Sections 2, 4 and 5, Chapter 4, Sections 2, 6 of [2]

Unit 5: Chapter 6, Sec 3,4, Chapter 8, Sec 4, Chapter 9, Sec 8,10, Chapter 11, Sec 10,16 of [2]

REFERENCE BOOKS:

1. Yashavant.P.Kanetkar (2002), Let us “C”, BPB Publications.

2. Rajaraman (1971), Computer Oriented Numerical Methods, Prentice-Hall of India.

COURSE OUTCOMES:

The student will be able to understand,

- Declaration of variables, constants, expressions and operators.
- Declaration and uses of functions and arrays.
- Develop their programming skills with programming environment with C program structure.
- Learn how to obtain numerical solution of nonlinear equations using bisection, secant, Newton and fixed-point iterations methods and convergence analysis of these methods.
- Solve simultaneous system of equations numerically.
- Familiar with calculation and interpretation of errors in numerical method.
- Familiar with programming with numerical packages like C Programming.

CORE COURSE XIV

NUMERICAL METHODS WITH 'C' PROGRAMMING – PRACTICAL

Internal : 40
External : 60

Instruction Hours : 2
Credit : 2
Exam Hours : 3

1. Solving a Quadratic Equation.
2. Sum of series (Sine , Cosine , e^x)
3. Ascending and descending order of numbers.
4. Largest and smallest of given numbers.
5. Sorting names in alphabetical order.
6. Finding factorial, generating Fibonacci numbers using recursive functions.
7. Matrix Manipulations (Addition, subtraction and Multiplication).
8. Mean Standard Deviation and Variance.
9. Solving equations by Bisection method
10. Solving equations by False position method
11. Solving equations by Newton –Raphson method
12. Gauss elimination method of solving simultaneous equations
13. GAUSS-Seidel method of solving simultaneous equations
14. Euler method ,Trapezoidal and Simpson's 1/3 rd rule of integration
15. .R-K Fourth order method of solving differential equations.

CORE COURSE XIV

ASTRONOMY

Internal : 25
External: 75
Exam Hours : 3

Semester : VI
No. of Hours/Week : 6
Credit : 5

Course Objectives:

- Introduce the exciting world of astronomy to the students.
- Help the students to study spherical trigonometry in the field of astronomy.
- Conceptualize the structure of the solar system and the universe;
- Classify and explain the reason for the differences between the planets in our solar system, stars in the sky and types of galaxies in the universe;
- Relate the earth, our sun, our galaxy and in general, our location to the rest of the universe.

UNIT I Relevant properties of a sphere and relevant formulae of Spherical trigonometry. Celestial Sphere (Chapter I Full, Chapter II Articles 38 - 59)

(Contents - 15 Hrs, Assessment - 3 Hrs) (18 hrs)

UNIT II Earth – Dip of the horizon – Twilight. (Chapter III – Sections 1, 5 and 6)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT III Astronomical refraction – Tangent and cassinie’s formulae – Properties and simple problems applying them. (Chapter IV full)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT IV Kepler’s laws of Planetary motion – Newton’s deductions from them – Three anomalies of the earth and relations between them.

(Chapter VI – Articles 146 , 153 , 158 to 164)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

UNIT V Moon – Phases of Moon – Harvest Moon – Metonic cycle – Lunar Mountain – Earth shine – Tides – Eclipses.(Chapter XII – Articles 229 – 242 and 249 – 255 and Chapter XIII)

(Contents – 15 Hrs, Assessment – 3 Hrs) (18hrs)

TEXT BOOK:

Kumaravelu S and Susheela Kumaravelu (1986), Astronomy for degree classes, 7th edition SKV Publishers, Nagarkoil.

REFERENCE BOOKS:

1. Astronomy for Degree Classes by Dr. S.M. Sirajudeen.
2. Astronomy by G.V. Ramachandran.
3. Astronomy by M.L. Khanna.

COURSE OUTCOMES:

On completion of the course, students will be able to

- Gain the knowledge to use mathematics to perform calculations on celestial bodies.
- Understand the use of our galaxy to contrast and compare it with other galaxies as to type, content, age, luminosity, motion and size.
- Apply the principle findings, common applications, current problems, fundamental techniques and underlying theory of the astronomy.
- Analyze the size, age structure and motion of the universe over all using cosmological models.
- Understand the phases of moon and occurrence of Eclipse.

MAJOR BASED ELECTIVE II - STOCHASTIC PROCESSES

Internal : 25
External: 75
Exam Hours : 3

Semester : VI
No. of Hours/Week : 6
Credit : 4

Objectives :

- To know probability and distribution function
- To understand the concept of Stability of the Markov System.
- To identify Markov chains ,Poisson Process and Birth and death Process
- To gain the knowledge of Renewal Theory
- To know the concept of queuing theory with some examples.

UNIT I Stochastic Processes: Some notions-Introduction-Specification of Stochastic Processes-Stationary processes-Markov chains: Definition and examples- Higher transition probabilities.(sec2.1-2.3,3.1and 3.2)

(Contents - 15 Hrs, Assessment - 3 Hrs) (18 Hours)

UNIT II Classification of states and chains- Determination of higher transition probabilities-Stability of a Markov system.(sec 3.4 and 3.6)

(Contents - 15 Hrs, Assessment - 3 Hrs) (18 Hours)

UNIT III Markov Processes with discrete state space: Poisson process and its extension-Poisson process-Poisson process and related distribution-Generalization of Poisson process-Birth and death process (sec4.1-4.4).

(Contents - 15 Hrs, Assessment - 3 Hrs) (18 Hours)

UNIT IV Renewal processes and Theory: Renewal processes- Renewal processes in continuous time- Renewal equation- Stopping Time: Wald's equation(sec 6.1- 6.4)

(Contents - 15 Hrs, Assessment - 3 Hrs) (18 Hours)

UNIT V Stochastic processes in Queueing and Reliability: Queueing system: General concepts-The Queueing model M/M/1: Steady state behavior-Transient behavior of M/M/1 model.(sec 10.1-10.3).

(Contents - 15 Hrs, Assessment - 3 Hrs) (18 Hours)

TEXT BOOK:

J.Medhi (1994), Stochastic Processes , Second Edition, New Age International, New Delhi.

References:

1. First course in Stochastic Processes by Samuel Karlin.
2. Stochastic Processes by Srinivasan and Metha (TATA McGraw Hill).

COURSE OUTCOMES:

On completion of the course, students will be able to

- Carry out derivations involving conditional probability distribution and conditional expectations.
- Define Basic Concepts from the theory of Markov chains and present proofs for the most important theorems.
- Compute Probabilities of transition between states and return to the initial states after long time intervals in Markov chains.
- Identify classes of states in Markov chains and characterize the classes.
- Derive differential equations for time continuous Markov Processes with a discrete state space Single server Markov Queues
- Rigorous understanding of the theoretical background of Queuing System

**MAJOR BASED ELECTIVE III –
GRAPH THEORY**

Internal : 25
External: 75
Exam Hours : 3

Semester : VI
No. of Hours/Week : 5
Credit : 6

Objectives:

- To understand the basic concepts of Graph Theory.
- To apply graph theory based tools in solving practical problems
- To study and develop the concepts of graphs, trees, Eulerian and Hamiltonian graphs.
- To represent graphs in matrix form.
- To understand the concept of planar graph.
- To analyse Chromatic Number, Matching, Covering of the Graph.

UNIT I Introduction- Definition finite and infinite graphs- Incidence and degree-Isolated vertex, null graph- Walk, path and circuits – connected and disconnected graphs -Euler graphs –Operation on graphs – Hamiltonian path and circuits.

(Sections 1.1 to 1.5, 2.4 to 2.9) **(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)**

UNIT II Trees and Fundamental Circuits – Trees – Properties of trees – Pendant vertex in a tree –On counting trees – Spanning tress – Fundamental circuits – Finding all Spanning trees.(Sections 3.1 to 3.9)

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT III Cut sets – Properties of a cut set – All cut sets in a graph – Fundamental circuits and cut sets – Connectivity and separability. (Section 4.1 to 4.5)

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT IV Planner graphs – Kuratowski’s two graphs – Different representations of a planner Graphs – Detection of planarity – Geometric dual. (Section 5.2 to 5.6)

(Contents – 12 Hrs, Assessment – 3 Hrs) (15hrs)

UNIT V Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Coverings – Four color problem. (Section 8.1 to 8.6)

(Contents –12 Hrs, Assessment – 3 Hrs) (15hrs)

TEXT BOOK:

Narsing Deo (1986), “Graph theory with applications to Engineering and computer science”, Prentice-Hall of India Private limited, New Delhi.

REFERENCE BOOKS:

1. Graph Theory – Harary .

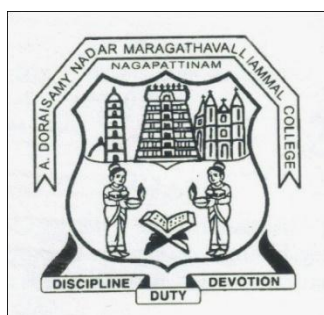
COURSE OUTCOMES:

On completion of the course, students will be able to

- Understand the basic concepts of graphs directed graphs and weighted graphs.
- Classify the graphs according to the properties studied.
- Obtain cutset of a graph and state properties of the cutset
- Describe Kuratowski's two graphs and represents graphs in various matrix forms.
- Understand the coloring of the graph.

A.D.M. COLLEGE FOR WOMEN,(Autonomous)
NAGAPATTINAM
(RE- ACCREDITED WITH ‘A’ GRADE BY NAAC)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS



ALLIED MATHEMATICS
(2019-20 onwards)

A.D.M COLLEGE FOR WOMEN(AUTONOMOUS), NAGAPATTINAM
(Accredited with 'A' Grade by NAAC)
POST GRADUATE AND RESEARCH DEPARTMENT OF MATHEMATICS
ALLIED MATHEMATICS
CHOICE BASED CREDIT SYSTEM

S.No	Semester	Class	Title	Inst. hrs	Credit	Exam hours	Marks		Total marks
							CIA	SE	
1	I	I.B.Sc (C.S)	Algebra and Calculus	6	4	3	25	75	100
2	I	I.B.Sc (I.T)	Algebra and Calculus	6	4	3	25	75	100
3	I	I.B.C.A	Algebra and Calculus	6	4	3	25	75	100
4	I	I.B.Sc., Physics/ Chemistry	Algebra, Numerical methods and Trigonometry	4	3	3	25	75	100
5	I	I.B.Sc., Geology	Algebra, Analytical Geometry (3D) and Trigonometry	4	3	3	25	75	100
6	II	I.B.Sc., Geology/ Chemistry	Calculus and Vector Calculus	6	4	3	25	75	100
7		I.B.Sc., Physics/ Chemistry/ Geology	Differential equations and Transforms	4	3	3	25	75	100
8	II	I.B.Sc (C.S)	Operations Research	4	3	3	25	75	100
9	II	I.B.Sc (I.T)	Operations Research	4	3	3	25	75	100
10	II	I.B.C.A	Numerical methods and Statistics	5	3	3	25	75	100
11	II	I.B.Sc (C.S)	Numerical methods and Statistics	4	3	3	25	75	100
12	II	I.B.Sc (I.T)	Numerical methods and Statistics	4	3	3	25	75	100
13	III	II.B.C.A	Operations Research	6	4	3	25	75	100

Allied Mathematics-I
Algebra and Calculus
I.B.Sc., Computer Science, I.T and I.B.C.A

Internal:25
External:75
Exam Hours:3

Semester:I
No.of Hours/Week:6
Credit:4

Course Objectives:

- To learn the basic concepts in the differential equations.
- To train the students to solve the problems in the Theory of equations.
- To apply the matrix models in Economics, Engineering , Physical, Environmental and Life science.
- To identify the extreme of a function of an internal and classify them as minima, maxima or saddles using the first derivation test
- To develop critical thinking and problem solving skills in content of algebra & calculus.

UNIT I

Theory of equations : Relation between roots and coefficients – transformations of equations – diminishing , increasing and multiplying the roots by a constant – forming equations with the given roots – Descartes’ rule of sign (Statement only) simple problems.
(Content -15 Hrs,Assessment- 3Hrs)(18 Hrs)

UNIT II

Matrices: singular matrices – inverse of a non singular matrix using Adjoint method – rank of a matrix- characteristic equation , Eigen value , Eigen vectors – Cayley Hamilton theorem (proof not needed) simple applications only.
(Content -15 Hrs,Assessment- 3Hrs)(18 Hrs)

UNIT III

Differentiation: Maxima and Minima-concavity ,Convexity- Points of inflexion – Partial Differentiations- Euler’s theorem- Total differential coefficients (proof not needed) simple problems only .
(Content -15 Hrs,Assessment- 3Hrs)(18 Hrs)

UNIT IV

Curvature radius of curvature in Cartesian and polar coordinates- Centre of curvature – Evolutes and involutes.
(Content -15 Hrs,Assessment- 3Hrs)(18 Hrs)

UNIT V

Differential equation : Variable separable – Linear equation – 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^{kx} (ii) $\sin(kx)$ or $\cos(kx)$ (iii) X^n , n being an integer (iv) $e^{kx}f(x)$.
(Content -15 Hrs, Assessment- 3Hrs)(18 Hrs)

TEXT BOOKS

1. T.K.Manichavasagam Pillay and S.Narayanan,1985 , **Algebra volume I** , (unit I), S.V. Publication, Revised edition.
2. T.K. Manichavasagam Pillay and S.Narayanan, 1985 , **Algebra volume II** , (unit II),S.V. Publication, Revised edition.
3. S. Narayanan, T. K. ManichavasagamPillay, 2003 , **Calculus volume I**, (unit III,IV), S. Viswanathan pvt ltd.
4. S. Narayanan, T. K. Manichavasagam Pillay, 2003, **Calculus volume II**, (unit V) , S. Viswanathan Pvt ltd,.

Unit I: Chapter 6 (Section : 11,15,17,18,24)

Unit II: Chapter 2 (section: 7, 8 ,11,12,13,16)

Unit III: Chapter 5 (section: 26, 27), Chapter 6 (section: 28.1 to 28.6)

Unit IV: Chapter 8 (Section : 34.1to 34.6)

Unit V: Chapter 8(Section: 2.1, 2.4), Chapter 9(Section:1 to 4)

COURSE OUTCOMES:

- Develop Critical thinking and problem solving skills in the context of Algebra and Calculus
- Develop an appreciation of Matrix Models in Economics ,Engineering and Physical Environmental and Life science
- Explain the significance of the derivatives and able to apply techniques for the derivatives in Engineering and sciences
- To Find Maxima and Minima , Critical Points and Inflection Points of Function and to determine the concavity of curves
- Solve Basic applications Problems described by second Order Linear Differential equations with constant coefficient

ALLIED MATHEMATICS I
ALGEBRA, NUMERICAL ANALYSIS AND TRIGONOMETRY

(For Geology , Physics and Chemistry Major)

Internal:25
External:75
Exam Hours:3

Semester:I
No.of Hours/Week:6
Credit:4

Course Objectives:

- To study the relation between the roots and coefficients.
- To find the eigen values and eigen vectors of square matrices.
- To know the different types of methods numerically to solve the given data.
- To solve problems using Lagrange's & Newton's interpolation methods.
- To know about Hyperbolic functions.

UNIT I

Relation between the roots and coefficients – Transformation of equations – Diminishing, Increasing, Multiplying the roots – Descartes' rule of signs - Simple Problems.

(12 Hours)

UNIT II

Eigen values and Eigen Vectors - Verifications of Cayley – Hamilton's Theorem – Simple Problems.

(12 Hours)

UNIT III

Solution of Algebraic and transcendental equations – Bisection method – Iteration method – Newton – Raphson method – Simple Problems.

(12 Hours)

UNIT IV

Interpolation – Newton's forward & backward difference interpolation formulae – Interpolation with unevenly spaced intervals – Lagrange's interpolating Polynomial – Divided differences – Newton's General Interpolating formula. (No proof only simple applications of the above formulae).

(12 Hours)

UNIT V

Hyperbolic functions – Relations between hyperbolic functions and circular Trigonometry functions – Inverse hyperbolic functions – Simple problems.

(12 Hours)

Text Books:

1. T.K. Manickavachagam Pillai, T.Natarajan and K.S. Ganapathy, Algebra Vol I (Units I and II), S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 2015.
2. Sastry.S, Introductory methods of Numerical Analysis (Units III and IV), Prentice Hall of India, Third Edition, New Delhi, 2000.
3. T.K. Manickavasagam Pillai and S.Narayanan, Trigonometry (Unit V), S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 7th Edition, 1980.

Reference Books :

1. M.L. Khanna, Theory of Equations, Jai Prakash Nath & Co, Meerut, 11th Edition, 1983.
2. M.K.Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Pvt. Ltd, 2001.
3. S.Arumugam and Thangapandi Issac, Trigonometry & Fourier Series, New Gamma Publishing House, 1999.

Course Outcomes:

On completion of the course, the students will be able

- To find the roots using transformation of equations.
- To find the inverse of a matrix using Cayley Hamilton's theorem.
- To solve the algebraic equations numerically.
- To simplify the complicated functions by various interpolation methods.
- To find the inverse hyperbolic functions and its application.

ALLIED MATHEMATICS II
CALCULUS AND VECTOR CALCULUS
(For Geology, Physics Chemistry Major)

Internal:25
External:75
Exam Hours:3

Semester:I
No.of Hours/Week:6
Credit:4

Course Objectives:

- To differentiate the given functions using Leibnitz's theorem.
- To introduce the notion of curvature, radius of curvature and Jacobians.
- To integrate using Bernoulli's formula.
- To integrate simply by changing the order of the given integration.
- To study the differentiation of vectors.

UNIT I

Differentiation: The n^{th} derivative of standard functions - Leibnitz's Theorem for n^{th} derivative of a product of functions (Statement Only) – Simple Problems.

(18 Hours)

UNIT II

Curvature – Radius of curvature in Cartesian only - Total Differential Coefficients - Jacobians of two and three variables– Simple Problems.

(18 Hours)

UNIT III

Bernoulli's formula – Reduction formula for the integrals $\int \sin^m x \cos^n x \, dx$, $\int x^m (\log x)^n \, dx$ (m, n is a positive integers), $\int e^{ax} \cos bx \, dx$ and $\int e^{ax} \sin bx \, dx$ – Simple Problems.

(18 Hours)

UNIT IV

Integration: Double integrals – Surface area - Changing the order of Integration – Triple Integrals.

(18 Hours)

UNIT V

Vector Differentiation: Gradient – Unit vector normal to the surface – Directional derivatives - Divergence, Curl – Solenoidal and Irrotational - Laplacian operator– Simple Problems.

(18 Hours)

Text Books:

1. T.K. Manickavasagam Pillai and S. Narayanan “ Calculus Vol I” (Units I and II), S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 2011.
- 2 T.K. Manickavasagam Pillai and S. Narayanan “Calculus Vol II” (Unit III and IV), S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 2011.
- 3 T.K. Manickavasagam Pillai and S.Narayanan, “Vector Algebra and Analysis” (Unit V) , S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 1986.

Reference Books:

1. S. Arumugam , Calculus, New Gamma Publishing House, Palayamkottai, 2001.
2. M.L. Khanna, Vector Calculus, Jai Prakash Nath & Co, 13th Edition, 1997.

Course Outcomes:

On completion of the course, the students will be able

- To calculate the n^{th} derivatives of the function
- To sketch curves in Cartesian coordinate systems.
- To apply the reduction formulae for finding integration.
- To find the area by changing the given order of integration.
- To understand the various properties of vector differentiation using Laplacian operator.

ALLIED MATHEMATICS III
DIFFERENTIAL EQUATIONS AND TRANSFORMS

(For Geology, Physics and Chemistry Major)

Internal:25
External:75
Exam Hours:3

Semester:I
No.of Hours/Week:6
Credit:4

Course Objectives:

- To study the concepts of linear equations.
- To study the basic concepts of partial differential equations.
- To know the standard forms of first order equations.
- To understand the concepts of Laplace Transform.
- To find the inverse Laplace transform of the given functions.

UNIT I

Linear equations with constant coefficients Evaluation of particular integral of x^k where k is a positive integer and $e^{ax} f(x)$, where f(x) is any function of x – second order linear equations with variable coefficients– Simple Problems. (12 Hours)

UNIT II

Partial differential Equations – Formation of equations by elimination of constants and arbitrary functions – Definition of General, Particular, Complete and singular integral (Geometrical meaning not expected) – Lagrange’s method of solving the linear equations (Pp+Qq=R)–SimpleProblems. (12 Hours)

UNIT III

Solutions of first order equations of the standard forms $F(p,q)= 0$, $F(x,p,q) = 0$, $F(y,p,q) = 0$, $F(z,p,q) = 0$, $F(x,p)=F(y,q)$ - Clairaut’s form- Simple Problems. (12 Hours)

UNIT IV

Definition – Laplace transform of functions e^{at} , $\cos at$, $\sin at$, t^n where n is a positive integer – Shifting theorems – Laplace transform of $e^{-at} f(t)$ – Laplace transform of $e^{-at} \cos bt$, $e^{-at} \sin bt$ and $e^{-at} f(t)$ – Laplace transform of $f'(t)$ and $f''(t)$ – Simple Problems. (12 Hours)

UNIT V

Inverse transform of standard forms – Application to the solution of ordinary differential equations with constant coefficients involving the above transformations – Simple Problems. (12 Hours)

TEXT BOOK:

T.K.Manickavachagam Pillai and S. Narayanan, Differential Equations, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai,1996.

REFERENCE BOOKS:

1. M.L.Khanna, Differential equations, Jai Prakash Nath & Co,Meerut, 14th Edition.
2. M.K.Venkatraman, Engineering Mathematics (Volume II),National Publication & Co, 1983.

COURSE OUTCOMES:

On completion of the course, the students will be able

- To solve the linear differential equations.
- To find the complete solution of partial differential equations.
- To find the solutions of first order equations of the standard form.
- To find the Laplace transform of the given functions.
- To solve the ordinary differential equations using inverse Laplace transform.

Allied Mathematics-II
Operations Research
I. B.Sc., Computer Science and I.B.Sc., I.T

Internal:25
External:75
Exam Hours:3

Semester:II
No.of Hours/Week:4
Credit:3

Course Objectives:

- To define and formulate linear programming problems and appreciate their limitation.
- To train the students in network problems.
- To train the students to solve the assignment problems, transportation problems.
- To solve LPP using appropriate techniques and optimization solvers.
- To develop mathematical skills to analyzed and solved integer programming and network models arising from a wide range of applications.

UNIT I

Operations Research : Introduction – Nature and Characteristic features of OR- OR and decision making - Linear programming formulations and graphical solution of two variables- Canonical and Standard forms of LPP .

(Content -9 Hrs, Assessment- 3Hrs)(12 Hrs)

UNIT II

Simplex method : Simplex method for $<,=,>$ constraints – Charner’s method of penalties – Two phase simplex method .

(Content -9 Hrs, Assessment- 3Hrs)(12 Hrs)

UNIT III

Transportation problems : Mathematical formulation of the problem – Degeneracy Transportation problem – Transportation Algorithm – Unbalanced Transportation Problem- Assignment algorithm.

(Content -9 Hrs, Assessment- 3Hrs)(12 Hrs)

UNIT IV

Sequencing Problems : Processing of n jobs through two machines – Processing of n jobs and k machines – Processing of 2 jobs and through m machines.

(Content -9 Hrs, Assessment- 3Hrs)(12 Hrs)

UNIT V

Networks: Network – Rules of Network construction – Time calculations in Networks – CPM computation – PERT computation.

(Content -9 Hrs, Assessment- 3Hrs)(12 Hrs)

TEXT BOOKS:

1. “Kanti Swarup , P.K. Gupta and Man Mohan (2002), “**Operations Research** “ by, Sultan Chand and Sons , Educational Publishers , New Delhi.

Unit I:Chapter 1(sec:1.1,1.2,1.7) Chapter 2(sec 2.1 to 2.6)

Unit II:Chapter 3(sec:3.1,3.3,3.5)

Unit III:Chapter 6(sec:6.1,6.2,6.5,6.7 to 6.9)

Unit IV:Chapter 10(sec:10.1 to 10.5)

Unit V:Chapter:21(sec:21.1 21.7)

COURSE OUTCOMES:

- Formulate the given simplified description of a suitable real work problem as a linear programming models in general , standard and canonical forms
- Solve Transportation and assignment Problems
- Know Principles of Construction of Mathematical; Model of Conflicting situations and Mathematical Analysis
- Methods of Operations Research be able to choose rational option in practical decision making problems using standard mathematical models of Operations Research
- Have Skills in Analysis of Operations Research objectives ,Mathematical Methods and Computerized systems

Allied Mathematics-III
Numerical methods and Statistics
I.B.Sc., Computer Science ,I.T and I.B.C.A

Internal:25
External:75
Exam Hours:3

Semester:II
No.of Hours/Week:4
Credit:3

Course Objectives:

- The Objectives of studying this Module are to make the students familiarize with the ways of solving complicated Mathematical Problems Numerically
- To Implement the Numerical Methods in Computational Problems
- The understanding of the several available solutions of equations in one variable \
- Demonstrate the knowledge of Probability and the standard statistical distributions
- Demonstrate the ability to apply linear ,Non linear and Generalized linear Models

UNIT I

Algebraic and transcendental Equations- Bisection method, Iteration method ,Newton-Rapson method-Finite differences-Forward, backward differences- Newton's Forward, Backward Interpolation formula .Lagrange's interpolation Polynomial .

(Content -9 Hrs,Assessment- 3Hrs)(12 Hrs)

UNIT II

Numerical Differentiation and Integration-Trapezoidalrule- Simpson's 1/3 and 3/8 rule.(proof not needed)-Solution of linear system –Direct method- Gauss Elimination method- Solution of linear system-Iterative methods-Gauss Jacobi's and Gauss Seidal methods of iteration.

(Content -9 Hrs,Assessment- 3Hrs)(12 Hrs)

UNIT III

Numerical Solution of Ordinary differential equations- Solution by Taylor's series- Euler's Method- Modified Euler's method- Runge Kutta Second and fourth order methods.

(Content -9 Hrs,Assessment- 3Hrs)(12 Hrs)

UNIT IV

Measures of central Tendency-Arithmetic mean –Median-Mode-Geometric mean-Harmonic mean-Measures of dispersion-range-Quartile deviation –Co-efficient of Variations.

(Content -9 Hrs,Assessment- 3Hrs)(12 Hrs)

UNIT V

Correlations-Karl Pearson's coefficient of correlations- Spearman's rank correlations-Linear regression-Regression coefficients- Simple problems.

(Content -9 Hrs,Assessment- 3Hrs)(12 Hrs)

TEXT BOOKS

1. S.S.Sastry, (1998) , **Introductory Methods of Numerical Analysis**, (For Unit 1,2,3) Third edition by, Prentice Hall of India, New Delhi.
2. Gupta S.C and VK. Kapoor (2002), **Fundamentals of Mathematical statistics**, (For Units 4,5) 11th edition Sulthan Chand & Sons, New Delhi.

Unit-I: Chapter -2: Sections- 2.1,2.2,2.3,2.4,2.5, Chapter -3: 3.1,3.2,3.6,3.9.1

Unit-II: Chapter-5:Sections 5.1,5.2,5.4,5.4.1,5.4.2,5.4.3,Chapter 6: Sec- 6.3.2,6.4

Unit-III: Chapter 7: Sections 7.1,7.2,7.4,7.4.2,7.5

Unit-IV:

Chapter2:Sections2.5,2.6,2.6.1,2.7,2.7.1,2.8,2.9,2.13,2.13.1,2.13.2,2.13.4,2.14.1

Unit-V: Chapter 10: 10.4,10.7,10.7.1,10.7.2,10.7.3 Chapter 11: Sec- 11.2,11.2.1

REFERENCE BOOKS

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).

COURSE OUTCOMES

- To train the students in the numerical problems
- To train the students in solving statistical problems.
- To implement numerical methods
- To apply numerical methods to obtain approximate solutions to mathematical problems.
- To make the students gain wide knowledge in Numerical methods and Statistical

Allied Mathematics-III
Operations Research
II.B.C.A

Internal:25
External:75
Exam Hours:3

Semester:III
No.of Hours/Week:6
Credit:4

Course Objectives:

- To define and formulate linear programming problems and appreciate their limitation.
- To train the students in network problems.
- To train the students to solve the assignment problems, transportation problems.
- To solve LPP using appropriate techniques and optimization solvers.
- To develop mathematical skills to analyzed and solved integer programming and network models arising from a wide range of applications.

UNIT I

Operations Research : Introduction – Nature and Characteristic features of OR- OR and decision making - Linear programming formulations and graphical solution of two variables- Canonical and Standard forms of LPP . (18 Hrs)

UNIT II

Simplex method : Simplex method for $<,=,>$ constraints – Charner’s method of penalties – Two phase simplex method . (18 Hrs)

UNIT III

Transportation problems : Mathematical formulation of the problem – Degeneracy Transportation problem – Transportation Algorithm – Unbalanced Transportation Problem- Assignment algorithm. (18 Hrs)

UNIT IV

Sequencing Problems : Processing of n jobs through two machines – Processing of n jobs and k machines – Processing of 2 jobs and through machines. (18 Hrs)

UNIT V

Networks: Network – Rules of Network construction – Time calculations in Networks – CPM computation – PERT computation. (18 Hrs)

TEXT BOOKS:

1. Kanti Swarup , P.K. Gupta and Man Mohan ,(2002) “Operations Research” Sultan Chand and Sons , Educational Publishers , New Delhi .

Unit I:Chapter 1(sec:1.1,1.2,1.7) Chapter 2(sec 2.1 to 2.6)

Unit II:Chapter 3(sec:3.1,3.3,3.5)

Unit III:Chapter 6(sec:6.1,6.2,6.5,6.7 to 6.9)

Unit IV:Chapter 10(sec:10.1 to 10.5)

Unit V:Chapter:21(sec:21.1 21.7)

COURSE OUTCOMES:

- Formulate the given simplified description of a suitable real work problem as a linear programming models in general , standard and canonical forms
- Solve Transportation and assignment Problems
- Know Principles of Construction of Mathematical; Model of Conflicting situations and Mathematical Analysis
- Methods of Operations Research be able to choose rational option in practical decision making problems using standard mathematical models of Operations Research
- Have Skills in Analysis of Operations Research objectives ,Mathematical Methods and Computerized systems

ALLIED MATHEMATICS I
ALGEBRA, ANALYTICAL GEOMETRY OF 3D, AND TRIGONOMETRY
(For Geology)

Internal:25
External:75
Exam Hours:3

Semester:I
No.of Hours/Week:4
Credit:3

Course Objectives :

- To Include the Knowledge of relation between the roots and coefficients
- To find a inverse of a matrix using Cayley Hamilton theorem
- Understand and use the formulas for surface areas of straight line and sphere
- Solve trigonometric equations in terms of $\sin \theta$, $\cos \theta$
- Solve Problems involving hyperbolic function and inverse hyperbolic functions

UNIT I

Relation between the roots and coefficients – Transformation of equations – Diminishing, Increasing, Multiplying the roots – Descartes’ rule of signs - Simple Problems.
(12 Hrs)

UNIT II

Eigen values and Eigen Vectors - Verifications of Cayley – Hamilton’s Theorem – Simple Problems.
(12 Hrs)

UNIT III

Right Line- Coplanar lines-Conditions for the Coplanarity of lines-Number of arbitrary constants in the equations of the straight line- The Shortest distance between two lines- Spheres-Definitions- The Sphere through four given points-Equations of a Circle.
(12 Hrs)

UNIT IV

Expansion of $\sin \theta$, $\cos \theta$ and $\tan \theta$ – $\sin^n \theta$, $\cos^n \theta$, $\sin^n \theta \cos^m \theta$ – Simple problems.
(12 Hrs)

UNIT V

Hyperbolic functions – Relations between hyperbolic functions and circular Trigonometry functions – Inverse hyperbolic functions – Simple problems.
(12 Hrs)

TEXT BOOKS

1. T.K. Manickavasagam Pillai and S. Narayanan (1985), **Algebra Volume I** (Units I and II)- S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
2. Shanthi Narayanan, Dr.P.K.Mittal, **Analytical solid geometry** ,(Unit III),16th edition S.Chand & Co., New Delhi.
3. T.K. Manickavasagam Pillai and S.Narayanan (1980), “**Trigonometry**” (Unit IV,V), S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai,(1980).

REFERENCE BOOKS :

1. M.L. Khanna (1957) ,Algebra,edition 4 ,Jai Prakash Nath Publications.
2. S. Arumugam and Thanga Pandi Issac, (1999), Trignometry and Fourier series, New gamma Publications.

COURSE OUTCOMES

- To Know the relationships between the sum and product of the roots of quadratic equations and coefficient of the equations
- To Analysis and evaluate the problem solution
- To Recognize three dimensional shapes in the world around them
- Finding trigonometric functions using definition and identities
- Apply the formulas for derivatives and integrals of the hyperbolic and inverse hyperbolic functions