GOVERNMENT ARTS COLLEGE (AUTONOMOUS)

SALEM-7

Reaccredited with B Grade by NAAC
(Affiliated to Periyar University)

B.Sc-MATHEMATICS

Regulations and Syllabus

(Effective from the Academic Year 2022-2023)

DEPARTMENT OF MATHEMATICS

VISION

The Department of Mathematics aims at holistic development through academic excellence, employability, acquisition of analytical skills and higher research.

MISSION

- **To motivate the students in upgrading their interest in contemporary mathematical techniques.**
- **To strengthen the students analytical abilities in the field of mathematics.**
- **To learn new mathematics of their own.**
- **To provide students in General Education mathematics courses with substantive skills in quantitative and abstract reasoning and in the use of mathematics as a computational and analytical tool.**
- **To ignite a passion for learning and teaching at high levels**

II - PROGRAMME SPECIFIC OUTCOMES:

Code	Description
PSO-1	Ability to acquire in-depth knowledge of Algebra, Calculus, Geometry, Differential equations and several other branches of Mathematics. This also leads to study of related areas like Computer science, Physical science, Chemical science and Life science. Thus, this Program helps learners in building a solid foundation for higher studies in Mathematics.
PSO-2	The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilized in modelling and solving real life problems.
PSO-3	Prepare and motivate students for research studies in mathematics and related fields.
PSO-4	Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.
PSO-5	Provide knowledge of a wide range of mathematical techniques and application of mathematical methods in other scientific and engineering domains.
PSO-6	Ability to communicate mathematics effectively by written, computational and graphic means.
PSO-7	Create mathematical ideas from basic axioms.
PSO-8	Ability to apply multivariable calculus tools in Physics, Economics, Optimization and understanding the architecture of curves and surfaces in plane and space etc..
PSO-9	Able to present Mathematics clearly and precisely, make vague ideas precise by formulating them in the language of mathematics.
PSO-10	Describe mathematical ideas from multiple perspectives and explain fundamental concepts of Mathematics to non-mathematicians.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), SALEM-636007

Course Structure for B.Sc. Programme

(For the candidates admitted from the academic year 2022-2023 onwards under CBCS)

Department of Mathematics

Part	Category	No. of Courses	Total Credits
I	Tamil	4	12
II	English + Communicative English	2+2	12
III	Core Course	16	**66**
III	Core Practical	-	**-**
III	Allied Theory	4	16
III	Allied Practical	2	**6**
III	Major Based Elective Course(MBEC)[1]	4	16
IV	Skill Enhancement Course(SEC)	4	8
IV	Non-Major Elective Course*** (**NMEC**)**[2]	2	4
IV	Ability Enhancement Compulsory Course(AECC)[3]	2	4
IV	Ability Enhancement Elective Course **MT**(AEEC)[4]	1	2
IV	Professional English (Mandatory)[5]	2	4
V	Extension Activity (ELECTIVE)[6]	1	2
	PART-III TOTAL CREDITS - 104		
	TOTAL	**46**	**152**

Total marks = 4500

S. No	Part	Course code	Course Name	Hours	Credits	Marks		Max
						IA	SE	
SEMESTER – I								
1	I	22FTL01	Language – I :	5	3	25	75	100
2	II	22FEL01	Communicative English-I	5	3	25	75	100
3	III	22UMT01	Core Course I : Classical Algebra and Trigonometry	4	4	25	75	100
4	III	22UMT02	Core Course - II: Differential Calculus	4	4	25	75	100
5	III	22APY01	Allied – I- Course I : Physics-I	5	4	25	75	100
6	III	22APYP1	Allied – I-Practical : Physics	3	--	--	--	--
7	IV	22AECC1	AECC –I: Value Based Education	2	2	25	75	100
8	IV	22UPE01	Professional English-I	2	2	50	--	50
TOTAL				**30**	**22**			**650**
SEMESTER – II								
1	I	22FTL02	Language –II :	5	3	25	75	100
2	II	22FEL02	Communicative English-II	5	3	25	75	100
3	III	22UMT03	Core Course III : Analytical Solid Geometry	4	4	25	75	100
4	III	22UMT04	Core Course IV: Integral & Vector Calculus	4	4	25	75	100
5	III	22APY02	Allied – I- Course II : Physics-II	5	4	25	75	100
6	III	22APYP1	Allied – I -Practical: Physics	3	3	40	60	100
7	IV	22AECC2	AECC-II: Environmental Studies	2	2	25	75	100
8	IV	22UPE02	Professional English-II	2	2	50	--	50
TOTAL				**30**	**25**	**--**	**--**	**750**
CUM-TOTAL					**47**			**1400**

SEMESTER – III								
1	**I**	22FTL03	Language – III :	5	3	25	75	100
2	**II**	22FEL03	Foundation English – I:	5	3	25	75	100
3	**III**	22UMT05	Core Course V : Differential Equations	4	4	25	75	100
4	**III**	22UMT06	Core Course VI : Statics	4	4	25	75	100
5	**III**	22AST01	Allied – II- Course I: Mathematical Statistics -I	5	4	25	75	100
6	**III**	22ASTP1	Allied – II –Practical: Mathematical Statistics	3	--	--	--	-
7	**IV**	22UMTS1	Skill Enhancement Course I: Basic Algebra	2	2	25	75	100
8	**IV**	22UMTN1	Non-Major Elective Course I: (From other Departments)	2	2	25	75	100
9	**V**	**22EXAT1**	**Extension(Community Service)* : National Cadet Corps**	**0(Self Study)**	**2**		**100**	**100**
		22EXAT2	**Extension(Community Service)* : National Social Service**					
		22EXAT3	**Extension(Community Awareness)* : Indian Heritage and Culture**					
		22 EXAT4	**Extension(Community Awareness)* : Public Health and Personal Hygiene**					
TOTAL				**30**	**24**			**800**
CUM-TOTAL					**71**			**2200**
SEMESTER – IV								
1	**I**	22FTL04	Language – IV	5	3	25	75	100
2	**II**	22FEL04	Foundation English – II	5	3	25	75	100
3	**III**	22UMT07	Core Course VII : Integral transforms and Fourier Series	4	4	25	75	100
4	**III**	22UMT08	Core Course VIII: Dynamics	4	4	25	75	100
5	**III**	22AST02	Allied – II-Course-II : Mathematical Statistics	5	4	25	75	100

6	**III**	22ASTP1	Allied – II – Practical: Mathematical Statistics	3	3	40	60	100
7	**IV**	22UMTS2	Skill Enhancement Course II: Sequences and Series	2	2	25	75	100
8	**IV**	22UMTN2	Non-Major Elective Course - II : (From other Departments)	2	2	25	75	100
9	**IV**	**22AEEC1**	**Ability Enhancement Elective Course I : Gandhian Thoughts**	**0(Self Study)**	**2**		**100**	**100**
		22AEEC2	**Ability Enhancement Elective Course I : Human Rights**					
		22AEEC3	**Ability Enhancement Elective Course I: Business Startup Fundamentals**					
		22AEEC4	**Ability Enhancement Elective Course I : Professional Ethics & Cyber Netiquette**					
TOTAL				**30**	**27**			**900**
CUM-TOTAL					**98**			**3100**
SEMESTER – V								
1	**III**	22UMT09	Core Course IX : Abstract Algebra - I	5	5	25	75	100
2	**III**	22UMT10	Core Course X : Real Analysis - I	5	4	25	75	100
3	**III**	22UMT11	Core Course XI : Complex Analysis-I	5	4	25	75	100
4	**III**	22UMT12	Core Course XII: Operations Research - I	5	4	25	75	100
5	**III**	22UMTM1	Major Based Elective I : Numerical Methods - I	4	4	25	75	100
		22UMTM2	Major Based Elective I: Astronomy- I					
6	**III**	22UMTM3	Major Based Elective II : Discrete Mathematics	4	4	25	75	100
		22UMTM4	Major Based Elective II: Programming in 'C' (Theory)					
7	**IV**	22UMTS3	Skill Enhancement Course III : Quantitative Aptitude - I	2	2	25	75	100
TOTAL				**30**	**27**			**700**

CUM-TOTAL					**125**			**3800**
SEMESTER – VI								
1	**III**	22UMT13	Core Course XIII : Abstract Algebra - II	5	5	25	75	100
2	**III**	22UMT14	Core Course XIV : Real Analysis - II	5	4	25	75	100
3	**III**	22UMT15	Core Course XV: Complex Analysis-II	5	4	25	75	100
4	**III**	22UMT16	Core Course – XVI : Operations Research - II	5	4	25	75	100
5	**III**	22UMTM5	Major Based Elective III : Numerical Methods - II	4	4	25	75	100
		22UMTM6	Major Based Elective III : Astronomy- II					
6	**IV**	22UMTM7	Major Based Elective IV: Graph Theory	4	4	25	75	100
		22UMTPR	**Project Work**					
7	**IV**	22UMTS4	Skill Enhancement Course IV : Quantitative Aptitude - II	2	2	25	75	100
TOTAL				**30**	**27**			**700**
CUM-TOTAL					**152**			**4500**

SEMESTER I

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMT01	**CLASSICAL ALGEBRA AND TRIGONOMETRY**	**55**	**5**	**-**	**4**

OBJECTIVES

This course introduces fundamental concepts such as matrix, theory of equations & vector calculus. It covers concepts such as Partial fractions Binomial, Exponential, Logarithmic Series, Symmetric, Skew Symmetric, Hermitian, Skew Hermitian, Orthogonal, Unitary matrices, Rank of a Matrix, consistency of Equations, Eigen values and Eigen vectors, Cayley – Hamilton theorem, Theory of equations and Trigonometry. It provides technical skills to understand and develop various applications.

LEARNING OUTCOMES:

After the completion of the chapters the students are expected to

- Be capable of identifying algebraic eigen value problem and the eigen value SOLUTIONS in certain cases.
- Have learnt the basic ideas of roots, the relation between roots and co-efficients which frequently occur in scientific and engineering works.
- Have learnt the ideas of transformation of equation into another whose roots bear with the roots of the original equation which can be solved easily.
- Have learnt various applications of De Moivre's theorem such as expansion of $\sin n\theta, \cos n\theta, \tan n\theta$, expansion of $\sin^n \theta$, $\cos^n \theta, \sin^m \theta \cos^n \theta$ in terms of θ.

SYLLABUS

Unit I

Characteristic equation – Characteristic roots and characteristic vectors – Properties – problems - Cayley Hamilton theorem (Statement only) - Applications of Cayley Hamilton theorem – problems.

Chapter 6:

Unit II

Theory of equations - Fundamental theorem in the theory of equations – Relation between roots and co-efficients – Imaginary and Irrational roots.

Chapter 7:

Unit III

Reciprocal equations - Transformation of equation – Multiplication of roots by m – Diminishing the roots of an equation – Removal of a term.

Chapter 7:

Unit IV

Expansions of $sinn\theta, cosn\theta, tann\theta$ Expansions of $sin^n\theta, cos^n\theta$. $sin^n\theta\ cos^n\theta$ – Chapter 11:

Unit V

Hyperbolic and Inverse Hyperbolic functions – Properties – Problems.

Chapter 11:

TEXT BOOKS:

1. P.R. Vital, Algebra, Analytical Geometry and Trigonometry, year of publication 2000, Margham Publications.

REFERENCE BOOKS

1. N.P. Bali, Trigonometry, Year of publication 1994.
2. T.K. Manicka vasagam pillai and S. Narayanan, Algebra (Vol I)Year of Publication 2004. Vijay Nicole Imprints Pvt. Ltd.,
3. T.K. Manicka vasagam pillai and S. Narayanan, Trigonometry, Year of publication 2004.Vijay Nicole Imprints Pvt. Ltd.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com

3. wiki.answers.com

ASSIGNMENTS

Problems can be given in the following topics:

1. Expansions of trigonometric functions.
2. Hyperbolic and Inverse Hyperbolic functions
3. Matrices.

GROUP TASKS

1. Try to find the applications of theory of equations and give a presentation.

2. Get a physical eigen value problem and give a presentation.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Identify the logic behind the execution of various Characterizations in Matrices and Partial fractions Binomial, Exponential, Logarithmic Series.	Remember
CO2	Understand the concepts of Eigen values, vectors, rank and Hamilton theorems.	Knowledge
CO3	Analyze and discover the Theory of equations.	Apply
CO4	Develop the idea about trigonometry and its problem.	Understand
CO5	Apply the concepts to solve hyperbolic function	Understand

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	M	M	S	M	S	M	S	M
CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	L	M	M	S	-	S	L
CO4	M	L	S	M	S	L	M	-	S	L
CO5	S	L	M	M	S	M	M	-	M	M

SEMESTER I

Course code	Course name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT02	**Differential Calculus**	**50**	**10**	**-**	**4**

OBJECTIVES

Calculus is a study of how things change. It provides a frame work for modeling system in which there is a change and a way to deduce the predictions of such models. The course is a prerequisite for the students to learn further topics of Mathematics in their higher semesters.

LEARNING OUTCOMES

After the completion of the chapters the students are expected to

- Have learnt the method of finding nth derivative and to use Leibnitz theorem
- Have understood effectively the geometrical aspects of curvature, radius of curvature, involutes, evolutes of plane curves which are essential and elegant applications of differential calculus.
- Have understanding in handling functions of more than one variable for finding the maxima and minima of functions of two variables and Lagrange's multipliers for finding maxima and minima along with the given constants.
- Have sound knowledge on calculating Angle between radius vector and tangent, angle of intersection of two curves.
- Have learnt the various methods of finding Asymptotes for a curve.

SYLLABUS

UNIT I

Successive Differentiation – nth derivative of standard functions – Leibnitz theorem (without proof) – problems.

Chapter : 1 and 2

UNIT II

Curvature and Radius of curvature in Cartesian and polar co-ordinates – envelopes – evolutes.

Chapters: 6, 8 and 9

UNIT III

Total differential co-efficient – Implicit functions – Jacobian – maxima and minima of functions of two variables – Lagrange's multiplier methods.

Chapter : 3

UNIT IV

Polar co-ordinates – Angle between radius vector and tangent - angle of intersection of two curves – Length of perpendicular from the pole of the tangent.

Chapter : 5

UNIT V

Asymptotes – working rule for finding asymptotes - Asymptotes parallel to axes of co-ordinates – Another method of finding asymptotes(factor method) – asymptotes by inspection – Intersection of a curve and its asymptotes (Problems only).

Chapter : 7

TEXT BOOKS

1. P.R. Vittal and V.Malini, Calculus, year of publication 2000. Margham Publications.

REFERENCE BOOKS

1. S. Narayanan & T.K. Manica vachagom Pillay, Calculus, Volume – I, Year of publication 2004, Vijay NicholeImprints Private Limited, Chennai.
2. D. Sudha, Calculus, year of Publication 1988, Emerald Publishers.

WEB RESOURSES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

COURSE OUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have learnt the method of finding nth derivative and to use Leibnitz theorem	Apply
CO2	Have understood effectively the geometrical aspects of curvature, radius of curvature, involutes, evolutes of plane curves which are essential and elegant applications of differential calculus.	Understand
CO3	Have understanding in handling functions of more than one variable for finding the maxima and minima of functions of two variables and Lagrange's multipliers for finding maxima and minima along with the given constants.	Apply
CO4	Have sound knowledge on calculating angle between radius vector and tangent, angle of intersection of two curves.	Remember
CO5	Have learnt the various methods of finding Asymptotes for a curve.	Apply

MAPPINF WITH PROGRAMMING OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	-	M	M	M	S	S	S	S	S
CO2	S	L	L	M	L	M	S	S	M	L
CO3	S	M	-	S	M	S	S	S	M	S
CO4	S	M	L	M	L	M	S	S	M	M
CO5	S	L	M	S	L	M	M	S	M	M

S- Strong; M-Medium; L-Low

SEMESTER II

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMT03	**ANALYTICAL SOLID GEOMETRY**	**55**	**5**	**-**	**4**

OBJECTIVES

This course contains Analytical Solid Geometry enhances the concept of visualizing ideas in three dimensions. The course is a prerequisite for the students to learn further topics of Mathematics in their higher semesters.

LEARNING OUTCOMES:

After the completion of the chapters the students are expected to

- Have gained knowledge about the regular geometrical figures and their properties.
- Have learnt the equations of a plane, Straight line, sphere, cone and cylinder which would be encountered by them in higher semesters.

SYLLABUS

Unit I: Plane

First degree equation – Determination of a plane – Plane perpendicular to a given direction – Planes parallel to given lines and through given points – Equation $P + \lambda P' = 0$ – Second degree homogeneous equation – Co-planarity of the lines through a point – Perpendicular to a plane – position of points with reference to a plane – Bisector planes of the angles between two given planes – Volume of a tetrahedron – Sums

Chapter 3: Sections 3.1 to 3.12 (Vector methods is to be excluded)

Unit II: Straight Line

Equations of a straight line – Symmetrical form- Conditions for various situations of a line – Co-planarity of the two lines - Sums

Chapter 4: Sections 4.1 and 4.2 (vector methods is to be excluded)

Unit III: Straight Line (continued)

Angle between a plane and a line – Projection of a line – Image of a point in a plane – Projection and image of a line in a plane – Perpendicular drawn to a line – Shortest distance between two skew lines – Foot of a common perpendicular – Equation of a plane containing the shortest distance – Line intersecting a given line - Lines of intersection of three planes – Equations of two given skew lines - Surface generated by a straight line - Sums

Chapter 4: Sections 4.3 to 4.11 (Vector methods is to be excluded)

Unit IV: Sphere

Equation of a sphere – Standard equation of a sphere – Results based on the properties of a sphere - Tangent plane to a sphere – Radical plane – Equations of a circle – Equations $S + \lambda P = 0$ and $S + \lambda S' = 0$ - Sums

Chapter 5: Sections 5.1 to 5.8 (Vector methods is to be excluded)

Unit V: Cone and Cylinder

Cone – equation of a cone — cone whose vertex is at the origin – Quadric cone with vertex at the origin –Intersection of a cone by a plane - Three mutually perpendicular generators – General quadric cone – Cylinder – Equation of a cylinder - Quadric surfaces – Sums

Chapter 6 : Sections 6.1 to 6.8, 6.13 (Vector methods is to be excluded)

TEXT BOOKS:

1. Duraipandian . P, Laxmi Duraipandian, Muhilan. D, "Analytical Geometry – 3 Dimensional", Emerald publishers, Edition1998

REFERENCE BOOKS

1. Shanti Narayanan & Mittal P. K, " Analytical Solid Geometry", 16th edition, S. Chand & Co., New Delhi
2. P.R. Vittal, Vector Analysis, Analytical geometry & sequences and series, Margham Publications.
3. D. Sudha, Calculus, year of Publication 1988, Emerald Publishers.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com

3. wiki.answers.com

ASSIGNMENTS

Problems can be given in the following topics:

1. Plane 2. Sphere 3. Straight Line

GROUP TASKS

1. Identify an application of regular geometrical figures and explain the same.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have a clear idea about the regular geometrical figures and their properties.	Remember
CO2	Understanding the concept of Conditions for various situations of a line and Co-planarity of the two lines	Understand
CO3	Analyze the concept of Projection and image of a line in a plane	Understand
CO4	Develop the idea about Results based on the properties of a sphere and Tangent plane to a sphere.	Analyze
CO5	Understanding the concept of Intersection of a cone by a plane and Three mutually perpendicular generators	Analyze

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	S	L	M	M	L	S	S	S
CO2	M	S	L	M	S	L	M	S	S	L
CO3	M	M	L	S	M	S	S	M	S	M
CO4	S	M	M	S	S	L	S	M	S	S

CO5	M	M	S	M	S	L	S	M	M	M

SEMESTER II

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT04	**INTEGRAL AND VECTOR CALCULUS**	**55**	**5**		**4**

OBJECTIVES

Integral Calculus is a study of how things change. It provides a frame work for modelling system in which there is a change and a way to deduce the predictions of such models. The course is a pre-requisite for the students to learn further topics of Mathematics in their higher semesters.

LEARNING OUTCOMES

After the completion of the chapters the students are expected to

- Have learnt the methods of double and triple integration which are needed in higher studies in other areas along with the confidence to handle integrals of higher orders.
- Have studied the basics of vector calculus comprising of gradient, divergence and curl which is mostly used in the study of solenoidal and irrotational fields in physics.
- Have learnt the application of line integrals which represent the workdone in mechanics. Also surface and volume integrals and the classical theorems involving line, surface and volume integrals which would be encountered by them in higher semesters.

SYLLABUS

UNIT I

Bernoulli's formula for integration by parts – Beta and Gamma functions- Properties – Relation between Beta and Gamma functions – Evaluation of definite integrals using Beta and Gamma functions – Problems.
Chapter 11 & 13[1]

UNIT II

Double integrals –Double integrals in polar co-ordinates - Triple integrals – Problems.
Chapter 17 [1]

UNIT III

Change of order of integration – Application of Double and Triple Integrals to Area, Volume and Centroid.

Chapter 17 [1]

UNIT IV

Vector differentiation – Gradient, Curl and Divergence of a Scalar and vector point function – Directional derivative of a scalar point function - Unit normal vector - Divergence and Curl of a vector POint function – Definitions – Solenoidal and irrotational vectors – problems.
Chapter 28 [2]

UNIT V

Line integrals – Surface integrals - Volume integrals - Gauss divergence theorem, Stoke's theorem, Green's theorem (statement only) – problems.

Chapter 29 [2]

TEXT BOOKS:

1. P.R. Vittal and V.Malini, Calculus, year of publication 2000. Margham Publications.
2. P.R. Vittal and V.Malini, Allied Mathematics, year of publication 2000. Margham Publications.(Unit IV and Unit V only)

REFERENCE BOOKS

1. S. Narayanan& T.K. ManicavachagomPillay, Calculus, Volume – II & III, Year of publication 2004, Vijay Nichole Imprints Private Limited, Chennai.
2. P.R. Vittal, Vector Analysis, Analytical geometry & sequences and series, Margham Publications.
3. D. Sudha, Calculus, year of Publication 1988, Emerald Publishers.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS

Problems can be given in the following topics:

1. Vector integration.
2. Changing the order of integration.

GROUP TASKS

1. Identify an application of line integrals in physics and explain the same.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have learnt about Beta, Gamma functions and their relations, Reduction formula and Evaluation of definite integrals.	Remember
CO2	Have learnt the methods of double and triple integration which are needed in higher studies in other areas along with the confidence to handle integrals of higher orders	Apply
CO3	Have learnt the methods of double and triple integration which are needed in higher studies in other areas along with the confidence to handle integrals of higher orders	Apply
CO4	Have studied the basics of vector calculus comprising of gradient, divergence and curl which is mostly used in the study of solenoidal and irrotational fields in physics.	Understand
CO5	Have learnt the application of line integrals which represent the work done in mechanics. Also surface and volume integrals and the classical theorems involving line, surface and volume integrals which would be encountered by them in higher semesters.	Analyze

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	S	S	M	S	M	S	M	S
CO2	S	L	S	S	M	S	M	S	M	S
CO3	S	L	M	S	M	S	M	S	M	S
CO4	S	M	M	S	M	M	M	S	M	M

CO5	S	M	M	S	M	M	M	S	M	M

SEMESTER III

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT05	**DIFFERENTIAL EQUATIONS**	**55**	**5**	**-**	**4**

OBJECTIVES

Many of the general laws of nature in Physics, Chemistry, Biology and Astronomy can be expressed in the language of differential equations and hence the theory of differential equations is the most important part of Mathematics for understanding Physical Sciences. Hence on completion of the course the students are expected to have learnt the method of solving systems of differential equations of certain types that they might encounter to their higher studies.

LEARNING OUTCOMES

After completion of these chapters the student are expected to

a. Have learnt the solution procedure for Ordinary Differential Equations of first order and higher degree and also a solution methodology for linear differential equation with constant co-efficients.

b. Have learnt the solution methodology for solving second order differential equations with variable co-efficients and total differential equations.

c. Have learnt the solution of differential equations whose solution cannot be expressed in terms of polynomials, rational functions, exponentials, trigonometric functions etc. can be obtained in terms of power series.

d. Have confidence in forming a Partial Differential Equation by eliminating the arbitrary constants and functions. Also to describe various methods of finding the solution to first order non linear PDE.

e. Have learnt the method of solving Clairaut's equation, Charpits method and Lagrange's equation and the solution methodology for higher order PDE.

SYLLABUS

UNIT I

Differential Equations – Equations of first order and higher degree – Equation solvable for p – Solvable for y – Solvable for x – Clairaut's equation. Second order differential equations with constant co-

efficient – Particular integrals of $e^{ax}, x^m, \sin ax, \cos ax, e^{ax}V$, where V is any function of x, $x^m(\sin ax \ or \ \cos ax)$ - problems.

Chapter 1(B), Chapter 2:

UNIT II

Second order Differential Equations with variable coefficients – variation of parameters – problems in all the above sections – Total differential equation $Pdx + Qdy + Rdz = 0$ – Condition for integrability – problems.

Chapter 3, Chapter 4:

UNIT III

Solutions of differential equations by power series method – power series – Frobenius Method.

Chapter 9:

UNIT IV

Formation of Partial differential equations by eliminating arbitrary constants and arbitrary functions – Non-linear differential equations of first order – Definition – Complete, Particular, Singular and general integrals – Solutions of the Partial Differential Equations of Standard types - Clairaut's equation.

Chapter 5:

UNIT V

Charpit's method - Solving Lagrange's equation – Problems – Partial Differential Equation of higher order – Homogeneous linear equation – Non- homogeneous linear equation.

Chapter 5[1], Chapter 2[2]: (Section 2.17 to section 2.22)

TEXT BOOKS:

1. P.R. Vittal, Differential Equations, Fourier and Laplace Transforms, Probability – Year of Publication 2000, Margham Publications, 24, Rameshwaram Road, T.Nagar, Chennai – 600 017.
2. Kandasamy, Gunavathi&Thilagavathy – Engineering Mathematics – III, Year of Publication 1996,Emerald Publishers. 135, Anna Salai, Chennai – 600 002.(For Unit V chapter:2 only)

REFERENCE BOOKS

1. S.Narayanan and Manickavasagampillai, Differential equations and its applications, Year of publication 2004, Vijay Nicole Imprints Pvt Ltd.
2. A. Singaravelu – Differential Equations and Laplace Transforms – Year of Publication 2002.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS

Problems can be given in the following topics:

1. Solutions of differential equations by power series method
2. Charpit's method and Solving Lagrange's equation

GROUP TASKS

1. Identify an application of Homogeneous linear equation and Non- homogeneous linear equation.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have learnt the methods to solve equations of first order and higher degree ,second order differential equations with constant coefficients, complementary function and particular Integral.	Apply
CO2	An ability to solve second order differential equations with variable coefficients, total differential equations and the method of variation of parameters.	Understand
CO3	Have knowledge in finding the solutions to differential equations using power series method and frobenius method.	Remember
CO4	Have learnt the procedure in the formation of partial differential equations by eliminating the arbitrary constant and arbitrary functions and to solve Partial Differential Equations .	Apply
CO5	Have the ability in finding the solutions to partial differential equations using Charpit's method and Lagrange's method and knowledge in solving partial differential equations of higher order.	Understand

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	S	S	M	M	M	S	S	S	M
CO2	S	S	S	M	M	M	M	M	S	M
CO3	S	S	M	M	L	S	S	M	S	M
CO4	S	S	M	S	S	S	M	M	S	M
CO5	S	S	S	M	M	L	M	L	S	L

SEMESTER III

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT06	**STATICS**	**55**	**5**	**-**	**4**

OBJECTIVES

This course contains the nature of forces acting on a surface, friction and centre of gravity. To realize the nature of forces acting on a particle especially static and dynamic forces.

LEARNING OUTCOMES:

After the completion of the chapters the students are expected to

- Realize the nature of forces and resultant forces when more than one force acting on a particle.
- Realize the concept about the forces, resultant force of more than one force acting on a surface, friction and centre of gravity.
- Differentiate static and dynamic forces.

SYLLABUS

UNIT I

Forces acting at a point – Parallelogram law –Triangle law – Converse of triangle law – polygon law of forces – Lami's theorem.

Chapter 2: Sections 1 to 9

UNIT II

An extended form of the parallelogram law of forces: Theorem – Resolution of forces – Components of a force – Resultant of any number of coplanar forces acting at a Point – Graphical method – Analytical method - Conditions of equilibrium.

Chapter 2: Sections 10 to 12, 14 to 16

UNIT III

Parallel forces and moments – Resultant of two parallel forces (Like and Unlike) – Conditions of equilibrium of three coplanar forces – Moment of a force – Geometrical representation – Sign of the moment – Unit of Moment – Varignon's theorem of moments - Couples – Equilibrium of two Couples – Equivalence of two Couples.

Chapter 3: Sections 1 to 12 &Chapter 4 Sections 1 to 3

UNIT IV

Co-planar forces acting on a rigid body – Reduction of any number of coplanar forces – Reduction of a system of forces to a single force or to a couple – Equation to the line of action of the resultant – Necessary and Sufficient conditions of equilibrium only.

Chapter 6: Sections 1 to 10

UNIT V

Centre of gravity (using integration only) – Equilibrium of Strings and Chains – Equation of the common Catenary – Definitions – Tension at any Point – Geometrical properties of the common Catenary.

Chapter 8: Sections 18 &Chapter 11: Sections 1 to 6

TEXT BOOKS:

1. Venkataraman.M.K., "Statics" , Year of publication 2007,Agasthiar Publications, Trichy.

REFERENCE BOOKS

1. Dharmapadam.A.V., "Statics" S. Viswanathan Printers and Publishing Pvt. Ltd., 1993.
2. Duraipandian.P and Laxmi Duraipandian, "Mechanics" S. Chand & Company Ltd., Ram nagar, New Delhi – 55, 1985.

WEB RESOURCES

1. *en.wikipedia.org/wiki/*
2. *.mathworld.wolfram.com*
3. *wiki.answers.com*

ASSIGNMENTS

Problems can be given in the following topics:

1. Laws of forces and Lami's theorem
2. Graphical method and Analytical method
3. Moments and Couples
4. Coplanar forces acting on a rigid body
5. Strings, Chains and common Catenary

GROUP TASKS

1. Solve the problems in Coplanar forces.

2. Find outwhere the Strings, Chain and Catenary are used in real life.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have a clear idea about Law of forces and their properties.	Remember
CO2	Understanding the concept of coplanar forces using graphical and analytical method	Understand
CO3	Analyze the concept of Equilibrium of three forces , moments and couples.	Understand
CO4	Develop the idea about Friction laws and its properties.	Analyzing
CO5	Understanding the catenary and its common properties and its real life problems.	Analyzing

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	S	S	M	M	M	S	S	S
CO2	S	S	S	M	S	L	M	S	S	L
CO3	M	M	M	S	M	S	S	M	S	M
CO4	S	M	M	S	S	L	M	M	S	S

CO5	M	M	S	M	S	L	S	M	M	M

SEMESTER IV

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT07	**INTEGRAL TRANSFORMS AND FOURIER SERIES**	**55**	**5**		**4**

OBJECTIVES

The transforms such as Laplace Transform, Fourier Transform are widely used in the theory of communication engineering, wave propagation and other branches of applied Mathematics. Fourier series find its application with the study of vibration and heat diffusion.

LEARNING OUTCOMES

After completion of these chapters the student are expected to

a. Have a sound knowledge of Laplace Transform and itsproperties.

b. Have sufficient exposure to get the solution of certain linear differential equation using Laplace Transform and inverse LaplaceTransform.

c. Have an idea of periodic function and come to know how to expand the given functions as aseries of sines and cosines which are simple periodicfunctions.

d. Have an idea of Fourier Transform and its properties which can be applied in future for solving Partial Differential equations by reducing the number of independent variable byone.

SYLLABUS

UNIT I Laplace Transform

Laplace transforms – Definition and properties– Elementary theorems with proof – Periodic function - Problems.

Chapter 7: Sections 1 to 3

UNIT II Inverse Laplace Transform

Inverse Laplace transforms – Standard formulae – Elementary theorems problems – Applications to solving second order differential equations with constant coefficients - Application to solving first order simultaneous differential equations.

Chapter 7: Sections 4 & 5

UNIT III Fourier Series

Fourier series – Definition – To find the Fourier coefficients of periodic functions of period 2π – Fourier Series for odd and even functions – Half range Fourier series – problems. (For the intervals 0 to 2π & $-\pi$ to $+\pi$)

Chapter: 6

UNIT IV Fourier Series

Change of Interval $(0,2l)$ – Even and odd functions – Half range sine and cosine series - Simple problems.

Chapter: 6

UNIT V Fourier Transform

Fourier integral theorem (Statement only) – Complex Fourier Transform and its inversions - Properties of Fourier transforms – Linearity property – Change of scale – Shifting property – Sine and cosine transforms - Properties - Simple problems.

Chapter: 8

TEXT BOOKS:

1. P.R. Vittal, Differential Equations, Fourier and Laplace Transforms, Probability – Year of Publication 2000, Margham Publications, 24, Rameshwaram Road,T.Nagar,Chennai – 600 017.

REFERENCE BOOKS

1. T.K. Manickavasagampillai and S. Narayanan: Calculus (Vol III) – Year of Publication 2004.Vijay Nicole Imprints Pvt Ltd, # C-7 Nelson Chambers, 115, Nelson Manickam Road, Chennai – 600029

2. K. Shankar Rao: Introduction to partial differential equations – (Pp-278 to 291) – Year of Publication 1997. Prentice Hall India – New Delhi – 110001.

WEB RESOURCES

1. en.wikipedia.org/wiki/Z-transform
2. en.wikipedia.org/wiki/Laplace transform

3. mathworld.wolfram.com
4. wiki.answers.com

ASSIGNMENTS

Problems can be given in the following topics:
Solving differential equations using Laplace Transform.

1. Solving difference equations using Z transform.
2. Fourier transform.

GROUP TASKS

1. In control engineering and control theory the transfer function is derived using the Laplace transform. Get an example from control theory and make a presentation.
2. Make a comparison between the transforms Laplace, Fourier and Z-transform.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have a sound knowledge of Laplace Transform and its properties	Remember
CO2	Have sufficient exposure to get the solution of certain linear differential equation using Laplace Transform and inverse Laplace Transform.	Apply
CO3	Have an idea of periodic function and come to know how to expand the given functions as a series of sines and cosines which are simple periodic functions.	Apply
CO4	Have an idea of change of integral and half range sine and cosine series.	Apply
CO5	Have known Complex Fourier Transform and its inversions and Properties of Fourier transforms	Apply

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	M	S	L	M	S	S	S	M

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

SEMESTER IV

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMT08	**DYNAMICS**	**55**	**5**	**-**	**4**

OBJECTIVES

This course provides the knowledge about the field of Kinematics, Projectiles, Simple harmonic motion and impact of a particle on a surface.

LEARNING OUTCOMES

After the completion of the chapters the students are expected to

- Apply laws, Principles, postulates governing the Dynamics in physical reality.
- Understand the reason for dynamic changes in the body.

SYLLABUS

UNIT I Projectiles

Definitions - Path of a projectile – Greatest height – Time of flight – Horizontal range – Range on an inclined plane through the Point of projection – Maximum range.

Chapter 6: Sections 6.1 to 6.6, 6.12 to 6.15

UNIT II Central Orbits

Velocity and Acceleration in polar co-ordinates – Differential equation of central orbits – Pedal equation of central orbit - Velocities in a central orbit.

Chapter 11: Sections 11.1 to 11.10

UNIT III Simple Harmonic Motion

Amplitude - Periodic time - Composition of two simple harmonic motions of the same period in a straight line and in two perpendicular lines.

Chapter 10: Sections 10.1 to 10.7

UNIT IV Collision of Elastic Bodies

Definitions – Newton's Experimental law – Principle of conservation of momentum – Impact of a smooth sphere on a smooth fixed plane – Direct impact of two smooth spheres – Loss of Kinetic energy due to direct impact of two smooth spheres

Chapter 8: Sections 8.1 to 8.6

UNIT V **Collision of Elastic Bodies (Continuation)**

Oblique impact of two smooth spheres – Loss of Kinetic energy due to oblique impact of two smooth spheres – Compression and Restitution – Impact of a particle on a rough plane

Chapter 8: Sections 8.7 to 8.11

TEXT BOOKS:

1. Venkataraman .M.K., "Dynamics", Year of publication 2006, Agasthiar Publications, Trichy.

REFERENCE BOOKS

1. Dharmapadam.A.V., "Dynamics" S. Viswanathan Printers and Publishing Pvt. Ltd., 1993.
2. Duraipandian.P and Laxmi Duraipandian, "Mechanics" S.Chand& Company Ltd., Ramnagar, New Delhi – 55, 1985.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS

Problems can be given in the following topics:

Projectile on horizontal and inclined planes

1. Velocity, acceleration and pedal equation of central orbit

2. Simple harmonic motions
3. Direct impact of two smooth spheres
4. Oblique impact of two smooth spheres

GROUP TASKS

1. Calculate the horizontal and vertical components with respect to velocity and position of a projectile at various Points along its path
2. Give some examples for simple harmonic Oscillator.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Behavior of motion of objects. Applications of Projectile in practical problems	Understand
CO2	Have an idea about central orbit and its pedal equation	Understand
CO3	Develop the idea about Simple Harmonic Motion and its Applications.	Understand
CO4	Analyze the Behavior of elastic bodies in real life problems, direct impact of two smooth spheres	Analyzing
CO5	Analyze the Behavior of elastic bodies in real life problems, oblique impact of two smooth spheres	Analyzing

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	M	S	M	S	M	S	S	M
CO2	M	S	M	M	S	M	M	M	M	S

CO3	M	M	S	S	M	S	S	M	S	M
CO4	S	M	M	M	S	L	L	M	S	M
CO5	M	S	S	M	S	M	S	M	M	S

SEMESTER V

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMT09	**ABSTRACT ALGEBRA–I**	**70**	**5**	**-**	**5**

OBJECTIVES

The main objective of the course is to learn the concept of groups, rings fields, Homomorphism, isomorphism and ideals.

LEARNING OUTCOMES:

On successful completion of this course students will be able to

- Define group and its properties, and understand the meaning of subgroups, cyclic groups, cosets and LaGrange's theorem.
- Describe fundamental properties of the normal subgroups, Quotient groups and all kinds of Morphisms
- Define a ring with examples, properties of rings and subfields
- Demonstrate an understanding of ideals and quotient rings, maximal ideals and prime ideals.

SYLLABUS

Unit – I: Group Theory:

Definition of Group – Some Examples of Groups - Some Preliminary Lemmas - Subgroups – Definition – Lemmas - Theorems (Lagrange's, Euler and Fermat) – Examples.

Sections: 2.1 to 2.4

Unit – II: Group Theory (Continuation):

A Counting Principle – Normal Sub Groups and Quotient Groups - Homomorphism – Definition – Lemmas – Theorems – Examples.

Sections 2.5 to 2.7

Unit – III: Group Theory (Continuation):

Automorphism- Cayley's Theorem - Permutation Groups – Definition – Lemmas – Theorems – Examples.

Sections: 2.8 to 2.10

Unit – IV: Ring Theory:

Definition and Examples of Rings – Some Special Classes of Rings – Homomorphisms – Ideals and Quotient Rings - More Ideals and Quotient Rings – Definition – Lemmas – Theorems – Examples.

Section: 3.1 to 3.5

Unit – V: Ring Theory (Continuation):

The field of quotient of an Integral Domain – Euclidean Rings – A Particular Euclidean Ring - polynomial Rings – Definition – Lemmas – Theorems – Examples – Polynomials over the Rational field.

Sections: 3.6 to 3.10

TEXT BOOKS:

1. Topics in Algebra by I. N. Herstein, John Wiley, New York 1975.

REFERENCE BOOKS

1. Modern Algebra by M. L. Santiago, Tata McGraw Hill, New Delhi, 1994.
2. A First Course in Modern Algebra by A. R. Vasishtha, Krishna PrekasanMandhir, 9, Shivaji Road, Meerut (UP), 1983.
3. Mathematics for Degree Students (B. Sc. 3 Years) by Dr. U.S. Rana, S. Chand 2012.
4. Modern Algebra by K. ViswananthaNaik, Emerald Publishers, 135, Anna Saslai, Chennai.

WEB RESOURCES

1. en.wikipedia.org/wiki
2. wiki.answers.com

3. mathworld.wolfram.com

ASSIGNMENTS

Assignments can be given from the following topics:

1. Group Homomorphism. 2. Ideals. 3. Rings and fields.

GROUP TASKS

Two group ideals can be given in the form of group discussion, Quiz etc. in the topics of permutation groups, ideals, subrings and subfields.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Acquiring knowledge of basic abstract systems of Mathematics.	Remember
CO2	Understand the normal sub group and Quotient groups.	Knowledge
CO3	Demonstrate understanding of the importance of homomorphism and isomorphism in groups.	Understanding
CO4	Develop the idea about the rings, integral domain, field and maximal ideal.	Applications
CO5	Understanding the Field of Quotient of an Integral Domain, Euclidean Rings, Principal ideal Ring.	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	L	-	S	M	M	L	M	S	M

CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	M	M	M	S	-	S	L
CO4	M	L	S	M	S	L	M	-	M	L
CO5	S	L	M	L	S	M	M	-	S	M

SEMESTER V

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMT10	**REAL ANALYSIS - I**	**70**	**5**	**-**	**4**

OBJECTIVES

The main objective of the course is to learn the concept of countability, convergence sequence, divergence sequence, bounded sequence, monotonic sequence, open sets and closed sets. This course aims to acquaint the students with various topics of real analysis.

LEARNING OUTCOMES:

On successful completion of this course students will be able to

- Define the rational numbers, the natural numbers, and the real numbers, and understand their relationship to one another and describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Define Cauchy sequence and prove that specific sequences are Cauchy.
- Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.
- Prove standard results about closures, intersections, and unions of open and closed.
- Define convergence of series using the Cauchy criterion and use the comparison and root tests to show convergence of series.
- Define limit superior and limit inferior and to use properties of limits.
- Present an overview of the basic properties of metric spaces and give standard examples of discontinuous functions, such as the Dirichlet function.

SYLLABUS

UNIT- I

Equivalence - Countability – Real numbers – Least upper bounds- Sequences of real numbers – Definition of sequence and subsequence – Limit of a sequence - Convergent sequences – Divergent sequences.

Chapter 1: Sections 1.5 to 1.7 & Chapter 2: Sections 2.1 to 2.4

UNIT- II

Bounded sequences – Monotone Sequences – Operations on convergent sequences - Operations on divergent sequences - Limit Superior and limit inferior – Cauchy sequences.

Chapter 2: Sections 2.5 to 2.10

UNIT- III

Series of real numbers – Convergence and divergence – Series with non-negative terms- Alternating series – Conditional convergence and absolute convergence – Tests for absolute convergence - Series whose terms form a non-increasing sequence – The class l^2.

Chapter 3: Sections 3.1 to 3.4, 3.6, 3.7 & 3.10

UNIT- IV

Limits and metric spaces – Limit of a function on the real line – Metric spaces –

Limits in metric spaces - Functions continuous at a Point on the real line -

Reformulation.

Chapter 4: Sections 4.1 to 4.3 & Chapter 5: Sections 5.1 to 5.2

UNIT- V

Functions continuous on a metric space - Open sets – Closed sets – Discontinuous functions on R^1.

Chapter 5: Sections 5.3 to 5.6

TEXT BOOKS:

1. Richard R.Goldberg – Methods of Real Analysis – Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.

REFERENCE BOOKS

1. Tom. M. Apostal – Mathematical Analysis –Year of Publication 2002 Narosa Publications, New Delhi.

2. Sterling K. Bargerian- A First course in real analysis – year of Publication 2004. Springer (India) Private Limited. New Delhi
3. M.S.Rangachari –Real Analysis Year of Publication 1996 New Century Book House, Chennai

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. wiki.answers.com
3. mathworld. wolfram.com
4. ects.ieu.edu.tr

ASSIGNMENTS

1. Prove that any bounded sequence of real numbers has a convergent subsequence.
2. State and prove Leibnitz theorem.
3. If G_1 and G_2 are open subsets of the metric space M, then prove that $G_1 \cap G_2$ is also open.

GROUP TASKS

Label each of the following sequences either (A) convergent, (B) divergent to infinity, (C) divergent to minus infinity, or (D) oscillating. (Use your intuition or information from your calculus course. Do not try to prove anything.)

a) $\{\sin(n\pi/2)\}_{n=1}^{\infty}$ b) $\{\sin n\pi\}_{n=1}^{\infty}$

c) $\{e^n\}_{n=1}^{\infty}$ d) $\{e^{1/n}\}_{n=1}^{\infty}$

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Identify the difference between lub and glb.	Remember
CO2	Understand the concepts convergent sequence and Cauchy sequence.	Knowledge
CO3	Tests for absolute convergence and conditional convergence.	Apply
CO4	Develop the idea about limit of a function on the real	Understand

	line.	
CO5	Apply the concepts of open sets and closed sets.	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	L	-	S	M	M	L	M	S	M
CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	M	M	M	S	-	S	L
CO4	M	L	S	M	S	L	M	-	M	L
CO5	S	L	M	L	S	M	M	-	S	M

SEMESTER V

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT11	**COMPLEX ANALYSIS -I**	**70**	**5**	**-**	**4**

OBJECTIVE

The theory of complex Analysis is one of the most outstanding accomplishments of classical mathematics. Complex analysis is a rich area of Mathematics. Its applications are numerous and can be found in many other branches of Mathematics, ranging from number theory, fluid dynamics and computer sciences.

LEARNING OUTCOMES

Students who successfully complete the course will provide the following outcomes:

- Have knowledge about the Regions in the complex plane, functions of a complex variable, limits and their properties.
- Have learnt a complex valued functions w(t), Anti-derivatives, Contours, contour integrals and their properties.

- Have a sufficient exposure to various theorems like Maximum modulus theorem, Liouville's theorem etc.
- Have learnt the mappings and their properties.
- Have learnt the elementary transformations, Bilinear transformation and various mappings.

SYLLABUS

Unit I :

Regions in the Complex Plane - Functions of a complex variable - Limits - Theorems on Limits - Limits Involving the Point at Infinity - Continuity - Derivative – Differentiation Formulas - Cauchy - Riemann Equations - Sufficient Conditions for differentiability - polar coordinates – Analytic Functions – Examples – Harmonic Functions.

Chapter 1: Section 8 & Chapter 2: Sections 9, 11 to 22

Unit II:

Complex valued functions w(t) - Contours - Contour Integrals - Some Examples - Examples with Branch cuts - Upper bounds for Moduli of contour Integrals - Anti-derivatives - Proof of the theorem – Cauchy-Goursat Theorem - Proof of the theorem - Simply connected Domains - Multiply connected Domains.

Chapter 4: Sections 30 to 38

Unit III:

Cauchy Integral Formula - An Extension of the Cauchy integral formula - Some consequences of the extension –Derivatives of Analytic Functions- Morera's Theorem- Maximum moduli of functions- Liouville's theorem and the Fundamental Theorem of Algebra.

Chapter 4: Section 39 to 43

Unit IV :

Mappings - Mappings by the elementary Functions - Linear functions - The function 1/z - Linear Fractional Transformations - An Implicit form.

Chapter 2: Section 10 & Chapter 7: Sections 64 to 66

Unit V:

The Transformation $w = e^z$, $w = \sin z$, $w = \cos z$, $w = \sinh z$, $w = \cosh z$ -Conformal mappings - preservation of Angles - Scale factors - Local Inverses.

Chapter 7: Sections 68 and 69 & Chapter 8: Sections 73 and 74

TEXTBOOKS

1. James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, McGraw Hill,

Inc, Fifth Edition.

REFERENCE BOOKS

1. S.Arumugam,A.Thangapandi Issac and A.Somasundaram ,Complex Analysis Sci Tech Publications Pvt.Ltd.
2. P.P Gupta – Kedarnath & Ramnath, Complex Variables, Meerut -Delhi
3. J.N. Sharma, Functions of a Complex variable, Krishna Prakasan Media(P) Ltd, 13th Edition, 1996-97.
4. T.K.Manickavachaagam Pillai, Complex Analysis, S.Viswanathan Publishers Pvt Ltd.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com

ASSIGNMENTS

Problems can be given in the following topics:

1. Limits and Continuity.
2. Contour Integrals.
3. Mappings by the Exponential Function

GROUP TASK

Discussion about the applications of transformations in graphics.

1. Problems in contour integration can be solved.

COURSEOUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have knowledge about the Regions in the complex plane, functions of a complex variable, limits and their properties.	Remember
CO2	Have learnt a complex valued functions w(t), Anti-derivatives, Contours, contour integrals and their properties.	Knowledge
CO3	Have a sufficient exposure to various theorems like Maximum modulus theorem, Liouville's theorem etc.	Understanding

CO4	Have learnt the mappings and their properties.	Applications
CO5	Have learnt the elementary transformations, Bilinear transformation and various mappings.	Knowledge

MAPPING WITH PROGRAMOUTCOMES

COs	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	S	M	M	S	M	S	S	M	S	S
CO2	S	M	M	S	M	M	M	M	M	M
CO3	S	L	M	L	M	L	L	L	L	M
CO4	S	S	S	S	M	M	S	M	M	M
CO5	S	M	S	S	M	M	S	M	M	M

SEMESTER V

Course Code	Course Name	Lecture(L)	Tutorial (T)	Practical (P)	Credit
22UMT12	**OPERATIONS RESEARCH -I**	**70**	**5**	**-**	**4**

OBJECTIVES

The main objective of the course is to enable various techniques of Operations Research and to make the students solve the real life problems in business management.

LEARNING OUTCOMES:

On successful completion of this course students

- Knew the formation of LPP and solve it
- Learnt the use of artificial variables and degeneracy of LPP
- Have knowledge about duality and simplex method
- Knew the solving techniques of transportation and assignment problems.

SYLLABUS

UNIT I: Mathematical Formulation

Introduction-Origin and development of O.R. – Methodology of O.R. – Applications of O.R. - Linear Programming problem – Mathematical Formulation of the problem and illustrations- Graphical solution method – Some exceptional cases.

Chapter 1: Sections 1.1, 1.2, 1.8 and 1.10 Chapter 2: Sections 2.1 to 2.4

Chapter 3: Sections 3.1 to 3.3

UNIT II: LPP-Simplex method

Introduction – The computational procedure- Use of Artificial variables-Degeneracy in linear programming – Applications of simplex method.

Chapter 4: Sections 4.1, 4.3,4.4, 4.5, 4.8.

UNIT III : Duality in LPP

Introduction – General primal-Dual pair- Formulating a dual problem-Duality and Simplex method- Economic interpretation of duality-Dual Simplex method.

Chapter 5: Sections 5.1, 5.2, 5.3, 5.7, 5.8 and 5.9.

UNIT IV : Transportation Problem

Introduction – LP formulation of the Transportation problem-Duality in TP-The Transportation Table-Loops in transportation tables- Solution of a TP – Finding an initial basic Feasible solution- Test for Optimality- Economic interpretation of u_i's and v_j's-Degeneracy in TP-Transportation Algorithm(Modi Method)- Stepping stone solution method-Some exceptional cases.

Chapter 10: Sections 10.1,10.2, 10.4 to 10.6, 10.8 to 10.15.

UNIT V: Assignment Problem

Introduction- Mathematical Formulation of the problem- Solution methods of AP-Special cases in AP- A Typical Assignment Problem.

Chapter 1S1: Sections 11.1 to 11.5.

TEXT BOOKS:

1. Kanti Swarup, P.K. Gupta and Man Mohan, OPERATIONS RESEARCH, Eighth edition, Reprint 2000 – Sultan Chand & sons, New Delhi.

REFERENCE BOOKS

1. S.Kalavathy – OPERATIONS RESEARCH – Second edition, year of publication 2002, Vikas publishing house, New Delhi,
2. P.K. Gupta and D.S.Hira - OPERATIONS RESEARCH year of publication 2004 second edition , S.Chand and Co, New Delhi
3. Hamdy Taha - OPERATIONS RESEARCH year of publication 1996. Prentice Hall publications, New Delhi.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. wiki.answers.com

3. mathworld. wolfram.com

ASSIGNMENTS

Assignments can be given from the following topics:

1. Solution of L.P.P. using Simplex procedures.
2. Duality.
3. Transportation and Assignment problems.

GROUP TASKS

1. Discussion about application of O.R.

2. Discussion on computational procedure of similar algorithms.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO 1	Acquire the knowledge of Mathematical formulation of the LPP and to solve them graphically.	Remember
CO 2	Getting acquainted with simplex procedure and the uses of artificial variable techniques.	Knowledge
CO 3	Recognize the concepts and properties of Economic interpretation of duality and Dual Simplex method.	Understanding
CO 4	Finding an initial basic feasible solution and test for optimality of a TP.	Applications
CO 5	Acquire the knowledge about the concepts of a typical Assignment Problem.	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO 1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	M	M	M	M	L	L	M	M	L
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

CO5	S	S	S	S	S	S	S	S	S	S

SEMESTER V

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTM1	**Major Based Elective I: NUMERICAL METHODS - I**	**55**	**5**	**-**	**4**

OBJECTIVES

The aim of this course is to introduce numerical techniques that can be used on computer, rather than to provide a detailed treatment of accuracy or stability. The solution of some of the main problems of the scientific computing are introduced and their implementation and analysis are given by using interactive environments for computing and the scientific visualization.

LEARNING OBJECTIVES

Students who successfully complete the course will provide the following outcomes:

- Use numerical methods to solve the algebraic and transcendental equations by using Bisection, Newton's method and some iterative methods.
- Have learnt the methods like matrix inversion, Gaussian, Gauss seidel methods etc., for solving linear system of algebraic equations.
- Expressing any value of y in terms of y_n and the backward differences of y_n, differences of a Polynomial, Factorial Polynomial and error propagation in a difference table.
- Have a sufficient exposure in constructing difference tables and to use Newton's forward and backward formula for interpolation in equal intervals.
- Have learnt to construct divided difference table and to use Stirling's and Lagrange's interpolation formula for unequal intervals.

SYLLABUS

UNIT I : Solution of Numerical, Algebraic & Transcendental equations

Bisection method – Method of Successive approximation - Regula Falsi method – Newton's method – Generalized Newton's method – Horner's method.

Chapter 3: Sections 3.1 to 3.5

UNIT II : Solution of Simultaneous Linear Algebraic equations

Direct method- Gauss Elimination – Gauss Jordan Method – Inversion of a matrix using Gauss Elimination method – Method of Triangularization – Crout's method – Iterative methods – Gauss Jacobi method – Gauss seidel method.

Chapter 4: Sections 4.1 to 4.5, 4.7 to 4.9

UNIT III: Finite Differences

First difference – Express any value of y in term of y_n and the backward differences of

y_n – Differences of a Polynomial – Factorial Polynomial – Error propagation in a difference table.

Chapter 5: Sections 5.1 to 5.5

UNIT IV : Interpolation (for equal intervals)

Introduction - Newton's Forward interpolation formula – Newton's Backward interpolation formula – Equidistant terms with one or more missing values – Central differences and central difference table – Central difference interpolation formula – Gauss forward interpolation formula – Gauss backward interpolation formula – Stirling's formula (Problems only).

Chapter 6: Sections 6.1 to 6.3, 6.7 & Chapter 7: Sections 7.1 to 7.5

UNIT V: Interpolation (for unequal intervals)

Introduction - Divided differences – Properties of divided differences – relations between divided differences and forward differences – Newton's divided difference formula – Lagrange's interpolation formula (for unequal intervals) – Inverse interpolation (Problems only).

Chapter 8: Sections 8.1 to 8.5, 8.7

TEXT BOOKS:

1. P. Kandasamy, K.Thilagavathy, K.Gunavathy, Numerical Methods, Third revised Edition, S.Chand & Company LTD, Ram Nagar, New Delhi.

REFERENCE BOOKS:

1. S.S. Sastry – Introductory methods of numerical Analysis 3rd edition, Prentize hall of India, New Delhi.
2. T.Veerarajan, T.Ramachandran, Numerical Methods with programs in C and C++, Tata Mc Graw – Hill Publishing Company Ltd., New Delhi.

WEB RESOURCES

1. *en.wikipedia.org/wiki/*
2. *mathworld.wolfram.com*

ASSIGNMENTS

Assignments can be given in the following topics:

1. Finding the roots for a given transcendental equation.
2. Interpolation

GROUP TASKS

1. Discussion about the applications of numerical methods in practical situations.
2. Solving problems by writing programs in C language.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Solving the algebraic and transcendental equations by using Bisection, Newton's method and some iterative methods.	Apply
CO2	Learning the methods like matrix inversion, Gaussian, Gauss seidel methods etc., for solving linear system of algebraic equations.	Knowledge
CO3	Expressing any value of y in terms of y_n and the backward differences of y_n, differences of a Polynomial, Factorial Polynomial and error propagation in a difference table.	Apply
CO4	Having a sufficient exposure in constructing difference tables and to use Newton's forward and backward formula for interpolation in equal intervals.	Understand
CO5	Having learnt to construct divided difference table and to	Knowledge

	use Stirling's and Lagrange's interpolation formula for unequal intervals.	

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	M	L	S	L	S	L	-	S	M
CO2	L	M	M	L	M	S	L	-	S	L
CO3	L	L	S	S	M	S	L	-	S	L
CO4	M	M	S	M	L	S	M	-	M	L
CO5	L	M	M	L	L	S	M	-	S	M

SEMESTER V

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTM2	**Major Based Elective I: ASTRONOMY -I**	**55**	**5**	**-**	**4**

OBJECTIVES

The main aim of the course is to learn the concept of Spherical Trigonometry, comets and meteorites, Celestial sphere,Diurnal motion, Twilight , Geocentric parallax, Cassini's formula and Kepler's law.

LEARNING OUTCOMES

On successful completion of this course students will be able to

- Define Spherical Trigonometry, comets and meteorites, Celestial sphere
- Describe fundamental concept of solar system.
- Know the concept of Diurnal motion, Twilight , Geocentric parallax
- The ability to use and understand the Cassini's formula and Kepler's law

SYLLABUS

UNIT I:

General description of the Solar system - Comets and meteorites – Spherical Trigonometry.

Chapter: I & XVI

UNIT II:

Celestial sphere – Celestial co – ordinates – Diurnal motion -Variation in length of the day.

Chapter: II

UNIT III:

Dip – Twilight – Geocentric parallex.

Chapter : III ,Section – 5&6 ,Chapter :V

UNIT IV:

Refraction – Tangent formula – Cassinis formula.

Chapter: IV

UNIT V:

Kepler's laws – Relation between true eccentric and mean anomalies.

Chapter: VI

TEXTBOOKS:

1. Treatment as in "ASTRONOMY" by S.Kumaravelu and SusheelaKumaravelu.

REFERENCE BOOKS

1. V.Thiruvenkatacharya,A Text Book of Astronomy , S.Chand and Co., Pvt Ltd.,1972
2. George.O.Abell, Exploration of the Universe, Holt, Rinehart and Winston of Canada Ltd, Second Revised Edition, 1969.

WEB RESOURCES

1 . en.wikipedia.org/wiki

2. wiki.answers.com

3. mathworld.wolfram.com

ASSIGNMENTS

Assignments can be given from the following topics:

1. General description of the Solar system
2. Refraction &Tangent formula
3. Relation between true eccentric and mean anomalies.

GROUP TASKS

Two group tasks can be given in the form of group discussion, Quiz etc. in the topics of Dip, Twilight & Geocentric parallax.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Identify the difference between Comets and meteorites.	Remember
CO2	Understand the concepts Celestial sphere, Celestial co – ordinates and Diurnal motion.	Knowledge
CO3	Tests for finding Dip, Twilight and Geocentric parallex.	Apply
CO4	Develop the idea about Refraction, Tangent formula and Cassinis formula	Understand
CO5	Apply the concepts of Kepler's laws.	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	L	-	S	M	M	L	M	S	M
CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	M	M	M	S	-	S	L
CO4	M	L	S	M	S	L	M	-	M	L
CO5	S	L	M	L	S	M	M	-	S	M

SEMESTER V

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTM3	**Major Based Elective II: DISCRETE MATHEMATICS**	**55**	**5**	**-**	**4**

OBJECTIVES

The main objective of the course is to brings out the relation between mathematics and computer science, in the way how it could be applied. The need of discrete structure is how we apply the mathematics in computer science. It will be applied not only in computer science and also how mathematics will be applied in engineering.

LEARNING OUTCOMES:

On successful completion of this course students will be able to

- Have an idea of mathematical logics and how to write principal of conjunctive normal form and disjunctive normal form.
- It helps to understand the concepts of permutation and combination.
- It helps to understand the concepts of Number theory
- It helps to understand the concepts of Lattice and Boolean algebra

SYLLABUS.

UNIT- I : Logic

Connectives – Tautology - Contradiction – Equivalence - Duality – Propositions – Tautology implications - Normal forms.

Chapter 1

UNIT- II : Logic (continued…)

Disjunctive and Conjunctive Normal forms – Principal of Disjunctive and Conjunctive Normal forms – Inference Theory – Truth table technique.

Chapter 1:

UNIT- III : Combinatorics

Permutations – Combinations – Permutation with repetition – Circular Permutation - Pigeon hole principle – Mathematical induction – Recurrence relations.

Chapter 6:

UNIT- IV : Number Theory

Divisibility – Prime Numbers – Fundamental Theorem of Arithmetic – GCD

– LCM – Congruence - Congruence class modulo m – Linear congruence

– Reminder Theorem.

Chapter 3:

UNIT- V : Lattice and Boolean algebra

Lattices –Properties of Lattices –Sub Lattices-Lattice Homomorphism-

Boolean Algebra-Sub Algebra-Expression of a Boolean Function in Canonical Form.

Chapter 2:

TEXT BOOKS:

1. T. Veerarajan – Discrete Mathematics – Year of publications reprint 1993, Tata McGraw – Hill Publishing Company Ltd., New Delhi..

REFERENCE BOOKS

1. J.P.Tremblay, R.Manohar – Discrete mathematical structures with applications to computer science – Tata Mc Graw Hill Publishing Company Ltd., Edition1997.

2. Kolman, Busby, Ross – Discrete mathematical structures – Pearson publications,
edition 2004.
3. A.Singaravelu – Discrete Mathematics – Meenakshi publishing company.

WEB RESOURCES

1.en.wikipedia.org/wiki/

2. mathworld.wolfram.com

3.wiki.answers.com

ASSIGNMENTS

Assignments can be given from the following topics:
1. How to write PCNF, PDNF with and without using truth table.
2. Problems to use Pigeon hole principles.

GROUP TASKS

1. Discussion about CNF and DNF.

2. How to apply circular permutation in computer science.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the concepts of Connectives , Tautology ,Contradiction and Equivalence.	Understand
CO2	Identify the difference between Disjunctive ,Conjunctive normal forms and Principal Disjunctive, Conjunctive normal forms.	Remember
CO3	Apply the concepts of permutation and combination	Apply
CO4	To Develop the idea about of Divisibility, Prime Numbers, Fundamental theorem of Arithmetic and GCD, LCM.	Knowledge
CO5	To Develop the idea about Lattices and Boolean algebra.	Apply

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	S	L	M	M	S	S	S	L
CO2	L	L	M	L	S	M	M	L	M	M
CO3	M	S	M	S	L	L	M	S	L	L
CO4	M	L	M	L	M	M	S	L	S	M
CO5	M	L	M	M	L	L	M	L	M	S

SEMESTER V

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTM4	**Major Based Elective II: PROGRAMMING IN C (Theory)**	**55**	**5**	**-**	**4**

OBJECTIVES

The main objective of the course is to learn the concept of the basic structure, operators and statements of C language and the decision making statements and to solve the problems based on it. Also Learnt arrays, functions and solve the problems Regarding about it.

LEARNING OUTCOMES:

On successful completion of this course students will be able to

- This paper presents the importance of C language, its structure, Data types, Operators of C, Various control statements, Arrays, different types of functions and practical problems.
- To enable the students to learn about the basic structure, Statements, arrays, functions and various concepts of C language.

SYLLABUS.

UNIT- I

Introduction – Importance of C - Basic structure of C programs - Character set - Constants – Keywords and identifiers – Variables- Data types – Declaration of variables – Assigning values to variables –Defining symbolic constants.

Chapter :1 Section:1.1-1.4, Chapter: 2 Section :2.1-2.10

UNIT- II

Arithmetic Operators - Relational operators - Logical operators – Assignment operators – increment and decrement operations –Conditional operators – Special operators – Arithmetic expressions –Evaluation of expressions –Precedence of arithmetic operators – Some computational problems –Type conversion in expressions – Operator precedence and associativity - mathematical functions

Chapter :3 Section:3.1-3.7 , 3.9-3.16.

UNIT- III

Reading and Writing a character – Formatted input and output-Decision making with IF statement – Simple IF statement – The If ELSE statement - Nesting of IF…..ELSE statement – The ELSE IF ladder. The Switch statement –The ? Operator –The GOTO statement.

Chapter :4 Section :4.1-4.5 , Chapter :5 Section : 5.1-5.9

UNIT- IV

The WHILE statement - The DO statement-The FOR statement –Jumps in loops.

Chapter :6 Section: 6.1-6.5

UNIT- V

One, Two dimensional arrays – Initializing two dimensional arrays – Multidimensional arrays – Declaring and initializing string variables –Reading strings from terminal – Writing strings to screen – Arithmetic operations on characters.

Chapter :7 section : 7.1-7.5, Chapter:8 Section: 8.1-8.5

TEXT BOOKS:

1. E.Balagurusamy“Programming in ANSI C” Second Edition – Tata McGraw –Hill Publishing Company Limited, New Delhi.

REFERENCE BOOKS

1. Byron Gottfried “Programming with C”(Schaum‟s outline series)-Tata McGrawHill publishing company -1998.
2. Ashok N.Kamthane “Programming with Ansi and Turbo C”, Pearson Education publishers, 2002
3. Hentry Mullish and Herbert L cooper , “The spirit of C” Jaico publisher , 1996.

4. THE ANSI C, Second edition , October 1992.BRIAN W.KERNIGHAN,DENNIS M.RITCHIE

Published by Prentice- Hall of India Privated Limited, M-97,New Delhi- 110001.

5. ANSI C: With Microsoft C 5.1 and Quick C 2.0 C.Balasubramanian.1992, Tata McGraw-Hill

Publishing company limited, New Delhi.

6. "PROGRAMMING IN C ", Kris A.Jamsa 1992 , Galgotia Publications Pvt.ltd

WEB RESOURCES

1.en.wikipedia.org/wiki/

2. mathworld.wolfram.com

3. wiki.answers.com

ASSIGNMENTS

Assignments can be given from the following topics:

1. How to write Basic structure of C programme & Assigning values to variables.
2. How to use Arithmetic operators - Relational operators - logical operators – assignment operators – increment and decrement operates –Conditional operators – Special operators

GROUP TASKS

1. Discussion about formatted input and output & Decision making with IF statement
2. How to apply the if ELSE statement - Nesting of IF…..ELSE statement – The ELSE IF ladder in computer science.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the concepts of Basic structure of C Programme and Declaration of variables	Understand
CO2	Identify the difference between Arithmetic operators and Arithmetic expressions	Remember
CO3	To Develop the idea about Reading and Writing character , formatted input and output	Knowledge
CO4	Apply the concepts of The WHILE statement - the DO statement	Knowledge
CO5	To Develop the idea about Declaring and initializing string variables	Apply

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	S	M	S	L	L	M	S	L	L
CO2	M	L	M	L	M	M	S	L	S	M
CO3	M	M	S	L	M	M	S	S	S	L
CO4	L	L	M	L	S	M	M	L	M	M
CO5	L	M	L	S	M	L	M	M	M	S

SEMESTER VI

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT13	**ABSTRACT ALGEBRA–II**	**70**	**5**	**-**	**5**

OBJECTIVES

The main aim of the course is to learn the concept of vector spaces, basis, Dual spaces, Inner product spaces, Linear transformation and Cramer's rule problems.

LEARNING OUTCOMES

On successful completion of this course students will be able to

- Define vector spaces, inner product spaces, modules.
- Describe fundamental properties of the linear transformation and matrices.
- Know the algebra of linear transformation, and definition of minimal Polynomial, characteristic roots.
- Know the algebra of matrices, triangular form and theorems on matrices.

SYLLABUS

Unit - I: Vector Spaces

Elementary Basis Concepts - Linear Independence and Bases – Definition – Lemmas – Theorems – Examples – Dual Spaces

Sections: 4.1 to 4.3

Unit – II: Modules

Inner Product Spaces – Definition – Lemmas – Theorems – Examples – Modules.

Sections: 4.4 & 4.5

Unit - III: Linear Transformations:

The Algebra of Linear Transformations – Characteristic Roots - Matrices- Definition – Lemmas– Theorems – Examples. Sections: 6.1 to 6.3

Unit – IV: Linear Transformations(Continuation):

Canonical Forms : Triangular Form - Nilpotent Transformations – Definition- Lemmas – Theorems – Examples. Sections: 6.4 & 6.5

Unit – V: Linear Transformations (Continuation):

Trace and Transpose - Determinants – Definitions – Properties – Theorems – Cramer's Rule- Problems. Sections: 6.8 & 6.9

TEXT BOOKS:

1. Topics in Algebra by I. N. Herstein, John Wiley, New York 1975.

REFERENCE BOOKS

1. Modern Algebra by M. L. Santiago, Tata McGraw Hill, New Delhi, 1994.
2. A First Course in Modern Algebra by A. R. Vasishtha, Krishna PrekasanMandhir, 9, Shivaji Road, Meerut (UP), 1983.
3. Mathematics for Degree Students (B. Sc. 3 Years) by Dr. U.S. Rana, S. Chand 2012.
4. Modern Algebra by K. ViswananthaNaik, Emerald Publishers, 135, Anna Saslai, Chennai.

WEB RESOURCES

1. en.wikipedia.org/wiki

2. wiki.answers.com
3. mathworld.wolfram.com

ASSIGNMENTS

Assignments can be given from the following topics:

1. Inner product space
2. Characteristic roots of matrices
3. Cramer's rule

GROUP TASKS

Two groups ideals can be given in the form of group discussion, Quiz etc. in the topics of dual space, modules, trace and transpose, and determinants.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Acquiring knowledge of vector space, Internal direct sum and External direct sum.	Remember
CO2	Understand the Linear Independence & Quotient space.	Knowledge
CO3	Demonstrate understanding of the importance of inner product space.	Understanding
CO4	Develop the idea about the linear transformation, matrices.	Applications

CO5	Understanding the traces, transposes and determinants.	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	L	-	S	M	M	L	M	S	M
CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	M	M	M	S	-	S	L
CO4	M	L	S	M	S	L	M	-	M	L
CO5	S	L	M	L	S	M	M	-	S	M

SEMESTER VI

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMT14	**REAL ANALYSIS - II**	**70**	**5**	**-**	**4**

OBJECTIVES

The main objective of the course is to learn the concept of Connectedness, completeness, compactness, calculus, and sequences and series of functions. This course aims to acquaint the students with various topics of real analysis .

LEARNING OUTCOMES:

On successful completion of this course students will be able to

- Define connectedness and identify connected and disconnected sets.
- Define Uniform continuity and show that given functions are uniformly continuous or not uniformly continuous.
- Define completeness and prove that a real line, equipped with the standard metric, is complete and to prove that if a sequence of continuous functions converges uniformly, when their limit is also continuous.
- Compute derivatives using the limit definition and prove basic properties of derivatives.
- State the Fundamental theorem of Calculus and to use it in proofs.
- Use the Weirstrass M – Test to check for uniform convergence of series.
- Define and distinguish between Point wise and uniform convergence.

SYLLABUS

UNIT I

Connectedness, Completeness & Compactness – More about open sets – Connectedness - Bounded sets & totally bounded sets – Complete metric space.

Chapter 6: Sections 6.1 to 6.4

UNIT II

Compact metric space – Continuous functions on compact metric spaces – Continuity of inverse functions – Uniform continuity.

Chapter 6 : Sections 6.5 to 6.8

UNIT III

Sets of measure zero – Definition of the Riemann integral – Existence of the Riemann integral- Properties of the Riemann integral – Derivatives.

Chapter 7: Sections 7.1 to 7.5

UNIT IV

Rolle's theorem – The law of the mean – Fundamental theorems of calculus – Improper integrals – Improper integrals(continued).

Chapter 7 : Sections 7.6 to 7.10

UNIT V

Point wise convergence of sequences of functions – Uniform convergence of sequence of functions – Consequence of uniform convergence- Convergence and uniform convergence of series of functions.

Chapter 9 : Sections 9.1 to 9.4

TEXT BOOKS:

1. Richard R.Goldberg – Methods of Real Analysis – Oxford & IBH, Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE BOOKS

1. Sterling K.Bargerian – A First course in real analysis - year of publication 2004. Springer (India) Private Limited. New Delhi
2. Tom. M. Apostel – MATHEMATICAL ANALYSIS – Year of publication 2002, Narosa publications, New Delhi.
3. M.S.Rangachari – REAL ANALYSIS Year of publication 1996 New century

Book House, Chennai.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. wiki.answers.com
3. mathworld. wolfram.com
4. ects.ieu.edu.tr

ASSIGNMENTS

1. State and prove Heine – Borel property.
2. Prove that every countable subset of R is of measure zero.
3. Show that $\int_1^{\infty} \frac{1}{x^2} dx$ is convergent.

GROUP TASKS

1. Calculate a value for which c for which $\frac{f(b)-f(a)}{g(b)-g(a)} = \frac{f'(c)}{g'(c)}$ for each of the following pairs of functions.
   (a) $f(x) = x, g(x) = x^2 \quad (0 \le x \le 1)$.
   (b) $f(x) = \sin x, g(x) = \cos x \quad (-\pi/2 \le x \le 0)$.
2. Give an example of a continuous function f such that $f(x) \ge 0,\ 0 \le x \le \infty)$ and such that $\sum_{n=1}^{\infty} f(n)$ Converges but $\int_1^{\infty} f(x)dx$ diverges.
2. Compute derivatives using the limit definition and prove basic properties of derivatives.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Identify the difference among connectedness, completeness and compactness.	Remember
CO2	Understand the concepts of continuous functions on compact metric spaces.	Knowledge
CO3	Tests for existence of the Riemann integral.	Apply
CO4	Develop the idea about the improper integrals.	Understand
CO5	Apply the concepts of uniform convergence.	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10

CO1	M	L	S	-	M	M	-	S	M	M
CO2	M	L	-	L	M	M	S	M	S	L
CO3	M	-	S	-	M	M	S	M	S	L
CO4	M	L	S	S	-	L	M	M	M	L
CO5	S	L	-	L	M	M	M	-	S	M

SEMESTER VI

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMT15	**COMPLEX ANALYSIS -II**	**70**	**5**	**-**	**4**

OBJECTIVES

Complex analysis, traditionally known as the theory of functions of a complex variable, is the branch of mathematical analysis that investigates functions of complex numbers. It is useful in many branches of mathematics, including algebraic geometry, number theory, analytic combinatorics, applied mathematics as well as in physics, including the branches of hydrodynamics, thermodynamics and particularly quantum mechanics.

LEARNING OUTCOMES

Students who successfully complete the course will provide the following outcomes:

- Have learnt to expand the given function in terms of Taylor's and Laurent's series.

- Have knowledge about the absolute and uniform convergence of Power series, continuity of sums of Power series, integration and differentiation of Power series and their properties.
- Have learnt the isolated singular Points, residues, Cauchy's residue theorem and their properties.
- Have learnt the method of definite integrals involving sines and cosines , Argument principle, Rouche's theorem.
- Have knowledge in the evaluation of improper real integrals and their properties**.**

SYLLABUS

UNIT I :

Convergences of Sequences - Convergences of Series - Taylor series - Proof of Taylor's Theorem - Examples - Laurent series - Proof of Laurent's theorem - Examples.

Chapter 5: Section 44 to 48

UNIT II:

Absolute and Uniform convergence of Power series - Integration and differentiation of Power series - Uniqueness of series representations - Multiplication and Division of Power series.

Chapter 5: Sections 49 to 52

UNIT III:

Residues - Cauchy's Residue Theorem - Principal part of a function- Residues at poles- Examples - Evaluation of integration using Cauchy's residue theorem -Zeros andpolesof order m - Examples.

Chapter 6: Section 53 to 57

UNIT IV :

Evaluation of Improper real Integrals - Examples - Improper Integrals involving sines and cosines - Jordan's Inequality (Statement only).

Chapter 6: Sections 58 & 59

UNIT V:

Definite Integrals Involving sines and cosines - Rouche's Theorem and its problems - Argument Principle.

Chapter 6 : Section 60 and 63(only Rouche's Theorem) & Chapter 12: Section 105

TEXTBOOKS

James Ward Brown and Ruel V. Churchill, Complex Variables and Applications, McGraw Hill, Inc, Fifth Edition.

REFERENCE BOOKS

1. Theory and Problems of Complex Variables-Murray.R.Spiegel,Schaum outline series.
2. Complex Analysis-P. Duraipandian.
3. Introduction to Complex Analysis.S. Ponnuswamy, Narosa publishers 1993.

WEBRESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com

ASSIGNMENTS

Problems can be given in the following topics:

1. Convergence of series.
2. Integration and differentiation of Power series.
3. Residues at poles.

GROUP TASK

1. Discussion about the applications of the Taylor series.
2. Problems in improper integrals from Fourier analysis can be solved.

COURSEOUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have learnt to expand the given function in terms of Taylor's and Laurent's series.	Remember
CO2	Have knowledge about the absolute and uniform convergence of Power series, continuity of sums of Power series, integration and differentiation of Power series and their properties.	Knowledge
CO3	Have learnt the isolated singular Points, residues, Cauchy's residue theorem and their properties.	Understanding
CO4	Have learnt the method of definite integrals involving sines and cosines , Argument principle, Rouche's theorem.	Applications
CO5	Have knowledge in the evaluation of improper real integrals and their properties.	Knowledge

MAPPING WITH PROGRAMOUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	M	S	M	S	S	M	M	M
CO2	S	M	M	S	M	S	S	M	M	M
CO3	S	S	M	M	M	S	S	M	M	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

SEMESTER VI

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMT16	**OPERATIONS RESEARCH-II**	**70**	**05**	**-**	**4**

OBJECTIVES

The main objective of the course is to enable the students to apply Mathematics in everyday situations and develop model decision making problems that involve constraints.

LEARNING OUTCOMES:

On successful completion of this course students will be able to

- Apply for a practical situation that corresponds to an industry producing a number of products each of which is to be processed through different machines.
- Make important decisions which would prefer to make correct choice.
- Make decision- making in a competitive situation.

- Understands the situations that arise when some items such as machines, men, electric – light bulbs etc. need replacement due to their deteriorating efficiency, failure or breakdown.

SYLLABUS

UNIT I : Sequencing Problem

Introduction – Problem of sequencing – Basic terms used in sequencing – Processing n Jobs through two machines – Processing n jobs through k machines – Processing 2 jobs through k machines.

Chapter 12: Sections 12.1 to12.6

UNIT II : Decision Analysis

Introduction – Decision–Making problems - Decision–Making process - Decision–Making Environment – Decisions under uncertainty – Decisions under risk – Decision-Tree Analysis.

Chapter 16: Sections 16.1 to 16.7

UNIT III : Games and Strategies

Introduction – Two-person zero-sum Games – some basic terms – The maximin-minimax principle – Games without saddle Points – Mixed strategies – Graphic solution of 2 x n and m x 2 Games – Dominance Property

Chapter 17: Sections 17.1 to 17.7

UNIT IV : Replacement Problem and System Reliability

Introduction – Replacement of Equipment/Asset that Deteriorates Gradually – Replacement of equipment that fails suddenly – Reliability and system failure rates.

Chapter 18: Sections 18.1 to 18.3, 18.6

UNIT V : Network Scheduling by PERT/CPM

Introduction – Networks: Basic components – Logical sequencing - Rules of network construction – Concurrent activities - Critical Path Analysis (CPM) – Probability consideration in PERT – Distinction between PERT and CPM - Applications of Network Techniques – Advantages of Network Techniques –Limitations and difficulties in using Network.

Chapter 25: Sections 25.1 to 25.11

TEXT BOOKS:

1. Kanti Swarup, P.K. Gupta and Man Mohan, OPERATIONS RESEARCH, Eighth edition,

Reprint 2000 – Sultan Chand & sons, New Delhi.

REFERENCE BOOKS

1. S.Kalavathy – OPERATIONS RESEARCH – Second edition, year of publication 2002, Vikas publishing house, New Delhi.
2. P.K. Gupta and D.S.Hira - OPERATIONS RESEARCH year of publication 2004 second edition, S.Chand and Co, New Delhi.
3. Hamdy Taha - OPERATIONS RESEARCH year of publication 1996. Prentice Hall publications, New Delhi.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. wiki.answers.com
3. mathworld.wolfram.com

ASSIGNMENTS

Assignments can be given from the following topics:

1. Sequencing problems
2. Games and strategies
3. Network - PERT/CPM

GROUP TASKS

1. Taking real world problems and finding solutions using the methods given in the above topics.

COURSE OUTCOMES:

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO 1	Acquire the knowledge of sequencing problems and solving different kinds of sequencing problems.	Remember
CO 2	Getting acquainted with the concepts of decision making under various environment	Knowledge
CO 3	Recognize the concepts of Maximin-Minimax principle and to solve problems with and without saddle Point.	Understanding
CO 4	Assimilate the concept of replacement of equipment that deteriorates gradually and replacement of equipment that fails suddenly	Applications
CO 5	Acquire the knowledge about the concepts of distinction between PERT and CPM and problems relating to applications of Network techniques.	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	M	M	M	M	L	L	M	M	L
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

SEMESTER VI

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTM5	**Major Based Elective III: NUMERICAL METHODS - II**	**55**	**5**	**-**	**4**

OBJECTIVES

The aim of this course is to introduce numerical techniques that can be used on computer, rather than to provide a detailed treatment of accuracy or stability. The solution of some of the main problems of the scientific computing are introduced and their implementation and analysis are given by using interactive environments for computing and the scientific visualization.

LEARNING OUTCOMES

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

- Use different methods to get derivative using numerical differentiation and to find maxima and minima of the function using the tabular values.

- Have learnt the numerical integration by using Newton's methods and Trapezoidal, Simpson's rule.
- Will come to know how to find the numerical solution of O.D.E using different methods like Taylor series, Euler, Runge-kutta methods etc.
- Have sufficient exposure to solve higher order and simultaneous O.D.E using Runge-kutta methods and predictor and corrector methods.
- Understand the classifications of P.D.E. and to find the numerical solutions of P.D.E.

SYLLABUS

UNIT – I : Numerical differentiation

Introduction – Newton's forward difference formula to get the derivative – Newton's

backward difference formula to compute the derivative – Derivative using Stirling's

formula – To find maxima and minima of the function given the tabular values

Chapter 9 : Sections 9.1 to 9.6

UNIT II : Numerical Integration

Introduction – Newton–Cote's formula – Trapezoidal rule –Geometrical interpretation – Truncation error in Trapezoidal rule - Simpson's one-third rule – Simpson's three–eigths rule – Weddle's rule – Truncation error in Simpson's formula (Problems only).

Chapter 9 : Sections 9.7 to 9.11, 9.13 to 9.16

UNIT – III: Numerical Solution of O.D.E

Introduction – Power series approximations – Pointwise methods – Solution by Taylor's series – Taylor series method for simultaneous first order differential equations – Taylor series method for second order differential equation – Euler's method – Improved Euler method – Modified Euler method – Runge-Kutta method (Fourth order Runge kutta method only)

Chapter 11: Sections 11.1 to 11.7, 11.9 to 11.11

UNIT – IV : Numerical Solution of O.D.E

Runge-Kutta method (Fourth order Runge kutta method only) - Runge-Kutta method for first order O.D.E - Runge-Kutta method for simultaneous first order differential equations - Runge-Kutta method for second order differential equations – Predictor – corrector methods – Milne's Predictor Corrector Formulae – Adam-Bashforth predictor corrector method.

Chapter 11: Section 11.12 to 11.18

UNIT – V : Numerical Solution of P.D.E

Introduction – Difference Quotients – Graphical representation of Partial Quotients – Classification of P.D.E's of the second order – Elliptic Equations – Solution of Laplace's equation – Poisson's equation –Parabolic equations – Bender-Schmidt Method – Crank-Nicholson Difference method – Hyperbolic equations.

Chapter 12 : Sections 12.1 to 12.10

TEXT BOOKS:

1. P. Kandasamy, K.Thilagavathy, K.Gunavathy, Numerical Methods, Third revised Edition, S.Chand & Company LTD, Ram Nagar, New Delhi.

REFERENCE BOOKS:

1. S.S. Sastry – Introductory methods of numerical Analysis 3rd edition, Prentize hall of India, New Delhi.
2. T.Veerarajan, T.Ramachandran, Numerical Methods with programs in C and C++, Tata Mc Graw – Hill Publishing Company Ltd., New Delhi.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com

ASSIGNMENTS

Assignments can be given in the following topics:

1. Numerical differentiation
2. Numerical Integration
3. Numerical solution of O.D.E

GROUP TASKS

1. Discussion about the applications of numerical methods in practical situations.
2. Solving problems by writing programs in C language.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Get derivative using numerical differentiation and to find	Apply

	maxima and minima of the function.	
CO2	Do numerical integration by using Newton's methods and Trapezoidal, Simpson's rule	Knowledge
CO3	Find the numerical solution of O.D.E using different methods like Taylor series, Euler, Runge-kutta methods etc.	Apply
CO4	Solve higher order and simultaneous O.D.E using Runge-kutta methods and predictor and corrector methods.	Apply
CO5	Understand the classifications of P.D.E. and to find the numerical solutions of P.D.E.	Understand

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	M	L	S	L	S	L	-	S	M
CO2	L	M	M	L	M	S	L	-	S	L
CO3	L	L	S	S	M	S	L	-	S	L
CO4	M	M	S	M	L	S	M	-	M	L
CO5	L	M	M	L	L	S	M	-	S	M

SEMESTER VI

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTM6	**Major Based Elective III: ASTRONOMY -II**	**55**	**5**	**-**	**4**

OBJECTIVES

The main aim of the course is to learn the concept of Equation of time, Conversion of time, Seasons , Calendar, annual parallax , aberration, eclipses, Planetary Phenomenon &The Stellar system

LEARNING OUTCOMES

On successful completion of this course students will be able to

- Define concept of Equation of time, Conversion of time, Seasons, Calendar.
- Describe fundamental properties of the annual parallax, aberration.
- Know the concepts of eclipses, Planetary Phenomenon.
- The ability to use and understand the concept of stellar system.

SYLLABUS

UNIT I:
Time: Equation of time – Conversion of time – Seasons – Calendar.

Chapter: VII

UNIT II:
Annual Parallax – Aberration.
Chapter: IX

UNIT III:

Precession – Nutation.
Chapter : X

UNIT IV:
The Moon – Eclipses.
Chapter: XII & XIII

UNIT V:
Planetary Phenomenon – The Stellar system.
Chapter: XIV & XVII

TEXTBOOKS:

1. Treatment as in "ASTRONOMY" by S.Kumaravelu and SusheelaKumaravelu.

REFERENCE BOOKS

3. V.Thiruvenkatacharya,A Text Book of Astronomy , S.Chand and Co., Pvt Ltd.,1972
4. George.O.Abell, Exploration of the Universe, Holt, Rinehart and Winston of Canada Ltd, Second Revised Edition, 1969.

WEB RESOURCES

1 . en.wikipedia.org/wiki 2.Wiki.answers.com 3. mathworld.wolfram.com

ASSIGNMENTS

Assignments can be given from the following topics:

1. Equation of time 2. Annual Parallax 3. Planetary Phenomenon

GROUP TASKS

Two group tasks can be given in the form of group discussion, Quiz etc. in the topics of Precession, Nutation,The Stellar system, Seasons and Calendar.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Identify the difference between Equation of time ,Conversion of time ,Seasons and Calendar.	Remember
CO2	Understand the concepts Annual Parallax and Aberration.	Knowledge
CO3	Tests for finding the Precession and Nutation.	Apply
CO4	Develop the idea the Moon and Eclipses	Understand

CO5	Apply the concepts of Planetary Phenomenon and the Stellar system	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	L	-	S	M	M	L	M	S	M
CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	M	M	M	S	-	S	L
CO4	M	L	S	M	S	L	M	-	M	L
CO5	S	L	M	L	S	M	M	-	S	M

SEMESTER VI

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTM7	**Major Based Elective IV: GRAPH THEORY**	**55**	**5**	**-**	**4**

OBJECTIVES

In the last two decades graph theory has established itself as a worthwhile mathematical discipline and there are many applications of graph theory to a variety of subjects which include Operations research, Physics, Chemistry, Economics, Genetics, Sociology, Engineering, Computer Science, Bio informatics etc.

LEARNING OUTCOMES:

Students who successfully complete the course will provide the following outcomes:

- Have a sound knowledge about graphs, subgraphs and operations of graphs.
- Have an idea on walks, Trials, Paths and Connectedness.
- Have a sufficient exposure of Eulerian and Hamiltonian graphs.

- Have an idea of trees and Matching in Bipartite graph.
- Have knowledge of planar graphs and it properties.

SYLLABUS

UNIT I : Graphs and Subgraphs

Introduction – Definition and example – Degrees – sub graphs- Matrices - Operations on Graphs .

Chapter 2: Sections 2.0 to 2.3, 2.8 and 2.9

UNIT II : Connectedness

Introduction – Walks, trails and paths - Connectedness and Components- Blocks - connectivity .

Chapter 4: Sections 4.0 to 4.4

UNIT III : Eulerian and Hamiltonian Graphs

Introduction – Eulerian Graphs –Konigsberg Bridge problem – Fleury's algorithm – Hamiltonian Graphs.

Chapter 5 :Sections 5.0 to 5.2 & Chapter 1: Section 1.1

UNIT IV : Trees and Matchings

Introduction – characterization of Trees –center of a tree – Matchings - Introduction – Matchings in bipartite graphs.

Chapter 6: Sections 6.0 to 6.2 & Chapter 7: Sections 7.0 to 7.2

UNIT V : Planarity

Planarity – Introduction – Definition and properties – Characterization of planar graphs – Thickness, Crossing and Outer planarity.

Chapter 8 : Sections 8.0 to 8.3)

TEXT BOOKS:

1. S.Arumugam, S.Ramachandran - Invitation to Graph Theory – Scitech Publications (India) Pvt. Ltd., Chennai-600 017.

REFERENCE BOOKS:

1. S.Kumaravelu & Suseela Kumaravelu – Graph Theory- year of publication 1996 - SKV Printers.
2. A.Chandran –A First course in Graph Theory - Year of publication 1997 – Macmillan Publishers - Chennai.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com

ASSIGNMENTS

1. A (p, q) graph has t Points of degree m and all other Points are of degree n, then show that (m-n)t + pm = 2q .
2. If every block of a connected graph G is Eulerian then show that G is Eulerian.
3. If G is a connected (p,q) plane graph with girth g, $q \leq \frac{g(p-2)}{g-2}$.

GROUP TASKS

1. Different ways to analyze a line graph and compare over age groups.
2. Determine an integer invariant of a graph or of a Point or of a line in the graph etc.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Know the basic definitions and concepts of Graphs and Subgraphs.	Remember
CO2	Gets an idea on walks, Trials, Paths and Connectedness	Knowledge
CO3	Gets sufficient exposure of Eulerian and Hamiltonian graphs	Apply
CO4	Develop an idea about trees and Matchings in Bipartite graph.	Understand
CO5	Gains the knowledge of planar graphs and its properties	Knowledge

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	L	-	S	M	M	L	M	S	M
CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	M	M	M	S	-	S	L

CO4	M	L	S	M	S	L	M	-	M	L
CO5	S	L	M	L	S	M	M	-	S	M

SEMESTER I

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22AMT01	**ALLIED MATHEMATICS – I**	**75**	**15**	**-**	**4**

OBJECTIVES

The course is a pre-requisite for the students to learn further topics of Mathematics in their higher semesters. At the end of the course the students would develop an understanding of the appropriate role of the Mathematical concept.

LEARNING OUTCOMES:

After the completion of the chapters the students are expected to

- Be capable of identifying algebraic eigen value problem and the eigen value solutions in certain cases.
- Have knowledge about the formation of equations, solution of equations and handlingroots.
- Have learnt the method of finding the solution of the radius of curvature in Cartesian coordinates and polarcoordinates.

- Have an understanding about the definite integral and their properties, integration by parts and reduction formula.
- Have learnt finite differences, construction of difference table and interpolation.

SYLLABUS

UNIT I: Matrices

Definition of characteristic equation of a matrix - Characteristic roots of a matrix - Eigen values and the corresponding eigen vectors of matrix – Cayley- Hamilton theorem (Statement only) - Verifications of Cayley-Hamilton Theorem - Problems only.

Chapter: 5

UNIT II : Theory of Equations

Imaginary & Irrational roots - Transformation of equations – Multiplication of roots by m - Diminishing the roots of an equation-Removal of a term- Descarte's rule of sign – Problems only.

Chapter: 6

UNIT III : Radius of Curvature

Radius of curvature in Cartesian coordinates- Parametric coordinates and polar coordinates (no proof for formulae) - Problems only. Chapter: 11

UNIT IV : Integral Calculus

Integral Calculus – Integration by parts – Definite integrals and its properties – Reduction formula for $\int cos^n x\, dx$, $\int sin^n x\, dx$,$\int_0^{\frac{\pi}{2}} cos^n x\, dx$, $\int_0^{\frac{\pi}{2}} sin^n x\, dx$, $\int x^n\, e^{ax}\, dx$, $\int_0^{\infty} e^{-x}\, x^n dx$ - Problems.

Chapters:15&16

UNIT V : Finite Differences

Finite difference –Construction of difference table – Interpolation – Newton's forward and backward formula (without proof)-Lagrange's formula (without proof)– Problems only.

Chapter: 7

TEXT BOOKS:

1. Dr.P.R .Vittal , Allied Mathematics, Margham publication, Chennai-17, Reprint 2012.

REFERENCE BOOKS

1. S.G.Venkatachalapathi, Allied Mathematics, Margham publication, Chennai-17, Reprint 2011.
2. T.K.Manickavasagam pillai and S.Narayanan, Algebra Volume 1, Vijay Nicole Imprints Pvt Ltd,Chennai – 29,2004.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS:

Problems can be given in the following topics:

Matrices ,Theory of Equations, Integration, Interpolation.

GROUP TASKS

Collect the applications of Matrices in physical sciences with examples.

What is the role of radius of curvature in civil engineering?

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Be capable of identifying algebraic eigen value problem and the eigen value solutions in certain cases.	Remember
CO2	Have knowledge about the formation of equations, solution of equations and handling roots.	Apply
CO3	Have learnt the method of finding the solution of the radius of curvature in Cartesian coordinates and polar coordinates.	Understand

CO4	Have an understanding about the definite integral and their properties, integration by parts and reduction formula.	Understand
CO5	Have learnt finite differences, construction of difference table and interpolation	Apply

SEMESTER II

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22AMT02	**Allied Mathematics – II**	**75**	**15**	**-**	**4**

OBJECTIVE

Many of the general laws of nature in Physics, Chemistry, Biology and Astronomy can be expressed in the language of differential equations and hence the theory of differential equations is the most important part of Mathematics for understanding Physical Sciences. Hence on completion of the course the students are expected to have learnt the method of solving systems of differential equations of certain types that they might encounter to their higher studies. The Laplace Transform, is widely used in the theory of communication engineering, wave propagation and other branches of applied Mathematics

LEARNING OUTCOMES

After the completion of the chapters the students are expected to

- Have learnt the methods to solve second order differential equations with constant coefficients, complementary function and particular Integral.
- Have learnt the method of formation of partial differential equations by eliminating the arbitrary constant and arbitrary functions.
- Have learnt the solution procedure to solve Partial Differential Equations.
- Have a sound knowledge of Laplace Transform and its properties.
- Have a sufficient knowledge of inverse Laplace Transform.

SYLLABUS

UNIT I : Second Order Differential Equations

Second order differential Equations with constant coefficients - Complementary function –

Particular integral and solution of the type e^{ax}, sinax or cosax , x^n, $e^{ax}V$ where V is any of the function of cosax or sinax or x or x^2.

Chapter: 23

UNIT II : Partial Differential Equations

Formation of partial differential equations by eliminating the arbitrary constants and arbitrary functions – Problems.

Chapter: 26

UNIT III : Partial Differential Equations (Continuation)

Definitions – Complete, particular, singular and general integrals -Solution of standard types of partial differential equations – Lagrange's linear partial differential equations - Problems only.

Chapter: 26

UNIT IV : Laplace Transforms

Laplace Transforms - Definitions -Standard formulas – Elementary theorems – Problems.

Chapter: 27

UNIT V : Inverse Laplace Transforms

Inverse Laplace Transforms - Standard formulas - Elementary theorems (without proof) - problems.

Chapter: 27

TEXT BOOKS

1. Dr.P.R .Vittal ,Allied Mathematics, Margham publication, Chennai-17, Reprint 2012.

REFERENCE BOOKS

1. S.G.Venkatachalapathi, Allied Mathematics, Margham publication, Chennai-17.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

COURSE OUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have learnt the methods to solve second order differential equations with constant coefficients, complementary function and particular Integral	Apply
CO2	Have learnt the method of formation of partial differential equations by eliminating the arbitrary constant and arbitrary functions	Understand

CO3	Have learnt the solution procedure to solve Partial Differential Equations	Remember
CO4	Have a sound knowledge of Laplace Transform and its properties	Apply
CO5	Have a sufficient knowledge of inverse Laplace Transform	Understand

SEMESTER I & II

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22AMTP1	**Practical - ALLIED MATHEMATICS**	**-**	**-**	**60**	**4**

OBJECTIVES

Many of the general laws of nature in Physics, Chemistry, Biology and Astronomy can be expressed in the language of differential Equations which involve derivatives and hence the theory of derivatives is

the most important part of Mathematics for understanding Physical Sciences. Hence on completion of the course the students are expected to have knowledge about ordinary and partial derivatives and vector differentiation, vector integration and its applications.

LEARNING OUTCOMES

After the completion of the chapters the students are expected to

a. Have studied how to do successive differentiation by applying Leibnitz formula.

b. Have learnt about homogeneous function in partial differentiation and the Euler's theorem.

c. Have studied the basics of vector calculus comprising of gradient, divergence and curl which is mostly used in the study of Solenoidal and Irrotational fields in physics.

d. Have learnt the application of line integrals which represent the work done in mechanics. Also surface and volume integrals and the classical theorems involving line, surface and volume integrals which would be encountered by them in higher semesters.

e. Have sufficient exposure to get the solution of certain linear differential equation using Laplace Transform and inverse Laplace Transform.

SYLLABUS

UNIT I

Successive differentiation – Standard nth derivatives – Leibnitz formula (without proof) for nth derivative – Problems.

Chapter: 8

UNIT II

Partial derivatives – Euler's theorem on homogeneous function (without proof) – Problems to verify Euler's theorem – Problems.

Chapter: 9

UNIT III

Scalar Point functions – Gradient of scalar Point functions – Vector Point functions –Divergence of vector Point functions – Curl of vector Point functions – Solenoidal of vector – Irrotational of vector – Problems only.

Chapter: 28

UNIT IV

Line integrals – Surface integrals & volume integrals- Gauss Divergence Theorem – Stoke's theorem- Green's theorem (Statements only) – Problems.

Chapter: 29

UNIT V

Applications of Laplace transforms -Solution to second order differential equations with constant co-efficient.

Chapter: 27

TEXT BOOKS:

1. P.R. Vittal, Allied Mathematics, Margham publications Chennai (2002)

REFERENCE BOOKS

1. T.K.Manickavasagam pillai, Allied Mathematics, S.Viswanathan and Co., Chennai(1992).
2. A.Singaravelu- Allied Mathematics , Meenakshi Traders, Chennai(20002)
3. P.Duraipandian - Udayabaskaran, Allied Mathematics volume I and II, Muhil Publishers, Chennai- 28, Year of Publications 1997.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS

Problems can be given in the following topics:

1. Vector Integration.
2. Finding successive differentiation using Leibnitz formula.
3. Vector differentiation

GROUP TASKS

1. Try to use a software package to successive derivatives for standard functions and give a presentation.
2. What is the role of vector differentiation in Physics?

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have studied how to do successive differentiation by applying Leibnitz formula	Remember
CO2	Have learnt about homogeneous function in partial differentiation and the Euler's theorem	Understand
CO3	Have studied the basics of vector calculus comprising of gradient, divergence and curl which is mostly used in the study of Solenoidal and Irrotational fields in physics.	Apply
CO4	Have learnt the application of line integrals which represent the workdone in mechanics. Also surface and volume integrals and the classical theorems involving line, surface and volume integrals which would be encountered by them in higher semesters	Apply
CO5	Have sufficient exposure to get the solution of certain linear differential equation using Laplace Transform and inverse Laplace Transform	Apply

SEMESTER III

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTS1	**Skill Enhancement Course I: BASIC ALGEBRA**	**25**	**5**	**-**	**2**

OBJECTIVES

This provides a basic knowledge of functions and relations to the learners and to understand the modern mathematics. It motivates the learners on algebra there by to lay foundation for future studies.

LEARNING OUTCOMES

Students who successfully complete the course are expected to have

a. An idea to distinguish certain ordered pairs from others and to define the relations from a set S to itself.

b. An ability to understand the equivalence classes and the partitions.

c. An ability to understand the notion of functions, surjective and bijective functions.

d. An ability to understand the inverse functions and some identities of functions.

SYLLABUS

UNIT I

Relations - Equivalence relations – Examples – Problems .

Chapter 2: Section 2.1 to 2.2

UNIT II

Equivalence classes – Partition – Examples – Problems - Theorems.

Chapter 2: Section 2.2

UNIT III

Functions – Examples – Injective , Surjective and bijective functions

Chapter 2: Section 2.4

UNIT IV

Functions - Composite of functions –Definitions – Theorems- Problems.

Chapter 2 : Section 2.4

UNIT V

Identity and inverse functions – Theorems - Problems.

Chapter 2: Section 2.4

TEXT BOOKS:

1. Dr. S. Arumugam Isaac A. T., Modern Algebra, New Gamma Publishing House,

Palayam Kottai, 2006.

REFERENCE BOOKS

1. S. G. Venkatachalapathi, Allied Mathematics, Margham Publication, Chennai-17, Reprint 2011.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS

Exercises can be given in the following topics:

1. Cartesian products, relations and to verify for the equivalencerelations.
2. Functions, one – one functions and ontofunctions.
3. Inverse functions and theidentities.

GROUP TASKS

Quiz competition can be conducted by giving exercises in the above topics.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Have an distinguish certain ordered pairs from others and to define the relations from a set S to itself.	Remember

CO2	Have an ability to understand the equivalence classes and the partitions.	Understand
CO3	Have an ability to understand the notion of functions, surjective and bijective functions.	Apply
CO4	Have an knowledge on composition of functions	Understand
CO5	Have an ability to understand the inverse functions and some identities of functions.	Apply

MAPPING WITH PROGRAMME OUTCOMES

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	S	L	L	S	S	M	L	M
CO2	M	L	-	L	L	M	S	M	L	M
CO3	S	M	L	M	M	S	S	M	M	S
CO4	M	M	L	-	L	S	M	M	S	S
CO5	S	M	M	S	L	M	M	S	M	M

SEMESTER IV

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTS2	**Skill Enhancement Course II: SEQUENCES AND**	**25**	**5**	**-**	**2**

	SERIES				

OBJECTIVES

This provides fundamental ideas and properties of sequences and series. It motivates the learners to solve the sequences and series problems.

LEARNING OUTCOMES

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

- Will come to know Sequences, Bounded sequence, Monotonic sequence, Convergent sequence, etc.
- Have sufficient exposure to test whether a sequence/ series is convergent or divergent.
- Understand the classifications of infinite series.

SYLLABUS

UNIT I

Sequences - Bounded sequence- Monotonic sequence - Convergent sequence.

Chapter 3: Sections 3.0 to 3.4

UNIT II

Divergent and Oscillating sequences , Algebra of limits

Chapter 3: Sections 3.5 to 3.6

UNIT III

Behaviour of monotonic sequences - Cauchy's first limit theorem - Cesaro's Theorem.

Chapter 3: Sections 3.7 to3.8

UNIT IV

Cauchy's Second limit theorem – Subsequences – Limit Points - Cauchy sequence.

Chapter 3: Sections 3.8 to 3.11

UNIT V

Upper and lower limits of sequences – Infinte Series .

Chapter 3: Section 3.12 & Chapter 4: Sections 4.1

TEXT BOOK:

1. S. Arumugam and Thangapandi Isaac A., Sequences and series, New Gamma Publishing House, Palayam Kottai, 2006.

REFERENCE BOOK:

1. Natarajan. S., Sequence and Series, S. V. Publications, Chennai.

WEB RESOURCES:

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS:

Exercises can be given in the following topics:

1. To identify the sequences whether they are bounded or oscillating.
2. To get some sequences and series and to test for its convergence.
3. To differentiate between the various tests in the above topics.

GROUP TASKS

Some of the sequences and series can be given and the students can be asked to tests for its convergence.

COURSE OUTCOMES:

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	An ability to understand about sequences, bounded	Knowledge

	sequences and its convergence and divergence.	
CO2	An ability to understand the Algebra of limits	Knowledge
CO3	An ability to analyse the behaviour of monotonic sequences.	Apply
CO4	An ability to apply the concept of the subsequence and Cauchy sequences.	Understand
CO5	An ability to apply the concept of infinite series	Understand

MAPPING WITH PROGRAMME OUTCOMES:

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	M	M	S	M	S	M	S	M
CO2	M	L	M	L	M	M	S	-	S	L
CO3	M	-	S	L	M	M	S	-	S	L
CO4	M	L	S	M	S	L	M	-	S	L
CO5	S	L	M	M	S	M	M	-	M	M

SEMESTER III

Course Code	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit
22UMTN1	**Non-Major**	**25**	**5**	**-**	**2**

	Elective Course I: BASIC MATHEMATICS				

OBJECTIVES

This syllabus aims to introduce students to use quantitative methods and techniques for effective decision-making model formulation and applications that are used in solving business decision problems. This tests the grasp of elementary concepts in Mathematics and Statistics and application of the same as useful quantitative tools.

LEARNING OUTCOMES

On successful completion of this course students will be able to

- Define concept of the Operations on Numbers.
- Describe fundamental properties of the H.C.F. and L.C.M of Numbers.
- Know the concepts of Percentage and Area.
- The ability to use and understand the concept of Volume and Surface area.

SYLLABUS

Unit -I :

Operations on Numbers.

Section-I – Chapter 1 – Solved examples 1-32 only. (Page No. 1-9 only)

Unit -II :

H.C.F. and L.C.M of Numbers.

Section-I – Chapter 2 (Page No. 30-45 only)

Unit -III :

Percentage

Section-I – Chapter 10 – Solved examples 1-33 only. (Page No.208-224 only)

Unit -IV :

Area

Section-I – Chapter 24 – Solved examples 1-32 only. (Page No. 499-505 only)

Unit - V:

Volume and Surface Area

Section-I – Chapter 25 – Solved examples 1-34 only. (Page No. 549-555 only)

TEXT BOOKS

1. Quantitative Aptitude for Competitive Examinations (Fully Solved) (Seventh Revised Edition) by **Dr. R. S. Aggarwal**, S.Chand& Company Pvt. Ltd.

REFERENCE BOOKS

1. Fast Track Objective Arithmetic by Rajesh Verma, Arihant Publications India Limited, New Delhi, Completely Revised Edition.

WEB RESOURCES

1. en.wikipedia.org/wiki/,
2. http://ncert.nic.in/ncerts/l/iemh113.pdf
3. https://yoursmahboob.files.wordpress.com/2016/12/quantramandeepbook-1.pdf

ASSIGNMENTS

Assignments can be given from the following topics:

1. H.C.F. and L.C.M 2. Percentage 3. Volume and Surface area.

GROUP TASKS

Two group tasks can be given in the form of group discussion, Quiz etc. in the topics of Operations on Numbers, H.C.F. and L.C.M of Numbers and Area.

COURSE OUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the fundamentals and to calculate	Remember

	H.C.F. & L.C.M of Numbers.	
CO2	Provide to calculate operations on numbers	Apply
CO3	Comprehend the concept and to calculate percentage.	Understand
CO4	Identify the Applications and to calculate the area.	Analyze
CO5	Explore the concepts and to calculate volume and surface area.	Evaluate

MAPPING WITH PROGRAMME OUTCOMES

COs	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	S	S	L	L	S	M	M	L	M	S
CO2	S	S	L	L	S	M	M	S	L	S
CO3	S	S	L	L	S	M	M	S	L	L
CO4	S	S	L	L	S	M	M	L	S	M
CO5	S	S	L	L	S	M	M	L	S	L

SEMESTER IV

Course Code	**Course Name**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**Credit**

22UMTN2	**Non-Major Elective Course II: MATHEMATICS FOR COMPETITIVE EXAMINATIONS**	**25**	**5**	**-**	**2**

OBJECTIVE

After the completion of the course the students get fundamental knowledge about the Matrices and will be able to solve the problems related to matrices.

LEARNING OUTCOMES

On successful completion of this course students will be able to

- Define concept of the Averages, Problems on Numbers.
- Describe fundamental properties of the Ratio and Proportion, Partnership.
- Know the concepts of Profit and Loss
- The ability to use and understand the concept of Simple Interest, Compound Interest

SYLLABUS

Unit - I

Averages, Problems on Numbers.

Section-I – Chapter 6 – Solved examples 1-15 only (Page No. 139-141),
Chapter 7 - Solved examples 1-15 only (Page No.161-163).

Unit - II

Profit and Loss

Section-I – Chapter 11 – Solved examples 1-29 only (Page No.251-256).

Unit - III

Ratio and Proportion, Partnership

Section-I – Chapter 12 – Solved examples 1-7 only (Page No.294-296),
Chapter 13 (Page No.311-325).

Unit - IV

Simple Interest, Compound Interest

Section-I – Chapter 22 – Solved examples 1-12 only (445-447),
Chapter 22 – Solved examples 1-15 only(466-470).

Unit - V

Odd Man Out and Series

Section-I – Chapter 35 (Page No.649-657).

TEXT BOOKS

1. Aptitude for Competitive Examinations (Fully Solved) (Seventh Revised Edition) by

Dr. R. S. Aggarwal, S. Chand & Company Pvt. Ltd.

REFERENCE BOOKS

1. Quantitative Aptitude for All Competitive Examinations by **Abhijit Guha**, McGraw Hill

Education, Sixth edition.

WEB RESOURCES

1 . en.wikipedia.org/wiki/,
2. http://ncert.nic.in/ncerts/l/iemh113.pdf

3 .https://yoursmahboob.files.wordpress.com/2016/12/quantramandeepbook-1.pdf

ASSIGNMENTS

Assignments can be given from the following topics:

1. Odd Man Out and Series
2. Simple Interest, Compound Interest
3. Profit and Loss

GROUP TASKS

1. Two group tasks can be given in the form of group discussion, Quiz etc. in the topics of Odd Man Out and Series Simple Interest, Compound Interest and Profit and Loss

COURSE OUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the fundamentals of Averages and problems on numbers	Remember
CO2	Provide the concept and to Find the Profit and loss of the given problem.	Apply
CO3	Comprehend the concept about Ratio and proportion, partnership	Understand
CO4	Identify the Applications and to solve the Simple interest and Compound interest.	Analyze
CO5	Explore the concepts and to solve problems of Odd man out and series..	Evaluate

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	S	L	L	S	M	M	L	M	S
CO2	S	S	L	L	S	M	M	S	L	S
CO3	S	S	L	L	S	M	M	S	L	L
CO4	S	S	L	L	S	M	M	L	S	M
CO5	S	S	L	L	S	M	M	L	S	L

SEMESTER V

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMTS3	**Skill Enhancement Course III: QUANTITATIVE APTITUDE–I**	**25**	**5**	**-**	**2**

OBJECTIVES

This syllabus aims to introduce students to use quantitative methods and techniques for effective decision-making model formulation and applications that are used in solving business decision problems. To test the grasp of elementary concepts in Mathematics and Statistics and application of the same as useful quantitative tools.

LEARNING OUTCOMES

Students who successfully complete the course will provide the following outcomes by tests and homework.

- An ability to calculate Time and Work
- An ability to calculate Time & Distance
- An ability to calculate Problems on Trains
- An ability to calculate Boats and Streams
- An ability to calculate Simple Interest and Compound Interest

SYLLABUS

UNIT I

Time and Work Section 1:15

UNIT II

Time and Distance Section 1:17

UNIT III

Problems on Trains Section 1:18

UNIT IV

Boats and Streams Section 1:19

UNIT V

Simple Interest and Compound Interest Section 1:22 & 22

TEXT BOOKS:

1. R.S. Aggarwal – Quantitative Aptitude – For Competitive Examinations, S.Chand & Company Ltd, Reprint 2008.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS

1. A does a work in 10 days and B does the same work in 15 days. In how many days they together will do the same work?
2. A train is running at a speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train?
3. At what rate percent per annum will a sum of money double in 16 years?

GROUP TASKS

1. A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?
2. In one hour, a boat goes 11 km along the stream and 5 km against the stream. The speed of the boat in still water (in km / hr) is :
3. What will be the compound interest on a sum of Rs.25,000 after 3 years at the rate of 12 p.c.p.a?

COURSE OUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	An ability to calculate Time and Work	Apply
CO2	An ability to calculate Time & Distance	Apply
CO3	An ability to calculate Problems on Trains	Apply
CO4	An ability to calculate Boats and Streams	Apply
CO5	An ability to calculate Simple Interest and Compound Interest	Apply

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	S	L	S	M	S	S	L	S	M
CO2	L	S	L	S	M	S	M	L	S	M
CO3	L	S	L	S	M	S	M	L	M	M
CO4	M	S	L	S	M	S	M	L	M	S
CO5	L	S	L	S	M	S	S	L	S	S

SEMESTER VI

Course Code	Course Name	Lecture(L)	Tutorial(T)	Practical(P)	Credit
22UMTS4	**Skill Enhancement Course IV: QUANTITATIVE APTITUDE–II**	**25**	**5**	**-**	**2**

OBJECTIVES

This syllabus aims to introduce students to use quantitative methods and techniques for effective decision-making model formulation and applications that are used in solving business decision problems.

LEARNING OUTCOMES

Students who successfully complete the course will provide the following outcomes by tests and homework.

- An ability to calculate area.
- An ability to calculate volume and surface area.
- An ability to calculate Races and games of skill, Calendar
- An ability to calculate Clocks, Stock and Shares
- An ability to calculate Permutations and combinations, Probability

SYLLABUS

UNIT I

Area — Section 1:24

UNIT II

Volume & Surface Areas — Section 1:25

UNIT III

Races & Games of Skill, Calendar — Section 1:26, 27

UNIT IV

Clocks, Stock and Shares — Section 1:28, 29

UNIT V

Permutations and combinations, Probability Section 1:30, 31

TEXT BOOKS

1. R.S. Aggarwal – Quantitative Aptitude – For Competitive Examinations, S.Chand & Company Ltd, Reprint 2008.

WEB RESOURCES

1. en.wikipedia.org/wiki/
2. mathworld.wolfram.com
3. wiki.answers.com

ASSIGNMENTS

1. The circumference of a circle, whose area is 24.64 m^2 , is ?
2. The capacity of a cylindrical tank is 246.4 litres. If the height is 4 metres, what is the diameter of the base?
3. On what dates of April, 2001 did Wednesday fall?

GROUP TASKS

1. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. The area of the lawn is 2209 sq. m. then what is the width of the road?

2. A hemisphere and a cone have equal bases. If their heights are also equal, then the ratio of their curved surfaces will be :

3. In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

COURSE OUTCOMES

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

S. NO.	COURSE OUTCOME	BLOOMS VERB
CO1	An ability to calculate area.	Apply
CO2	An ability to calculate volume and surface area.	Apply
CO3	An ability to calculate Races and games of skill, Calendar	Apply
CO4	An ability to calculate Clocks, Stock and Shares	Apply
CO5	An ability to calculate Permutations and combinations, Probability	Apply

MAPPING WITH PROGRAMME OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	S	L	S	M	S	S	L	S	M
CO2	L	S	L	S	M	S	M	L	S	M
CO3	L	S	L	S	M	S	M	L	M	M
CO4	M	S	L	S	M	S	M	L	M	S
CO5	L	S	L	S	M	S	S	L	S	S