KALAIGNAR KARUNANIDHI GOVERNMENT ARTS COLLEGE FOR WOMEN
(Autonomous)
(Re - Accredited with B^{++} by NAAC)

PUDUKKOTTAI – 622 001.

PG & RESEARCH DEPARTMENT OF MATHEMATICS

COURSE PATTERN AND SYLLABI

(For candidates admitted from the academic year
2021 – 2022 Onwards)

B. Sc. MATHEMATICS

ALLIED MATHEMATICS

ALLIED STATISTICS

CONTENTS

KALAIGNA KARUNANIDHI GOVERNMENTARTS COLLEGEFOR WOMEN (Autonomous),

PUDUKKOTTAI - 622 001.

PG & RESEARCH DEPARTMENT OF MATHEMATICS

Members of Board of Studies 2021 – 2022

Board of Studies Meeting:

University Nominee

Dr. D.Muthuramakrishnan
Associate Professor and Head,
Department of Mathematics,
NationalCollege(Autonomous),
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Subject Experts

1. Dr. M.Kamaraj
Associate Professorand Head
Department of Mathematics,
Government Arts & Science College,
Sivakasi-626 124.

2.Dr. A.P.Dhana Balan
Assistant Professor and Head
Department of Mathematics,
Alagappa Government Arts College,
Karaikudi- 630 003.

Chairman

Mrs. R. Rohini
Assistant Professor and Head
PG and Research Department of Mathematics,
Kalaignar Karunanidhi Govt. Arts College
for Women (A),
Pudukkottai – 622001.

Faculty Members

Mrs. N. Maheswari
Assistant Professor of Mathematics,
PG & Research Department of Mathematics,
Kalaignar Karunanidhi Govt. Arts College
For Women (A),
Pudukkottai – 622001.

Industrialist

Mr. N. Balaji
Industrialist Inkrefuge Solutions
CAO, C-66 Thillainagar west,
Thiruchirappalli – 620 018.

Alumni

Dr.V. Shanthi
Associate Professor of Mathematics,
National Institute of Technology,
Tiruchirappalli – 620 015.

GENERAL COURSE PATTERN FOR B.Sc., MATHEMATICS

Sl.No	Part	No. of Courses	Credits	Total Marks
1	I	4	12	400
2	II	4	12	400
3	III			
	Core Courses	15	69	1500
	Allied Courses	6	18	600
	Elective Courses	3	12	300
			Total	**2200**
4	IV			
	Non – Major Elective Courses	2	4	200
	Skill Based Courses	3	6	300
	Value Based Education Course	1	2	100
	Environmental Studies Course	1	2	100
	Yoga	1	1	10
5	V			
	Gender Studies Course	1	1	100
	Extension Activity		1	-
	Total	**39**	**141**	**3900**

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(For candidates admitted from the academic year 2021 – 2022 onwards)

B.Sc., MATHEMATICS

KALAIGNAR KARUNANIDHI GOVERNMENT ARTS COLLEGE FOR WOMEN (AUTONOMOUS), PUDUKKOTTAI – 622 001.
B.Sc., MATHEMATICS
COURSE PATTERN
2021 -22 Onwards

Sem.	Part	Sl.No.	Code	Subject Code	Title of the Course	Instrn. Hrs	Credits
I	I	1	LC-I	21UT1	Tamil - Paper I	6	3
	II	2	ELC-I	21UE1	English - Paper I	6	3
	III	3	CC-I	22UMA01	Differential Calculus and Trigonometry	6	5
	III	4	CC-II	21UMA02	Analytical Geometry of Three Dimensions and Integral Calculus	4	4
	III	5	FAC-I	21UASM1	Allied Statistics – Paper I	6	3
	IV	6	AEC-VB	21UVB	Value Education	2	2
		TOTAL				**30**	**20**
II	I	7	LC-II	21UT2	Tamil - Paper II	6	3
	II	8	ELC-II	21UE2	English - Paper II	6	3
	III	9	CC-III	21UMA03	Classical Algebra	5	5
	III	10	CC-IV	21UMA04	Sequences and Series	4	4
	III	11	FAC-II	21UASM2	Allied Statistics – Paper II	5	3
	III	12	FAC-III	21UASM3P	Allied Statistics II-Practical	4	3
		TOTAL				**30**	**21**
III	I	13	LC-III	21UT3	Tamil - Paper III	6	3
	II	14	ELC-III	21UE3	English - Paper III	6	3
	III	15	CC-V	21UMA05	Integral Calculus	6	5
	III	16	CC-VI	21UMA06	Vector Calculus and Fourier Series	5	5
	III	17	SAC-I	21UAP1	Allied Physics – Paper I	5	3
	IV	18	AEC-ES	21UES	Environmental Studies	2	2
					TOTAL	**30**	**21**
		19	SS1	21UMASS1	Theory of Numbers		2

Sem	part	Sl.No.	Code	Subject Code	Title of the Course	Instrn. Hrs	Credits
IV	I	20	LC-IV	21UT4	Tamil - Paper IV	6	3
	II	21	ELC-IV	21UE4	English - Paper IV	6	3
	III	22	CC-VII	21UMA07	Differential Equations	4	4
	III	23	CC-VIII	21UMA08	History of Mathematics and Vedic Mathematics	3	3
	III	24	SAC-II	21UAP2	Allied Physics – Paper II	5	3
	III	25	SAC-III	21UAP3P	Allied Physics - Practical	4	3
	IV	26	SEC-I	21UMASB1	LATEX	2	2
					TOTAL	**30**	**21**
		27	SS2	21UMASS2	Astronomy		2
V	III	28	CC-IX	21UMA09	Algebra	5	5
	III	29	CC-X	21UMA10	Real Analysis	5	5
	III	30	CC-IX	21UMA11	Graph Theory	4	4
	III	31	CC-XII	21UMA12	Statics	5	4
	III	32	ME-I	21UMAME1	Elective Course I	4	4
	IV	33	SEC-II	21UMASB2	MATLAB	2	2
	IV	34	SEC-III	21UMASB3	Soft Skill for professionals	2	2
	IV	35	NME-I	21UMANME1	Quantitative Aptitude - I	2	2
	IV	36	Yoga	21UYOGA	Yoga and Health	1	2
					TOTAL	**30**	**30**
VI	III	37	CC-XIII	21UMA13	Complex Analysis	5	5
	III	38	CC-XIV	21UMA14	Numerical Methods	6	5
	III	39	CC-XV	21UMA15	Dynamics	6	5
	III	40	ME - II	21UMAME2	Elective Course II	5	4
	III	41	ME-III	21UMAME3	Elective Course III	5	4
	IV	42	NME-II	21UMANME2	Quantitative Techniques	2	2
	V	43	GS	21UGS	Gender Studies	1	1
	V	44	EXA	21UEXA	Extension Activity	-	1
					TOTAL	**30**	**27**
					GRAND TOTAL		**140**

COURSE PATTERN

Distribution of Hours, Marks and Credits for B.Sc. Mathematics - CBCS

SEMESTER I

Sl. No.	Course	No. of Courses	Hrs./week	Credits	Max. Marks (SE+CIA) (75 + 25)
1	Part I – Lang. Course I	1	6	3	100
2	Part II – Eng. Course I	1	6	3	100
3	Core Course I	1	6	5	100
4	Core Course II	1	4	4	100
5	Allied Statistics Course I	1	6	3	100
6	Value Education	1	2	2	100
	Total	**6**	**30**	**20**	**600**

SEMESTER II

Sl. No.	Course	No. of Courses	Hrs./week	Credits	Max. Marks (SE + CIA) (75 + 25)
1	Part I – Lang. Course II	1	6	3	100
2	Part II – Eng. Course II	1	6	3	100
3	Core Course III	1	5	5	100
4	Core Course IV	1	4	4	100
5	Allied Statistics Course II	1	5	3	100
6	Allied Statistics Course (Practical)	1	4	3	100
	Total	**6**	**30**	**21**	**600**

SEMESTER III

Sl. No.	Course	No. of Courses	Hrs./week	Credits	Max. Marks (SE + CIA) (75 + 25)
1	Part I – Lang. Course III	1	6	3	100
2	Part II – Eng. Course III	1	6	3	100
3	Core Course V	1	6	5	100
4	Core Course VI	1	5	5	100
5	Allied Physics Course I	1	5	3	100
6	AEC-ES	1	2	2	100
	Total	**6**	**30**	**21**	**600**
	SS1			2	100

SEMESTER IV

Sl. No.	Course	No. of Courses	Hrs./week	Credits	Max. Marks (SE + CIA) (75 + 25)
1	Part I – Lang. Course IV	1	6	3	100
2	Part II – Eng. Course IV	1	6	3	100
3	Core Course VII	1	4	4	100
4	Core Course VIII	1	3	3	100
5	Allied Physics Course II	1	5	3	100
6	Allied Physics Course (Practical)	1	4	3	100
7	Skill Enhancement Course - I	1	2	2	100
	Total	**7**	**30**	**21**	**700**
	SS2			2	100

SEMESTER V

Sl. No.	Course	No. of courses	Hrs./week	Credits	Max. Marks (SE+CIA) (75 + 25)
1	Core Course IX	1	5	5	100
2	Core Course X	1	5	5	100
3	Core Course XI	1	4	4	100
4	Core Course XII	1	5	5	100
5	Elective Course I	1	4	4	100
6	Skill Enhancement CourseII	1	2	2	100
7	Soft Skill for professionals III	1	2	2	100
8	Non Major Elective I	1	2	2	100
9	Yoga	1	1	1	100
	Total	**9**	**30**	**30**	**900**

SEMESTER VI

Sl. No.	Course	No. of courses	Hrs./week	Credits	Max. Marks (SE + CIA) (75 + 25)
1	Core Course XIII	1	5	5	100
2	Core Course XIV	1	6	5	100
3	Core Course XV	1	6	5	100
4	Elective Course II	1	5	4	100
5	Elective Course III	1	5	4	100
6	Non Major Elective II	1	2	2	100
7	Gender Studies	1	1	1	100
8	Extension Activity	-	-	1	-
	Total	**7**	**30**	**27**	**700**

OVERALL TOTAL – SEMESTER-WISE

Semester	No. of Courses	Marks	Credits
I	6	600	20
II	6	600	21
III	6	600	21
IV	7	700	21
V	9	900	30
VI	7	700	26
Extension Activity			1
Total	41	4100	**140**

OVERALL TOTAL – COURSE-WISE

Subject	No. of Courses	Credit/Course	Total Credits
Lang. I	4	3	12
Lang. II	4	3	12
Core – Theory	9	5	45
	7	4	28
	1	3	3
Allied Statistics – Practical	1	3	3
Theory	2	3	6
Allied Physics – Theory	2	3	6
Practical	1	3	3
Elective	3	4	12
Skill Based	3	2	6
Non Major Elective	2	2	4
ValueEducation	1	2	2
Gender Studies	1	1	1
Environmental Studies	1	2	2
Extension Activity	-	1	1
Yoga	1	1	1
Total	**38**		**147**

Number of Courses offered by the Department

1.	Core Courses	:	15
2.	Major Elective Courses	:	3
3.	Allied Statistics Courses	:	3
4.	Allied Mathematics Courses for Physics & Chemistry Major	:	3
5.	Allied Mathematics Courses for Computer Science Major	:	3
6.	Skill Based	:	3
❖	Number of Units in each course	:	5
❖	Examination Hours for each course	:	3
❖	Maximum Marks for each course–EXT.	:	75
❖	Maximum Marks for each course–CIA.	:	25
❖	Total Marks	:	100

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF) FOR UNDERGRADUATE PROGRAMME

PREFACE

Mathematics is the science of structures, order and relation that has evolved from elementary practices of counting, measuring and describing the shapes of objects, numbers, quantity, space and algebraic structures either as abstract concepts or applied in various disciplines. The under graduate programme is equipped with the wide range of branches in mathematics such as differential calculus and trigonometry, analytical geometry of three dimensions, classical algebra, Sequences and series, Integral calculus, vector calculus and fourier series, differential equations, algebra, mathematical analysis, statics and dynamics.

The school of computational sciences aspires to equip students with a globally relevant curriculum and a scientific approach. Students are expected to develop a scientific temperament in the long run. Ultimately, in everyday life, this scientific temper applies a scientific technique of decision-making.

The curriculum designed by the department of mathematics seeks to offer students with disciplinary knowledge as well as digital literacy. This progressively improves the learners' ability to locate, assess and clearly explain information. It makes learners develop critical thinking skills. It also improves the spirit of collaboration and ethical standards. As a result, both on an individual and organizational level, this serves as a guide to behaviour.

The undergraduate mathematics programme, which includes a learning outcomes-based curriculum framework (LOCF), meets the demands of students in the field of mathematical sciences. This new structure is supposed to aid in the maintenance of the mathematics program's standard across the country. It also keeps the standard of quality up to date by examining and amending a broad framework of programme qualities, course descriptors, programme learning outcomes, and course outcomes.

At the undergraduate level, learners are expected to be taught mathematical concepts, methods, methodologies, models, structures and spaces using this innovative approach to curriculum planning. The first and second semester courses are designed to connect the mathematical ideas taught in the higher secondary school.

Overall, the training that students attain from all of the courses prepares them to utilize what they've learnt in pursuing higher education and future endeavours. Altogether, this provides learners with a variety of options to build skills for job advancement and research.

In a broader sense, this curriculum has been created to meet the needs of students by providing them with exposure to current trends in mathematical sciences. It helps students improve their critical thinking, analytical reasoning, and problem-solving abilities. LOCF also builds the personality of young brains as a holistic and socially responsible human being by improving scientific thinking, entrepreneurial abilities and human values.

VISION AND MISSION OF THE DEPARTMENT

VISION

To acquaint coherent knowledge of mathematics to form credible, innovative and socially committed citizens.

MISSION

To explore and elevate mathematical techniques and enable students with academic excellence and core competencies.

PROGRAMME OUTCOMES (POs) – (UG Science)

Upon Completion of B.Sc., Degree programme, the graduates will be able to

PO1	Acquire fundamental knowledge of mathematics, physical, chemical, life science and computing to identify, formulate and obtain solutions for the scientific problems.
PO2	Relate scientific ideas with pratical experience in various fields and develop skills to implement new scientific techniques.
PO3	Apply analytical, creative and problem solving skills to plan, execute and report the results of theoretical and experimental investigations.
PO4	Explore technical knowledge and improve communicative skills to pursue higher education and excel as entrepreneurs.
PO5	Integrate professional, ethical and social issues and interpret the benefits, limitations of science and its application in technological developments.

PROGRAMME SPECIFIC OUTCOMES (PSOs) – (UG Science)

Upon Completion of B.Sc., Degree programme, the graduates will be able to

PSO1	Discuss the foundation and history of mathematics, perform computations in calculus, Trigonometry, Algebra and Theory of numbers.
PSO2	Apply analytical and theoretical skills and mathematical ideas to solve mathematical problems and to model real-world problems.
PSO3	Utilize technology to address mathematical ideas, and mathematical programming using C programming language and MATLAB.
PSO4	Acquire good knowledge and understanding in advanced areas of mathematics andstatistics, chosen by the student from the given course.
PSO5	Appreciate different dimensions of contemporary mathematics and develop & integrate appropriate solutions to the problems faced by people in diverse domains.

TITLE OF PROPOSED COURSES – B.Sc. MATHEMATICS

List of Core Courses

Sl.No.	Code	Subject Code	Title of the Course
1	CC-I	21UMA01	Differential Calculus and Trigonometry
2	CC-II	21UMA02	Analytical Geometry of Three Dimensions
3	CC-III	21UMA03	Classical Algebra
4	CC- IV	21UMA04	Sequences and Series
5	CC-V	21UMA05	Integral Calculus
6	CC-VI	21UMA06	Vector Calculus and Fourier Series
7	CC-VII	21UMA07	Differential Equations
8	CC-VIII	21UMA08	History of Mathematics and Vedic Mathematics
9	CC-IX	21UMA09	Algebra
10	CC-X	21UMA10	Real Analysis
11	CC-XI	21UMA11	Graph Theory
12	CC-XII	21UMA12	Statics
13	CC-XIII	21UMA13	Complex Analysis
14	CC-XIV	21UMA14	Numerical Methods
15	CC-XV	21UMA15	Dynamics

List of Extra Core Courses

Sl.No.	Code	Subject Code	Title of the Course
1	CC-XVI	21UMA16	Differential Geometry
2	CC-XVII	21UMA17	Fuzzy Mathematics
3	CC-XVIII	21UMA18	Mathematical Modelling

List of Elective Course (Any THREE)

Sl.No.	Code	Subject Code	Title of the Course
1	ELC - I	21UMAME1	Operations Research
2	ELC - II	21UMAME2	Laplace Transforms, Fourier Transforms and z- Transforms
3	ELC - IV	21UMAME3	Web Technology
4	ELC - III	21UMAME4	Discrete Mathematics
5	ELC - V	21UMAME5	Combinatorics

List of Self Study Courses (Any ONE)

SI.No.	Code	Subject Code	Title of the Course
1	SSC-I	21UMASS1	Theory of Numbers
2	SSC-II	21UMASS2	Astronomy
3	SSC-III	21UMASS3	Quantitative Techniques

List of Skill Based Courses

Sl.No.	Sem.	Subject Code	Title of the Course
1	IV	21UMASB1	Paper I: LATEX
2	V	21UMASB2	Paper II : MATLAB
3	V	21UMASB3	Paper III: Soft Skill for professionals

List of Courses Common to all Major

Sl.No.	Sem.	Subject Code	Title of the Paper
1	I	21UVB	Value Based Education
2	III	21UES	Environmental Studies
3	V	21USB1	Yoga and Health
4	VI	21UGS	Gender Studies

Allied Mathematics for B.Sc. Physics and Chemistry

Sl.No.	Semester	Subject Code	Title of the Course
1	I	21UAM1	Allied Mathematics I - Calculus and Vector Calculus
2	II	21UAM2	Allied Mathematics II – Differential Equations, Laplace Transforms and Fourier Series
3	II	21UAM3	Allied Mathematics III – Algebra and Trigonometry

Allied Mathematics for B.Sc. Computer Science

Sl.No.	Semester	Subject Code	Title of the Course
1	I	21UAMCS1	Allied Mathematics I - Numerical Methods and Operations Research
2	II	21UAMCS2	Allied Mathematics II - Integral Calculus, Differential Equations, Vector Calculus and Fourier Series
3	II	21UAMCS3	Allied Mathematics III – Algebra, Probability and Statistics

List of Allied Courses for B.Sc. Mathematics

(i) I Year -Statistics

Sl.No.	Semester	Subject Code	Title of the Course
1	I	21UASM1	Statistics for Mathematics - I
2	II	21UASM2	Statistics for Mathematics – II
3	II	21UASM3P	Statistics for Mathematics (Practical)

(ii) II Year -Physics

Sl.No.	Semester	Subject Code	Title of the Course
1	III	21UAP1	Allied Physics - I
2	IV	21UAP2	Allied Physics - II
3	IV	21UAP3P	Allied Physics Practical

QUESTION PAPER PATTERN – B.Sc. Mathematics
(Other than Non Major Elective Courses)

THEORY

Part	**Type**	**Qn. No.**	**Unit**	**Marks for each Question**	**Total Marks**
A	Answer All the Questions	1 & 2	I	2	20
		3 & 4	II		
		5 & 6	III		
		7 & 8	IV		
		9 & 10	V		
B	Internal Choice – Answer All the Questions	11a / 11b	I	5	25
		12a / 12b	II		
		13a / 13b	III		
		14a / 14b	IV		
		15a / 15b	V		
C	Answer any Three Questions	16	I	10	30
		17	II		
		18	III		
		19	IV		
		20	V		
	External Marks CIA				75 25
	Max. Marks				100

CONTINUOUS INTERNAL ASSESSMENT PATTERN - U.G.

Theory Course

Exam.	Max. Marks	Converted To
Mid Sem.	40	5
End Sem.	40	5
Model	75	10
Assignment	10	5
Total		25

Statistics Practical Course

CIA: 40 Marks (Model Exam: 30, Class Performance:10) Performance in

Practical : 50Marks

Record : 10 Marks

Passing minimum:

UG: Semester Exam. : 30 Marks(40% of Max. marks 75)

CIA: 10 Marks (40% of max. marks25)

Total: 40Marks

B.Sc. MATHEMATICS
2021 – 2022 Onwards

Sub. Code: 21UMA01

Semester: I **Hours /Week: 6 hrs**
Core Course: I **Credit : 5**

DIFFERENTIAL CALCULUS AND TRIGONOMETRY

Course Objectives

The objective of this programme is

CO-1	To understand limit of function and higher order differentiation. Recognize and relate successive differentiation
CO-2	To demonstrate and calculate maxima and minima.
CO-3	To assimilate the idea of curvature.
CO-4	To expand a trigonometric function as multiple of θ and a series of powers of θ
CO-5	To determine the hyperbolic function, inverse hyperbolic function and separation into real and imaginary parts.

Prerequisites: Basic knowledge of differentiation and trigonometry.

UNIT I

Function and Limits:

1.1 Variable tending to a limit and Limit of a function

1.2 Limits and value of a function and Rules for finding the limit of a function

1.3 Some general theorems on limits and Certain special limits Continuous and Discontinuous functions.

D**ifferentiation**:

1.4 Definition and Differential coefficients of x^n, e^x, $\log_e x$, sinx, cosx and tanx(Standard result only-excluding problems)

1.5 Successive differentiation

UNIT II

Maxima and minima:

2.1 Increasing and decreasing functions

Partial Differentiation, Errors and Approximation:

2.2 Maxima and minima of functions of two variables

2.3 Working rule and problems.

2.4 Lagrange's method of undetermined multipliers.

UNIT III

Envelopes, Curvature of Plane Curves:

3.1Curvature

3.2 Radius of curvature in Cartesian co-ordinates

3.3 Coordinates of the center of curvature

3.4 Evolutes and Involutes

3.5 Radius of curvature when the curve is given in polar co-ordinates and p-r equations.

UNIT IV

Applications of DeMoivre's Theorem:

4.1 Expression for $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$

4.2 Expression for $\sin^n\theta$ and $\cos^n\theta$

4.3 Expansion of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in powers of θ.

UNIT V

Hyperbolic functions:

5.1Hyperbolic functions, Relations between hyperbolic functions and circular trigonometric functions

5.2 Inverse hyperbolic functions.

TEXT BOOKS

1. Calculus Vol.I, S.Narayanan, T.K.Manicavachagom Pillay, S.Viswanathan Pvt. LTD, 2007. (Units – I toIII)
2. Trigonometry and Fourier series – S.Arumugam, A. ThangapandiIssac, A. Somasundaram, New Gamma publishing House, Palayamkottai. (Units IV &V)

UNIT I :Chapter 1: Sec.5 –11 &
Chapter 2: Sec.1, 2.1 – 2.6 &
Chapter 3

UNIT II :Chapter 5: Sec. 1 &
Chapter 8: Sec. 4, 4.1 &5

UNIT III :Chapter 10: Sec. 2.1, 2.3- 2.7

UNIT IV :Chapter 1 : Sec. 1.2 –1.4

UNIT V :Chapter 2 : Sec. 2.1,2.2

REFERENCE BOOKS

1. Calculus - Volume I , S. Arumugam A. T. Isaac, New Gamma Publishing House, 1991.
2. Trigonometry, S. Narayanan andT.K.Manicavachagam Pillay, S. Viswanathan(Printers & Publishers), Pvt. Ltd., and Vijay Nicole Imprints Pvt Ltd, Chennai, 2004

3. Plane Trigonometry, S.L.Loney, S.Chand & Co., NewDelhi.
4. Trigonometry, Vittal P. R., Margham Publications, 1988.
5. Engineering Mathematics Vol I, Arumugam S, and Isaac A, Scitech Publications, 1999.

WEB RESOURCES

1. https://bit.ly/3FGGW2H
2. https://nitkkr.ac.in/docs/2-Geometrical%20Applications%20of%20Differentiation.pdf
3. https://mast.queensu.ca/~math121/Notes/notes09.pdf
4. https://brilliant.org/wiki/expansions-of-certain-trigonometric-functions/
5. https://www.mathsisfun.com/sets/function-hyperbolic.html

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Recall and recognize of functinos, limits and differentiation,.	K1, K2
CO2	Apply the concept maxima and minima and to perform partial differentiation, errors and approximation.	K3
CO3	Examine the envelopes, curvature of plane curves.	K4
CO4	Develop the expansions of basic trigonometric, hyperbolic functions	K5
CO5	Interpret the relation between the hyperbolic trigonometric functions and circular functions.	K6

B.Sc. MATHEMATICS
2021 – 2022 Onwards

Sub Code : 21UMA02

Semester: I **Hours/Week : 4hrs**

CoreCourse: II **Credit :4**

ANALYTICAL GEOMETRY OF THREE DIMENSIONS

Course Objectives

The objective of this programme is

CO-1	To understand the concept of the straight line.
CO-2	To interpret the concept of the cylinder.
CO-3	To assimilate the concept of the plane.
CO-4	To construct the concept of cone
CO-5	To visualize spheres and to develop tangent plane of a sphere.

Prerequisites: Basic knowledge of Analytical Geometry

UNITI

The Straight Line:

1.1 A straight line may be determined as the intersection of two plans

1.2 Symmetrical form of the equations of a line

1.3 The symmetrical form of the equations of the line

1.4 Equation of a straight line passing through two given points

UNIT II

The Cylinder:

2.1 Cylinder

2.2 The equation of the cylinder whose generators intersect the curve

2.3 A right Circular Cylinder

2.4 Equation of a right circular cylinder whose radius r and axis is the line.

UNIT III

The Plane:

3.1 Standard equation of the plane and intercept form, Normal form

3.2 Plane passing through the given points

3.3 Angle between the planes and plane through the line of intersection of two planes

3.4 Length of perpendicular

3.5 Planes bisecting the angle between the planes.

UNIT IV

Cone

4.1 Cone and right circular cone

4.2 Intersection of a straight line and a quadric cone

4.3 Tangent plane and normal

4.4 Condition for the plane

4.5 The angle between the lines and cuts the cone

UNIT V

The Sphere:

5.1 Definition and the equation of a sphere when the center and radius are given

5.2 Standard equation of sphere and length of the tangent from any point

5.3 The plane section of a sphere is a circle and equation of a circle on a sphere

5.4 Sphere passing through a given circle and Intersection of two spheres is a circle

5.5 Equation of the tangent plane to the sphere.

TEXT BOOKS

1. A Textbook of Analytical Geometry – Part II – Three Dimensions - T.K.M.Pillay and T. Natarajan – S. Viswanathan Pvt. LTD 2008. (UNIT I,III toV)
2. Engineering Mathematics, Vol.I, M.K. Venkataraman, The National Publishing Company, Chennai, 2011. (UNIT II)

UNITI : Chapter 3: Sec. 1 – 4
UNIT II : Chapter 5: Sec. 5.5 – 5.8
UNIT III : Chapter 2: Sec. 1–5, 7, 9–11
UNITIV : Chapter 5: Sec. 2 –6
UNITV : Chapter 4: Sec. 1 –8

REFERENCE BOOKS

1. Engineering Mathematics, Vol.II, M.K. Venkataraman, The National Publishing Company, Chennai, Reprinted2009
2. Coordinate Geometry, Duraipandian. P, Emerald Publishers, 1984.
3. Engineering Mathematics Volume I, Arumugam S, Isaac A, Scitech Publications, 1999.
4. Coordinate Geometry, Duraipandian. P, Emerald Publishers, 1984.

WEB RESOURCES

1. https://slideplayer.com/slide/10560643/
2. https://www.toppr.com/guides/maths/three-dimensional-geometry/
3. https://archive.org/details/in.ernet.dli.2015.148219/page/n9/mode/2up
4. https://fdocuments.in/document/a-textbook-of-analytical-geometry-of-two dimensions.html

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Recall and recognize straight line, cylinder, the plane, cone and sphere	**K1, K2**
CO2	Apply the concept of straight line, cylinder, the plane, cone and Sphere	**K3**
CO3	Apply the concept of straight line, cylinder, the plane, cone and sphere	**K4**
CO4	Determine the expansions of basic straight line, cylinder, the plane, cone and Sphere	**K5**
CO5	Improve the concept of straight line, cylinder, The plane, cone and Sphere	**K6**

B.Sc. MATHEMATICS

2021 – 2022 onwards

Sub. Code : 21UMA03

Semester: II **Hours/Week : 5hrs**

CoreCourse: III **Credit :5**

CLASSICAL ALGEBRA

Course Objectives

The objective of this programme is

CO-1	To understand the theory of Equations and roots of the equations
CO-2	To learn reciprocal equation and transformation in general terms
CO-3	To classify the different techniques and methodologies to find the solution.
CO-4	To apply the concept of some theorem for inequalities.
CO-5	To summarize the concept of congruence to derive fundamental standard theorems in number theory

Prerequisites: Fundamental knowledge on theory of equations and theory of numbers.

UNIT I

Theory of Equations

1.1 Relations between the roots and coefficients of equations

1.2 Symmetric function of the roots

1.3 Sum of powers of roots of an equation.

1.4 Newton's theorem on the sum of the powers of the roots.

UNIT II

2.1 Transformations of equations and reciprocal equation

2.2 To increase or decrease the roots of a given equation by a given quantity

2.3 Form of the quotient and remainder when a polynomial is divided by a binomial

2.4 Removal of terms and to form an equation whose roots are any power of the roots of a given equation

2.5 Transformation in general

UNIT III

3.1 Descartes' Rule of signs

3.2 Rolles' theorem

3.3 Multiple roots

3.4 Newton's Method of divisors

3.5 Horner's Method

UNIT IV

Inequalities

4.1 Elementary principles of inequalities

4.2 Geometric and Arithmetic means

4.3 Weirstrass Inequalities

4.4 Cauchy's Inequality

4.5 Applications to Maxima and Minima.

UNIT V

Theory of Numbers

5.1 Prime and Composite numbers, The sieve of Eratosthenes and divisors of a given number N, Euler's function $\phi(N)$

5.2 Integral part of a real number and the highest power of a prime p contained in n!

5.3 The product of r consecutive integers is divisible by r!

5.4 Congruence, Numbers in a arithmetical progression and Fermat's theorem, Generalization of Fermat's theorem

5.5 Wilson's theorem and Lagrange Theorem.

TEXT BOOK

1. Algebra – Vol. I – T.K.Manicavachagom Pillay, T. Natarajan and K.S.Ganapathy, S. Viswanathan Pvt. LTD, 2008. (Units – I to III)
2. Algebra – Vol. II – T.K. Manicavachagom Pillay, T.Natarajan and K.S. Ganapathy S.Viswanathan Pvt. LTD, 2013. (Units – IV to V).

UNIT I : Chapter 6: Sec. 11to14
UNIT II : Chapter 6: Sec. 15 - 21
UNIT III : Chapter 6: Sec. 24, 25, 26, 29.4 &30
UNIT IV : Chapter4
UNIT V : Chapter5

REFERENCE BOOKS:

1. Theory of equations Theory of Numbers and Inequalities, First edition 2002, The National Publishing Company.

WEB RESOURCES:

1. www.mathworld.wolfram.com
2. https://mathsolver.microsoft.com
3. https://themathpage.com
4. www.numbertheory.org

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Recall and recognizetheory of numbers	**K1, K2**
CO2	Apply the concept of increasing or decreasing the roots of a given equation	**K3**
CO3	Apply the concept of Descartes' Rule, Rolles' theorem and Newton's Method of divisors	**K4**
CO4	Determine the expansions of Inequalities	**K5**
CO5	Improve the concept of theory of numbers	**K6**

B.Sc. MATHEMATICS

2021 – 2022 onwards

Sub Code: 21UMA04

Semester: II **Hours/Week: 4hrs**

CoreCourse: IV **Credit: 4**

SEQUENCES AND SERIES

Course Objectives

The objective of this programme is

CO-1	To understand the concept of the straight line.
CO-2	To interpret the concept of the infinite series.
CO-3	To make a clear difference between differentiability and continuity.
CO-4	To construct the concept of Binomial theorem for a rational index and some applications.
CO-5	To visualize about the applications of series.

Prerequisites: Basic knowledge of Analytical Geometry

UNIT I

1.1 Sets, Sequences, Bounded Sequences and Monotonic Sequences

1.2 Convergent Sequences

1.3 The Algebra of Limits

1.4 Behavior of Monotonic Sequences

1.5 Some theorems on limits.

UNIT II

2.1 Infinite Series and Some general theorems concerning infinite series

2.2 Series of positive terms

2.3 Comparison Tests

2.4 D'Alembert's ratio test

2.5 Simple problems.

UNIT III

3.1 Cauchy's Condensation test and Cauchy's Root test

3.2 Raabe's Test and its Corollaries and Simple problems

3.3 Absolutely convergent series

3.4 An absolutely convergent series is convergent

3.5 Series whose terms are alternately positive and negative.

UNIT IV

4.1 Binomial theorem for a rational index

4.2 Some important particular cases of the Binomial expansion

4.3 Application of the Binomial theorem to the summation of series

4.4 The Exponential theorem (Statement only)

4.5 Summation

UNIT V

Summation of series

5.1 Applications of partial fractions

5.2 Summation by difference series

5.3 Successive difference series

TEXT BOOKS:

1. Sequences and Series, S. Arumugam, A.Thangapandi Issac, New Gamma Publishing House, Palayamkottai, 2000 (Unit I)
2. Algebra, Vol I –T.K.Manicavachagom Pillay, T. Natarajan& K.S.Ganapathy, S. Viswanathan Pvt. LTD 2008 (Units II – V)

UNIT I : Chapter 3: Sec 3.1-3.4, 3.6, 3.7, 3.8

UNIT II : Chapter 2: Sec 8 -14, 16

UNIT III : Chapter 2 : Sec 15,17- 19, 21-24

UNIT IV : Chapter 3: Sec 5, 6, 10 & Chapter 4: 2, 3

UNIT V : Chapter 5: Sec 2.1, 6, 6.1

REFERENCE BOOK:

1. Sequences and series, Dr. M.K.Venkataraman, First published - June 2002, The National publishing company.
2. Sequences and series –N.P.Bali.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Recall and recognize proficient in behavior of sequences and its subsequences	K1, K2
CO2	Infinite series and various tests for finding its convergence	K3
CO3	Examine the test and convergent series Cauchy's Condensation	K4
CO4	Develop the expansion of Binomial.	K5
CO5	Interpret the series by using partial fraction	K6

B.Sc. MATHEMATICS
2021 – 2022 Onwards

Sub Code : 21UMA05

Semester: III **Hours/Week: 6hrs**

CoreCourse: V **Credit : 3**

INTEGRAL CALCULUS

Course Objectives

The objective of this programme is

CO-1	To understand the concept of integration by some methods.
CO-2	To interpret the properties of definite integrals and integration by parts for solving indefinite integrals.
CO-3	To reduction formulae for solving integrals.
CO-4	To construct the concept of multiple integrals.
CO-5	To visualize about the Beta and Gamma functions for improper integrals.

Prerequisites: Basic knowledge of Integral Calculus

UNITI

Integration:

1.1 Methods of integration

1.2 Integrals of functions

1.3 Intergation of rational algebraic functions

UNIT II

Integration:

2.1 Properties of definite integrals

2.2 Integration by parts

UNIT III

Integration:

3.1 Reduction formula

UNIT IV

Multiple integrals:

4.1 Double integral

4.2 Definition of the double integral

4.3 Evaluation of the double integral
4.4 Double integral in Polar co-ordinates
4.5 Triple integrals

UNIT V

Improper Integrals: Beta and gamma functions:

5.1 Definitions, Convergence of gamma (n)
5.2 Recurrence formula of Gamma functions and Properties of Beta functions
5.3 Relation between them
5.4 Definite Integrals using gamma functions
5.5 Applications of gamma functions to multiple integrals

TEXT BOOKS

1. Calculus – Vol. II – S. Narayanan and T.K.M. Pillay - S.Viswanathan Pvt. LTD.2013

UNITI : Chapter 1: Sec. 5 - 7
UNIT II : Chapter 1: Sec. 11- 12
UNIT III : Chapter 1: Sec. 13
UNITIV : Chapter 5: Sec. 1 –4
UNITV : Chapter 7: Sec. 2 –6

REFERENCE BOOKS

1. Integral calculus differential equations, Dipak chatterjee second reprint 2002, TataMc Graw Hill publishing companylimited.
2. Integral Calculus, Shanti Narayan, Dr. P. K. Mittal, S., Chand & Co., 11th Edition Reprint,2018.

WEB RESOURCES

1. https://mast.queensu.ca/~math121/Notes/notes09.pdf
2. https://ocw.mit.edu/ans7870/textbooks/Strang/Edited/Calculus/14.pdf
3. https://www.mit.edu/~jeffery/gamma_beta.pdf

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Define and understand the basic concepts of differential and integral calculus.	K1, K2
CO2	Employ various techniques in finding derivatives and evaluating multiple integrals.	K3
CO3	Analyze and explain the resultsof calculus through illustrations with examples.	K4
CO4	Predict appropriate methods to find the solution of problems on differential and integral calculus.	K5
CO5	Generate more ideas of calculus in various streams of science and technology.	K6

B.Sc. MATHEMATICS

2021 – 2022 onwards

Sub. Code: 21UMA06

Semester: III **Hours/Week:5hrs**

Core Course: VI **Credit: 4**

VECTOR CALCULUS AND FOURIER SERIES

Course Objectives

The objective of this programme is

CO-1	Know the basic concept of vector differentiation.
CO-2	Know the applications of derivatives of vectors.
CO-3	Be able to understand line integral, surface integral and volume integral and understand theirinter – relations and their applications.
CO-4	Know the methods of finding Fourier series expansion for periodic functions.
CO-5	Evaluate the half range series.

Prerequisites: Basic knowledge of Integral Calculus

UNIT I

1.1 Vector differentiation

1.2 Gradient, Divergence and Curl

UNIT II

Vector Integration

2.1 The line integral, Surface and volume integrals

2.2 Simple problems

UNIT III

Vector Integration

3.1 Gauss divergence theorem, stoke's theorem and Green's Theorem (Statement only and Simple problems)

UNIT IV

Fourier Series

4.1 Periodic functions

4.2 Fourier series-Full range

UNIT V

Fourier Series

5.1 Half - Range Expansions
5.2 Arbitrary Range

TEXT BOOK

1. Vector Analysis – P.R.Vittal & V.Malini, Margham Publications, Chennai, 1997(Unit I, II & III)
2. Fourier series – S.Arumugam and Issac, A.Thangapandi Issac, New Gamma Publication House, Palayamkottai - 627002, Nov.2012 (Unit IV & V)

UINT I : Chapter 1 (Page No. 1- 53)
UNIT II : Chapter 2 (Page No. 54 - 88)
UNIT III : Chapter 2 (Page No. 89 - 140)
UNIT IV : Chapter 1: Sec 1.1 &1.2
UNIT V : Chapter 1: Sec 1.3 & 1.4

REFERENCE BOOK

1. A Text Book of Vector Calculus, Shanti Narayanan, P.K.Mittal, S.Chand& company Ltd Reprint 2008.
2. Vector Calculus and Fourier series – M.K. Venkatraman, Mrs. S. Manorama Sridhar,The National Publishing Company, June 2002.
3. Vector Analysis, Murray R. Spiegel, McGraw Hill, Second Edition, 2017.
4. A Textbook of Advance Calculus Vectors and Numerical Analysis, Ansari. B, Manglam Publications, First Edition, 2007.
5. Fourier Series, Fourier Transform and their applications to Mathematical Physics, Valery Serov, Springer, Kindle Edition, 2018.
6. Vector Analysis, Duraipandian P and Laxmi Duraipandian, Emerald Publishers, Second Edition, 2003.

WEB RESOURCES

1. https://www.youtube.com/watch?v=Wfpb-fniSSk
2. https://www.youtube.com/watch?v=spUNpyF58BY&t=51s
3. https://www.whitman.edu/mathematics/calculus_online/chapter16.html

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Define and understand the basic concepts of differential and integral calculus.	**K1, K2**
CO2	Employ various techniques in finding derivatives and evaluating multiple integrals.	**K3**
CO3	Analyze and explain the results of calculusthrough illustrations with examples.	**K4**
CO4	Predict appropriate methods to find the solution of problems on differential and integral calculus.	**K5**
CO5	Generate more ideas of calculus in various streams of science and technology.	**K6**

B.Sc. MATHEMATICS

2021 – 2022 onwards

Sub. Code: 21UMA07

Semester: IV **Hours/Week: 4hrs**

CoreCourse: VII **Credit:4**

DIFFERENTIAL EQUATIONS

Course Objectives

The objective of this programme is

CO-1	To recognize and implement solution techniques to solve higher order differential equations with constant and Variable coefficients
CO-2	To get the exact method of solving higher order differential equations
CO-3	To classify partial differential equations and obtain their solutions for some methods
CO-4	To model and solve charpit's method using partial differential equations
CO-5	To solve second order partial differential equation and focus on eigen values - eigen functions and applications.

Prerequisites: Basic knowledge in differential equations

UNIT I

1.1 Variables Separable

1.2 Homogeneous Equations and Non-Homogeneous Equations of the first degree in x and y

1.3 Linear equation and Bernouill's equation

1.4 The operator D, Complementary function of a linear equation with constant coefficients and Particular intergal

1.5 Linear equations with variable coefficients

UNIT II

2.1 Exact differential equations

2.2 Equation of the type $d^2y/dx^2 = f(y)$

2.3 Equation not containing y directly

2.4 Equation not containing x directly

UNIT III

3.1 Partial differential equations of the first order

3.2 Classification of integrals

3.3 Derivation of partial differential equations
3.4 Lagrange's method of solving the linear equation
3.5 Special methods, standard forms

UNIT IV

4.1 Charpit's method

UNIT V

5.1 Origin of the second order differential equations
5.2 Separation of variables
5.3 Eigen values and Eigen functions
5.4 The vibrating string

TEXT BOOKS

1. Differential Equations and it's Applications, S.Narayanan,T.K.M.Pillay, S.Viswanathan Pvt. LTD 2006

UINT I : Chapter 2 : Sec. 1 – 5 & Chapter 5: Sec. 2- 5
UNIT II : Chapter 7 : Sec. 1 - 4
UNIT III : Chapter 12: Sec. 1 – 5
UNIT IV : Chapter 12 : Sec. 6
UNIT V : Chapter 13 : Sec. 1 - 4

REFERENCE BOOKS

1. Engineering Mathematics, M.K.Venkataraman ,New Gamma Publishing Ltd.1985, Revised.
2. Differential Equations, M.L.Khanna, Jaiprakashnath twenty six edition 2004,Tai Prakash Nath & Co,Meerut.
3. Differential equations with Applications and Historical Notes, George F. Simmons, McGraw Publications, 2nd Edition, 2017.
4. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley India Pvt. Ltd., 9th Edition, 2011.
5. Elementary Differential Equations and Boundary Value Problems, William E. Boyce, RichardC. Di Prima, Douglas B. Meade, John Wiley & Sons Inc., 11th edition, 2017.
6. A First Course in Differential Equation with Applications, Macmillan Publications, 2006.
7. Ordinary and Partial Differential Equations, M.D. Raisinghania, S Chand & Co Ltd., 2017.
8. Differential Equations (Schaum's Outlines), Richard Bronson, Gabriel B. Costa, McGraw- Hill Education, 4th Edition,

WEB RESOURCES

1. https://ocw.mit.edu/courses/mathematics/18-03sc-differential-equations-fall-2011
2. https://www.khanacademy.org/math
3. https://www.coursera.org/learn/differential-equations-engineers?#reviews

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts of general soluation of higher order differential equations with constant coefficients Variable coefficients	**K1, K2**
CO2	Determine the solutions of differential equations by various methods	**K3**
CO3	Analyze the properties of Laplace transform and examine the solutions of ordinary and partial differential equations.	**K4**
CO4	Evaluate general solutions of ordinary and partial differential equations using various methods.	**K5**
CO5	Propose the solution of real-life problems using ordinary and partial differential equations.	**K6**

B.Sc. MATHEMATICS

2021 – 2022 onwards

Sub Code: 21UMA08

Semester:IV **Hours/Week: 3hrs**

CoreCourse:VIII **Credit:3**

HISTORY OF MATHEMATICS AND VEDIC MATHEMATICS

Course Objectives

The objective of this programme is

CO-1	To understand the knowledge in Pythagoreans tuples and irraional
CO-2	To develop the knowledge in the Role of Number theory and pell's
CO-3	To implement the knowledge for finding the Cube roots and Square roots of any Numbers.
CO-4	To enable the basic knowledge in multiplication of Numbers.
CO-5	To Enable the Basic knowledge in Multiplication of Numbers.

Prerequisites: Basic knowledge in History and Vedic Mathematics

UNIT I

The Theorem of Pythagoras

1.1 Arithmetic and Geometry and Pythagorean triples
1.2 Rational points on the Circle
1.3 Right – Angled Triangles and Irrational Numbers
1.4 The Definition of Distance
1.5 Biographical Notes: Pythagoras.

UNIT II

Greek Number Theory:

2.1 The Role of Number Theory
2.2 Polygonal, Prime, and Perfect Numbers
2.3 The Euclidean algorithm
2.4 Pell's Equation
2.5 The Chord and Tangent Methods and Biographical Note: Diophanutus

UNIT III

Vedic Mathematics Basic Level:

3.1 Miscellaneous Simple Method
3.2 Criss – Cross system of Multiplication
3.3 Squaring Numbers
3.4 Cube Roots of Perfect Cubes
3.5 Square Roots of Perfect Squares

UNIT IV

Vedic Mathematics intermediate Level:

4.1 Base Method for Multiplication
4.2 Base Method for Squaring
4.3 Digit – Sum Method
4.4 Magic Squares

UNIT V

Vedic Mathematics intermediate Level:

5.1 Dates & Calendars
5.2 General Equations
5.3 Simultaneous Linear Equations

TEXT BOOK

1. Mathematics and its History – Second Edition John stillwell, Springer – 2005.

   (Unit – I, II).

2. Vedic Mathematics - Dhaval Bathia (Unit – III, IV, V).

   UNIT I :Chapter 1: Sec 1.1 – 1.7
   UNIT II : Chapter 3: Sec 3.1 – 3.7
   UNIT III : Chapter : Sec 1 – 5
   UNIT IV : Chapter : Sec 6 – 9
   UNIT V : Chapter : Sec 10 - 12

REFERENCE BOOKS

1. History of Modern Mathematics - David Eugene Smith – 2008.
2. Vedic mathematics – Jagaduru Swami Sri, Bharati Krsna tirthaji, Maharaja – 1994.

WEB RESOURCES

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts of general soluation of higher order differential equations with constant coefficients Variable coefficients	**K1, K2**
CO2	Determine the solutions of differential equations by various methods	**K3**
CO3	Analyze the properties of Laplace transform and examine the solutions of ordinary and partial differential equations.	**K4**
CO4	Evaluate general solutions of ordinary and partial differential equations using various methods.	**K5**
CO5	Propose the solution of real-life problems using ordinary and partial differential equations.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMA09

Semester:V **Hours/Week: 5 hrs**

CoreCourse:IX **Credit: 5**

ALGEBRA

Course Objectives

The objective of this programme is

CO-1	To understand basic algebraic structures and encrcise solving of problems related to them.
CO-2	To analyse different algebraic structures and their theories.
CO-3	Toundestand the improtance of linear algebra.
CO-4	To investigate properties of vector spaces and subspaces.
CO-5	To discuss various types of matrices.

Prerequisites: Basic knowledge of algebra

UNIT I

Groups

1.1 Definition, Examples and Elementary properties of groups
1.2 Permutation of groups, Subgroups and Cyclic groups
1.3 Order of an element, Cosets and Lagrange's theorem
1.4 Normal subgroups and Quotiet groups
1.5 Isomorphism and Homomorphisms

UNIT II

Rings:

2.1 Definition, Examples and Elementary properties of rings
2.2 Isomorphism
2.3 Types of Rings, Subrings and Ideals
2.4 Quotient rings and Homomorphism of rings
2.5 Polynomial rings

UNIT III

Vector Spaces:

3.1 Definition, Examples and Subspaces
3.2 Linear Transformation and Span of a set
3.3 Linear independence and Basis and Dimension.
3.4 Rank and Nullity
3.5 Matrix of a linear transformation.

UNIT IV

Inner product Spaces:

4.1 Definition and Examples

4.2 Orthogonality

4.3 Orthogonal Complement

Bilinear forms

4.4 Bilinear forms

4.5 Quadratic forms

UNIT V

Theory of Matrices:

5.1 Simultaneous Linear Equations

5.2 Characteristic Equation and Cayley Hamilton theorem

5.3 Eigen Values and Eigen Vectors

TEXT BOOK

1. Modern Algebra, Dr. S. Arumugam and A. Thangapandi Isaac, Scitech Publications (India) Pvt., Ltd. Reprint 2015.

UNIT I :Chapter 3: Sec. 3.1 –3.11(Except 3.3)
UNIT II :Chapter 4: Sec. 4.1 – 4.4, 4.6 - 4.8, 4.10 &4.16
UNIT III :Chapter 5: Sec. 5.1 - 5.8
UNITIV :Chapter 6: Sec. 6.1 - 6.3
Chapter 8: Sec. 8.1 - 8.2
UNITV :Chapter 7: Sec. 7.6 – 7.8

REFERENCE BOOKS

1. A Text Book of Modern Abstract Algebra – Shanti Narayan and Sat Pal Hans Raj S.Chand & Co., Reprinted 1985, NewDelhi.
2. A Text Book of Modern Algebra – R. Balakrishnan And N.Ramabhadran,Vikas Publishing House Pvt Ltd.Modern Algebra, M. L. Santiago, Tata McGraw-Hill Publishing Company Limited, New Delhi,2001
3. Charles C. Pinter, A book of Abstract Algebra, Dover Publications, Second Edition.
4. John B. Fraleigh, A First Course in Abstract Algebra, Pearson Education India, Seventh Edition.
5. Vijay K Khanna, S K Bhambri, A Course in Abstract Algebra, Vikas Publishing, 2017.
6. Santiago M. L, Modern Algebra, Tata McGraw - Hill, Second Edition, 2001.
7. Arumugam S., Isaac A. T, Modern Algebra, SciTech publications (India) Pvt. Ltd,2015.

WEB RESOURCES

1. https://ocw.mit.edu/courses/mathematics/18-703-modern-algebra-spring-2013/
2. http://www.math.clemson.edu/~macaule/classes/m20_math4120/
3. https://www.khanacademy.org/math
4. https://www.mathway.com/Algebra
5. https://ocw.mit.edu/courses/mathematics/18-703-modern-algebra-spring-2013/

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts in groups, subgroups and homomorphisms and isomorphisms between the algrbraic structure	**K1, K2**
CO2	Compare different algebraic structures and their theories	**K3**
CO3	Realize and apply the theory of vector spaces	**K4**
CO4	Analyze various forms of inner product spaces.	**K5**
CO5	Determine the solutions of matrices and eigen values and eigen vectors.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMA10

Semester:V **Hours/Week: 5 hrs**

CoreCourse:X **Credit : 5**

REAL ANALYSIS

Course Objectives

The objective of this programme is

CO-1	To understand the concept of algebraic, order and completeness propperties of the set of real numbers.
CO-2	To comprehenad the solution of limit of a function and its properties.
CO-3	Torealize the theoretical aspects and applications of derivatives of real functions.
CO-4	To apply the knowledge of Rolle's, Lagranges, cauchy's, Taylor's theorems and power series expansions.
CO-5	To recongnize the concepts of Reemann Integrasl and its properties.

Prerequisites: A deep knowledge about the real line and its properties

UNIT I

1.1 Real number system and The Field axioms

1.2 Theorem about field properties and Order in R

1.3 Absolute value

1.4 Supremum and infimum of a set, Order Completeness property, Some impartant subsets of R

1.5 Countable and uncountable sets.

UNIT II

2.1 Limits and Continuous functions

2.2 Types of discontinues and algebra of Continuous function

2.3 Boundedness of Continuous function

2.4 Intermediate value theorem and Inverse function theorem

2.5 Uniform continuity

UNIT III

3.1 Differentiability of a function

3.2 derivability and continuity

3.3 Algebra of derivatives

3.4 Inverse function's theorem

3.5 Darboux's theorem on derivatives.

UNIT IV

4.1 Rolle'stheorem

4.2 Lagrange's mean value theorems

4.3 Cauchy's mean value theorem

4.4 Taylor's theorem and Taylor's series

4.5 Power series expansion

UNIT V

5.1 Riemann Integrability and Darboux's theorem

5.2 Another equivalent definition of integrability and integral

5.3 Conditions for Integrability and Particular classes of bounded integrable functions

5.4 Properties of integrable functions and functions defined by definite integrals

5.5 The first mean value theorem of integral calculus

TEXT BOOK

1. M. K. Singal & Asha Rani Singal, A First Course in Real Analysis, R. Chand & Co., 2008. (Unit I, II, III & IV).
2. Shanthi Narayan and P.K.Mittal, Acourse of Mathematical Analysis, S.Chand & Co., Reprint 2016. (UnitV)

UNIT I :Chapter 1 - Section: 1-10
UNIT II :Chapter 5 - Section: 1- 8
UNIT III:Chapter 6 - Section: 1- 5
UNIT IV:Chapter 7 - Section: 1- 6
UNIT V :Chapter 6 - Section: 6.2 - 6.9, 6.9.1.

REFERENCE BOOKS

1. S.L. Gupta and N.R.Gupta, Principles of Real Analysis, Pearson Education Pvt.Ltd. NewDelhi, Second Edition- 2003.
2. Tom Apostol, Mathematical Analysis, Narosa Publishing House, NewDelhi, 2002.
3. Topology of metric spaces, S. Kumaresan, Alpha Science International Ltd., 2005, First edition.
4. Real Analysis - K. Viswanatha Naik - Emerald Publishers - First Edition.
5. Introduction to Real Analysis, Liviu I. Nicolaescu University of Notre Dame, e book, 2021.
6. Methods of Real Analysis - Richard R Goldberg - Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi - 1970.

WEB RESOURCES

1. https://www.cimt.org.uk/projects/mepres/alevel/pure_ch13.pdf
2. https://www.youtube.com/watch?v=j9UczXkGj_c
3. https://www3.nd.edu/~lnicolae/Hon_Calc_Lectures.pdf
4. https://people.math.osu.edu/fowler.291/sequences-and-series.pdf

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand various concepts related to the real numbers squence and series.	K1, K2
CO2	Utilize the concepts of analysis of real functions in solving problems.	K3
CO3	Analyze the concepts of limits,continuity, differentiability, intergrability of real functions and topology on real numbers.	K4
CO4	Access the results of limits, continuity, differentiability, intergrability of real functions and topology on real numbers.	K5
CO5	Generate ideas and results of limits, continuity, differentiability, intergrability of real functions and topology on real numbers.	K6

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMA11

Semester:V **Hours/Week: 4hrs**

CoreCourse:XI **Credit :4**

GRAPH THEORY

Course Objectives

The objective of this programme is

CO-1	To understand the idea of graphs and the importance in science.
CO-2	To apply graph theorrtical tools in solving real life problems.
CO-3	To realize the Euler and Hamiltonian circuits.
CO-4	To understand the various planar graphs and their properties .
CO-5	To use grph theory as a modelling tool related to problems in computer science.

Prerequisites: Basic knowledge on graphs

UNIT I

Graphs and Subgraphs:

1.1 Definition, Examples and Degrees

1.2 Subgraphs and Isomorphism

1.3 Independent Sets and Coverings

1.4 Intersection Graphs and Line Graphs

1.5 Matrices and Operations on Graphs

UNIT II

Degree Sequences:

2.1 Degree sequences

2.2 Graphic Sequences

Connectedness:

2.3 Walks, Trails and Paths

2.4 Connectedness and Components

2.5 Blocks and Connectivity

UNIT III

Eulerian and Hamiltonian Graphs:

3.1Eulerian Graphs

3.2 Hamiltonian Graphs

Trees:

3.3Characterisation of trees

3.4 Centre of a Tree.

UNIT IV

Planarity:

4.1 Definition and Properties

4.2 Characterization of Planar Graphs

4.3 Thickness, Crossing and Outer Planarity.

UNIT V

Colourability:

5.1 Chromatic Number and Chromatic index

5.2 The Five Colour Theorem

5.3 Chromatic Polynomials.

TEXT BOOK

Invitation to Graph Theory, S. Arumugam &S.Ramachandran, Scitech Publications Pvt. Ltd., November 2007

UNIT I : Chapter 2: Sec 2.1-2.9(except 2.5)
UNIT II : Chapter 3 & Chapter 4
UNIT III : Chapter 5 & Chapter 6
UNIT IV: Chapter8
UNITV : Chapter 9: Sec 9.1- 9.4(except 9.3)

REFERENCE BOOKS

1. Graph Theory, F. Harary, Narosa Publishing House, New Delhi, Tenth Reprint,2001
2. A First Course in Graph Theory, S.A. Choudam.– Macmillan Publishers India Limited, Chennai, Reprinted2013.
3. Graph Theory with Applications to Engineering and Computer Science –Narsingh Deo – Prentice Hall of India Pvt. Ltd., New Delhi,1997
4. G. Suresh Singh, Graph Theory, PHI Learning Pvt. Ltd., 2010.
5. R. Balakrishnan and K. Ranganathan, A Textbook of Graph Theory, Springer-Verlag New York, 2012.
6. S. Arumugam and S. Ramachandran, Invitation to Graph Theory, SciTech Publication Pvt. Ltd, 2015

WEB RESOURCES

1. https://www.geeksforgeeks.org/graph-types-and-applications/?ref=lbp
2. http://discrete.openmathbooks.org/dmoi3/sec_trees.html
3. https://www.javatpoint.com/planar-and-non-planar-graphs

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the basic ideas of graphs and developments in computer science.	**K1, K2**
CO2	Apply the concept of degree sequences and connectedness of graphs	**K3**
CO3	Analyze the Euler, Hamiltonian and trees of graphs in underlying communications related problems.	**K4**
CO4	Compare the different plannar graphs.	**K5**
CO5	Construct the various graphs of chromatic number, five colour theorem and chromatic polynomials.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMA12

Semester:V **Hours/Week: 5 hrs**

CoreCourse:XII **Credit :4**

STATICS

Course Objectives

The objective of this programme is

CO-1	To understand the basic principles of forces and analyze its effect on the system.
CO-2	To understand the concepts of parallel force, moments of forces and principles behind them.
CO-3	To determined the resultant of the system of coplanar forces.
CO-4	To apply Newton's law of motion of solve various problems .
CO-5	To explore and analyze the behaviour of a equlibrium of strings.

Prerequisites: Basic knowledge of statics in physics

UNIT I

1.1 Forces acting at a point,

1.2 Parallel forces and Moments

UINT II

Parallel forces and Moments

2.1 Moment of a force

2.2 Couples

2.3 Equilibrium of three Forces acting on a rigid body and simple problems

UNIT III

3.1 Coplanar Forces (Except Chapter 6: sec 14)

UNIT IV

4.1 Friction: (Except Chapter 7: sec 14) and simple problems only

UNIT V

5.1 Equilibrium of strings

TEXT BOOK

Statics - M.K. Venkataraman, 18th Edition, Agasthiar Publications, August 2016.

UNIT I : Chapter 2 & Chapter 3: Sec.1 - 6
UNIT II : Chapter 3: Sec. 7 – 14 , Chapter 4 & Chapter 5: Sec.1 - 6
UNIT III: Chapter 6: Sec. 1 - 13
UNIT IV: Chapter 7: Sec. 1 - 13
UNIT V : Chapter11

REFERENCE BOOKS

1. Statics, M.L.Khanna, Tweith edition 1996 Jai prakash nath &co, Meerutcity.
2. Statics, T.K.Manickavachagam Pillai. 1978, The National Publishing Co,Madras.
   K.V. Naik and M.S. Kasi, Statics, Emerald Publishers, 1987, First Edition.

WEB RESOURCES

1. https://www.youtube.com/watch?v=5aHaf0KlT9s
2. https://www.youtube.com/watch?v=bL3DZTft4DU&feature=youtu.be
3. https://www.youtube.com/watch?v=_jbXsSlqUg4&feature=youtu.be
4. https://www.youtube.com/watch?v=XjwjL_7OsU8&feature=youtu.be

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand and recognize different forces system, parallel forces and moments.	**K1, K2**
CO2	Realize mechanical problems and mathematical models and examine their behaviours.	**K3**
CO3	Investigate the coplanar and the resultant forces and the motion of a particle under the influence of forces.	**K4**
CO4	Analyze the theoretical aspects of mathematics in correlation with environmental studies.	**K5**
CO5	Construct mechanical models and demonstrate its applications to cater real life problems	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMA13

Semester: VI **Hours/Week: 5 hrs**

CoreCourse: XIII **Credit: 5**

COMPLEX ANALYSIS

Course Objectives

The objective of this programme is

CO-1	To understand the importance of complex valued functions.
CO-2	To apply the concepts of Bilinear transformation and cross ratio.
CO-3	To derive and utilize formulae in evaluating intergrals and higher derivatives.
CO-4	To classify the generating power series and the types of singularities of analytic functions.
CO-5	To realize the calculus of residues in the complex plane.

Prerequisites: Fundamental knowledge in Mathematical Analysis

UNIT I

Analytic Functions

1.1 Functions of a complex variable

1.2 Limits and theorems on limit

1.3 Continuous Functions and Differentiability

1.4 The C.R. Equations

1.5 Analytic Functions and Harmonic Functions

UNIT II

Bilinear Transformations:

2.1 Elementary Transformations

2.2 Bilinear Transformations

2.3 Cross ratio

2.4 Fixed points of bilinear transformations

2.5 Some special bilinear Transformations

UNIT III

Complex Integration:

3.1 Definite Integral

3.2 Cauchy's Theorem

3.3 Cauchy's Integral Formula

3.4 Higher derivatives

UNIT IV

Series Expansions

4.1 Taylor's series

4.2 Laurent's series

4.3 Zeros of an analytic Function

4.4 Singularities

UNIT V

Calculus of Residues:

5.1 Residues

5.2 Cauchy's Residue Theorem

5.3 Evaluation of Definite integrals.

TEXT BOOK

Complex Analysis, S. Arumugam, A.Thangapandi Isaac, and A. Somasundaram, Scitech Publications (India) Pvt. Ltd., Chennai (2007).

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

REFERENCE BOOKS

1. Complex Analysis, T.K Manickavasagam Pillai & others, 1981 Ananda Book Depot., Madras.
2. Functions of Complex Variable, J .N. Sharma, Revised edition 1981-82 Krishna Prakashan Mandir. Meerut.
3. Complex Analysis - S. Arumugam, T. Isaac, Somasundaram - Scitech Publications - 2015.
4. Foundations of complex analysis - S. Ponnusamy - Narosa Publishing House - 2011.
5. Complex Analysis - Joseph Bak, Donald J. Newman - Springer - 3rd edition - 2010.
6. Complex Variables (Schaum's Outlines) - Murray Spiegel, Seymour Lipschutz, John Schiller, Dennis Spellman - McGraw Hill Education - 2nd edition - 2017.
7. Complex Analysis - Lars Ahlfors - McGraw Hill Education - 3rd edition - 2017.

WEB RESOURCES

1. https://ocw.mit.edu/courses/mathematics/18-703-modern-algebra-spring-2013/
2. http://www.math.clemson.edu/~macaule/classes/m20_math4120/
3. https://www.khanacademy.org/math
4. https://www.mathway.com/Algebra
5. https://ocw.mit.edu/courses/mathematics/18-703-modern-algebra-spring-2013/

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the fundamental notions of theory of various techniques in evaluating problems on analytic funbctaions and harmonic functions.	**K1, K2**
CO2	Apply the concepts of bilinear transformation and cross ratio.	**K3**
CO3	Classify the concepts of analyticity, contour integrals and higher derivatives.	**K4**
CO4	Evaluate problems on integration, power series expansions and linear fractional transformations.	**K5**
CO5	Discuss analytic functions, contour integrals in determining improper integrals for calculus of residues.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMA14

Semester: VI **Hours/Week: 6 hrs**

CoreCourse: XIV **Credit: 5**

NUMERICAL METHODS

Course Objectives

The objective of this programme is

CO-1	To find approximate solutions to the functions using iterative methods.
CO-2	To convert a system of linear equations into matrix form acquire knowledge to solve them using Gauss elimations, Gauss Jordan, Gauss- seidel methods.
CO-3	To utilize various interpolation,techniques in obtaining approximate interpolation of discrete data in real life situations.
CO-4	To evaluate numerical calculations of problems in differentiation and intergration.
CO-5	To design algorithms in solving real life problems.

Prerequisites: Basic knowledge in Algebra

UNIT I

Solutions of Algebraic and Transcendental Equations:

1.1 Introduction
1.2 The Bisection Method
1.3 Iteration method
1.4 Regula falsi method
1.5 Newton- Raphson Method

UNIT II

Solution of simultaneous linear algebraic equations

2.1 Gauss Elimination method
2.2 Gauss Jordan elimination method
2.3 Iterative Methods
2.4 Jacobi Method of iteration
2.5 Gauss-Seidel method of iteration

UNITIII

Finite Differences

3.1 First difference and Forward differences and Backward differences
3.2 Newton's forward and Newton's backward Interpolation formula
3.3 Interpolation with unequal intervals
3.4 Divided Differences and their properties

3.5 Lagrange's Interpolation formula

UNIT IV

Numerical Differentiation and Integration:

4.1 Newton's forward and backward difference formula to compute the derivatives

Numerical Integration

4.2 Newton- cote's formula

4.3 Trapezoidal Rule

4.4 Simpson's 1/3 Rule

4.5 Simpson's 3/8 Rule.

UNIT V

Numerical Solution of Ordinary Differential Equations

5.1 Solution by Taylor's series (Type I)

5.2 Picard's Method of successive approximations

5.3 Euler's Method, Improved Euler's Method and Modified Euler's Method

5.4 Runge - Kutta Methods and Predictor Corrector Methods

5.5 Milne's Predictor corrector formulae and Adams-Bashforth predictor corrector method.

TEXT BOOK

Numerical Methods – P. Kandasamy, K. Thilagavathy, K. Gunavathy,S. Chand & Company Ltd., New Delhi.(1997).

UNIT I :Chapter 3:Sec.3.1, 3.1.1, 3.2 - 3.4.
UNIT II :Chapter 4:Sec.4.1, 4.2, 4.2.1, 4.7 -4.9.
UNIT III :Chapter 5: Sec.5.1, 5.2,
Chapter 6: Sec.6.1- 6.3 & Chapter 8: Sec.8.1 - 8.7
UNIT IV :Chapter 9: Sec.9.1- 9.3, 9.7- 9.9, 9.13,9.14.
UNITV :Chapter 11: Sec.11.5, 11.8 -11.18

REFERENCE BOOKS

1. Introductory Methods of Numerical Analysis, S.S.Sastry, PHILearning pvt ltd.-2013.
2. Numerical Methods in Science and Engineering – M.K. Venkataraman, The National Publishing Co., Chennai, Fourth Edition,1998.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the different techniques in obtaining approximate solutions to intractable mathematical problems.	**K1, K2**
CO2	Apply the various concepts in numerical methods.	**K3**
CO3	Utilize several methods for algebraic and transcendental equations, interpolation, differentiation and integration.	**K4**
CO4	Evaluate problems and interpret results on real life problems using appropriate numerical techniques.	**K5**
CO5	Implement algorithms to the problems of numerical methods.	**K6**

B.Sc. MATHEMATICS

2021 – 2022 onwards

Sub.Code:21UMA15

Semester:VI **Hours/Week: 6 hrs**

CoreCourse: XV **Credit: 5**

DYNAMICS

Course Objectives

The objective of this programme is

CO-1	To introduce the basic principle of kinematics of velocity and motion under the action of central forces.
CO-2	To explore and analyse the behaviour of a projectile and its trajectory.
CO-3	To apply the concept impulsive force and collision of elastic bodies.
CO-4	To study about motion under a central forces.
CO-5	To determine the results of the system of forces acting on the body, moment of force and the motion of inertia of the body.

Prerequisites: Basic Knowledge of Dynamics in physics

UNIT I

1.1 Kinematics

1.2 Motion under the Action of Central Forces

UNIT II

Projectile

2.1 Definitions and two fundamental principles

2.2 To show that the path of a projectile is a parabola

2.3 Characteristics of the motion of a projectile

Simple Harmonic Motion:

2.4 Simple Harmonic Motion in a Straight Line and General solution of the S.H.M. equation

2.5 Composition of two SHM of the same period in two perpendicular directions

UNIT III

Impulsive Force:

3.1 Impulse - Impulsive Force and Impact of two bodies

3.2 Loss of Kinetic Energy in Impact and Motion of a shot and gun

Collision of Elastic Bodies

3.3 Introduction- Definitions, Fundamental laws of Impact and Impact of a smooth sphere on a fixed smooth plane

3.4 Direct impact of two smooth spheres and Loss of kinetic energy due to direct

impact of two smooth spheres and oblique impact of two smooth spheres

3.5 Loss of kinetic energy due to oblique impact of two smooth spheres and Simple problems

UNIT IV

Motion under a Central Force:

4.1 Motion under a central force and Differential Equation of central orbits

4.2 Pedal Equation of the central orbit and Pedal Equation of some of the well known curves

4.3 Velocities in a central orbit and two fold problems in central orbits

4.4 Apses apsidal distances and given the law of force to the pole, to find the orbit

4.5 Law of Inverse Square.

UNIT V

Moment of inertia:

5.1 Definition, The Theorem of Parallel Axes

5.2 The Theorem of Perpendicular Axes

5.3 Moment of Inertia in some particular cases

5.4 Simple problems

TEXT BOOK

Dynamics - Dr. M.K.Venkatraman, 18thEdition, Agasthiar publications January 2017.

UNITI : ChapterIII: Sec. 3.1- 3.30 &
ChapterXI: Sec. 11.1 - 11.4

UNIT II : ChapterVI : Sec. 6.1 - 6.11&
ChapterX: Sec. 10.1 -10.7

UNIT III : ChapterVII :Sec. 7.1 - 7.5&
Chapter VIII:Sec. 8.1 - 8.8

UNITIV : ChapterXI :Sec. 11.5 - 11.14

UNITV : ChapterXII :Sec .12.1 - 12.4

REFERENCE BOOKS

1. Dynamics, .L.Khanna , Jaiprakash Nadhan and company , Meerut, 10th edition,1975
2. Dynamics, K. Visvanatha Naik and M.S. Kasi , Emerald Publishers,Chennai.
3. K.V. Naik and M.S. Kasi, Dynamics, Emerald Publishers, 1987, First Edition.
4. D. S. Kumar, Statics and Dynamics, S. K. Kataria & sons, 2013.

WEB RESOURCES

1. https://www.youtube.com/watch?v=e7CnGZYcsAE
2. https://www.youtube.com/watch?v=BYtsu8j6N7I
3. https://www.youtube.com/watch?v=u5oSQg0vcp4
4. https://www.youtube.com/watch?v=W61RfotNmTI&feature=youtu.be
5. https://www.youtube.com/watch?v=R8wKV0UQtlo&t=15s

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concept of kinematics of velocity and motion under the action of central forces.	**K1, K2**
CO2	Realize mechanical problems as projectile and simple harmonic motion.	**K3**
CO3	Investigate the theoretical aspects of mechanics in correlation with environmental studies.	**K4**
CO4	Agree and evaluate the motion under a central forces.	**K5**
CO5	Create mechanical models and demonstrate its application to cater real life problems.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMA16

Hours/Week: 5 hrs

Extra Core Course: I **Credit : 5**

DIFFERENTIAL GEOMETRY

Course Objectives

The objective of this programme is

CO-1	To introduce space curves and its applications.
CO-2	To introduce space surface and its applications.
CO-3	To understand the fundamental theorem for surface.
CO-4	To study the parametric curves on surfaces help us to study the properties of surfaces.
CO-5	To study the orthogonal trajectories and families of curves.

Prerequisites: Basic Knowledge of differential geometry

UNIT I

1.1 Introduction and Representation of Space Curves

1.2 Unique Parametric Representation of a space curve and Arc length

1.3 Tangent and osculating plane and Principal normal and binomial

1.4 Curvature and torsion

1.5 Behavior of a curve near one of its points

UNIT II

The curvature and torsion of a curve as the intersection of two curves

2.1 Contact between curves and surfaces and osculating circle and osculating sphere

2.2 Locus of centers of spherical curvature and Tangent surfaces, involutes and evolutes

2.3 Bertrand Curves – Spherical indicatrix and intrinsic equations of space curves

2.4 Fundamental Existence Theorem for space curves

2.5 Helices

UNIT III

The First Fundamental form and Local Intrinsic Properties of a surface

3.1 Introduction and definition of a surface

3.2 Nature of points on a surface
3.3 Representation of a surface and curves on surfaces
3.4 Tangent Plane and surface normal
3.5 The general surfaces of revolution

UNIT IV

4.1 Helicoids
4.2 Metric on a surface Direction Coefficients on a surface
4.3 Families of curves
4.4 Orthogonal trajectories
4.5 Double family of curves

UNIT V

Geodesics on a surface

5.1 Introduction and geodesics and their differential equations
5.2 Canonical geodesic equations
5.3 Geodesics on surface of revolution
5.4 Normal property of geodesics
5.5 Differential equations of geodesics using normal property.

TEXT BOOK

Differential Geometry – A First Course, D. Somasundaram – Narosa Publishing House Chennai, Fourth Reprint 2010.

UNITI :Chapter 1:Sec. 1. 1 – 1.8
UNITII :Chapter 1:Sec. 1.9 – 1.18
UNITIII:Chapter II:Sec. 2.1 - 2.7
UNITIV:Chapter II:Sec. 2.8 – 2.13
UNITV :Chapter III: Sec. 3.1 – 3.6

REFERENCE BOOKS

1. Three Dimensional Differential Geometry – DR. Gupta and Malik- Second Revised Edition 1985.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concept the curvature and torsion of a curve.	K1, K2
CO2	Realize the intersection of two surfaces.	K3
CO3	Investigate the equivalence of two curves by applying theorems.	K4
CO4	Agree differential forms on surfaces.	K5
CO5	Create the derivative map of an isometry and geodesics.	K6

B.Sc., Mathematics
2021 – 2022 onwards

Sub. Code : 21UMA17
Hours/Week : 6

Extra Core Course: II **Credit: 4**

FUZZY MATHEMATICS

Course Objectives

The objective of this programme is

CO-1	To introduce the concept of fuzzy set theory.
CO-2	To understand the concept and properties of fuzzy relation and their basic operation.
CO-3	To explore and analyze the behaviour of fuzzy operations and fuzzy numbers
CO-4	To describe the concepts of fuzzy relations and fuzzy graphs.
CO-5	To apply export decision making in fuzzy environment of fuzzy set theory.

Prerequisites: Basic knowledge of fuzzy srt theory

UNITI

Fuzzy Set Theory

1.1 Fuzzy Set: Definition
1.2 Types of Fuzzy Sets
1.3 Characteristics of Fuzzy Sets
1.4 Other important operations
1.5 General properties: Fuzzy Vs crisp

UNITII

Operations on FuzzySets

2.1 Introduction and some important theorems
2.2 Extension Principle for Fuzzy Sets and Fuzzy Compliments
2.3 Further Operations on Fuzzy Sets and t–norms and t- conforms
2.4 Definition of Intersection and Union by Hamacher
2.5 Extension principle for fuzzy sets and general theorems

UNIT III

Fuzzy Numbers and Arithmetic

3.1 Introduction, Fuzzy Numbers and algebraic operations with Fuzzy Numbers
3.2 Binary Operation of Two Fuzzy Numbers and Some special extended operations

3.3 Extended Operations for L-R Representations of Fuzzy sets
3.4 Fuzzy Arithmetic
3.5 Arithmetic Operations on Fuzzy Numbers in the form of α-cut sets.

UNIT IV

Fuzzy Relations and Fuzzy Graphs
4.1 Introduction
4.2 Projections and cylindrical fuzzy relations
4.3 Composition
4.4 Pproperties of Min-Max composition
4.5 Fuzzy Graphs

UNIT V

Decision Making in Fuzzy Environment
5.1 Introduction and individual Decision Making
5.2 Multiperson Decision Making
5.3 Multicriteria Decision Making
5.4 Fuzzy Ranking Method
5.5 Fuzzy Linear Programming

TEXT BOOKS:

1. Fuzzy Sets and Applications – Dr. Sudhir, K. Pundir, Dr. Rimple Pindir – Pragati Prakashan, India First Edition, 2006. (Unit I, II, III& V)
2. Fuzzy Set Theory and its Applications – H.J. Zimmermann – Springer international Edition – Fourth Edition. 2006. (Unit IV)

UNIT I : Chapter 1 : 1.16 to1.21
UNITII : Chapter 2 : 2.1 to2.7, 2.10
UNITIII : Chapter 3 : 3.1 to 3.8
UNITIV : Chapter 4: 4.1- 4.4,4.8
UNITV : Chapter 10 : 10.1 and10.6

REFERENCE BOOKS

1. Fuzzy Sets and Fuzzy Logic - George J.Klir and Bo Yuan – Prentice Hall of India, New Delhi,2004.
2. Essentials of Fuzzy Modeling and Control – Ronald R. Yager and Dimitar P.Filev– John Wiley and Sons,Inc.
3. Introduction to Fuzzy Arithmetic Theory and Applications – Arenold Kaufmannand Madan M. Gupta – Van Nostrand Reinhold, NewYork.
4. Neural Networks and Fuzzy Systems, Bart Kosko, Printice-Hall, INC., New Jersey, 1992.
5. Neural Networks and Fuzzy Systems: A Dynamical Systems Approach to Machine Intelligence, Bart Kosko, Printice-Hall, INC., New Jersey, 1992.

WEB RESOURCES

1. https://www.javatpoint.com/fuzzy-logic
2. https://www.tutorialspoint.com/fuzzy_logic/index.html

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand and recognize the development of fuzzy theory and its properties.	K1, K2
CO2	Apply the concept of operations on fuzzy sets.	K3
CO3	Analyze different fuzzy operations on fuzzy numbers.	K4
CO4	Compare different Fuzzy relations and fuzzy graphs	K5
CO5	Create models for real life situations using fuzzy theory.	K6

B.Sc., Mathematics
2021 – 2022 onwards

Sub. Code: 21UMA18
Hours/Week : 6

Extra Core Course: III **Credit: 5**

MATHEMATICAL MODELLING

Course Objectives

The objective of this programme is

CO-1	To introduce the concepts of need, Techniques, classifications and illustrations.
CO-2	To understand the concepts of mathematical modelling through geometry, algebra and calculus.
CO-3	To classify the types of mathematical modelling through ordinary differential equations of first order.
CO-4	To explore the continuous of mathematical modelling through differential equations of first order.
CO-5	To apply the concepts of mathematical modelling through graphs.

Prerequisites: Basic knowledge of mathematical modelling

UNIT I

MathematicalModelling: Need,Techniques, Classifications and Simple Illustrations:

1.1Simple Situations Requiring Mathematical modeling
1.2The Technique of Mathematical modelling
1.3 Classification of Mathematical Models
1.4 Some Characteristics of Mathematical Models

UNIT II

Mathematical Modelling: Need, Techniques, Classifications and Simple Illustrations (Continuation):

2.1 Mathematical Modelling through Geometry
2.2 Mathematical modelling Through Algebra
2.3 Mathematical modelling Through Calculus
2.4 Limitations of Mathematical modelling

UNIT III

Mathematical Modelling through O.D.E. of First Order:

3.1 Mathematical modelling through Differential Equations of first order
3.2 Linear growth and decay models
3.3 Non linear growth and decay models
3.4 Compartment models.

UNIT IV

Mathematical Modelling through O.D.E. of First Order (Continuation):

4.1 Mathematical modelling through system ordinary Differential Equations of first order.

Mathematical Modelling through Systems of ODE of the First Order:

4.2 Mathematical modelling in population dynamics

4.3 Prey

4.4 Predator Models

4.5 Competition Models

UNIT V

Mathematical modelling through Graphs:

5.1 Situations that can be Modelled Through Graphs

5.2 Mathematical models in terms of Directed Graphs

5.3 Mathematical modelling in terms of Unoriented Graphs

TEXT BOOK:

Mathematical Modelling - J.N.Kapur- New Age International (P) Ltd Publishers. 1st edition 1998 , Reprint 2005

UNIT I : Chapter 1: Sec.1.1 -1.4.
UNIT II : Chapter 1: Sec.1.5, 1.6, 1.8, 1.9.
UNIT III : Chapter 2: Sec.2.1 -2.4.
UNIT IV : Chapter 2: Sec. 2.5.
Chapter 3: Sec. 3.1 - 3.1.1, 3.1.2
UNIT V : Chapter 7: Sec.7.1, 7.2, 7.5.

REFERENCE BOOK

1. J.N. Kapur, Mathematical Models in Biology and Medicine, EWP, New Delhi, 1985.
2. Numerical Algorithms computations in Science & Engineering, E.V. Krishnamurthy & S. K. Sen, Affiliated East-West Press Pvt. Ltd., 1994.
3. Numerical Methods, Kandasamy. P Sultan and sons private ltd, 1997.
4. Numerical Methods and Statistical Techniques Using C, Manish Goyal, Lakshmi publication, 2009.
5. Numerical Methods for engineers D. Vaughan Griffiths, I. M. Smith, Chapman &Hall, CRC, 2006.

WEB RESOURCES

1. https://books.google.co.in/books?id=anwHfrXY8_wC&printsec=frontcover#v=onepage&q&f=false
2. https://numericalmethodstutorials.readthedocs.io/en/latest/
3. Elementary Numerical Analysis: An Algorithmic Approach by Samuel Daniel Conte (e-book)

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Introduce the concepts of need, Techniques, classifications and illustrations for mathematical modeling.	**K1, K2**
CO2	Apply the concepts of mathematical modelling through some mathematical subjects.	**K3**
CO3	Compare the concepts of mathematical modelling through ordinary differential equations of first order.	**K4**
CO4	Agree the continuous mathematical modelling through ordinary differential equations of first order.	**K5**
CO5	Create graphs for real life situations using mathematical models.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMAME1

Hours/Week: 4 hrs

Elective Course:I **Credit : 4**

OPERATIONS RESEARCH

Course Objectives

The objective of this programme is

CO-1	To understand the formulation of a linear programming problem and find its optimal solutions.
CO-2	To find optimal strategies to solve games formed in conflict and competitive environments.
CO-3	To solve transportation problems using different methods
CO-4	To find assignment problems using different methods
CO-5	To set motivation to take up a project to solve real life problems by adopting the techniques of operations research.

Prerequisites: Basic knowledge of Operations Research

UNIT I

Linear Programming Problem:

1.1 Introduction and requirements for employing L.P.P

1.2 Mathematical Formulation of L.P.P

1.3 General, Canonical and Standard forms of L.P.P

1.4 The Simplex method

1.5 The Simplex Algorithm

UNIT II

2.1 Artificial Variable Techniques

2.2 The Big- M Method and the Two - Phase Method

2.3 Formulation of dual problem

2.4 Some important results in duality

2.5 Dual Simplex Method

UNIT III

Transportation Problem:

3.1 Introduction

3.2 Transportation Algorithm (MODI Method)

3.3 Degeneracy in Transportation Problems

3.4 Unbalanced Transportation Problems

UNIT IV

Assignment problem:

4.1 Introduction and Mathematical Formulation of an assignment problem

4.2 Comparison with Transportation Model

4.3 Difference between the transportation problem and the assignment problem

4.4 Assignment Algorithm (or) Hungarian Method

4.5 Unbalanced Assignment Models

UNIT V

5.1 Scheduling by PERT & CPM

TEXT BOOKS

Resource Management Techniques – V. Sundaresan K. S. Ganapathy Subramanian& K. Ganesan, A.R. Publications Chennai – 600 100. (6^{th} Edition 2013)

UNIT I : Chapter 2: Sec. 2.1-2.3 & Chapter 3: Sec. 3.1.1- 3.1.4
UNIT II: Chapter 3: Sec. 3.2 – 3.2.2 & Chapter 3Sec. 5.1 – 5.3, 5.5
UNIT III : Chapter 7: Sec. 7.1 -7.4
UNIT IV: Chapter 8: Sec. 8.1 – 8.6
UNIT V : Chapter 15: Sec. 15.1 – 15.7

REFERENCE BOOK

1. Operations Research – Prem Kumar Gupta & D.S. Hira, S. Chand & Company Ltd., Ram Nagar, New Delhi-110 055 (Reprint 2005).
2. Operations Research – Kanti Swarup, P.K. Gupta & Man Mohan – Sultan Chand & Sons– New Delhi (Fourteenth Thoroughly Revised Edition, Reprint2008)
3. Frederick S. Hillier, Gerald J. Lieberman, Bodhibrata Nag, Preetam Basu, Introduction to Operational Research, Tama McGraw Hill Ltd., New Delhi, 2012.
4. C. R. Kothari, An Introduction to Operational Research, Vikas Publishing house Pvt. Ltd.,Third Edition, 2009.
5. S. D. Sharma, Operations Research - Theory, Methods and Applications, Kedar Nath Ram Nath, 2014.
6. G. Srinivasan, Operations Research: Principles and Applications, Prentice Hall of India, e-Book, 2010.
7. P. Mariappan, Operations Research: An Introduction, Pearson, e-book, First Edition, 2013.

WEB RESOURCES

1. https://web.itu.edu.tr/topcuil/ya/OR.pdf
2. https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em8720.pdf
3. https://nptel.ac.in/content/storage2/courses/105108127/pdf/Module_3/M3L5_LN.pdf
4. https://ocw.ehu.eus/pluginfile.php/40935/mod_resource/content/1/5_Transportation.pdf
5. https://hithaldia.in/faculty/sas_faculty/Dr_M_B_Bera/Lecture%20note_8_CE605A&CHE705B.pdf
6. https://bit.ly/3lC8Ipq
7. https://nptel.ac.in/courses/111/104/111104027/

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the principles of linear programming problems, theory of games and network analysis.	**K1, K2**
CO2	Compute optimal solutions of linear programming problems, find optimal strategies to win a game and optimal schedule of a given project by suitable algorithms.	**K3**
CO3	Analyze the optimization techniques of linear programming, theory of games and network analysis in solving real world problems.	**K4**
CO4	Evaluate the concepts in linear programming and game theory and to estimate the optimal schedule of a project.	**K5**
CO5	Design a mathematical model for an optimization problem in real life by adopting the techniques of operations research.	**K6**

B.Sc. MATHEMATICS

2021 – 2022 onwards

SubCode :21UMAME2

Hours/Week:5hrs

ElectiveCourse: II **Credit:4**

LAPLACE TRANSFORMS, FOURIER TRANSFORMS AND Z-TRANSFORMS

Course Objectives

The objective of this programme is

CO-1	To understand the Laplace transformations for solving differential equations and inverse Laplace transform.
CO-2	To learn the concept of differential.
CO-3	To determine the fourier series expansions of certain functions and investigate its convergence.
CO-4	To find odd and even function, half range fourier series.
CO-5	To apply the concept of Z-Transforms.

Prerequisites: Basic knowledge Differentiation and Integration

UNIT I

Laplace Transforms

1.1 Condition for existence of Laplace Transforms

1.2 Laplace Transforms of derivatives

1.3 Linearity Property

1.4 periodic Functions

UNIT II

2.1 Inverse Laplace Transforms

2.2 Linearity Property

2.3 Method of partial fractions

2.4 Convolution Theorem

2.5 Applications of Laplace Transforms for solving Differential Equations

UNIT III

Fourier Transforms

3.1 Integral transfoms and Fourier Integral Theorem

3.2 Fourier sine and cosine Integral

3.3 Fourier transforms Complex Fourier transforms and its inversion formula

3.4 Fourier sine transforms and Fourier cosine transforms

3.5 Properties of Fourier sine transforms and Fourier cosine transforms

UNIT IV

4.1 Convolution of two functions and Convolution theorem for Fourier transforms

4.2 Parsevals Identity and applications of Fourier transforms for solving integral equations

4.3 Fourier transforms of the derivative of a function of two variables

4.4 Finite Fourier transforms

4.5 Additional solved problems

UNIT V

Z-Transforms

5.1 Definition of the Z-Transforms

5.2 Properties and Theorems of Z-Transforms

5.3 Z-Transforms of standard functions

5.4 Standard results

5.5 Inverse Z-Transforms

TEXT BOOKS

1. MA231 Mathematics-III, New 12th Edition 2003, A. Singaravelu, Meenakshi Agency, Chennai (Unit I – IV)
2. Enggineering Mathematics Volume II, P. Kandasamy, K. Thilagavathy, K.Gunavathy, 2001, S.Chand & company LTD, New Delhi(Unit V)

UINT I : Chapter 4 :Page No. 4.1 – 4.46

UNIT II : Chapter 4 : Page No. 4.54 – 4.98

UNIT III : Chapter 5 : Page No. 5.1 – 5.48

UNIT IV : Chapter 5 : Page No. 5.57 – 5.79

UNIT V : Chapter 10: page No: 464 - 497

REFERENCE BOOKS

1. Enggineering Mathematics Volume II, P. Kandasamy, K. Thilagavathy, K.Gunavathy 2001, S.Chand & company LTD, New Delhi

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts of differential equations and Laplace transforms.	**K1, K2**
CO2	Determine the solutions of differential equations by various methods and Inverse Laplace transforms.	**K3**
CO3	Analyze the concepts of fourier transforms.	**K4**
CO4	Facilitate fourier series expansion of certain functions and the significannce of integral theorems.	**K5**
CO5	Develop the concept of Z- Transforms.	**K6**

B.Sc. MATHEMATICS

2021 – 2022 onwards

SubCode:21UMAME3

Hours/Week:5hrs

ElectiveCourse : III **Credit: 4**

WEB TECHNOLOGY

Course Objectives

The objective of this programme is

CO-1	To use the basics of internet programming
CO-2	To understand the basics of HTML
CO-3	To understand the Head and Body sections
CO-4	To apply the concept ofcreat Table
CO-5	To apply the set Frameset

Prerequisites: Basic knowledge in set theory and numbers .

UNIT I

Introduction to the Internet:

1.1 Computers in Business, Networking, Internet, Email, Resource sharing, Gopher

1.2 World wide web, Usenet, Telnet, Bulletin Board service, Wide Area Informationservice.

Internet Technologies:

1.3 Modem, Internet Addressing, Physical Connections and Telephone Lines

UNIT II

Introduction to HTML:

2.1 Designing a home page, History of HTML, HTML generations, HTML document

2.2 Anchor tag, Hyper Links and Sample HTML documents

Head and Body Sections :

2.3 Header section, Title, Colorful Web Page and Comment Lines

UNIT III

Designing the Body Section :

3.1 Heading Printing, Aligning the heading, Horizontal rule, Paragraph

3.2 Tab settings, Images and Pictures, Embedding PNG format images

Ordered Unordered List :

3.3 Unordered Lists, Headings in a List, Ordered Lists and Nested Lists

UNIT IV

Table Handling :

4.1 Table Creation in HTML, Width of table and cells
4.2 Cell Spanning Multiple Rows / Columns, Coloring Cells, Column Specification

DHTML and Style Sheets:

4.3 Defining styles, Elements of Styles, Linking Style sheet to HTML documents
4.4 Inline Style sheets, External Style sheets, Multiple Styles.

UNIT V

Frames :

5.1 Frameset definition
5.2 Frame Definition
5.3 Nested Frame sets

TEXT BOOKS

1. "World Wide Web design with HTML" – C.Xavier – Tata McGraw-Hill Education(India) Pvt. Chennai.

UNIT I : Chapter 1 : Sec. 1.1 – 1.11
Chapter 2 : Sec2.1-2.4
UNIT II : Chapter 4 : Sec. 4.1–4.7
Chapter 5: Sec. 5.1, 5.2, 5.5,5.6
UNIT III : Chapter 6 : Sec. 6.1– 6.7
Chapter 7 : Sec. 7.2 –7.5
UNIT IV: Chapter 8 : Sec. 8.2–8.6
Chapter 9 : Sec 9.1 – 9.5, 9.7
UNIT V : Chapter10 : Sec. 10.1 –10.3

REFERENCE BOOK

1."Web design in Nut Shell" - Jennifer Niederst – O'Refilly- Shroff publishers and Distributors Pvt. Ltd.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts of interet programming	**K1, K2**
CO2	Apply the concepts of basics of HTML	**K3**
CO3	Analyze the concepts of the Head and Body sections	**K4**
CO4	Evaluate of creat Table	**K5**
CO5	Facilitate the set Frameset	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code:21UMAME4

Hours/Week: 5 hrs

Elective Course: IV **Credit : 4**

DISCRETE MATHEMATICS

Course Objectives

The objective of this programme is

CO-1	To motivate the students to think logically and apply the techniques in solving problems.
CO-2	To analyze the outcomes of mathematical arguments using logical laws.
CO-3	To understand the fundamental properties of lattices and Boolean algebra.
CO-4	To apply the knowledge of abstract mathematical structures.
CO-5	To explore the predicate calculus of the statement function and analyze their logical validity.

Prerequisites: Basic knowledge in group theory.

UNIT I

Logic:

1.1 Introduction and TF-Statements

1.2 Connectives and Atomic and Compound Statements

1.3 Well formed (Statement) Formulae

1.4 Truth Table of a formula and Tautology

1.5 Tautological Implications and Equivalence of formulae and Replacement process.

UNIT II

Logic (continuation):

2.1 Normal forms

2.2 Principal Normal forms

2.3 Theory of Inference.

UNIT III

Logic (continuation):

3.1 Open statements

3.2 Quantifiers

3.3 Valid Formulae and Equivalence

3.4 Theory of inference for Predicate Calculus

UNIT IV

Lattices and Boolean Algebra:

4.1 Lattices

4.2 Some Properties of Lattices

4.3 New Lattices

4.4 Modular and Distributive Lattices

4.5 Boolean Algebras

UNIT V

Formal languages and Automata:

5.1 Preliminaries

5.2 Grammars

5.3 Finite State Automata

TEXT BOOK

1. Discrete Mathematics-M.K.Venkataraman, N. Sridharan, N. Chandrasekaran, The National Publishing Company, Sep 2000. (UNIT I - III & IV)
2. Discrete Mathematics ,V. Sundaresan , K.S.Ganapathy Subramanian, K.Ganesan, A.R. Publications, Second Edition 1998(Revised). (UNITIV)

UNIT I :Chapter IX:Sec 1- 9 (Text Book1)
UNIT II :Chapter IX: Sec 11 -13 (Text Book1)
UNIT III:Chapter IX: Sec 14 – 17 (Text Book1)
UNIT IV:Chapter X: Sec 1 – 4 (TextBook1)
UNIT V :Chapter VII: Sec 7.1- 7.3 (Text Book 2)

REFERENCE BOOKS

1. Discrete Mathematics Structures with application to Computer Science– J.P. Tremblay and R. Manohar.
2. Discrete Mathematics, A. Singaravelu, M.P. Jayaraman, Meenakshi Agency, Chennai, Complete Revised Edition,2002.
3. N. Chandrasekaran and M. Umaparvathi, Discrete Mathematics, Prentice Hall of India, 2013.
4. Kenneth H Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill Pub. Co. Ltd, sixth edition, 2008.

WEB RESOURCES

1. https://notendur.hi.is/mbh6/html/_downloads/Discrete%20Mathematics%20and%20Its%20Applications%20-%20Kenneth%20Rosen%20(2012).pdf
2. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_propositional_logic.htm
3. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_predicate_logic.htm
4. https://www.tutorialspoint.com/discrete_mathematics/rules_of_inference.htm
5. https://www.javatpoint.com/discrete-mathematics-tutorial
6. https://www.tutorialspoint.com/discrete_mathematics/index.htm
7. https://nptel.ac.in/courses/111/107/111107058/
8. http://discrete.openmathbooks.org/dmoi3/dmoi.html

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand and identify the logical techniques and their applications.	**K1, K2**
CO2	Recognize and apply the concept of logic, inference theory, lattices and Boolean algebra.	**K3**
CO3	Analyze various forms of mathematical statements, its predicates and discrete structures.	**K4**
CO4	Interpret the validity of the formula functions and the existence of algebraic structures.	**K5**
CO5	Construct abstract structures using predicates, quantifiers and logical connectives.	**K6**

B.Sc., MATHEMATICS

2021-2022 onwards

Elective Course: V **Sub code : 21UMAME5**

Hours/Week: 5 hrs

Credit: 4

COMBINATORICS

Course Objectives

The objective of this programme is

CO-1	To use permutation and combination to solve counting problems.
CO-2	To understand the concept of Generating functions
CO-3	To setup and utilize recurrence relations in solving combinatorial problems
CO-4	To apply the concept of inclusion and exclusion principle.
CO-5	To apply the ideas of permutation and combination to daily life situations of arranging and grouping the objects.

Prerequisites: Basic knowledge in set theory and numbers .

UNIT I

Permutations and Combinations:

1.1 Distributions of Distinct objects

1.2 Distribution of non distinct object

UNIT II

Generating Functions:

2.1 Generating function for combinations

2.2 Enumerations for permutations

2.3 Distributions of distinct objects into non-distinct cells

2.4 Partitions of integers

UNIT III

Recurrence Relations:

3.1 Linear Recurrence relations with constant coefficient

3.2 Solutions by the technique functions

3.3 A special class of non linear difference equations

3.4 Recurrence relations with two indices

UNIT IV

The Principle of Inclusion and Exclusion:

4.1 General formula Derangements
4.2 Permutations with restriction on relative positions

UNIT V

Polya's Theory of Counting:

5.1 Equivalence classes under a permutations group
5.2 Equivalence classes of functions
5.3 Weight and inventories of functions
5.4 Polya's fundamental theorem

TEXT BOOK

1.C.L.Liu – Introduction of Combinatorial Mathematics, McGraw Hill,

UNIT 1: Chapter 1: 1.1–1.6
UNIT 2: Chapter 2: 2.1 – 2.5
UNIT 3: Chapter 3: 3.1 – 3.5
UNIT 4: Chapter 4: 4.1 – 4.5
UNIT 5: Chapter 5: 5.3 – 5.6

REFERENCE BOOK

1. Combinatorics, V.K. Balakrishnan, Schuam Series, 1996.
2. Combinatorics , George Duckett, Questions and Answers , 2015, e-Book.
3. A course in Combinatorics, Lint, J.H. Van and Wilson, R.M, Cambridge University Press, Reprinted 2007, Second Edition.
4. Combinatorics Problems and Solutions, Stefan Hollos and J. Richard Hollos, Abrazol Publishing, 2013, e-Book.

WEB RESOURCES

1. https://ocw.mit.edu/high-school/mathematics/combinatorics-the-fine-art-of-counting/related-resources.
2. https://www.coursera.org/courses?query=combinatorics

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts of permutation, combination, recurrence relation, derangement and inclusion-exclusion principle.	**K1, K2**
CO2	Apply the concepts of permutation, combination, recurrence relation, derangement and inclusion-exclusion principle and determine the solutions of combinatorial problems.	**K3**
CO3	Analyze the concepts of permutation, combination, recurrence relation, derangement and inclusion-exclusion principle.	**K4**
CO4	Evaluate and interpret the solutions of some practical real-life problems.	**K5**
CO5	Facilitate the solutions of problems by various combinatorial methods.	**K6**

B.Sc., MATHEMATICS
2021-2022 onwards

Sub code : 21UMASS1
Hours/Week: 5 hrs
Credit: 2

SELF STUDY PAPER –I

THEORY OF NUMBERS

The objective of this programme is

CO-1	To use the definition of Diophantine Equation and understand their applications.
CO-2	To understand the concept of Primes and Their Distribution and understand The Theory of Congruences.
CO-3	To understand the Fermat's Theorem.
CO-4	To apply the concept ofNumber–Theoretic Functions.
CO-5	To apply the ideas of Euler's Phi-Function their properties to daily life situations

Prerequisites: Basic knowledge in set theory and numbers.

UNIT I

Divisibility Theory in the Integers:

1.1 The Division Algorithm
1.2 The Greatest Common Divisor
1.3 The Euclidean Algorithm
1.4 The Diophantine Equation ax+ by =c

UNIT II

Primes and Their Distribution:

2.1 The Fundamental Theorem of Arithmetic
2.2 The Sieve of Eratosthenes.

The Theory of Congruences:

2.3 Basic Properties of Congruence
2.4 Linear Congruences and the Chinese Remainder Theorem

UNIT III

Fermat's Theorem:

3.1 Fermat's Little Theorem and Pseudoprimes
3.2 Wilson's Theorem.

UNIT IV

Number–Theoretic Functions:

4.1 The Sum and Number of Divisors

4.2 The Mobius Inversion Formula

4.3 The Greatest Integer Function.

UNIT V

Euler's Generalization of Fermat's Theorem:

5.1 Euler's Phi-Function

5.2 Euler's Theorem

5.3 Some properties of the Phi-Function

TEXT BOOK:

1. Elementary Number Theory – David M. Burton – Tata McGraw-Hill PublishingCompany Limited – New Delhi – Sixth Edition (2007)

UNITI : Chapter 2: 2.2 –2.5
UNIT II : Chapter 3: 3.1, 3.2; Chapter 4: 4.2 &4.4
UNIT III : Chapter 5: 5.2 &5.3
UNIT IV : Chapter 6: 6.1 –6.3
UNITV : Chapter 7: 7.2 –7.4

REFERENCE BOOKS

1. Theory of Numbers – Dr. Sudhir, K. Pundir and Dr. Rimple Pundir-Third Revised Edition 2012

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts of Division Algorithm and Euclidean Algorithm.	**K1, K2**
CO2	Analyse the effect of The Fundamental Theorem of Arithmetic and Linear Congruences and the Chinese Remainder Theorem.	**K3**
CO3	Analyze the concepts of the Fermat's and Wilson's Theorem.	**K4**
CO4	Evaluate of Number–Theoretic Functions.	**K5**
CO5	Facilitate the phi and Euler's Generalization of Fermat's Theorem.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code: 21UMASS2
Hours/Week: 5hrs

SELF STUDY PAPER – II **Credit: 2**

ASTRONOMY

Course Objectives

The objective of this programme is

CO-1	To understand astronomical phenomena of celestial bodies.
CO-2	To visualize and analyze the occurrence of astronomical events.
CO-3	To conceptualize the formation of universe.
CO-4	To catalog star categories.
CO-5	To demonstrate star mapping and acquire knowledge about telescope.

Prerequisites: Basic knowledge in space science.

UNIT I

Spherical Trigonometry:

1.1Relevant Properties of a Sphere & relevant formulae from spherical trigonometry (All without proof).

1.2 Celestial sphere, Diurnal motion.

UNIT II

Earth:

2.1 The zones of earth to Geographical and Nautical miles

2.2 Dip of the Horizon

2.3 Civil, Nautical and Astronomical twilights.

UNIT III

Refraction - Geocentric Parallax.

UNIT IV

Kepler's laws – Time.

UNIT V

Helio centric parallax – Aberration – The Moon.

TEXT BOOK

1. Astronomy S. Kumaravelu and Susheela Kumaravelu,S KV Publication. Revised and enlarged edition – 2005, Reprinted 2009.

UNIT I :Chapter 1& 2: Section:1-79.

UNIT II : Chapter 3: Section: 87 -101, 106-116.

UNIT III: Chapter 4: Section:117-132,
Chapter 5: Section: 135 - 145.

UNIT IV : Chapter 6: Section: 146 - 165,

Chapter 7: Section: 166 -172.

UNITV : Chapter 8, Section: 190 -194,
Chapter 9: Section: 195 - 203,
Chapter 12: Section: 229 - 245.

REFERENCE BOOK

1. V. Thiruvenkatachalam, A Text Book of Astronomy, S. Chand and Co., Pvt. Ltd.,1972.
2. Extragalactic Astronomy and Cosmology by Peter Schneider Springer.
3. Astronomy for graduate and post graduate classes by Rukmani Ramachandran.
4. Astronomy- A self-teaching guide by Dinah. l. Moche, John Wiley & Sons Inc.

WEB RESOURCES

1. https://starchild.gsfc.nasa.gov/docs/StarChild/questions/question48.html.
2. https://www.cgg.org/index.cfm/library/bqa/id/118/what-are-origins-of-names-our-days- months.html
3. https://www.timeanddate.com/calendar/aboutseasons.html.
4. http://www.hindupedia.com/en/Astronomy.
5. https://www.metmuseum.org/toah/hd/astr/hd_astr.htm
6. http://w.astro.berkeley.edu/~kalas/ethics/documents/coi/Modern%20Astronomy, %20the%20Bible,%20and%20Creation.pdf
7. Atlas of the universe by Sir Patrick Moore, e-book.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Describe the basic concepts in astronomy.	**K1, K2**
CO2	Demonstrate the theory of motion of celestial bodies.	**K3**
CO3	Analyze the occurrence of astronomical events.	**K4**
CO4	Assess the application of mathematics in astronomy.	**K5**
CO5	Arrange astronomical instruments and compile star maps.	**K6**

B.Sc. MATHEMATICS

2021- 2022 onwards

Sub.Code :21UMASS3

Hours/Week : 5 hrs

SELF STUDY PAPER -III **Credit : 2**

QUANTITATIVE TECHNIQUES

Course Objectives

The objective of this programme is

CO-1	To understand the concept of OR
CO-2	To apply the Formulation of Linear programming problem
CO-3	To understand the to apply Linear Programming Problem to solve transportation
CO-4	To apply to the Linear Programming Problem to solve and assignment problems.
CO-5	To apply the methods of solving Game theory

Prerequisites: Basic knowledge in set theory and numbers .

UNIT I

1.1 Introduction, Scope or Uses or Application of O.R
1.2 Role of Operations Research and Classification of Models
1.3 Some Characteristics of a good model and Principles of Modelling
1.4 General Methods for Solving O.R Models, Main Phases of O.R
1.5 Limitation

UNIT II

2.1 Introduction
2.2 Requirements for employing L.P.P technique
2.3 Mathematical Formulation of L.P.P

UNIT III

3.1 Introduction
3.2 Mathematical formulation of a Transportation Problem
3.3 Methods for finding initial basic feasible solution

UNIT IV

4.1 Introduction
4.2 Mathematical formulation of an assignment problem
4.3 Comparison with Transportation Model
4.4 Difference between the transportation problem and the assignment problem

4.5 Assignment algorithm (or) Hungarian Methods

UNIT V

5.1 Introduction
5.2 Two Person Zero-Sum Games
5.3 The Maxmin-Minimax Principle

TEXT BOOK

1. Resource Management Techniques (Operations Research), V.Sundaresan, K.S.Ganapathy Subramanian and K.Ganesan, A.R.Publications, Sirkali,1999.

UNIT I : Chapter 1 :Sec. 1.1 – 1.9
UNIT II : Chapter 2 : Sec. 2.1, 2.2, 2.3
UNIT III : Chapter 7 : Sec.7.1
UNIT IV : Chapter 8 : Sec. 8.1, 8.5
UNIT V : Chapter 16 : Sec. 16.1 – 16.3

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the concepts of integer programming	**K1, K2**
CO2	Apply the concepts of basics of HTML	**K3**
CO3	Analyze the concepts of the Head and Body sections	**K4**
CO4	Evaluate of creat Table	**K5**
CO5	Facilitate the set Frameset	**K6**

B.Sc., Mathematics
2021 – 2022 onwards

Semester :IV **Sub. Code : 21UMASB1**

Skill Based Course : I **Hours : 2**

Credit: 2

LATEX

Course Objectives

The objective of this programme is

CO-1	To understand the creating a tables. Sections, labelling and tables of contents.
CO-2	To apply the coloured text, font size, comments and special characters.
CO-3	To apply some table alignment and insert an image.
CO-4	To apply to the Linear Programming Problem to solve and assignment problems.
CO-5	To apply to the inserting equation, mathematical symbols.

Prerequisites: Basic knowledge of LATEX .

UNIT I

Introduction

1.1 What is LATEX? Before you start

Document Structure

1.2 Essentials and Troubleshooting

1.3 Creating a Title

1.4 Sections and Labelling

1.5 Table of Contest

UNIT II

Typesetting Text

2.1 Font Effects

2.2 Coloured Text

2.3 Font sizes and Lists

2.4 Comments & spacing

2.5 Special characters

UNIT III

Tables

3.1 Practical

Figures

3.2 Practical

UNIT IV

Equations

4.1 Inserting Equations

4.2 Mathematical symbols

4.3 Practical

UNIT V:

Inserting References

5.1 Introduction and The BibTex file
5.2 Inserting the Bibliography
5.3 Citing reerences
5.4 Styles
5.5 Practical

TEXT BOOK

1. Latex for Beginners – Work Book, Edition 5, March 2014.

UNIT I : Chapter 1 : Sec : 1.1 – 1.2
Chapter 2 : Sec : 2.1 – 2.6
UNIT II : Chapter 3 : Sec : 3.1 – 3.6
UNIT III : Chapter 4 : Sec : 4.1
Chapter 5 : Sec : 5.1
UNIT IV : Chapter 6 : Sec : 6.1 – 6.3
UNIT V : Chapter 7 : Sec : 7.1 – 7.6

REFERENCE BOOKS

1. The latex companion by Michel Goosens, Frank Mittelbach, Alexander Samarin, Addison Wesley Publishing Company, 1994.
2. Ranjitsingh's Text Formatting with LATEX, RT publications, Chandigarh.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	To understand the concepts of Work in latex document.	K1, K2
CO2	To apply the concepts of coloured text and font size.	K3
CO3	To analyze the concepts of the insert an image.	K4
CO4	To evaluate of codes in latex to apply mathematical symbols.	K5
CO5	To facilitate the set Frameset	K6

B.Sc., Mathematics
2021 – 2022 onwards

Semester : V **Sub. Code: 21UMASB2**
Skill Based Course :II **Hours : 2**
Credit: 2

MATLAB

Course Objectives

The objective of this programme is

CO-1	This course provides basic fundamentals on MATLAB, primarily for numerical computing.
CO-2	To learn the characteristics of script files, functions and function files, two-dimensional plots and three-dimensional plots.
CO-3	To enhance the programming skills with the help of MATLAB
CO-4	To allow learning and applying specialized technologies.
CO-5	To operate with digital signal processing

Prerequisites: Basic knowledge in set theory and numbers .

UNIT I

1.1 Introduction to MATLAB
1.2 Constants, Variables and Expressions

UNIT II

2.1 Vectors and Matrices

UNIT III

3.1 Polynomials

UNIT IV

4.1 Ordinary Differential Equations and symbolic mathematics

UNIT V

5.1 MATLAB applications in digital singal processing

TEXT BOOK:

1. "MATLAB: And its applications in Engineering" by Raj Kumar Bansal, Ashok Kumar Goel, Monoj Kumar Sharma, Pearson Eduction Dorling Kindersley (India) Pvt. Ltd., 2009.

UNIT I : Chapter 1 & Chapter 2
UNIT II : Chapter 3
UNIT III: Chapter 4
UNIT IV: Chapter 9
UNIT V :Chapter 15

REFERENCE BOOK

1. MATLAB – The language of Technical Computing-1984-1997 by sthe MathWorks,Inc. All Rights Reserved.
2. A Beginnner's Guide to MATLAB- Christos Xenophontos. MATLAB is a registered trademark of the MathWorks Inc. A first draft of this document appeared as Tech nical Report 98-02. – Clarkson University.
3. Introduction to MATLAB 7 for Engineers, William J Palm III, McGraw Hill, 2005.
4. MATLAB with applications to engineering, physics and finance, David Baez-Lopez, CRC Press, 2010.
5. Solving Applied Mathematical Problems with MATLAB, Dingyu Xue Yangquan chen, CRC Press, 2008.
6. Introduction to MATLAB for Engineering Students, David Houcque, Northwestern University, 2005, ebook.

WEB RESOURCES

1. https://www.mathworks.com/videos/introduction-to-matlab-81592.html
2. https://www.educba.com/introduction-to-matlab/
3. MATLAB PROGRAMMING - Google Books

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the mathematical library functions of MATLAB.	K1, K2
CO2	Apply programming skills in writing mathematical scripts.	K3
CO3	Analyze and examine MATLAB codes for debugging.	K4
CO4	Customize and visualize mathematical structures using plot functions.	K5
CO5	Generate MATLAB codes to handle mathematical concepts.	K6

KALAIGNAR KARUNANIDHI GOVERNMENT ARTS COLLEGE FOR WOMEN
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DEPARTMENT OF MATHEMATICS

COURSE PATTERN AND SYLLABI

2021 – 2022 ONWARDS

ALLIED MATHEMATICS

COURSE PATTERN

ALLIED MATHEMATICS

(For Physics, Chemistry and Computer Science Major Students)

For Physics and Chemistry Major

Sl. No.	Sem.	Subject Code	Title of the Course	Hours/ week	Credit	Exam. Hours	Max. Marks SE + CIA 75 +25
1	I	21UAM1	Allied Mathematics I - Calculus and Vector Calculus	6	3	3	100
2	II	21UAM2	Allied Mathematics II – Differential Equations,Laplace Transforms and Fourier Series	5	3	3	100
3	II	21UAM3	Allied Mathematics III – Algebra and Trigonometry	4	3	3	100
			Total	**15**	**9**		**300**

For Computer Science Major

Sl. No.	Sem.	Subject Code	Title of the Course	Hours/ week	Credit	Exam. Hours	Max. Marks SE + CIA 75 +25
1	I	21UAMCS1	Allied Mathematics I - Numerical Methods and Operations Research	6	3	3	100
2	II	21UAMCS2	Allied Mathematics II – Integral Calculus, Differential Equations, Vector Calculus and Fourier Series	5	3	3	100
3	II	21UAMCS3	Allied Mathematics III – Algebra, Probability and Statistics	4	3	3	100
			Total	**15**	**9**		**300**

ALLIED MATHEMATICS - I
(For Physics and Chemistry Major)
2021- 2022 Onwards

Sub. Code : 21UAM1
Hours/Week : 6
Credit: 3

Semester: I
Allied Course: I

CALCULUS AND VECTOR CALCULUS

Course Objectives

The objective of this programme is

CO-1	To evaluate the derivative of a function and examine its applications geometrically.
CO-2	To apply the concepts of jacobians and radius of curvature
CO-3	To understand the types of reduction formula.
CO-4	To assimilate the concepts of vector differential operators and solve related problems.
CO-5	To grasp the vectors calculus for Divergence and curl.

Prerequisites: Basic knowledge in calculus and vector calculus.

UNIT I Successive Differentiation:

1.1 Definition and notation and to find d^2y/dx^2 when x and y are expressed in terms of a parameter
1.2 Standard functions
1.3 Use of partial fractions
1.4 Trigonometrical Transformations
1.5 Leibnitz'z theorem on the n^{th} differential co-efficient of the product of two functions of x

UNIT II Total differential and Jacobians

2.1 Total differential co-efficient and Jacobians
2.2 Properties of Jacobians
2.3 Curvature of a Curve and circle, radius and center of curvature
2.4 Formula for the radius of curvature
2.5 Cartesian formula for the radius of curvature

UNIT III Integration

3.1 Reduction formula

UNIT IV Vector Calculus: Vector differentiation

4.1 Ways in which a vector may vary, Scalar functions and Vector functions
4.2 Differentiation of vector and Differentiation formulas
4.3 Differentiation of the Dot and Cross products
4.4 Derivative of a vector referred to a fundamental system

Vector Calculus: Gradient

4.5 Gradient of a scalar function and important deductions (Worked examples)

UNIT V Vector Calculus: Divergence and Curl

5.1 The Divergence of a vector
5.2 The curl of vector
5.3 Physical Interpretation of the curl of a vector (Worked examples)
5.4 Solenoidal and irrotational fieids (Worked examples)

TEXT BOOKS

1. Differential Calculus & Trigonometry - M.K. Venkataraman, & Mrs. Manorama Sridhar Ist Edition, The National Publishing Company,2002 (Units – I, II).
2. Calculus Vol-II – S. Narayanan & T.K.M. Pillay, S.Viswanathan Pvt. LTD, 2008 (Units –III)
3. Vector Calculus and Fourier series M.K. Venkataraman, & Mrs. Manorama Sridhar, The National Publishing Company,2002 (Units –IV&V).

UNIT I : Chapter 2- Sec.2.1 to 2.4 & 2.6,2.7
UNIT II : Chapter 3 - Sec.3.4, 3.9,3.10
Chapter 6 - Sec.6.1 to 6.5
UNIT III : Chapter 1 - Sec.13.1 to 13.10
UNIT IV : Chapter 2 – Sec. 2.1 to 2.4, 2.6 to 2.8
Chapter 3 - Sec.3.3, 3.5
UNIT V : Chapter 3 - Sec. 3.7, 3.9, 3.10 & 3.15

REFERENCE BOOKS

1. Differential & Integral Calculus – Shanthi Narayanan S.Chand &Co.
2. Vector Calculus - M.L. Khanna, Jai Prakash, Educational Publishers,1996
3. Vector Calculus _ Duraipandiyan &Others., S.Viswanathan (Printers & Publishers) Pvt. Ltd.,1980.
4. Allied Mathematics – A. Singaravelu, Meenakshi Agency, Chennai,2007.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the fundamentals of derivatives, jacobians, Curvatures , integrations and Vector Calculus.	**K1, K2**
CO2	Employ appropriate Mathematical Methods and Techniques in solving problems.	**K3**
CO3	Analyze the applications of calculus, curvature, reduction formula and vector calculus.	**K4**
CO4	Evaluate the solution of differential calculus, radius of curvature, reduction formula and vector calculus.	**K5**
CO5	Formulate and solve problems in physics using various techniques of calculus, radius of curvature, reduction formula and vector calculus.	**K6**

ALLIED MATHEMATICS - II
(For Physics and Chemistry Major)
2021- 2022 Onwards

Sub. Code :21UAM2
Semester: II **Hours/Week : 6**
Allied Course: II **Credit: 3**

DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORM AND FOURIER SERIES

Course Objectives

The objective of this programme is

CO-1	To understand the various concepts of differential equations.
CO-2	To acquire knowledge of partial differental equations and use suitable for solving them.
CO-3	To introduce the Laplace transforms and apply it for solving appropriate Methods.
CO-4	To apply the concepts of inverse Laplace transforms.
CO-5	To grasp the theory of vector calculus for evaluating line and surface integral.

UNIT I Partial differential Equations of the first order:

1.1 Classification of Integrals
1.2 Derivation of Partial Differential Equations
1.3 Lagrange's method of solving the linear equations $Pp + Qq = R$

UNIT II Partial differential Equations of the first order (Special methodsonly)

2.1 Standard forms $F(p,q)=0$
2.2 Standard forms $F(x,p,q) = 0$, $F(y,p,q) = 0$, $F(z,p,q) = 0$
2.3 Standard forms $f_1(x,p) = f_2(y,q)$
2.4 Standard forms $F_1(x,p) = F_2(y,q)$, $z = px + qy + f(p,q)$ (Clairaut's form), Simple problems only.

UNIT III The Laplace Transforms:

3.1 Introduction and Laplace Transform of $f(t)+\phi(t)$, $cf(t)$, $f'(t)$, $f''(t)$
3.2 Initial Value Theorem and Final Value Theorem
3.3 Laplace Transform of e^{-at}, e^{at}, coshat, sinhat, cosat, sinat, t^n
3.4 Some general Theorems
3.5 Evaluation of certain integrals using Laplace Transforms

UNIT IV The Inverse Transforms:

4.1 Inverse transforms of $F(s+a)$, $F(ks)$, $F'(s)$, $sF(s)$, $(1/s)F(s)$

4.2 Finding the inverse transform of function by the method of Partial Fractions
4.3 Solving Ordinary Differential Equations with Constant Co-efficients using Laplace Transforms.

UNIT V Fourier Series:

5.1 Introduction
5.2 The Euler Formulae
5.3 Convergence of Fourier Series
5.4 Use of Fourier Series
5.5 Examples of Fourier Series

TEXT BOOKS

1. Differential Equations anditsApplications - S. Narayanan & T.K.M.Pillay, S.Viswanathan Pvt. LTD, 2015 (Units – I to IV)
2. Vector Calculus and Fourier Series – Dr.M.K. Venkataraman and Mrs. Manorama Sridhar, The National Publishing Company, 2009 (Unit – V)

UNIT I : Chapter XII - Sec.1 to 4
UNIT II : Chapter XII - Sec.5, 5.1, 5.2, 5.3, 5.4
UNIT III : Chapter IX - Sec.1to 5(Except sec.3)
UNIT IV : Chapter IX - Sec.6 to 8
UNIT V : Chapter I - Sec. 1.1 – 1.5

REFERENCE BOOKS

1. Partial Differential Equations – I.N. Sneddon, McGraw – Hill International Book Company,1984.
2.Transforms and PDE, A. Singaravelu, Meenakshi Agency, Chennai, 18th Revised Edition-2011.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand and recall concept in partial differential equations, Laplace and inverse Laplace transforms and vector integrations.	**K1, K2**
CO2	Apply the apply mathematical techniques in different areas of physics and chemistry.	**K3**
CO3	Determine the lagrange's methods, standard forms of first order partial differential equations, Laplace and inverse Laplace Transforms using appropriate methods and vector integrations.	**K4**
CO4	Evaluate the solution of differential calculus, radius of curvature, reduction formula and vector calculus.	**K5**
CO5	Formulate and solving problems in physics and chemistry using techniques of differential equation, Laplace transforms and vector integrations.	**K6**

ALLIED MATHEMATICS - III
(For Physics and Chemistry Major)
2021- 2022 Onwards

Sub. Code :21UAM3
Hours/Week : 6
Credit: 3

Semester: II
Allied Course: III

ALGEBRA AND TRIGONOMETRY

Course Objectives

The objective of this programme is

CO-1	To understand the various concepts of Binomial series and summation of function
CO-2	To acquire knowledge of solving problems in Exponential and logarithmic series
CO-3	To acquire knowledge of solving problems in matrices
CO-4	To apply the concepts of knowledge of trigonometric functions and related problems
CO-5	To grasp the theory of become proficient in various types of hyperbolic functions

Prerequisites: Basic knowledge in algebra and trigonometry

UNIT I Algebra

1.1 Binomial Series.

UNIT II Algebra

2.1 Exponential and logarithmic series (Simple Problem Only)

UNIT III Matrices

3.1 Various types of matrices
3.2 Characteristic roots of a square matrix
3.3 Rank of a Matrix
3.4 Evaluation of Eigen values and Eigen vectors
3.5 Verification of Cayley Hamilton theorem

UNIT IV Trigonometry

4.1 Expansion of cosnx, sinnx & tannx (n is a positive integer)
4.2 Expansion of $\cos^n x$, $\sin^n x$ in a series of sines & cosines of multiples of x, x given in radius (proof not required), simple problems

UNIT V Trigonometry

5.1 Hyperbolic functions
5.2 Relations between Hyperbolic functions
5.3 Formula involving hyperbolic functions
5.4 Expansion of sinhx & coshx in power of x.
5.5 Inverse hyperbolic functions $\sinh^{-1}x$, $\cosh^{-1}x$ & $\tanh^{-1}x$ in terms of logarithmic functions

TEXT BOOKS:

1. Algebra vol. I - T.K.M. Pillay &Others, S.Viswanathan Pvt.LTD, 2007 (Unit –I &II)
2. Algebra vol. II - T.K.M. Pillay &Others,S.Viswanathan Pvt.LTD, 2007 (Unit –III)
3. Trigonometry, S. Narayanan &T.K.M.Pillay. S.ViswanathanPvt.LTD, 2004 (Units – IV &V)

UNIT I : Chapter 3: Sec. 5, 6, 10
UNIT II : Chapter 4: Sec.1to 7
UNIT III : Chapter 2: Sec.1 to 8,11 to 13,16
UNIT IV : Chapter 3 : Sec.1,2,4
UNIT V : Chapter 4 : Sec.1, 2.1 to 2.3

REFERENCE BOOKS:

1. Algebra,Suriyanarayanan and Santiago, ArulPublication.
2. Trigonometry and Fourier Series, S.Arumugam, A. ThangapandiIsaac, A. Somasundram, New Gamma Publishing House, Palayamkottai.
3. Allied Mathematics, A. Singaravelu, Meenakshi Agency, Chennai.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand and recall concept in Binomial Series	**K1, K2**
CO2	Verify Cayley Hamilton theorem for Matrices	**K3**
CO3	Evaluate Eigen values and Eigen vectors for Square Matrices .	**K4**
CO4	Expand $\cos^n x$, $\sin^n x$ in a series of sines & cosines of multiples of x, x given in radians .	**K5**
CO5	Formulate Inverse hyperbolic in terms of logarithmic functions	**K6**

Allied – MATHEMATICS
(For Computer Science Major)
2021 – 2022 Onwards

Sub.Code : 21UMACS1
Semester: I **Hours /Week:6**
Allied Course: I **Credit:3**

NUMERICAL METHODS AND OPERATIONS RESEARCH

Course Objectives

The objective of this programme is

CO-1	To find approximate solutions to the functions using iterative methods.
CO-2	To evaluate numerical calculations of problems in differentiation and integration.
CO-3	To utilize the formulation of a linear programming problem and find its optimal solution.
CO-4	To understand the optimal strategies to solve games formed in conflict and competitive environment.
CO-5	To get motivation to take up a project to solve real life problems by adopting the techniques of operations research in algebra and probability distributions.

UNIT I

Algebraic and Transcendental Equations

1.1 Introduction
1.2 Iteration Method
1.3 Bisection Method
1.4 Regula falsi method
1.5 Newton- Raphson Method.

UNIT II

Numerical Solutions of Ordinary Differential Equations

2.1 Taylor's series Method
2.2 Euler's Method
2.3 Modified Euler's Method
2.4 Runge-KuttaMethods (2^{nd} order only)

UNIT III

Linear Programming Formulation and Graphical Method

3.1 Introduction
3.2 Requirements for employing LPP Technique
3.3 Mathematical Formulation of LPP
3.4 Basic Assumptions
3.5 Graphical Method of the Solution of a LPP.

UNIT IV

Transportation Model & Assignment Problems,

4.1 Introduction–Transportation

4.2 Algorithm (or) MODI Method (Modified distribution method) (Test for Optimal Solution)

Assignment Problem

4.3 Introduction and Mathematical formulation of an AP

4.4 Comparison with Transportation model

4.5 Difference between the TP and AP, Assignment algorithm (or) Hungarian method

UNIT V

Scheduling by PERT and CPM

5.1 Introduction and Basic Terminologies

5.2 Rules for Constructing a Project Network

5.3 Network Computations and Floats

5.4 Programme Evaluation Review Technique (PERT)

5.5 Basic Difference Between PERT and CPM

TEXT BOOKS

1. S. Arumugam, A. Thangapandi Isaac, A. Somasundaram, Numerical Methods, Scitech Publications(India) Pvt. Ltd., Chennai,2014.(UNIT: I –II)
2. V. Sundaresan, K.S.Ganapathy Sunbramanian, K.Ganesan, Resource ManagementTechniques (Operations Research), A.R. Publications, Nagapattinam Dt, 2012. (UNIT: III –V)

UNIT I : Chapter III– Sec. 3, 3.2 – 3.5

UNIT II : Chapter X– Sec. 10.1, 10.3, 10.4

UNIT III : Chapter II – Sec. 2.1–2.5.

UNIT IV : Chapter VII – Sec. 7.1 , 7.2
Chapter VIII – Sec. 8.1 – 8.5

UNIT V : Chapter XV – Sec. 15.1 – 15.7

REFERENCE BOOKS

1. S.S.Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India Ltd., New Delhi,1994
2. S.D Sharma, Operations Research, Kedarnath, RamnathPublishers.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the different techniques in obtaining approximates solutions to intractable mathematical problems.	**K1, K2**
CO2	Construct and interpret results on real life problems using appropriate mathematical problems.	**K3**
CO3	Compare the principles of linear programming problems, theory of games and network analysis	**K4**
CO4	Agree the optimation techniques of linear programming, theory of games and network analysis in solving real word problems	**K5**
CO5	Design a mathematical model for an optimization problem in real life by adopting the techniques of operations research	**K6**

Allied – MATHEMATICS
(For Computer Science Major)
2021 – 2022 Onwards

Sub.code:21UAMCS2

Semester: II **Hours /Week: 5 hrs**
Allied Course : II **Credit : 3**

INTEGRAL CALCULUS, DIFFERENTIAL EQUATIONS, VECTOR CALCULUS AND FOURIER SERIES

Course Objectives

The objective of this programme is

CO-1	To study the standard methods of evaluation of integrals
CO-2	To apply the concepts of vector calculus in computer science
CO-3	To assimilate the concept of vector differential operations solve related problems
CO-4	To grasp the theory of vector calculus for evaluating line and surface integrals
CO-5	To determine the fourier series expansions of certain functions and investigate its convergence

Prerequisites: Basic knowledge in algebra and trigonometry

UNIT I

Integral Calculus:

1.1 Reduction formula for $\int x^n e^{ax}\,dx$, $\int x^n \cos ax\,dx$, $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \sin^m x \cos^n x\,dx$, $\int \tan^n x\,dx$

UNIT II

Differential Equations: Equations of the First Order but of the higher degree

2.1 Equations Solvable for $\frac{dy}{dx}$

2.2 Equations Solvable for y

2.3 Equations Solvable for x

2.4 Clairaut's form(Simple case only)

UNIT III

Vector Differentiation

3.1 Scalar functions and Vector functions and Differentiation of a vector and Differentiation of the dot and cross product

3.2 Derivative of a vector referred to a fundamental system and Partial derivative of vectors And Vector Differential Operator of vectors

3.3 Scalar and vector Field and The Vector Differential Operator ∇

3.4 Gradient of a scalar function, Directional derivative, Important deductions and Operation involving ∇

3.5 The divergence of a vector, Curl of a vector and Expansion formula for operators involving ∇

UNIT IV

Vector Differentiation

4.1 Second order Differential operators

4.2 Two more expansion formulae

4.3 Solenoidal and irrotationl field

Vector Integration

4.4 Line, Surface and Simple Problems

UNIT V

Fourier Series

5.1 Introduction and Euler's formulae

5.3 Examples of Fourier serious

TEXT BOOKS

1. Calculus Vol II: T.K. Manicavachagom Pillay, S. Narayanan, S. Viswanathan Private Ltd, 2017 (UNIT I)
2. Differential Equations and its Applications: S. Narayanan and T.K. Manicavachagom Pillay, S. Viswanathan Private Ltd, 2015 (UNIT II)
3. Vector Calculus and Fourier Series: M.K.Venkataraman, Manorama Sridhar, The National Publishing Company, Chennai, 2002 (UNITS III – V)

UNIT I : Chapter 1- Sec.13.1 - 13.6.

UNIT II: Chapter 4- Sec. 1, 2, 2.1, 2.2, 3.1

UNIT III : Chapter 2–Sec. 2.2- 2.4, 2.6- 2.9 ; Chapter 3–Sec. 3.1- 3.7, 3.9 - 3.11

UNIT IV : Chapter 3 – Sec. 3.12 - 3.15; Chapter 4– Sec 4.1, 4.2, 4.5

UNIT V: Chapter 1 – Sec. 1.1 , 1.2, 1.5

REFERENCE BOOKS

1. Murray Spiegel, Advanced Calculus, Schaum's Outline Series, Asian Student Edition, McGraw Hill Book Company
2. Murray Spiegel, Vector Analysis, Schaum's Outline Series, Asian Student Edition, McGraw Hill Book Company
3. Allied Mathematics – A. Singaravelu, Meenakshi Agency, Chennai, 2007.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the fundamentals of integral calculus, differential equations, vector calculus and fourier series.	**K1, K2**
CO2	Employ appropriate mathematical techniques in solving problems.	**K3**
CO3	Analyze the applications of integral calculus, differential equations, vector calculus and fourier series.	**K4**
CO4	Evaluate the vector differentions.	**K5**
CO5	Facilitate fourier series expantion of certain functions and the significance of integral theorems.	**K6**

Allied – MATHEMATICS
(For Computer Science Major)
2021 – 2022 Onwards

Sub. Code: 21UAMCS3

Semester : II **Hours /Week : 4**
Allied Course: III **Credit : 3**

ALGEBRA, PROBABILITY AND STATISTICS

Course Objectives

The objective of this programme is

CO-1	To study the concepts of binomial theorem and solve the simple problems.
CO-2	To recall the concepts of exponential and logarithmic series
CO-3	To utilize the concepts probability theory.
CO-4	To find the solutions of statistics
CO-5	To obtain approximate solutions of expectation, covariance and properties of MGF.

Prerequisites: Basic knowledge in algebra, probability and statistics

UNIT I

Algebra:

1.1 Binomial theorems and simple problems

UNIT II

2.1 Exponential

2.2 Logarithmic series.(Simple Problem Only)

UNIT III

3.1Theory of Probability and Probability Sample Space

3.2 Probability of Events and Independence of Events

3.3 Theorems on Probability

3.4 Conditional Probability

3.5 Baye's Theorem.

UNIT IV

4.1 Random Variables

4.2 Distribution Function

4.3 Discrete & Continuous Random Variables

4.4 Probability Mass and Density function of Random Variables

4.5 Joint Probability Distribution.

UNIT V

5.1 Expectation, Properties of Expectation

5.2 Properties of Variance - Covariance

5.3 Moment Generating Functions,

5.4 Properties of Moment Generating Functions.

TEXT BOOK

1. Algebra vol. I - T.K.M. Pillay&Others, S.ViswanathanPvt.LTD, 2007 (Unit – I, II)
2. S.C. Gupta and V.K. Kapoor Fundamentals of Mathematical Statistics. Sultan Chand and Sons, June 2002.Reprint 2009.(UNIT III– V)

UNIT I : Chapter 3: Sec. 5,6,10.
UNIT II : Chapter 4: Sec. 2, 3, 5.6, 7
UNIT III : Chapter 3: Sec.3.4, 3.5, 3.8, 3.8.5, 3.9, 3.9.1, 3.10-3.12
Chapter 4: Sec. 4.2
UNIT IV : Chapter 5: Sec. 5.1 – 5.5.2(Omit Sec 5.4.2)
UNIT V : Chapter 6: Sec. 6.2- 6.6.1, Chapter 7– Sec. 7.1, 7.1.2

REFERENCE BOOKS

1. Seymour Lipchutz, Theory and Problems of Probability, Schaum's Outline Series, Asian Student Edition, McGraw Hill Book Company
2. Thambidurai, Practical Statistics, Rainbow Publications.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Understand the various concepts of algebra, probability and statistics	**K1, K2**
CO2	Apply the concepts of algebra probability and statistics	**K3**
CO3	Analyze the concepts of algebra probability and statistics	**K4**
CO4	Determine the impact of Mathematical concepts in computer science using algebra probability and statistics	**K5**
CO5	Create mathematical tools and models used in computer science.	**K6**

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PUDUKKOTTAI – 622 001

DEPARTMENT OF MATHEMATICS

COURSE PATTERN AND SYLLABI

2021 – 2022 ONWARDS

ALLIED STATISTICS

Allied – STATISTICS
(For Mathematics Major)
2021 – 2022 Onwards

Sub. Code: 21UASM1

Semester: I **Hours/Week : 4**
Allied Course: I **Credit : 3**

STATISTICS FOR MATHEMATICS – I

Course Objectives

The objective of this programme is

CO-1	To make the students understand various characteristic of discrete and continuous statistical distribution with mathematical techniques.
CO-2	Calculate Probability, Conditional Probability and its axiom and theorems
CO-3	Analyze discrete and continuous random variable and its properties and properties of two dimensional random variable.
CO-4	Evaluate Expectation and Variance and its relevant theorems.
CO-5	Find Binomial, Poisson and Geometric distribution

UNIT I

1.1. Definition of probability
1.2. Axiomatic approach to probability, basic theorems on probability, conditional probability.
1.3. Addition and Multiplication theorem of probability
1.4. Independent Events – Pairwise Independent Events
1.5. Baye's theorem.

UNIT II

2.1 Random variable
2.2 Distribution function and its properties
2.3 Discrete random variable
2.4 Probability mass function, continuous random variable, probability density function, continuous distribution function,
2.5 Two – dimensional random variable – joint probability mass function, marginal and conditional distributions

UNIT III

3.1 Mathematical expectation
3.2 Addition and Multiplication theorems
3.3 Covariance
3.4 Moment generating function – Properties

UNIT IV

4.1 Discrete distribution
4.2 Binomial, Poisson - MGF, CGF, Moments and Recurrence relation

4.3 Geometric – MGF, Moments

UNIT V

5.1 Continuous distributions
5.2 Normal- Properties, Moments, MGF, CGF
5.3 Rectangular- Moments, MGF;
5.4 Gamma- MGF, CGF;
5.5 Exponential -Moments

TEXT BOOK

1. Gupta S.C.andKapoor, V.K. Fundamentals of Mathematical Statistics.

Sultan Chand and Sons, 2002.

UNIT I : Chapter 3: Sec. 3.4, 3.5, 3.8, 3.8.5, 3.9, 3.9.1, 3.10 - 3.12, 3.15.
Chapter 4: Sec. 4.2
UNIT II : Chapter 5: Sec: 5.1- 5.4., 5.4.1, 5.4.3, 5.5 - 5.5.3.
UNIT III : Chapter 6: Sec: 6.2 - 6.6.1
Chapter7: Sec: 7.1, 7.1.2
UNIT IV : Chapter8: Sec: 8.4 - 8.4.2, 8.4.6, 8.4.9, 8.5, 8.5.2, 8.5.4,
8.5.5, 8.5.7, 8.7, 8.7.2, 8.7.3.
UNIT V : Chapter 9: Sec: 9.2, 9.2.2, 9.2.5 - 9.2.7, 9.3 - 9.3.2, 9.5 - 9.5.2, 9.8, 9.8.1.

REFERENCE BOOKS

1. Statistics, R.S.N. Pillai, Bagavathi, S.Chand& Company limited, New Delhi Reprint 1999.
2. Statistics, S. Arumugam and A.T. Isaac, New Gamma Publishing House, Palayamkottai, 2007
3. Probability and statistics, M.B.K.Moorthi.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Recognize and discuss probability, conditional probability abd its axiom theorems.	**K1, K2**
CO2	Explain and relate discrete and continuous random variable	**K3**
CO3	Compute Expectation and variance and discuss relevant theorems.	**K4**
CO4	Recognize Binomial distribution, Poisson distribution and describe their properties.	**K5**
CO5	Explain Normal distribution and its properties, Rectangular, Exponential and Gamma distribution	**K6**

Allied – STATISTICS
(For Mathematics Major)
2021 – 2022 Onwards

Sub. Code: 21UASM2

Semester: II **Hours/Week : 5**
Allied Course: II **Credit: 3**

STATISTICS FOR MATHEMATICS – II

Course Objectives

The objective of this programme is

CO-1	To understand study correlation, Regression and its properties.
CO-2	To apply the F, t, x^2 – Distribution and its application
CO-3	To find ANNOVA test
CO-4	To study large sample test
CO-5	To evaluate small sample test

Prerequisites: Basic knowledge in statistics

UNIT I

1.1 Meaning of Correlation and Scatter diagram
1.2 Karl Pearson's coefficient of Correlation
1.3 Introduction and Linear Regression and regression Coefficients
1.4 Properties of regression Coefficients
1.5 Angle between two Line of Regression

.

UNIT II

2.1 x^2 – Distribution derivation (I^{st} Method only) and MGF, CGF, Limiting form of x^2
2.2 Distribution Applications ,students 't' Distribution
2.3 Derivation- constants, limiting form
2.4 Applications, 'F' Distribution -derivation- constants and Applications Relation between 't'& 'F' Distribution
2.5 Relation between 'F' & 'Chi -Square' Distribution.

UNIT III

3.1 ANOVA - One way Classification
3.2 Two way Classification
3.3 Latin Square.

UNIT IV

4.1Test of Significance and Procedure of testing Hypothesis
4.2 Formation of null & Alternative Hypothesis
4.3 Type – I & Type – II error, One -tail and two – tail test- critical region .

4.4 Test for proportion, difference between two proportion, Large small test

4.5 Test for mean, difference between two means.

UNIT V

5.1 Small sample tests- test for mean, difference between two means (including paired 't' test)

5.2 Tests based on F and Chi-Square distribution

5.3 Test for variance

5.4 Test for goodness of fit, test for independence of attributes.

TEXT BOOK

1. Gupta S.C. and Kapoor, V.K. Fundamentals of Mathematical Statistics. Sultan Chand and Sons, 2002.(Unit I,II,IV &V)
2. Statistics Dr.S Arumugam and Thangapandi Isaac,New Gamma Publishing House 2011.(UnitIII)

UNIT I : Chapter 10:Sec:10.2-10.4,10.7 Chapter 11: Sec: 11.1,11.2-11.2.3.

UNIT II : Chapter15: Sec: 15.1-15.3-15.3.2, 15.6 -15.6.3,
Chapter16: Sec: 16.1-16.2.1, 16.2.4, 16.2.5, 16.3-16.3.3, 16.5- 16.5.2, 16.6 - 16.6.1, 16.7, 16.8.

UNIT III : Chapter 17

UNIT IV : Chapter 14: Sec: 14.4-14.4.5, 14.5, 14.6, 14.7-14.7.2, 14.8.3, 14.8.4.

UNIT V :Chapter 15: Sec: 15.6.1-15.6.3 Chapter 16: Sec: 16.3.1-16.3.3,16.6.1.

REFERENCE BOOKS

1. Statistics, R.S.N. Pillai, Bagavathi, S.Chand & Company limited, New Delhi Reprint1999.
2. Statistics, S. Arumugam and A.T. Isaac, New Gamma Publishing House, Palayamkottai,2007
3. Introduction to Bio Statistics and Research Methods P.S.S.Sundar Rao and J.Richard,PHI Learning PrivateLtd.,2012

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Analyze the correlation and Regression problems.	**K1, K2**
CO2	Analyze the F, t, x^2 – Distribution.	**K3**
CO3	Calculate the ANNOVA problems	**K4**
CO4	Calculate the large sample problems	**K5**
CO5	Calculate the small sample problems	**K6**

Allied – STATISTICS
(For Mathematics Major)
2021 – 2022 Onwards

Sub. Code: 21UASM3P

Semester: II **Hours/Week : 4**
Allied Course: III **Credit: 3**

STATISTICS FOR MATHEMATICS (PRACTICAL)

Course Objectives

The objective of this programme is

CO-1	To derive statistical inferences.
CO-2	To find methods of calculation of measures of central tendency and measures of dispersion of a data.
CO-3	To Calculation of Straight line, Parabola and Exponential Curve
CO-4	To evaluate Joint Probability Distribution for discrete random variable
CO-5	To Calculate the Binomial, Poisson and Normal Distribution

List of Experiments:

- Calculation of measures of central tendency
- Calculation of measures of dispersion
- Calculation of Skewness and Kurtosis
- Expectations of discrete and continuous random variables
- Binomial, Poisson and Normal Distribution

UNIT I Measures of Central Tendency and Measures of Dispersion

1.1 Mean, Median, Mode,
1.2 Harmonic Mean and Geometric Mean,
1.3 Range, Quartile Deviation, Mean Deviation and Standard Deviation

UNIT II

2.1Coefficient of Variation
2.2Measures of Skewness
2.3 Kurtosis.

UNIT III

3.1 Curve fitting
3.2 Straight line, Parabola and Exponential Curve

UNIT IV

4.1 Joint Probability Distribution for discrete random variable
4.2 Marginal and Conditional Distribution
4.3 Mathematical Expectation

UNIT V

5.1 Fitting of Binomial
5.2 Poisson and Normal Distributions (Area method only)

TEXT BOOKS

1. Gupta S.C.and Kapoor, V.K. Fundamentals of Mathematical Statistics. Sultan Chand and Sons, 2002. (Eleventh Edition)
2. Statistics, S. Arumugam and A.T. Isaac, New Gamma Publishing House, Palayamkottai, 2007

UNIT I : Chapter 2: Sec: 2.4, 2.5-2.9; 2.13.
UNIT II : Chapter 2: Sec: 2.14-2.17
UNIT III :Chapter 11: 11.3,
UNIT IV : Chapter 5 : Sec: 5.5
UNIT V : Chapter 8 & 9: Sec: 8.4; 8.5. Sec: 9.2

REFERNCE BOOKS

1. Statistics, R.S.N. Pillai, Bagavathi, S.Chand & Company limited, New Delhi Reprint 1999.
2. Probability and Statistics, G. Balaji, G. Balaji Publishess, Chennai, Second Edition, January 2007.
3. Statistics, S. Arumugam and A.T. Isaac, New Gamma Publishing House, Palayamkottai, 2007.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	To classify the corrlation and Regression problems.	**K1, K2**
CO2	To apply the F, t, x^2 – Distribution.	**K3**
CO3	To survey the ANNOVA problems	**K4**
CO4	To agree the large sample problems	**K5**
CO5	To adapt the small sample problems	**K6**

COURSE PATTERN

For Non –Major Elective (Commerce Major)

Sl. No.	Sem	Subject Code	Title of the Course	Hours/ week	Credit	Exam. hours	Max. Marks SE + CIA 75 +25
1	V	21UMANME1	Quantitative Aptitude - I	2	5	3	100
2	VI	21UMANME2	Quantitative Techniques	2	5	3	100
3		21UMANME3	Quantitative Aptitude - II	2	5	3	100
			Total	**6**	**15**		**300**

NON – MAJOR ELECTIVE COURSE I

2021 – 2022 Onwards

Sub. Code: 21UMANME1

Semester: V **Hours/Week: 2**

Allied Course: I **Credit: 5**

QUANTITATIVE APTITUDE - I

Course Objectives

The objective of this programme is

CO-1	To enhance the problem solving skills.
CO-2	To improve the basic mathematical skills.
CO-3	To generalize the concept of average, problems on ages, surds and Indices.
CO-4	To basic concepts of percentage, ratio and proportion.
CO-5	To the help students who are preparing for any type of competitive examinations.

UNIT I

1.1 Average - Solved Examples.

UNIT II

2.1 Problems on Ages – Solved Examples.

UNIT III

3.1 Surds and Indices - Solved Examples.

UNIT IV

4.1 Percentage - Solved Examples.

UNIT V

5.1 Ratio and Proportion - Solved Examples.

TEXT BOOK:

1. Quantitative Aptitude , R.S. Aggarwal, S. Chand & Company Ltd., Ram nagar, New Delhi – 110 055. (Revised Edition 2008)

UNITI : Chapter 1- Sec.1: 6
UNIT II : Chapter 1- Sec.1: 7
UNIT III : Chapter 1- Sec.1: 9
UNITIV : Chapter 1- Sec.1: 10
UNITV : Chapter 1- Sec.1: 12

REFERENCE BOOK:

1. Quantitative Aptitude for Competitive Examinations, Abhijit Guha, Tata Mcgraw- Hill publishing company Ltd. New Delhi.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO1	Explain enhance the problem solving skills.	**K1, K2**
CO2	Develop the basic mathematical skills.	**K3**
CO3	Classify the basic concepts of quantitative ability.	**K4**
CO4	Agree real-life problems requiring interpretation and various	**K5**
CO5	Solve campus placement aptitude papers covering quantitative ability.	**K6**

NON – MAJOR ELECTIVE COURSE II
2021- 2022 onwards

Semester:VI **Sub.Code:21UMANME2**
Hours/Week : 2 hrs **Credit : 5**

QUANTITATIVE TECHNIQUES

Course Objectives

The objective of this programme is

CO-1	To identify and develop operational research models from the verbal description of the real system.
CO-2	To understand the mathematical tools that are needed to solve optimization problems.
CO-3	To introduce the concept of transportation problem.
CO-4	To apply solve assignment problems using Hungarian method and methods of solving game theory.
CO-5	To most important objectives of business may be classified are as follows: Profit Earning, Production and Supply of Quality Goods and Service.

UNIT I

1.1 Introduction and Scope or Uses or Application of O.R
1.2 Role of Operations Research and Classification of Models
1.3 Some Characteristics of a good model and Principles of Modelling
1.4 General Methods for Solving O.R Models and Main Phases of O.R
1.5 Limitation

UNIT II

2.1 Introduction
2.2 Requirements for employing L.P.P Technique
2.3 Mathematical Formulation of L.P.P.

UNIT III

3.1 Introduction
3.2 Mathematical Formulation of a Transportation Problem
3.3 Methods for finding initial basic feasible solution

UNIT IV

4.1 Introduction

4.2 Mathematical formulation of an assignment problem
4.3 Comparison with Transportation Model
4.4 Difference between the transportation problem and assignment problem
4.5 Assignment algorithm (or) Hungarian Methods

UNIT V

5.1 Introduction
5.2 Two Person Zero-Sum Games
5.3 The Maximin-Minimax Principle

TEXT BOOK:

1. Resource Management Techniques (Operations Research), V.Sundaresan, K.S.Ganapathy Subramanian and K.Ganesan, A.R.Publications, Sirkali,1999.

UNITI : Chapter 1Sec. 1.1 – 1.9
UNIT II : Chapter 2 : Sec. 2.1, 2.2, 2.3
UNIT III : Chapter 7 : Sec.7.1
UNITIV : Chapter 8 : Sec. 8.1 - 8.5
UNITV : Chapter 16 : Sec. 16.1 – 16.3

REFERENCE BOOK

1. Operations Research – Prem Kumar Gupta & D.S. Hira, S. Chand & Company Ltd., Ram Nagar, New Delhi-110 055 (Reprint 2005).
2. Operations Research – Kanti Swarup, P.K. Gupta & Man Mohan – Sultan Chand & Sons– New Delhi (Fourteenth Thoroughly Revised Edition, Reprint2008)

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive Level
CO-1	Compare any real life system with limited constraints and depict it in a	**K1, K2**
CO-2	Apply formulate and solve problems on LPP and graphical representation.	**K3**
CO-3	Analyze the Transportation problems.	**K4**
CO-4	Agree variety of problems such as Assignment model.	**K5**
CO-5	Solve the zero-sum two-person games.	**K6**

NON – MAJOR ELECTIVE COURSE III

2021- 2022 onwards

Semester V/VI **Sub.Code :21UMANME3**

Hours/Week : 2 hrs

Credit : 5

QUANTITATIVE APTITUDE - II

Course Objectives

The objective of this programme is

CO-1	To Enhance the problem solving skills.
CO-2	To identified and classified mathematical skills.
CO-3	To apply the basic knowledge of mathematical ability.
CO-4	To generalize the concepts of time and work, distance, problems on ages.
CO-5	To help students who are preparing for any type of competitive examinations.

Course Outcomes:

UNIT I

1.1 Chain rule- Solved Examples.

UNIT II

2.1Time and work– Solved Examples.

UNIT III

3.1 Time and Distance - Solved Examples.

UNIT IV

4.1 Problems on Trains- Solved Examples.

UNIT V

5.1 Simple Interest and Compound Interest- Solved Examples.

TEXT BOOK:

1. Quantitative Aptitude , R.S. Aggarwal, S. Chand & Company Ltd., Ramnagar, New Delhi – 110 055. (Revised Edition 2008)

UNITI : Chapter 1- Sec.1: 14

UNIT II : Chapter 1- Sec.1: 15

UNIT III : Chapter 1- Sec.1: 17

UNITIV : Chapter 1- Sec.1: 18
UNITV : Chapter 1- Sec.1: 21,22

REFERENCE BOOK:

1. Quantitative Aptitude for Competitive Examinations, Abhijit Guha, Tata Mcgraw- Hill publishingcompany ltd. New Delhi.

COURSE OUTCOMES (COs) & COGNITIVE LEVEL MAPPING

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

COs	CO Description	Cognitive
CO-1	Understand the basic concepts of quantitative ability.	**K1, K2**
CO-2	Apply the real-life problems requiring interpretation and comparison of various representations of time and work.	**K3**
CO-3	Analyze the real-life problems requiring interpretation and comparison of various representations of time and distance.	**K4**
CO-4	Agree the real-life problems on trains requiring interpretation.	**K5**
CO-5	Solve campus placement aptitude papers covering quantitative ability.	**K6**