

MAHENDRA ARTS & SCIENCE COLLEGE

(AUTONOMOUS)

(Affiliated to Periyar University)

[Accredited by NAAC "A" Grade & Recognized u/s 2(f) and 12(B) of the UGC act 1956]

KALIPPATTI-637501.



BACHELOR OF SCIENCE

SYLLABUS FOR B.Sc. MATHEMATICS

OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM

**FOR THE STUDENTS ADMITTED FROM
THE ACADEMIC YEAR 2019 – 2020 ONWARDS**

MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
(Affiliated to Periyar University)
Department of Mathematics

B.Sc. Mathematics

PREAMBLE:

Seek and cultivate new knowledge, to engage vigorously and fearlessly in the spirit of truth and to interpret old knowledge and beliefs in the light of new needs and discoveries. Also to provide the right kind of leadership in all walls of life, to identify gifted youth and help them develop their potential to the full by cultivating physical fitness, right interests, attitudes and moral and intellectual values.

I - PROGRAMME EDUCATIONAL OBJECTIVES:

- ❖ Graduates will have successful careers in Mathematics fields or will be able to successfully pursue higher studies.
- ❖ Graduates will apply their technical knowledge and skills to develop and implement solutions for the problems that accomplish goals to the industry, academic, government or research area.
- ❖ Contribute effectively to the Mathematics Profession by fostering effective interaction, ethical practices and communication skills, while pursuing education through lifelong learning.

II - PROGRAMME OUTCOMES:

1. Provides a solid foundation in the discipline of Mathematics and enable students to formulate mathematical solutions to real life problems.
2. Under graduate students are to be passionately engaged in initial learning with an aim to think differently as agents of new knowledge, understanding and applying new ideas in order to acquire employability/ self employment.
3. Under graduate students are trained to take up higher learning programmes.

4. Under graduate students are to be exposed to technical, analytical and creative skills.
5. Under graduate students are to be imparted with a board conceptual background in the Biological sciences/Computer sciences/ Languages and cultures / Management studies / Physical sciences.

III – REGULATIONS:

These regulations shall take effect from the academic year 2019-2020, i.e., for students who are to be admitted to the first year of the course during the academic year 2019-20 and thereafter.

1. Objectives of the Course:

Mathematics to-day is penetrating all fields of human endeavor and therefore it is necessary to prepare the students to cope with the advanced developments in various fields of Mathematics. The objectives of this course are the following:

(a) To impart knowledge in advanced concepts and applications in various fields of Mathematics.

(b) To provide wide choice of elective subjects with updated and new areas in various branches of Mathematics to meet the needs of all students.

2. Eligibility for Admission:

A Pass in the Higher Secondary Examination of Tamil Nadu Higher Secondary Board or some other Board accepted by the Syndicate as equivalent thereto with Mathematics (other than Business mathematics) as one of the subjects.

3. Duration of the Course:

The candidates shall complete all the courses of the programme in 3 years from the date of admission. The programme of study shall consist of six semesters and a total period of three years with a minimum of 140 credits. The programme of study will comprise the course according to the syllabus.

4. Course of Study:

The course of study for the UG degree has been divided into the following five categories:

Part I : Tamil / Other Languages.

Part II : English Language.

Part III : Core Courses, Elective Courses and Allied Courses.

Part IV : Skill Enhancement Courses, Non-Major Elective Course, Enhancement Compulsory Courses.

Part V : Value added Courses and Extension Activity.

5. Examinations:

The course of study shall be based on semester pattern with Internal Assessment under Choice Based Credit System.

The examinations for all the papers consist of both Internal (Continuous Internal Assessment - CIA) and External (End Semester) theory examinations. The theory examinations shall be conducted for three hours duration at the end of each semester. The candidates failing in any subjects(s) will be permitted to appear for the same in the subsequent semester examinations.

6. Structure of the Programme:

SEMESTER: I

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil – I / French – I / Hindi – I	M19UFTA01/ M19UFFR01/ M19UFHI01	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – I	M19UFEN01	5	-	3	25	75	100
III	CORE COURSE-I	Algebra and Trigonometry	M19UMA01	5	-	4	25	75	100
III	CORE COURSE-II	Mathematics For Competitive Examinations	M19UMA02	4	-	4	25	75	100
III	ALLIED COURSE-I	Allied I: Mathematical Statistics	M19USTA01	5	-	4	25	75	100
III	ALLIED PRACTICAL –I	Allied Practical I: Mathematical Statistics	M19USTAP01	-	2	-	-	-	-
V	VALUE ADDED COURSE	Communicative English	M19UENVA03	2	-	2	100	-	100
IV	ENHANCEMENT COMPULSORY COURSE – I	Value Education – Yoga	M19UVE01	2	-	2	25	75	100
Total				28	2	22	250	450	700

SEMESTER: II

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil – II / French – II / Hindi – II /	M19UFTA02/ M19UFFR02/ M19UFHI02	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – II	M19UFEN02	5	-	3	25	75	100
III	CORE COURSE-III	Differential Calculus & Integral Calculus	M19UMA03	6	-	5	25	75	100
III	CORE COURSE-IV	Analytical Geometry 2D & 3D	M19UMA04	5	-	4	25	75	100
III	ALLIED COURSE-II	Allied II: Statistical Inference	M19USTA02	5	-	4	25	75	100
III	ALLIED PRACTICAL –I	Allied Practical I: Mathematical Statistics	M19USTAP01	-	2	2	40	60	100
IV	ENHANCEMENT COMPULSORY COURSE – II	Environmental Studies	M19UES01	2	-	2	25	75	100
Total				28	2	23	190	510	700

SEMESTER: III

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil – III / French – III/ Hindi – III /	M19UFTA03/ M19UFFR03/ M19UFHI03	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – III	M19UFEN03	5	-	3	25	75	100
III	CORE COURSE-V	Differential Equations and Laplace Transforms	M19UMA05	4	-	4	25	75	100
III	CORE COURSE-VI	Statics	M19UMA06	5	-	4	25	75	100
III	ALLIED COURSE-III	Allied III: Physics – I	M19UPHA03	4	-	4	25	75	100
III	ALLIED PRACTICAL – II	Allied Practical II: Physics	M19UPHAP03	-	3	-	-	-	-
IV	NMEC-I			2	-	2	25	75	100
IV	SEC-I	Verbal and Non-Verbal Reasoning	M19UMAS01	2	-	2	25	75	100
Total				27	3	22	175	525	700

SEMESTER: IV

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil – IV / French – IV / Hindi – IV /	M19UFTA04/ M19UFFR04/ M19UFHI04	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – IV	M19UFEN04	5	-	3	25	75	100
III	CORE COURSE-VII	Vector Calculus and Fourier Series	M19UMA07	4	-	4	25	75	100
III	CORE COURSE-VIII	Dynamics	M19UMA08	5	-	4	25	75	100
III	ALLIED COURSE-IV	Allied IV: Physics – II	M19UPHA04	4	-	4	25	75	100
III	ALLIED PRACTICAL –II	Allied Practical II: Physics	M19UPHAP03	-	3	3	40	60	100
IV	NMEC-II			2	-	2	25	75	100
IV	SEC-II	Programming in C	M19UMAS02	2	-	2	25	75	100
V	EXTENSION ACTIVITIES	Extension Activities	M19UEX01	-	-	1	-	-	-
Total				27	3	26	215	585	800

SEMESTER: V

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE-IX	Algebraic Structures-I	M19UMA09	6	-	5	25	75	100
III	CORE COURSE-X	Real Analysis – I	M19UMA10	6	-	5	25	75	100
III	CORE COURSE-XI	Numerical Methods	M19UMA11	5	-	4	25	75	100
III	CORE COURSE-XII	Operation Research –I	M19UMA12	6	-	4	25	75	100
III	ELECTIVE COURSE	Elective – I		5	-	4	25	75	100
IV	SEC-III	Mat lab	M19UMAS03	2	-	2	25	75	100
Total				30	-	24	150	450	600

SEMESTER: VI

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE-XIII	Algebraic Structures-II	M19UMA13	6	-	5	25	75	100
III	CORE COURSE-XIV	Real Analysis – II	M19UMA14	6	-	5	25	75	100
III	CORE COURSE-XV	Complex Analysis	M19UMA15	6	-	4	25	75	100
III	CORE COURSE-XVI	Operation Research –II	M19UMA16	5	-	4	25	75	100
III	ELECTIVE COURSE	Elective – II		5	-	4	25	75	100
III	CORE PROJECT	Project	M19UMAPR1	-	-	2	40	60	100
IV	SEC-IV	Quantitative Aptitude	M19UMAS04	2	-	2	25	75	100
	Additional Credit for online courses (SWAYAM / MOOC)			-	-	-	-	-	-
Total				30	-	26	190	510	700
GRAND TOTAL				166	14	143	1170	3030	4200

Summary of Credits, Hours and Mark Distribution:

Part	Course Name	No. of Credits						Total Credits	Total Hours	No. of Courses	Max. Marks
		I	II	III	IV	V	VI				
I	Language – I	3	3	3	3	-	-	12	20	4	400
II	Language – II	3	3	3	3	-	-	12	20	4	400
III	Core Course	8	9	8	8	18	18	69	84	16	1600
	Elective Course	-	-	-	-	4	4	8	10	2	200
	Project	-	-	-	-	-	2	2	-	1	100
	Allied Course	4	4	4	4	-	-	16	18	4	400
	Allied Practical	-	2	-	3	-	-	5	10	2	200
IV	SEC	-	-	2	2	2	2	8	8	4	400
	NMEC	-	-	2	2	-	-	4	4	2	200
	Enhancement Compulsory Course	2	2	-	-	-	-	4	4	2	200
V	Value Added Course	2	-	-	-	-	-	2	2	1	100
	Extension Activities	-	-	-	1	-	-	1	-	1	-
Total		22	23	22	26	24	26	143	180	43	4200

ALLIED SUBJECTS FOR B.Sc. MATHEMATICS STUDENTS:

Semester	Course Title	Course Code
I	Allied I: Mathematical Statistics	M19USTA01
II	Allied II: Statistical Inference	M19USTA02
	Allied Practical I: Mathematical Statistics	M19USTAP01
III	Allied III: Physics – I	M19UPHA03
IV	Allied IV: Physics – II	M19UPHA04
	Allied Practical II: Physics	M19UPHAP03

ALLIED SUBJECTS OFFERED FOR OTHER MAJOR STUDENTS:

Semester	Course Title	Course Code
I	Allied I: Mathematics – I Algebra, Integral Calculus And Fourier Series	M19UMAA01
II	Allied II: Mathematics – II Differential Equations And Laplace Transforms	M19UMAA02
	Allied Practical - I - Mathematics	M19UMAAP01

ELECTIVE SUBJECTS FOR B.Sc. MATHEMATICS STUDENTS:

(Students can choose any one of course from the given list)

Semester	ELECTIVE – I	
	Course Title	Course Code
V	Discrete Mathematics	M19UMAE01
	Elementary Number Theory	M19UMAE02
	Astronomy	M19UMAE03
ELECTIVE – II		
	Course Title	Course Code
VI	Graph Theory	M19UMAE04
	Mathematical Modeling	M19UMAE05
	Probability Theory	M19UMAE06

SKILL ENHANCEMENT COURSES:

Semester	Course Title	Course Code
III	Verbal and Non - Verbal Reasoning	M19UMAS01
IV	Programming in C	M19UMAS02
V	Mat lab	M19UMAS03
VI	Quantitative Aptitude	M19UMAS04

NON - MAJOR ELECTIVE COURSES: [FOR OTHER DEPARTMENTS]:

Semester	Course Title	Course Code
III	1. Mathematics for Competitive Examination – I	M19NMA01
	2. Matrix Algebra	M19NMA02
IV	1. Mathematics for Competitive Examination – II	M19NMA03
	2. Applied Numerical Methods	M19NMA04

VALUE ADDED COURSES: [FOR OTHER DEPARTMENTS]:

Semester	Course Title	Course Code
III	Verbal and Logical Reasoning	M19UMAVA01
IV	Quantitative Aptitude Examinations	M19UMAVA02

IV SCHEME OF EXAMINATION:

1. Question Paper Pattern for Theory Papers:

Time: Three Hours

Maximum Marks: 75

Part A: (10 x 1 = 10)

Answer ALL Questions
(Two Questions from Each Unit)

Part B: (5 x 2 = 10)

Answer ALL Questions
(One Question from Each Unit)

Part C: (5 x 5 = 25)

Answer ALL Questions
(One Question From Each Unit with internal choice)

Part D: (3 x 10 = 30)

Answer Any Three Questions out of Five Questions
(One Question from Each Unit)

2. Question Paper Pattern for Practical Papers:

EXTERNAL MARK: 60

INTERNAL MARK: 40

QUESTION PATTERN

Answer all Questions (5x10 =50)

Questions from each Unit

Mark Allotment:

External - 60

Practical - 50 Record - 10

Internal - 40

3. Distribution of Marks:

The following are the distribution of marks for external and internal for End Semester Examinations and continuous internal assessment and passing minimum marks for Theory / Practical / Mini project / Project papers of UG programmes.

ESE	EA Total	Passing Minimum for EA	CIA Total	Passing Minimum for CIA	Total Marks Allotted	Passing Minimum (ESE)
Theory	75	30	25	10	100	40
Practical	60	24	40	16	100	40
Project	60	24	40	16	100	40

The following are the Distribution of marks for the Continuous Internal Assessment in Theory / Practical papers of UG programmes.

THEORY:

EVALUATION OF INTERNAL ASSESSMENT

Test : 15 Marks

Assignment : 05 Marks

Attendance : 05 Marks

Total : 25 Marks

The Passing minimum shall be 40% out of 25 marks (10 marks)

PRACTICAL:

EVALUATION OF INTERNAL ASSESSMENT

Test 1 : 15 Marks
Test 2 : 15 Marks
Record : 10 Marks

Total : 40 Marks

The Passing minimum shall be 40% out of 40 marks (16 marks)

PROJECT:

EVALUATION OF INTERNAL ASSESSMENT

Review 1 : 10 Marks
Review 2 : 10 Marks
Review 3 : 10 Marks
Pre-Viva : 10 Marks

Total : 40 Marks

The Passing minimum shall be 40% out of 40 marks (16 marks)

4. Passing Minimum:

The Candidates shall be declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Theory Exam mark) with minimum of 30 marks in the End Semester Theory Examinations.

The Candidates shall be declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 24 marks in the End Semester Practical Examinations.

5. Submission of Record Note Books for Practical Examinations:

Candidates appearing for practical examinations should submit a bonafide record note books prescribed for practical examinations. The candidates failed to submit the record book shall not be permitted to appear for the practical examinations.

6. Project:

The following guidelines to be followed for the Project with Viva-voce:

1. The project should be valued for 60 marks by an external examiner; however the Viva-Voce examination should be conducted by both the external examiner appointed by the College and the internal examiner / guide / teacher concerned.
2. The Project Report may consist a minimum of 60 pages.
3. The candidate has to submit the Project Report 20 days before the commencement of the VI Semester Examinations.
4. A candidate who fails in the Project/Dissertation or is absent may resubmit the report, on the same topic, with necessary modification / correction / improvements in the subsequent Even Semester Examinations for evaluation and shall undergo viva-voce Examination.

7. Note:

a) SWAYAM / MOOC – Free Online Education:

SWAYAM / MOOC is an instrument for self-actualisation providing opportunities for a life-long learning. Here the student can choose from hundreds of courses, virtually every course taught at the college level, offered by the best teachers in India and elsewhere.

The students can choose an online SWAYAM / MOOC course during their period of study which will earn an extra credit and it will be transferred to the academic records of the students.

b) Add-on courses:

Students are provided with additional courses during their course of study right from the First year. Students are free to choose the courses. On successful completion of each course, the students will gain one extra credit.

SEMESTER I

Core – I	B.Sc. Mathematics	2019 - 2020
Code:M19UMA01	ALGEBRA AND TRIGONOMETRY	
Credits: 4		

Objectives:

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

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind the execution of various Characterizations in Matrices and Partial fractions Binomial, Exponential, Logarithmic Series.	K1
CO2	Understand the concepts of Eigen values, vectors, rank and Hamilton theorems.	K2
CO3	Analyze and discover the Theory of equations.	K4
CO4	Develop the idea about trigonometry and its problem.	K3
CO5	Apply the concepts to solve hyperbolic function & Logarithm of a complex number .	K3

Unit I:

Partial fractions-Binomial -Exponential - Logarithmic Series(without Proof)- Symmetric-Skew Symmetric- Hermitian-Skew Hermitian- Orthogonal -Unitary matrices.

Unit II:

Rank of a Matrix-consistency of Equations-Eigenvalues and Eigen vectors- Cayley – Hamilton theorem (statement only) and its problems.

Unit III:

Polynomial equations – Imaginary and Irrational roots – relation between roots and coefficients of equations – Reciprocal equations – problems. To increase or decrease the roots of a given equation by a given quantity. Removal of terms - Descarte's rule of signs – problems.

Unit IV:

Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ – Expansions of $\sin^n \theta$, $\cos^n \theta$ and $\tan^n \theta$.

UNIT V:

Hyperbolic and inverse hyperbolic functions and their properties – Logarithm of a complex number – problems.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Algebra, Calculus and Trigonometry	Dr.P.R.Vittal.	Margham publications,24,Rameswaram Road, T.Nager, Chennai-600017.	2000

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Algebra-Volume I	T.K.Manicka vasagamPillai and S. Narayanan.	Vijay Nicole Imprints Pvt, Ltd,#c-7,Nelson Manickam Road,Chennai-600029	2004
2.	Trigonometry	T.K.Manicka vasagamPillai and S. Narayanan	Vijay Nicole Imprints Pvt, Ltd,#c-7,Nelson Manickam Road, Chennai-600029	2004

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER - I

Core - II	B.Sc. Mathematics	2019 - 2020
Code:M19UMA02	MATHEMATICS FOR COMPETITIVE EXAMINATIONS	
Credits: 4		

Objectives:

This course introduces fundamental concepts such as Numbers, system in Quantitative aptitude. It covers concepts such HCF, LCM, SQUARE ROOT, average, numbers, profit, loss , percentage, proposition & partnership. It provides technical skills to understand and develop various department examinations like Group Exams, TNPSC, RRB, SSC & IBPS.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind numbers and fractions	K1
CO2	Understand the concepts of Square root, cube root and average.	K2
CO3	Analyze the problems on numbers and problems on ages.	K2
CO4	Develop the problems on indices, percentage, Profit And Loss.	K2
CO5	Apply the concepts to solve a problem for Ratio and Proportion , Partnership.	K3

Unit I:

Numbers - H.C.F and L.C.M. of numbers - Decimal fractions.
(Section - I: 1, 2, 3)

Unit II:

Simplification - Square roots and Cube Roots - Average.
(Section - I: 4, 5, 6)

Unit III:

Problems on numbers - Problems on Ages.
(Section - I: 7, 8)

Unit IV:

Surds and Indices – Percentage - Profit and Loss.
(Section - I: 9, 10,11)

Unit V:

Ratio and Proportion - Partnership. (Section - I: 12, 13)

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	Year Of Publication
1.	Quantitative Aptitude for Competitive Examinations	R.S.Aggarwal	S.Chand Co Ltd,152, Anna salai ,Chennai.	2001

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-I

ECC-I	B.Sc. Mathematics	2019 - 2020
Code:M19UVE01	YOGA	
Credits: 2		

பாடநோக்கம்:

இளம் வயது முதல், உடல், மனம் இரண்டையும் பக்குவமாக வைத்துக் கொள்ள வேண்டியதன் அவசியத்தை மாணவர்களுக்கு உணரச் செய்தல்.

அலகு 1:

யோகமும் உடல்நலமும்:

உடலமைப்பு - எளியமுறை உடற்பயிற்சி - மகராசனம் - யோகாசனங்கள்

அலகு 2:

இளமைகாத்தல் - பாலுணர்வும் ஆன்மீகமும் - மனதின் 10 படிநிலைகள் - மன அலைச்சுழல்.

அலகு 3:

குணநலப்பேறு:

வாழ்வின் நோக்கம் - எண்மை ஆராய்தல் - ஆசை சீரமைத்தல் - சினம் தவிர்த்தல்.

அலகு 4:

கவலை ஒழித்தல் - வாழ்த்தும் பயனும் - நட்பு நலம் - தனிமனித அமைதி.

அலகு 5:

செயல்விளைவுத் தத்துவம் - மனத்தூய்மை, வினைத்தூய்மை - அன்பும் கருணையும் - பண்பாட்டுக் கல்வி.

பாடநூல்: 'மனவளக்கலை யோகா'

உலக சமுதாய சேவா சங்கம்

வேதாத்திரி பதிப்பகம்

156, காந்திஜி ரோடு

ஈரோடு - 638 001.

போன்: 0424 - 2263845.

பார்வை நூல்கள்:

மனவளக்கலை யோகா -ஐ - உலக சமுதாய சேவா
சங்கம். மனவளக்கலை யோகா -ஐஐ- வேதாத்திரி
பதிப்பகம் மனவளக்கலை யோகா -ஐஐஐ-156, காந்திஜி
ரோடு

எளிமுறை உடற்பயிற்சி - ஈரோடு - 638 001.

யோகப்பயிற்சிகள் - போன்: 0422-2263845

SEMESTER-II

Core- III	B.Sc. Mathematics	2019 - 2020
Code:M19UMA03	DIFFERENTIAL CALCULUS & INTEGRAL CALCULUS	
Credits: 5		

Objectives:

This course introduces fundamental concepts of differential and integral calculus. It covers concepts such as successive differentiation, Radius of curvature, integration by parts, Multiple integral, change of order of integration and applications of differential and integral calculus. It provides technical skills to understand and study various concepts about calculus.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind the differentiation and successive differentiation.	K1
CO2	Understand the Radius of curvature and related problems.	K2
CO3	Analyze the integration concepts and integration by parts.	K4
CO4	Develop the idea about reduction formulae and multiple integrals and its problems.	K3
CO5	Apply the change of order of integration concepts to solve a real-time problem using Jacobians and convergence ideas.	K3

UNIT I: Differential Calculus:

Definition and Notations – n^{th} derivatives – Standard forms – Partial fractions – Trigonometric transformations – Leibnitz's theorem on the n^{th} derivatives – Problems.

UNIT II:

Radius of curvature in Cartesian and polar forms-Pedal equations-Evolutes and Envelopes.

UNIT III: Integral Calculus:

Integration by parts .Definite integral , Reduction formulae.

UNIT IV:

Multiple Integral - Evaluation of double and triple integrals.

UNIT V:

Change of order of integration in double integral- Jacobians- change of variables in double and triple integrals-Notion of improper integrals.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Allied Mathematics	Dr. P.R. Vittal	Margham Publications, Chennai.	1999.

REFERENCE BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Mathematics for BSc – Vol I and II	Kandasamy & K. Thilagavathy	S. Chand and Co.	2004

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-II

Core - IV	B.Sc. Mathematics	2019 - 2020
Code:M19UMA04	ANALYTICAL GEOMETRY 2D & 3D	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Analytical geometry 2D & 3D. It covers concepts such as Straight lines, planes, tangent, normal, Sphere, cone & cylinder. It provides technical skills to understand and study various concepts geometry.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind the straight lines	K1
CO2	Understand the polar co ordinates, Straight line & Conic	K2
CO3	Analyze the concept of straight lines in 3D, co planarity and shortest distance between two lines.	K4
CO4	Develop the idea about the sphere, tangent plane to the sphere and equation of the conic.	K3
CO5	Apply the cone and cylinder concepts to the 3D problems.	K3

UNIT I:

Analytical geometry of 2D - Straight line – Simple problems

UNIT II:

Analytical geometry of 2D - Polar coordinates – Equation of Straight Line - Polar Equation of a conic.

UNIT III:

Analytical Geometry 3D – Straight lines - Coplanarity of straight line-shortest distance (S.D) and Equation of S.D between two lines - simple problems.

UNIT IV:

Sphere: standard equation of sphere - Results based on the properties of a sphere - Tangent plane to a sphere- equation of a circle.

UNIT V:

Cone and cylinder: Cone whose vertex is at the origin - Envelope cone of a sphere - Right circular cone - Equation of a cylinder - Right circular cylinder.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Analytical Geometry of 2D (Unit I & II)	T. K. Manicka vasagamPillay	Viswanathan Publications.	2005
2.	Analytical Geometry (Unit III, IV & V)	P. DuraiPandian	Emerald Publications	2003

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-II

ECC-II	B.Sc. Mathematics	2019 - 2020
Code:M19UES01	ENVIRONMENTAL STUDIES	
Credits: 2		

Unit I: Fundamentals:

Environment – Definition, Scope, Structure and Function of Ecosystems– Producers, Consumer and Decomposers – Energy Flow in the Ecosystem –Ecological Succession – Food Chain, Food Webs and Ecological Pyramids –Concept of Sustainable Development.

Unit II: Natural Resources:

Renewable Resources – Air, Water, Soil, Land and Wildlife resources, Non-Renewable Resources, Coal, Oil and Natural Gas, Environment problems related to the extraction and use of Natural Resources.

Unit III: Biodiversity:

Biodiversity – Definition – Values – Consumption use, Production Social, Ethical, Aesthetic and Option Values Threats to Biodiversity – Hotspots of Biodiversity – Conservation of Biodiversity: In-situ, Ex-situ, Bio-Wealth National and Global Level.

Unit IV: Environmental Pollution:

Definition – Causes, Effects and Mitigation Measures – Air, Water, and Soil Pollution, Noise Pollution, Thermal pollution, Nuclear Hazards, Solid Wastes, Acid Rain, Climate change and Global Warming, Environmental Laws and Regulations in India – Earth summit.

Unit V: Pollution and Environment:

Population Explosion – Environment and Human Health – HIV/AIDS – Women and Child Welfare – Resettlement and rehabilitation of people, Role of Information Technology in Environmental Health – Environment Awareness, Environmental Awareness, Environment Disaster Management – Fire Safety and Prevention.

SEMESTER-III

Core-V	B.Sc. Mathematics	2019 - 2020
Code:M19UMA05	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	
Credits: 4		

Objectives:

This course introduces fundamental concepts of differential equations. It covers concepts such as Linear differential equations with constant coefficients and variable coefficients, Exact differential equations, Clairaut's form, Partial differential equations, Laplace transform, inverse Laplace transform. It provides technical skills to understand and study various concepts in differential equations.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of differential equations	K1
CO2	Understand the exact differential equations and Clairaut's form.	K2
CO3	Demonstrate understanding of the importance of partial differential equations.	K3
CO4	Develop the idea about the Laplace transform and its properties and simple problem.	K3
CO5	Understanding the inverse Laplace transform and its problem.	K3

Unit I: Differential Equations:

Differential Equations - Linear differential equations with constant co-efficients - The operators D and D^{-1} - Particular Integral - Special methods of finding particular integral - Linear equations with variable co-efficients - To find the particular integral - Special method of evaluating the particular integral when x is of the form x^m .

Unit II:

Exact differential equations - conditions of integrability of $Mdx + Ndy = 0$ - Practical rule for solving an exact differential equation - Rules for finding integrating factors - equations of the first order but of higher degree - Solvable for x , y , dy/dx - Clairaut's form - equations that do not contain x explicitly - Equations that do not contain y explicitly- Equations homogeneous in x & y .

Unit III:

Partial differential equations - Derivation of partial differential equations by elimination of constants, arbitrary functions - Different Integrals of P.D.E. - Solutions of P.D.E. in some simple cases- Standard types of first order equations - Standard I, II, III, IV - Equations reducible to the standard forms - Lagrange's equation.

Unit IV: Laplace Transforms:

The Laplace Transforms - Sufficient conditions for the existence of the Laplace Transforms - Laplace Transforms of periodic functions - General theorems - Evaluation of certain integrals using Laplace Transforms.

Unit V:

The inverse Laplace transforms - Inverse Laplace transforms of functions - Method of partial fractions - Applications of Laplace Transforms to solve ordinary differential equations.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Calculus Volume III	S. Narayanan & T. K. Manicka vasagam Pillay	S. Viswanathan Pvt. Ltd.	2008

Unit I - Chapter 2 § 1, 1.2, 2, 3, 4, 8, 8.1,8.2,8.3

Unit II - Chapter 1 § 3.1 – 3.3, 4, 5, 5.1 – 5.5, 6.1, 7.1 - 7.3

Unit III - Chapter 4 § 1, 2, 2.1, 2.2, 3, 4, 5, 5.1 – 5.5, 6

Unit IV - Chapter 5 § 1, 1.1, 1.2, 2, 3.4, 5

Unit V - Chapter 5 § 6, 7, 8, 9

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Differential Equations and Laplace Transforms	P. R. Vittal	Margham Publications	2004
2.	Differential Equations and Integral Transforms	S. Sudha	Emerald Publishers	2003

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-III

Core – VI	B.Sc. Mathematics	2019 - 2020
Code:M19UMA06	STATICS	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Mechanics. It covers concepts such as Law of forces, moments, frictions and centenary. It provides technical skills to understand and study various concepts in statics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Law of forces and their properties.	K1
CO2	Understand the concept of moments and couples.	K2
CO3	Analyze the concept of Equilibrium of three forces	K3
CO4	Develop the idea about Friction laws and its properties.	K3
CO5	Understanding the catenary and its common properties and its real life problems.	K4

UNIT I:

Forces acting at a point - Parallelogram of forces – Triangle of forces – Lami’s Theorem – Extended form of the parallelogram of law of forces – Resultant of any number of coplanar forces acting at a point.

UNIT II:

Resultant of two like and unlike parallel forces acting on a rigid body – Moments of a force – Varignon’s Theorem of moments – Couple – Equilibrium of two couples.

UNIT III:

Equilibrium of three forces acting on a rigid body – Three coplanar forces – Two trigonometrical theorems – Coplanar forces – Reduction of any number of coplanar forces – Conditions for a system of forces to reduce to a single force or to a couple – Equation to the line of action of the resultant.

UNIT IV:

Friction – Laws of friction – Co-efficient of friction, angle and cone of friction – Equilibrium of a particle on a rough inclined plane under any forces – Problems on friction.

UNIT V:

Uniform string under the action of gravity - Equilibrium of strings and chain under gravity – Equation of common catenary – Tension at any point – Geometrical properties of the common catenaries – Problems.

TEXT BOOK:

S.No	Title of the Book	Author	Publiser	Year of Publication
1.	Statics	M.K. Venkatraman	Agasthiar Publication	1999

UNIT I Chapter 2 Sections 3 - 5, 9, 10 and 15

UNIT II Chapter 3 Sections 1 - 4, 7, 8, 12 and Chapter 4 Sections 1, 2

UNIT III Chapter 5 Sections 1, 2, 5 and Chapter 6 Sections 1, 2, 3, 5 and 8

UNIT IV Chapter 7 Sections 1 - 8, 10 and 13

UNIT V Chapter 11 Sections 1 – 6

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Statics	A.V. Dharmapadam	Agasthiar Publication S.Viswanath an Printers & Publishers Pvt. Ltd	2009
2.	Mechanics	P. Duraipandian, Laxmi Duraipandian. Muthamizh Jayapragasam	S. Chand & Company Ltd	2010

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-III

SKILL ENHANCEMENT COURSE – I

SEC – I	B.Sc. Mathematics	2019 - 2020
Code:M19UMAS01	VERBAL AND NON - VERBAL REASONING	
Credits: 2		

Objectives:

This course introduces fundamental concepts of aptitude. It covers concepts such as Series Completion, Coding Decoding, Blood Relations, Direction Sense Test, Logical Venn Diagrams, Mathematical Operations, Logical Sequence of Words, Inserting the Missing Character, Assertion and Reason and Verification of Truth of the Statement. It provides technical skills to understand and study various concepts in verbal reasoning.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Series Completion, Coding Decoding and their properties.	K1
CO2	Understand the concept of Blood Relations and Direction Sense Test.	K2
CO3	Classification, Analytical reasoning and their properties.	K3
CO4	Analyze the concept of Mirror images, Water images.	K3
CO5	Develop the ideas about incomplete	K3

Unit I:

Series Completion - Coding Decoding. (Section - I: 1, 4)

Unit II:

Blood Relations –Direction Sense Test. (Section - I: 5, 8)

Unit III:

Classification – Analytical Reasoning. (Section – II: 3, 4)

Unit IV:

Mirror Images – Water Images. (Section – II: 5, 6)

Unit V:

Completion of Incomplete Pattern (Section – II: 8)

Text Book:

S.No	Name of the Book	Author	Publisher	Year Of Publications
1.	Verbal and Non-Verbal Reasoning	R.S.Aggarwal	S.Chand Co Ltd,152, Annasalai, Chennai.	2001

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-IV

Core - VII	B.Sc. Mathematics	2019 - 2020
Code:M19UMA07	VECTOR CALCULUS AND FOURIER SERIES	
Credits: 4		

Objectives:

This course introduces fundamental concepts of calculus. It covers concepts such as vector calculus and Fourier Series. It provides technical skills to understand and study various concepts in analysis.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of Gradient, directional derivative of scalar point functions, Equations of tangent plane	K1
CO2	Understand the Vector point function.	K2
CO3	Demonstrate understanding of the Fourier series.	K4
CO4	Develop the idea about the Half Range sine series.	K3
CO5	Understanding the applications Fourier integral.	K3

Unit I:

Partial derivative of vector function – Gradient- directional derivative of scalar point functions -Equations of tangent plane and Gradient - directional derivative of scalar point functions-Equations of tangent plane - Gradient - directional derivative of scalar point functions -Equations of tangent plane - and normal line to a level surface.

Unit II:

Vector point function: Divergence and curl of a vector point function – Solenoidal and irrotational functions – Physical interpretation of divergence and curl of a vector point function - Problems. Gauss-Divergence Theorem (Statement only) – Problems-Green's Theorem (Statement only) Problems. Stoke's Theorem (Statement only) -Problems.

UNIT III:

Dirichlet's Conditions – General Fourier series – Odd and Even functions - Harmonic analysis.

UNIT IV:

Half Range sine series – Half range cosine series – Complex form of fourier series – Parseval's identity.

UNIT V:

Fourier integral theorem – Fourier transform pair – Sine and cosine transforms – Properties of Fourier transforms - Simple functions – Convolution theorem – Parseval's identity.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1	Vector Analysis (UNIT- I&II)	P. R. Vittal and V. Malini,	Margham Publications, Chennai,	2006.
2	Transforms and Partial Differential Equations (UNIT-III ,IV &V)	Dr. A. Singaravelu	Meenakshi Agenc, Chennai.	June, 2012.

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-IV

Core - VIII	B.Sc. Mathematics	2019 - 2020
Code:M19UMA08	DYNAMICS	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Mechanics. It covers concepts such as velocity, acceleration, projectile, impact, SHM and central orbits. It provides technical skills to understand and study various concepts in Dynamics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Basic concepts of velocity and acceleration.	K1
CO2	Behavior of motion of objects. Applications of Projectile in practical problems	K2
CO3	Analyze the Behavior of elastic bodies in real life problems.	K2
CO4	Develop the idea about Simple Harmonic Motion and its Applications.	K3
CO5	Law of forces in central orbit and Law of inverse square.	K4

UNIT I:

Kinematics - Speed, Displacement - Velocity - Composition of velocities - Triangle of velocities - Relative velocity - Angular velocity - Relative angular velocities - Accelerations - Motion in a straight line under uniform acceleration - Simple problems.

UNIT II:

Projectiles - Path of the projectile is a parabola - Characteristics of the motion of a projectile - Velocity of the projectile in magnitude and direction at the end of time - Range on an inclined Plane - Simple problems.

UNIT III:

Collision of elastic bodies - Newton's experimental law - Impact of a smooth sphere on a fixed smooth plane - Direct impact of two smooth spheres - Loss of Kinetic Energy - Oblique impact of two smooth spheres and loss of Kinetic Energy - Simple problems.

UNIT IV:

Simple harmonic motion - Simple harmonic motion in a straight line - General solution of a simple harmonic motion - Composition of two simple harmonic motions of the same period and in the same straight line - Composition of simple harmonic motions of the same period in two perpendicular directions - Simple problems.

UNIT V:

Motion under the action of central forces - Velocity and acceleration in polar coordinates - Differential equation of central orbits - Pedal equation of the central orbit - Law of the inverse square - Simple problems.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	A Text Book of Dynamics	M. K. Venkatraman	Agasthiar Publications	1970

UNIT I Chapter III Sections 3.1 to 3.4, 3.7, 3.10, 3.11, 3.15, 3.17 and 3.22

UNIT II Chapter IV Sections 6.2, 6.4, 6.5, 6.9 and 6.12

UNIT III Chapter VIII Sections 8.3 - 8.8

UNIT IV Chapter X Sections 10.2, 10.3, 10.6 and 10.7

UNIT V Chapter XI Sections 11.2, 11.4, 11.6, 1

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Dynamics	M.L. Khanna	Jai Prakash Nath and Company, Meerut.	Tenth Edition (1975)
2.	Dynamics	K.Visvanatha Naik and M.S. Kasi	Emerald Publishers, Chennai.	1992

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-IV
SKILL ENHANCEMENT COURSE – II

SEC – II	B.Sc. Mathematics	2019 - 2020
Code:M19UMAS02	PROGRAMMING IN C	
Credits: 2		

Objectives:

This course introduces the student to gain knowledge on various services of programming in C. It also presents various sample programs.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Understand the basic concepts of C language	K2
CO2	Apply different types of decision making statements in c program	K3
CO3	Remember different types of String handling function	K1
CO4	Analyze different kinds of Arrays and functions	K4
CO5	Evaluate the concepts in C Programming	K5

UNIT I:

Overview of C: History of C – Basic structure of C programs. Character Set - C Tokens – Keywords and identifiers – Constants – Variables-Declaring of Variables-Assigned Values to Variables – Data types – Operators - **Managing Input and Output Operations:** Reading a Character - Writing a Character -Formatted Input-Formatted Output.

UNIT II:

Decision Making and Branching: Simple IF, IF-ELSE, Nesting of IF-ELSE, ELSE-IF ladder, Switch statements – GOTO statements.
Decision Making and Looping: WHILE statement – DO statement – FOR statement – Jumps in loops.

UNIT III:

Strings: Declaring and initializing string variables –Reading strings from terminal – Writing strings to screen-Comparison of Two Strings – String handling functions - Table of Strings.

UNIT IV:

Arrays: Definition - Declaration of arrays- Initialization of arrays- One dimensional arrays - Two dimensional arrays – Multi Dimensional Arrays. **User-Defined functions:** Introduction – Defining a function - Return values and their types – Function calls – Function declaration – All category of functions – Recursion.

UNIT V:

Simple program using - Operators - IF statement – Nested if Statement – Switch Statements - FOR loop – While loop – Do- While loop- String handling Functions - Arrays - Recursion.

TEXT BOOK:

S.no	Author	Title of Book	Publisher	Year of Publication
1.	E.Balagurusamy	Programming in ANSI C	Tata McGraw Hill	6th Edition

REFERENCE BOOKS:

S.no	Author	Title of Book	Publisher	Year of Publication
1.	Yashavant Kanetkar	Let Us C	BPB Publications	13 th Edition
2.	D.Ravichandran	Programming in ANSI C	New Age International (P) Ltd	11 th Edition

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-V

Core - IX	B.Sc. Mathematics	2019 - 2020
Code:M19UMA09	ALGEBRAIC STRUCTURES – I	
Credits: 5		

Objectives:

This course introduces fundamental concepts of Algebraic structures. It covers concepts such as groups, cyclic groups, normal groups, homomorphism, automorphism, rings, integral domain, field and Principal ideal Ring. It provides technical skills to understand and study various concepts in algebra.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic abstract systems of Mathematics.	K2
CO2	Understand the normal sub group and Quotient groups.	K2
CO3	Demonstrate understanding of the importance of homomorphism and isomorphism in groups.	K4
CO4	Develop the idea about the rings, integral domain, field and maximal ideal.	K3
CO5	Understanding the Field of Quotient of an Integral Domain, Euclidean Rings, Principal ideal Ring.	K3

Unit I:

Group – Definition – Examples – Some Preliminary lemmas – Problems – Subgroups – definition – lemmas – Cosets – definition – theorems – Cyclic group – Lagrange’s Theorem – order of an element – Euler’s Theorem – Fermat’s Theorem. (Sections 2.1 to 2.4).

Unit II:

A Counting Principle – Normal Sub Groups – Definition – Properties – Problems – Quotient groups – Definitions – Lemma. (Sections 2.5 and 2.6).

Unit III:

Homomorphism – Definition – Examples - Lemmas - Kernel of a homomorphism – Fundamental theorem – Automorphism – Definition – Inner Automorphism – Lemmas – Examples – Cayley’s Theorem. (Sections 2.7 – 2.9 excluding application 1 & 2).

Unit IV:

Ring – Definition – Examples – some special classes of Rings – Zero Divisor – Integral Domain - Field - Definition –Examples-Ideals – Quotient Rings – Maximal ideal.(sections 3.1 , 3.2 , 3.4 & 3.5).

Unit V:

The Field of Quotient of an Integral Domain – Euclidean Rings – Definition –Principal ideal Ring – Greatest common divisor – Properties – Unique factorization theorem (sections 3.6 & 3.7).

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Topics in Algebra	I.N.Herstein.	John Wiley, Newyork.	1975

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	A first course in modern algebra	A.R.Vasistha	Krishna PrekasanMandhir, 9, Shivaji Road, Meerut(UP)	1983
2.	Modern Algebra	M.L.Santiago	Tata McGraw Hill, New Delhi.	1994
3.	Modern Algebra	K.Viswanatha Naik	Emerald Publishers, 135, Anna Salai, Chennai.	1988

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-V

Core - X	B.Sc. Mathematics	2019 - 2020
Code:M19UMA10	REAL ANALYSIS - I	
Credits: 5		

Objectives:

This course introduces fundamental concepts of Real Analysis. It covers concepts such as Functions, Sequence, Series, Metric space and Continuous. It provides technical skills to understand and study various concepts in analysis.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Basic concepts of functions and sequence	K1
CO2	Understand the bounded sequence, monotone sequence, limit superior and inferior	K2
CO3	Analyze the concept of series and tests for absolute convergence.	K4
CO4	Develop the idea about the Metric space and limits in metric space	K3
CO5	Understanding the continuous functions in metric spaces, Open sets and closed sets and discontinuous	K4

Unit I:

Functions – Real Valued functions – Equivalence – Countability – Real Numbers – Least upper bounds. (Sections 1.3 to 1.7) Sequence of real numbers – Definition of sequence and subsequence – Limit of a sequence – Convergent sequences – Divergent Sequences. (Section 2.1 to 2.4)

Unit II:

Bounded sequences – Monotonic sequences – operations on convergent sequences – operations on Divergent sequences – Limit superior and limit inferior – Cauchy sequences. (Section 2.5 to 2.10)

Unit III:

Series of real numbers – convergence and divergence – series with non negative terms – alternating series – conditional convergence and absolute convergence – Rearrangement of series – Test for absolute convergence – series whose terms form a non increasing sequence. (Sections 3.1 to 3.7)

Unit IV:

Limits and Metric spaces – limit of a function on the real line – metric spaces limits in metric spaces (sections 4.1 to 4.3)

Unit V:

Continuous functions on metric spaces- Functions continuous at a point on the real line – Reformulation – functions continuous on a metric space – open sets – closed sets – Discontinuous functions on \mathbb{R}' . (Sections 5.1 to 5.6).

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Methods of Real Analysis	Richard R. Goldberg .	Oxford & IBH Publishing Co.Pvt.Ltd.	1970

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	A First course in Real Analysis .	Sterling K .Barberian.	Springer (India) Private Limited, New Delhi.	2004
2.	Mathematical Analysis	Tom M. Apostel	Narosa Publications, NewDelhi	2002
3.	Real Analysis	M.S.Rangachari	New Century Book House, chennai.	1996

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-V

Core - XI	B.Sc. Mathematics	2019 - 2020
Code:M19UMA11	NUMERICAL METHODS	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Numerical methods. It covers concepts such as Bisection method, Iteration method, Regular Falsi method, Newton-Raphson method, Direct methods, Gauss elimination method, Gauss-Jordan method, Iterative methods, Jacobi method, Gauss-Seidal method, Gregory-Newton interpolation formulae, Interpolation with unequal intervals, Lagrange's interpolation formula, Inverse interpolation, Trapezoidal rule, Simpson's one third rule, Simpson's three-eighth rule, Taylor series method, Euler's method, Runge-Kutta methods-2nd Order, Runge-Kutta methods-3rd Order, Runge-Kutta methods-4th Order. It provides technical skills to understand and study various concepts in Numerical analysis.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of the solution of algebraic and transcendental equations.	K1
CO2	Understand the Solution of simultaneous linear algebraic equations.	K2
CO3	Demonstrate understanding of the importance of interpolation	K2
CO4	Develop the idea about the Numerical differentiation and integration .	K3
CO5	Understanding the Numerical solution of ordinary differential equation	K3

Unit I:

Introduction to numerical analysis - The solution of algebraic and transcendental equations – Bisection method – Iteration method – Regular Falsi method, Newton-Raphson method.

Unit II:

Solution of simultaneous linear algebraic equations – Direct methods – Gauss elimination method – Gauss-Jordan method – Iterative methods – Jacobi method – Gauss-Seidal method.

Unit III:

Finite differences - Interpolation for equal intervals – Gregory Newton interpolation formulae – Interpolation with unequal intervals – Lagrange’s interpolation formula – Inverse interpolation.

Unit IV:

Numerical differentiation and integration – Newton’s formulae to compute the derivative – Numerical integration – A general quadrature formula – Trapezoidal rule - Simpson’s one third rule – Simpson’s three-eighth rule.

Unit V:

Numerical solution of ordinary differential equation – Taylor series method – Euler’s method – Runge- Kutta methods-2nd Order - Runge-Kutta methods-3rd Order – Runge- Kutta methods-4th Order -Predictor corrector methods.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Numerical Methods	P.Kandasamy, K.Thilagavath, K.Gunavathy	Chand & Company limited, NewDelhi	2009

Unit I - Chapter 3: 3.1, 3.1.1, 3.2, 3.2.1, 3.2.2, 3.3, 3.3.1, 3.4, 3.4.1, 3.4.3, 3.4.4.

Unit II - Chapter 4: 4.1, 4.2, 4.2.1, 4.7, 4.8, 4.9.

Unit III - Chapter 5: 5.1, 5.2, Chapter 6: 6.1, 6.2, 6.3, Chapter 8: 8.7, 8.8.

Unit IV- Chapter 9: 9.1, 9.2, 9.3, 9.7, 9.8, 9.9, 9.10, 9.13, 9.14.

Unit V - Chapter 11: 11.5, 11.9, 11.12, 11.13, 11.16, 11.17.

REFERENCE BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Introducing methods of Numerical analysis	S. S. Sastry	Prentice Hall of India private limited, New Delhi	3rd Edition 2002

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-V

Core- XII	B.Sc. Mathematics	2019 - 2020
Code:M19UMA12	OPERATION RESEARCH - I	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Operation Research. It covers concepts linear Programming, Simplex Method, Duality in Linear Programming, Transportation Problem, Assignment problem, Inventory Control. It provides technical skills to understand the concepts in applied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of the linear programming.	K1
CO2	Understand the Solution of the simplex method.	K2
CO3	Demonstrate understanding of the importance of the duality of linear programming	K4
CO4	Develop the idea about the Transportation problem.	K3
CO5	Understanding the concept of Assignment problem.	K4

Unit I: Linear Programming:

Introduction-Origin and Development of O.R.-Nature and features of O.R.-Scientific Method in O.R-Modeling in O.R-Advantages and Limitations of Models –General solutions Methods for O.R models.- Methodology of O.R-linear Programming Problem-Mathematical Formulations of the Problem-graphical Solutions method- Canonical and standard Forms of LPP.

[Chap -1- 1.1-1.8,Chap - 2 - 2.2 - 2.3, Chap-3-3.2,3.5.]

Unit II: Simplex Method:

Introduction-Fundamental Properties of Solutions - The Computational Procedure-Use of Artificial Variables-Degeneracy in Linear Programming-Solution of Simultaneous Linear Equations-Inverting Matrix Using Simplex Method-Applications of Simplex Method.

[Chap-4- 4.1-4.8]

Unit III: Duality in Linear Programming:

Introduction-General Primal-Dual Pair-Formulating a Dual Problem-Primal-Dual Pair in Matrix Form-Duality Theorems-Complementary Slackness Theorem-Duality and Simplex Method-Economic Interpretation of Duality-Dual Simplex Method.

[Chap-5.1-5.9]

Unit IV: Transportation Problem:

Introduction-LP Formulation of the Transportation Problem-Existence of Solution in T.P.-Duality in Transportation Problem-The Transportation Table-Loops in Transportation Tables-Triangular Basis in a T.P.-Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Degeneracy in Transportation Problem-Transportation Algorithm (MODI Method.

[Chap-10 -10.1-10.9,10.12-10.13]

Unit V: Assignment Problem:

Introduction - Mathematical Formulation of the Problem-Solution Methods Assignment Problem-A Typical Assignment Problem-Dual of the assignment Method-The Travelling Salesman Problem.

[Chap -11 – 11.1-11.3,11.5-11.7]

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	Year of Publication
1.	Operations Research 15th Edition	KantiSwarup, P.K.Guptaand Manmohan	Sultan Chand & Sons, Chennai.	2010

REFERENCE BOOK:

S.No	Name of the Book	Author	Publisher	Year of Publication
1.	Operations Research, Second Edition	S.Kalavathy	Vikas Publishing House, New Delhi	2002

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-V

SKILL ENHANCEMENT COURSE – III

SEC – III	B.Sc. Mathematics	2019 - 2020
Code:M19UMAS03	MATLAB	
Credits: 2		

Objectives:

This course introduces fundamental concepts of Matlab theory. It covers concepts Basics of Matlab, The MATLAB Environment, Files Input / Output, Passing Functions To M – Files , Errors, Round Off Errors and Truncation Errors. It provides technical skills to understand the concepts in Matlab.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of the Basic Matlab.	K1
CO2	Understand the Matlab programming skills.	K3
CO3	Demonstrate understanding of the Matlab Commands and Various Page Styles.	K2
CO4	Develop the idea about the Passing Functions To M – Files	K3
CO5	Understanding the concept errors handling.	K4

Unit I:

A simple Mathematical Model – Conservation laws in Engineering and Science – Numerical Methods Covered in this Book.
(Chapter I –Full)

Unit II:

The MATLAB Environment – Assignment – Mathematical operations – Use of Built - in Functions – Graphics – Other Resources – Case study – Exploratory Data Analysis.
(Chapter II – Full)

Unit III:

M – Files – Input – Output – Structured Programming – Nesting and Indentation.
(Chapter III –section 3.1 - 3.4)

Unit IV:

Passing Functions To M – Files – Case Study :Bungee Jumper Velocity (Chapter 3 – Section 3.5 – 3.6)

Unit V:

Errors 80 – Round Off Errors – Truncation Errors – Total Numerical Error – Blunders – Model Errors – Data Uncertainty.
(Chapter IV – Full)

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	Year Of Publications
1.	Applied Numerical Methods with MATLAB for Engineers And Scientists	Steven C. Chapra	TATA Mc Graw –Hill Publishing company Ltd.	2007

REFERENCE BOOKS:

S.No	Name of the Book	Author	Publisher	Year Of Publications
1.	Technical Analysis and applications with Matlab	Stanley	Printed and bounded in India by Barkha Nath Printers ,Delhi	2007

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium

SEMESTER-VI

Core - XIII	B.Sc. Mathematics	2019 - 2020
Code:M19UMA13	ALGEBRAIC STRUCTURES -II	
Credits: 5		

Objectives:

This course introduces fundamental concepts of Algebraic structures. It covers concepts such as vector space, Quotient space, Inner product space, Linear transformation, matrices, trace, transpose and determinants. It provides technical skills to understand and study various concepts in algebra.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of vector space, Internal direct sum and External direct sum.	K1
CO2	Understand the Linear Independence & Quotient space.	K2
CO3	Demonstrate understanding of the importance of inner product space.	K3
CO4	Develop the idea about the linear transformation, matrices.	K3
CO5	Understanding the traces, transposes and determinants.	K4

Unit I:

Vector Spaces – Definition – Simple properties – Examples – Homomorphism – Sub space – Quotient spaces – Internal direct sum – External direct sum. (Section 4.1).

Unit II:

Linear Independence – Dimension of a Vector space – Bases – Dimension of Quotient spaces (Section 4.2).

Unit III:

Inner product spaces – Definition – Examples – Applications – Orthogonal complement of a sub space – Orthonormal & Orthonormal Basis – Gram Schmidt Orthogonalization process (Section 4.4) .

Unit IV:

Linear Transformation – The Algebra of linear transformations – Characteristic roots – Matrices – Canonical forms – Triangular forms. (section 6.1 - 6.4)

Unit V:

Trace and Transpose – Definitions, Properties – Theorems – Determinants – Definitions – Properties – Theorems – Cramer's Rule – Problems. (Sections 6.8 and 6.9)

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Topics in Algebra- 2nd Edition	I.N.Herstein	John Wiley, NewYork	1975

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	A first course in modern algebra	A.R.Vasistha	Krishna PrakasanMandhir, 9, Shivaji Road, Meerut (UP) Emerald Publishers, 135, Anna Salai, Chennai	1983
2.	Modern Algebra	ViswanathaNaik		2001

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-VI

Core - XIV	B.Sc. Mathematics	2019 - 2020
Code:M19UMA14	REAL ANALYSIS - II	
Credits: 5		

Objectives:

This course introduces fundamental concepts of Real Analysis. It covers concepts such as connected, complete, compact, Riemann integral, Point wise convergence and uniform convergence of series of functions. It provides technical skills to understand and study various concepts in Real analysis.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Basic concepts of connected sets and complete metric space.	K2
CO2	Understand the continuous functions in compact metric space and uniform continuous.	K2
CO3	Existence of Riemann integral and properties of Riemann integral.	K4
CO4	Develop the idea about the Rolls theorem, Law of mean and Improper integrals.	K3
CO5	Understanding the Point wise convergence of sequence of functions, uniform convergence of sequence of functions and uniform convergence of series of functions	K4

Unit I:

More about open sets – Connected sets – Bounded sets - Totally bounded sets – Complete metric spaces. (Sections 6.1 to 6.4)

Unit II:

Compact metric spaces – Continuous functions on Compact Metric spaces – Continuity of the inverse functions – Uniform continuity . (Section 6.5 – 6.8).

Unit III:

Sets of measure zero - Definition of the Riemann integral – Existence of Riemann integrals – Properties of Riemann integrals – Derivatives (Section 7.1 to 7.5)

Unit IV:

Rolle's theorem – Law of Mean – Fundamental theorem of calculus – Improper integrals – Theorems on Improper integrals (Section 7.6 to 7.10).

Unit V:

Point wise convergence of sequence of functions – uniform convergence of sequence of functions – consequences of uniform convergences – convergence and uniform convergence of series of functions (Section 9.1 to 9.4)

TEXT BOOK:

S.No.	Title of the Book	Author	Publisher	Year of Publication
1.	Methods of Real Analysis.	Richard R. Goldberg.	IBM Publishing New Delhi.	1970

REFERENCE BOOKS:

S.No.	Title of the Book	Author	Publisher	Year of Publication
1.	A First course in Real Analysis.	Sterling K Barberian.	Springer (India) Private Limited, New Delhi.	2004
2.	Mathematical Analysis	Tom M. Apostol	Narosa Publications, New Delhi	2002
3.	Real Analysis	M.S.Rangachari	New Century Book House, Chennai.	1996

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-VI

Core - XV	B.Sc. Mathematics	2019 - 2020
Code:M19UMA15	COMPLEX ANALYSIS	
Credits: 4		

Objectives:

This course introduces fundamental concepts of complex analysis . It covers concepts such as Complex Numbers and Analytical Functions, Bilinear Transformations and Mapping By Elementary Functions, Power Series and Series Expansions, Complex Integration and Calculus Of Residues. It provides technical skills to understand and study various concepts in analysis.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of Complex Numbers And Analytical Functions.	K1
CO2	Understand Bilinear Transformations And Mapping By Elementary Functions.	K2
CO3	Demonstrate understanding of the Power Series And Series Expansions.	K4
CO4	Develop the idea about the Complex Integration.	K4
CO5	Understanding the applications Calculus of Residues.	K3

UNIT I: COMPLEX NUMBERS AND ANALYTICAL FUNCTIONS:

Introduction – Functions of a complex variable – Limits – Theorems on limit – Continuous functions – Differentiability – The Cauchy Riemann equations – Analytic functions – Harmonic functions – Conformal mapping. Chapter 2: Sec: 2.0-2.9.

UNIT II: BILINEAR TRANSFORMATIONS AND MAPPING BY ELEMENTARY FUNCTIONS:

Introduction – Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of bilinear transformations – Some special bilinear transformations - Mapping by elementary functions. Chapter 3: Sec: 3.0-3.5 & Chapter 5: Sec: 5.0-5.7.

UNIT III: POWER SERIES AND SERIES EXPANSIONS:

Introduction – Sequence & Series – Sequences and series of functions – Power series – Elementary functions – Taylor's series – Laurent's series – Zeros of an analytic function – Singularities.

Chapter 4: Sec: 4.0-4.4 & Chapter 7: Sec: 7.0-7.4.

UNIT IV: COMPLEX INTEGRATION:

Introduction – Definite integral – Cauchy's theorem – Cauchy's integral formula – Higher derivatives. Chapter 6: Sec: 6.0-6.4.

UNIT V: CALCULUS OF RESIDUES:

Introduction – Residues – Cauchy's Residue theorem – Evaluation of definite integrals – Contour integral. Chapter 8: Sec: 8.0-8.3.

TEXT BOOK:

S.No.	Title of the Book	Author	Publisher	Year of Publication
1.	Complex Analysis	S.Arumugam, A.Thangapandi Issac & A.Somasundaram	Scitech publications(I) Pvt. Ltd. T.Nagar, Chennai-600017.	2002

REFERENCE BOOK:

S.No.	Title of the Book	Author	Publisher	Year of Publication
1.	Complex Analysis	T. K . Manica vachagampillai, S.P.Rajagopalan, R Sattanathan	S.Viswanathan (Printers and publishers) Pvt Ltd, Chennai - 600031.	2009

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-VI

Core - XVI	B.Sc. Mathematics	2019 - 2020
Code:M19UMA16	OPERATION RESEARCH -II	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Operation Research. It covers Non-Linear Programming, Sequencing Problem, Dynamic Programming, Replacement Problem and System Reliability , Queuing Theory, Network Routing Problems and Network Scheduling By PERT / CPM. It provides technical skills to understand the concepts in applied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of the Non-Linear Programming.	K1
CO2	Understand the Solution of Sequencing Problem.	K2
CO3	Demonstrate understanding of the importance of the Inventory Control.	K4
CO4	Develop the idea about the Queuing Theory.	K3
CO5	Understanding the concept of Network Routing Problems and Network Scheduling By PERT / CPM	K4

Unit I: NON-LINEAR PROGRAMMING:

Introduction - Formulating Non-Linear Programming Problem (NLPP)
- General Non-Linear Programming Problem-Constrained Optimization with equality Constraints - Constrained Optimization with Inequality Constraints - Saddle Point Problems-Saddle Points and NLPP - Games and strategies - Introduction - Two-Person Zero - Sum Games - Some Basic Terms - The Maximum - Minimax Principle - Games Without Saddle Points - Mixed Strategies- Graphic Solution of $2 \times n$ and $m \times 2$ Games- Dominance Property - Arithmetic Method for $n \times n$ Games- General Solution of $m \times n$ Rectangular Games - Game against Passivity .

[Chap-27-27.1-27.7 and chap-17-17.1-17.10]

Unit II: SEQUENCING PROBLEM:

Introduction- Problem of Sequencing - Basic Terms Used in Sequencing - Processing n Jobs through Two Machines - Processing n Jobs through k Machines - Processing 2 Jobs through k Machines - Maintenance Crew Scheduling - Problems of Complex Scheduling .

[Chap-12-12.1-12.6]

Unit III: INVENTORY CONTROL:

Introduction - Types of Inventories-Reasons for Carrying Inventories - The Inventory Decisions-Objectives of Scientific Inventory Control - Cost associated with inventory control-An Inventory Control Problem - The Concept of EOQ - Deterministic Inventory Problems with No Shortages - Deterministic Inventory Problem with Shortages - Problems of EOQ with Price Breaks. [Chap-19- 19.1-19.12]

Unit IV: QUEUEING THEORY:

Introduction - Queueing System- Elements of a Queueing System - Operating Characteristics of a Queueing System - Deterministic Queueing System - Probability Distribution in Queueing System - Classification of Queueing Models - Definition of Transient and Steady States- Poisson Queueing System - Non-Poisson Queueing System - Cost Models in Queueing.[Chap-21-21.1-21.11]

Unit - V**NETWORK ROUTING PROBLEMS:**

Introduction-Network Flow Problems-Minimal Spanning Tree Problem-Shortest Route Problems-More Applications of Shortest Route Problem-Maximal Flow Problems-Minimum Cost Flow Problems.

NETWORK SCHEDULING BY PERT – CPM:

Introduction-Network: Basic Components-Logical Sequencing-Rules of Network Construction-Concurrent Activities-Critical Path Analysis-Probability Considerations in PERT - Distinction between PERT and CPM-Applications of Network Techniques.

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	Year of Publication
1.	Operations Research 15th Edition	KantiSwarup, P.K.Gupta and Manmohan	Sultan Chand & Sons, Chennai.	2010

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Operations Research, Second Edition	S.Kalavathy	Vikas Publishing House, New Delhi	2002
2.	Operations Research, Second Edition	P.K.Gupta and D.S.Hira	S.Chand& Co, NewDelhi	2004
3.	Operations Research	HamdyTaha	Prentice Hall Publications, NewDelhi	1996
4.	Operations Research	Nita Hshah Ravi M. GorHardiksoni	PHI, P,Ltd,	2010

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER-VI

SKILL ENHANCEMENT COURSE – IV

SEC – IV	B.Sc. Mathematics	2019 - 2020
Code:M19UMAS04	QUANTITATIVE APTITUDE	
Credits: 2		

Objectives:

This course introduces fundamental concepts such as Numbers, system in Quantitative aptitude. It covers concepts such Time & Work, Pipes & Cistern, Time & Distance, Problem on Trains, Simple Interest, Compound Interest, Area, Volume & Surface Areas, Permutations & Combinations Probability. It provides technical skills to understand and develop various department examinations like Group Exams, TNPSC, RRB, SSC & IBPS.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind Time & Work Pipes & Cistern.	K1
CO2	Understand the concepts of Time & Distance and Problem on Trains	K2
CO3	Analyze the problems on Simple Interest And Compound Interest	K2
CO4	Develop the Area Volume & Surface Areas.	K2
CO5	Apply the concepts to solve a problem for Permutations & Combinations Probability.	K3

Unit I:

Time & Work – Pipes & Cistern. (Section-I: 15 and 16)

Unit II:

Time & Distance – Problems on Train. (Section-I: 17 and 18)

Unit III:

Simple Interest – Compound Interest. (Section-I: 21 and 22)

Unit IV:

Area – Volume & Surface Areas. (Section-I: 24 and 25)

Unit V:

Permutations & Combinations – Probability. (Section-I: 30 and 31)

Text Book:

S.No	Name of the Book	Author	Publisher	Year Of Publications
1.	Quantitative Aptitude for competitive Examinations	R.S.AggarWal	S.Chand Co Ltd,152, Annasalai, Chennai.	2001

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER -V
ELECTIVE COURSE – I

Elective - I	B.Sc. Mathematics	2019 - 2020
Code:M19UMAE01	DISCRETE MATHEMATICS	
Credits: 4		

Objectives:

This course introduces fundamental concepts of discrete mathematics. It covers concepts such as Mathematical Logic, Normal Forms, Statement Calculus, Relations, Functions, Algebraic systems, homomorphism of semi groups & monoids, Lattices as Algebraic systems and Boolean Functions . It provides technical skills to understand and study various concepts in abstract algebra.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of Mathematical Logic and Statement Formulas and Truth Table.	K1
CO2	Understand Normal Forms , Statement Calculus.	K2
CO3	Demonstrate understanding of the Relations and Functions.	K3
CO4	Develop the idea about the Algebraic systems, homomorphism of semi groups & monoids	K4
CO5	Understanding the applications of Lattices as Algebraic systems and Boolean Functions	K3

Unit I:

Mathematical Logic – Statements and Notations – Connectives – Negation -conjunction – Disjunction-Statement Formulas and Truth Table – Conditional and Biconditional – Well formed Formulas – Tautologies. (sections 1.1 , 1.2.1 – 1.2.4 , 1.2.6 –1.2.8).

Unit II:

Normal Forms – Disjunctive Normal Forms – Conjunctive Normal Forms -Principal Disjunctive Normal Forms – Principal Conjunctive Normal Forms - Ordering and Uniqueness of Normal Forms – The Theory of Inference for the Statement Calculus –Validity using Truth tables - Rules of Inference - Consistency of premises and indirect method of proof . (sections 1.3.1 - 1.3.5 , 1.4.1 – 1.4.3).

Unit III:

Relations & Ordering – Relations – Properties of binary relation in a set -Functions – Definition & Introduction – Composition of Functions – Inverse function –Binary and n - array operations – Hashing Functions – Natural numbers – Peano Axioms & Mathematical Induction – Cardinality.

Unit IV:

Algebraic systems – Definition & Examples – Semi groups and monoids –definition and examples – homomorphism of semi groups &monoids – sub semi groups & sub monoids – Grammars – Formal Definition of a Language – Notions of Syntax Analysis.

(Sections 3.1.1, 3.1.2 , 3.2.1 , 3.2.2 , 3.2.3 , 3.3 , 3.3.2 , 3.3.3).

Unit V:

Lattices as partially ordered Sets: Definition and Examples – some properties of Lattices – Lattices as Algebraic systems – sub Lattices – Direct product and homomorphism. Boolean Algebra: Definition and Examples – subalgebra , Direct product and homomorphism – Boolean Functions – Boolean Forms and Free Boolean Algebras - Values of Boolean Expression and Boolean Functions

(sections 4.1.1 , 4.1.2 , 4.1.3 , 4.1.4 , 4.2.1 , 4.2.2 , 4.3.1 , 4.3.2).

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Discrete mathematical structures with applications to computer science	J.P.Trembly, R.Manohar	Tata McGraw Hill, NewDelhi	2001

REFERENCE BOOKS:-

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Discrete Mathematics	Prof.V.Sundaresan, K.S.GanapathySubr amaniyan, K.Ganesan	Tata McGraw Hill, New Delhi	2000
2.	Discrete Mathematics	L.Lovarz, J.Pelikan, K.Vexztergombi	Springer Internationa l Edition	2002
3.	Discrete Mathematics	N. Chandrasekaran M. Uma parvathi	PHI Learning P. Ltd.	2010

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-V
ELECTIVE COURSE – I

Elective – I	B.Sc. Mathematics	2019 - 2020
Code:M19UMAE02	ELEMENTARY NUMBER THEORY	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Number theory. It covers concepts such as Divisibility of integers-Division, Euclidean algorithm, Prime and Composite numbers, Divisors of an integer-Arithmetic functions, Perfect numbers, Euler function, Congruence's, linear congruence, Fermat's theorem, Wilson's theorem, Lagrange's theorem. It provides technical skills to understand and study various concepts in number theory analysis.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of the Divisibility of integers-Division and Euclidean algorithm.	K1
CO2	Understand Prime and Composite numbers and Divisors of an integer-Arithmetic functions	K2
CO3	Demonstrate understanding of the Perfect numbers and Euler function.	K3
CO4	Develop the idea about the Congruence's and linear congruence.	K3
CO5	Understanding the applications of Fermat's theorem, Wilson's theorem, Lagrange's theorem.	K3

Unit I:

Absolute value - Divisibility of integers - Division algorithms - Greatest common divisor - Euclidean algorithm - Least common multiple.

Unit II:

Prime and Composite numbers - The sieve of Eratosthenes-Euclid's theorem - Unique factorization theorem - Positional representation of an integer - Divisors of an integer - Arithmetic functions - Product of divisors.

Unit III:

Perfect numbers - Euclid's theorem - Abundant, deficient and amicable numbers-Triangular number - Euler function-Greatest integer functions.

Unit IV:

Congruences - Residues - Residue classes - complete residue system-Reduced residue system - Magic number - Divisibility tests - Linear congruence - Chinese Remainder Theorem.

Unit V:

Introduction-Fermat's theorem-Euler's Extension of Fermat's theorem-Wilson's theorem-Lagrange's theorem.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Elements of Number theory	S. Kumaravelu and Susheela Kumaravelu	SKV publication	2002

Unit I - Chapter 2 Section 53 - 57

Chapter 3 Section 61 - 76

Unit II - Chapter 4 Section 77 - 97

Unit III - Chapter 4 Section 98 - 113

Unit IV - Chapter 6 Section 155 - 188 & 199 - 201

Unit V - Chapter 7 Section 191 - 211

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Elements of Number theory	David M.Burton	Tata Mc-Graw Hill publication	2010
2.	An Introduction to Theory of Numbers	Ivan Niven and H. Zuckerman	John wiley and sons	2008

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

**SEMESTER V
ELECTIVE COURSE – I**

Elective- I	B.Sc. Mathematics	2019 - 2020
Code:M19UMAE03	ASTRONOMY	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Astronomy. It covers concepts such as Standard formulae in Spherical Trigonometry , Diurnal motion Astronomical Refraction , Geocentric parallax , Kepler’s laws of planetary motion , Fixing the position of the First point of Aries , Eclipses , General description of solar system and Stellar universe, . It provides technical skills to understand and study various concepts in space analysis.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Introducing the exciting world of astronomy to the students.	K1
CO2	Helping the students to study about the celestial objects.	K2
CO3	Understanding the effects of refractions geocentric parallax.	K3
CO4	Compiling solar and lunar ellipses. Understanding Kepler’s laws of planetary motion	K2
CO5	Understanding the variation in duration of day and night in various zones of earth.	K4

Unit I:

Standard formulae in Spherical Trigonometry – Statements only – Celestial sphere – Celestial co-ordinates and their conversions – Diurnal motion - Problems connected with Diurnal Motion - Zones of Earth - Dip – Twilight – Problems.

Unit II:

Astronomical Refraction – Tangent and Cassini’s formulae – Geocentric parallax – Heliocentric parallax – problems.

Unit III:

Kepler’s laws of planetary motion – Newton’s deductions from Kepler’s Laws -Equation of Time – Seasons – Calender – Conversion of time – problems.

Unit IV:

Fixing the Ecliptic – Fixing the position of the First point of Aries (Flamsteed’s method) - The Moon – Different phases - Metonic cycle – Tides – problems .

Unit V:

Eclipses – solar eclipses - Lunar eclipses – General description of solar system and Stellar universe – problems.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Astronomy	Kumaravelu and Susila Kumaravelu	S.Kumaravelu, MurugaBhavanam, Chidambara Nagar, Nagarkoil-2.	1984

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER-VI
ELECTIVE COURSE – II

Elective - II	B.Sc. Mathematics	2019 - 2020
Code:M19UMAE04	GRAPH THEORY	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Graph theory . It covers as Graphs, Sub graphs, Operations on graphs, paths, connection, blocks, Eulerian, Hamiltonian, Trees and directed graphs . It provides technical skills to understand the concepts in applied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea graphs and sub graphs.	K1
CO2	Understand the Paths, connections.	K2
CO3	Demonstrate understanding of the importance of the cut point, cutedge and blocks.	K3
CO4	Develop the idea about the trees and centre of tree.	K3
CO5	Understanding the concept of directed graphs and its characterization.	K4

Unit I:

Introduction – Definition and Examples – Degrees – Sub graphs – Operations on Graphs – Problems.
(Chap – II : Sec – 2.0 – 2.3 & 2.9)

Unit II:

Introduction – Walks , Trails and Paths – Connectedness and components – Blocks – Connectivity.
(Chap – IV : Sec – 4.0 – 4.4)

Unit III:

Introduction – Eulerian Graphs – Hamiltonian Graphs.
(Chap – V : Sec – 5.0 – 5.2)

Unit IV:

Introduction – Characterization of Trees – Center of a Tree.
(Chap – VI : Sec – 6.0 – 6.2)

Unit V:

Introduction – Definition and Basic Properties – Paths and connections – Digraphs and Matrices.
(Chap – X : Sec – 10.0 – 10.3)

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Invitation to Graph Theory	S.Arumugam, S.Ramachandran	Scitech Publications, Chennai	2001

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Basics of Graph Theory	K.R.Parthasarathy	TMH Publishing company	2001
2.	Graph theory	S.Kumaravelu and Suseela kumaravelu	SKV Printers	1996
3.	A first course in Graph theory	A.Chandran	Macmillan Publishers, Chennai	1997

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

**SEMESTER-VI
ELECTIVE COURSE – II**

Elective- II	B.Sc. Mathematics	2019 – 2020
Code:M19UMAE05	MATHEMATICAL MODELLING	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Mathematical modeling. It covers Linear growth model, Non-linear growth and decay models, Modeling in population dynamics, Modeling of epidemics, Modeling in second order O.D. E, Elliptic motion of a satellites, Modeling through difference equations, Harrod model, Modeling through graphs, Communication network and Detection of clique. It provides technical skills to understand the concepts in applied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of the Linear growth model, Non-linear growth and decay models.	K1
CO2	Understand the Modeling in population dynamics and Modeling of epidemics.	K2
CO3	Demonstrate understanding of the importance of the Modeling in second order O.D. E, Elliptic motion of a satellites.	K2
CO4	Develop the idea about the Modeling through difference equations, Harrod model.	K3
CO5	Understanding the concept of Modeling through graphs, Communication network and Detection of clique.	K3

Unit I:

Ordinary differential equation – Linear growth model – Growth of science and scientists – Non-linear growth and decay models – Diffusion of glucose or a medicine in the bloodstream.

Unit II:

Modeling in population dynamics – Prey-predator models – Competition models – Multi-species models – Modeling of epidemics – Simple epidemic models – A model for diabetic-mellitus.

Unit III:

Modeling in second order O.D.E. – Modeling of planetary motion – Motion under central force – Circular motion – Elliptic motion of a satellites – Rectilinear motion.

Unit IV:

Modeling through difference equations – Linear difference equation – Obtaining complementary function by use of matrices – Harrod model – cob-web model – Applications of Actuarial science.

Unit V:

Modeling through graphs – seven bridge problem – representing results of tournament – Genetic graph – Food web – Communication network – Matrices associated with a directed graph – Detection of clique – Terms of signed graph.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Mathematical Modeling	J. N. Kapur	Wiley Eastern Limited, New Age International Pvt. Ltd.,	2013

Unit I Chapter 2: 2.1 – 2.3 , 2.4.2

Unit II Chapter 3: 3.1.1 – 3.1.3, 3.2.1 & 3.5.1

Unit III Chapter 4: 4.1.1 – 4.3.1

Unit IV Chapter 5: 5.2.1 – 5.2.6, 5.3.1, 5.3.2 & 5.3.4

Unit V Chapter 7: 7.1.2 – 7.3.1

REFERENCE BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Mathematical Models in Biology and Medicine	J. N. Kapur	Wiley Eastern Limited, New Age International Pvt. Ltd.,	1985

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

**SEMESTER-VI
ELECTIVE COURSE – II**

Elective - II	B.Sc. Mathematics	2019 - 2020
Code:M19UMAE06	PROBABILITY THEORY	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Statistics . It covers such as probability Axioms, conditional probability , probability distribution of a random variable, Discrete and continuous variables, Functions of a random variable, Moment generating functions, Binomial distribution, Poisson distribution, Gamma distribution, Normal distribution, Regression model Two way analysis of variance. It provides technical skills to understand the concepts in applied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of probability Axioms, conditional probability.	K1
CO2	Understand the probability distribution of a random variable, Discrete and continuous variables.	K2
CO3	Demonstrate understanding of the importance of the Functions of a random variable, Moment generating functions.	K2
CO4	Develop the idea about the Binomial distribution, Poisson distribution, Gamma distribution, Normal distribution.	K3
CO5	Understanding the concept of Regression model Two way analysis of variance.	K3

Unit I:

Introduction – probability Axioms – conditional probability – Baye’s theorem – independent events – problems.

Unit II:

Random variable – probability distribution of a random variable – Discrete and continuous variables – problems.

Unit III:

Expected value – Functions of a random variable – Moment generating functions – problems.

Unit V:

Two point distribution – Binomial distribution – Poisson distribution – Gamma distribution – Normal distribution – Chebychev’s inequality – problems.

Unit V:

Regression model – one way analysis of variance – Two way analysis of variance – problems.

TEXT BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	An Introduction to Probability Theory and Mathematical Statistics	V.K.Rokatgi	Wiley Eastern Publication, NewDelhi	1985

REFERENCE BOOK:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Probability theory and Mathematical Statistics	Marek - Fisher	John Wiley and sons, NewYork	1956

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER - I
ALLIED I: MATHEMATICS - I

ALLIED - I		2019 - 2020
Code:M19UMAA01	ALGEBRA, INTEGRAL CALCULUS AND FOURIER SERIES	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Basic Mathematics. It covers such as matrix, Eigen Values and Eigen Vectors, Cayley Hamilton theorem, Polynomial equations, Imaginary and irrational roots, Descarte's rule of signs, Radius of curvature in Cartesian and polar co-ordinates, Integral Calculus, Integration by Parts, Fourier Series, Half range series. It provides technical skills to understand the concepts in allied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of matrix, Eigen Values and Eigen Vectors, Cayley Hamilton theorem.	K1
CO2	Understand the theory of equations and its properties.	K2
CO3	Demonstrate understanding of the importance of the radius of curvature.	K2
CO4	Develop the idea about the solution of Integral Calculus, Integration by Parts.	K2
CO5	Understanding the concept of Fourier Series, Half range series.	K3

Unit I:

Definition of Matrix – Addition ,Subtraction , Multiplication of Matrices . Transpose of a Matrix – Adjoint of a Matrix – Inverse of the Matrix. Characteristic Equation – Eigen Values and Eigen Vectors – Cayley Hamilton Theorem (Statement only)

Unit II:

Polynomial Equations – Imaginary and Irrational roots – Transformation of Equation – Descarte’s rule of signs – Problems.

Unit III:

Radius of Curvature in Cartesian and polar coordinates – Pedal Equation of a curve – Radius of curvature in Polar Coordinates.

Unit IV:

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

Unit V:

Fourier Series – Definition – To find the Fourier coefficients of periodic functions of period 2π – even and odd functions – Half range series – problems.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Algebra Volume-I	T.K.Manicka vasagamPillai and S.Narayanan.	Vijay Nicole Imprints Pvt Ltd, # C-7 Nelson Chmbers. 115,NelsonManicka m Road, Chennai – 600029.	2004
2.	Algebra Calculus and Trigonometry	Dr.P.R.Vittal .	Margham Publications, 24, RameswaramRoad ,T.Nager, Chennai - 600017.	2000

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Calculus	N.P. Bali	Krishna PrakasanMandhir, 9, Shivaji Road, Meerut (UP).	1994
2.	Calculus	D. Sudha	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1988

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER - II
ALLIED II: MATHEMATICS - II

Allied - II		2019 - 2020
Code:M19UMAA02	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	
Credits: 4		

Objectives:

This course introduces fundamental concepts of Basic Mathematics. It covers such as Second order differential equation with constant coefficient, Formation of partial differential equation by eliminating arbitrary constants and arbitrary functions, Solutions of standard types of partial differential equations, Laplace transforms, Inverse Laplace transforms . It provides technical skills to understand the concepts in allied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of Second order differential equation with constant coefficient and its problems.	K1
CO2	Understand the Formation of partial differential equation by eliminating arbitrary constants and arbitrary functions.	K2
CO3	Demonstrate understanding of the importance of the Solutions of standard types of partial differential equations	K2
CO4	Develop the idea about the solution of the Laplace transforms and its problems.	K2
CO5	Understanding the concept of the inverse Laplace transforms and its problems.	K3

Unit I:

Second order differential equation with constant coefficient - particular intergral of the type e^{ax} , $\cos ax$ or $\sin ax$, x^n , $e^{ax} V$ where V is any function of $\cos ax$ or $\sin ax$ or x or x^2 .

Unit II:

Formation of partial differential equation by eliminating arbitrary constants and arbitrary functions - problems - definitions - complete, particular, singular and general integrals.

Unit III:

Solutions of standard types of partial differential equations - clairauts's form.

Unit IV:

Laplace transforms - definitions - Standard formula - Elementary theorems - problems.

Unit V:

Inverse Laplace transforms - Standard formula - Elementary theorems - problems.

TEXT BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Differential Equations and Laplace Transforms	Dr.P.R.Vittal	Margham Publications, Chennai -600017.	2002
2.	Allied Mathematics	Dr.P.R.Vittal .	Margham Publications, 24, RameswaramRoad ,T.Nager, Chennai -600017.	2002
3.	Allied Mathematics	A.Singaravelu	Meenakshi Publishers,120,Pushpa Nagar, Medavakkam, Chennai - 601302.	2002

REFERENCE BOOKS:

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Engineering Mathematics	Gunavathi & Thilkavathy	Emerald Publishers, 135,AnnaSalai, Chennai – 600002.	1984
2.	Calculus	N.P.Bali.	Krishna Prakasam Mandir,9,Shivaji Road, Meerut(UP).	1994

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER - II

ALLIED PRACTICAL – I - MATHEMATICS

ALLIED PRACTICAL		2019- 2020
Code:M19UMAAP01	ALLIED PRACTICAL – I - MATHEMATICS	
Credits: 2		

Objectives:

This course introduces fundamental concepts of Basic Mathematics. It covers such as Characteristic equation, Cayley Hamilton theorem, nth derivative, Leibnitz formula for nth derivative, Partial differentiation, Homogeneous functions, Scalar point function Divergence, curl of a vector point function Solenoidal and irrotational vectors. Application of Laplace transforms to solve second order differential equations with constant coefficients. It provides technical skills to understand the concepts in allied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of Characteristic equation, Cayley Hamilton theorem and its problems.	K1
CO2	Understand the Formation of nth derivative, Leibnitz formula for nth derivative.	K2
CO3	Demonstrate understanding of the importance of the Solutions Partial differentiation, Homogeneous functions.	K2
CO4	Develop the idea about the solution of the Scalar point function Divergence, curl of a vector point function , Solenoidal and irrotational vectors.	K2
CO5	Understanding the concept of the Application of Laplace transforms to solve second order differential equations with constant coefficients.	K3

Unit I:

Characteristic equation – Cayley Hamilton theorem – Problems

Unit II:

n th derivative – Leibnitz formula for n th derivative – problems

Unit III:

Partial differentiation – Partial derivatives of higher order – Homogeneous functions – Problems.

Unit IV:

Scalar point function – gradient of scalar point functions – vector point functions – Divergence, curl of a vector point function – Solenoidal and irrotational vectors.

Unit V:

Application of Laplace transforms to solve second order differential equations with constant coefficients

TEXT BOOKS :

S.No	Title of the Book	Author	Publisher	Year of Publication
1.	Allied Mathematics	T.K.Manicka vasagam Pillai and S.Narayanan.	S.Viswanathan and Co., Chennai	1992
2.	Allied Mathematics	Dr.P.R.Vittal .	Margham Publications, 24, Rameswaram Road, T.Nager, Chennai - 600017.	2002
3.	Allied Mathematics	A.Singaravelu	Meenakshi Traders, Chennai	2002

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

SEMESTER - III
NON MAJOR ELECTIVE COURSE - I

NMEC - I		2019 - 2020
Code:M19NMA01	NMEC-I - MATHEMATICS FOR COMPETITIVE EXAMINATION - I	
Credits: 2		

Objectives:

This course introduces fundamental concepts such as Numbers, system in Quantitative aptitude. It covers concepts such HCF, LCM, Square Root, average, numbers, profit, loss , percentage, proposition & partnership. It provides technical skills to understand and develop various department examinations like Group Exams, TNPSC, RRB, SSC & IBPS.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind numbers and fractions	K1
CO2	Understand the concepts of Square root, cube root and average.	K2
CO3	Analyze the problems on numbers and problems on ages.	K2
CO4	Develop the problems on indices, percentage, Profit And Loss.	K2
CO5	Apply the concepts to solve a problem for Ratio and Proportion, Partnership.	K3

Unit I:

H.C.F. and L.C.M of Numbers. (Section-I: 2)

Unit II:

Square Roots and Cube Roots. (Section-I: 5)

Unit III:

Problems on Numbers. (Section-I: 7)

Unit IV:

Percentages. (Section-I: 10)

Unit V:

Profit and Loss. (Section-I: 11)

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	Year Of Publication.
1.	Quantitative Aptitude For Competitive Examinations	R.S.Aggarwal	S.Chand & Co Ltd,152, Annasalai, Chennai.	2001

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER - III
NON MAJOR ELECTIVE COURSE - I

NMEC - I		2019 - 2020
Code:M19NMA02	NMEC – I - MATRIX ALGEBRA	
Credits: 2		

Objectives:

This course introduces fundamental concepts of Basic Mathematics. It covers such as Matrix, Addition, Subtraction, Multiplication, Transpose of a Matrix, Adjoint of a Matrix, Inverse of the Matrix, Symmetric, Skew symmetric, Hermitian and Skew Hermitian Matrix, Rank of The Matrix, Cayley Hamilton Theorem. It provides technical skills to understand the concepts in allied mathematics.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of Matrix, Addition, Subtraction, Multiplication,	K1
CO2	Understand the Transpose of a Matrix, Adjoint of a Matrix, Inverse of the Matrix.	K2
CO3	Demonstrate understanding of the importance of the Symmetric, Skew symmetric, Hermitian and Skew Hermitian Matrix.	K2
CO4	Develop the idea about the Rank of The Matrix.	K2
CO5	Understanding the concept Cayley Hamilton Theorem and its problem.	K3

Unit I:

Definition of Matrix – Addition, Subtraction, Multiplication of Matrices.

Unit II:

Transpose of a Matrix – Adjoint of a Matrix – Inverse of the Matrix.

Unit III:

Symmetric, Skew symmetric, Hermitian and Skew Hermitian Matrix – Problems.

Unit IV:

Rank of The Matrix – Definition – Finding Rank of the Matrix – Problems up to 3x3 Matrix.

Unit V:

Cayley Hamilton Theorem (statement only) – Problems only.

TEXT BOOK:

S.No	Name of The Book	Author	Publisher	Year of Publications
1.	Allied Mathematics	Dr.P.R.Vittal	Margham Publications, Chennai -17	2000

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER - IV

NON MAJOR ELECTIVE COURSE – II

NMEC - II		2019 - 2020
Code:M19NMA03	NMEC – II - MATHEMATICS FOR COMPETITIVE	
Credits: 2	EXAMINATION - II	

Objectives:

This course introduces fundamental concepts such as Numbers, system in Quantitative aptitude. It covers concepts such as Partnership, Simple interest, Compound interest, Area and Odd man out & series. It provides technical skills to understand and develop various department examinations like Group Exams, TNPSC, RRB, SSC & IBPS.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind Partnership and its problem.	K1
CO2	Understand the concepts of Simple interest and its problem.	K2
CO3	Analyze the problems on Compound interest and its problem.	K2
CO4	Develop the problems on Area and its problem. .	K2
CO5	Apply the concepts to solve a problem for Odd man out & series.	K3

Unit I:

Partnership (Section-I: 13)

Unit II:

Simple interest (Section-I: 21)

Unit III:

Compound interest (Section-I: 22)

Unit IV:

Area. (Section-I: 24)

Unit V:

Odd man out & series (Section-I: 35)

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	Year Of Publications
1.	Quantitative Aptitude for competitive Examinations	R.S.AggarWal	S.Chand & Co Ltd,152, Annasalai, Chennai.	2001

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER - IV
NON MAJOR ELECTIVE COURSE - II

NMEC - II		2019 - 2020
Code:M19NMA04	NMEC – II - APPLIED NUMERICAL METHODS	
Credits: 2		

Objectives:

This course introduces fundamental concepts such as Numerical methods. It covers concepts such as Solution of algebraic and Transcendental equations , Bisection Method, Newton – Raphson Method, Finite difference , Expression of any value of y in terms of the initial value y_0 and differences, Newton Forward difference, Newton Backward difference, Central differences. It provides technical skills to understand and develop the numerical ability.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind Solution of algebraic and Transcendental equations , Bisection Method, Newton – Raphson Method.	K1
CO2	Understand the concepts of , Finite difference , Expression of any value of y in terms of the initial value y_0 and differences	K2
CO3	Analyze the problems on Newton Forward difference and its problem.	K3
CO4	Develop the problems on Newton backward difference and its problem. .	K2
CO5	Apply the concepts to solve a problem for Central differences.	K3

Unit I:

Solution of algebraic and Transcendental Equations – Bisection Method - Newton – Raphson Method.

Unit II:

Finite difference – Definition – First difference – Higher differences – Difference tables – Expression of any value of y in terms of the initial value y_0 and differences.

Unit III:

Newton Forward difference – Simple problems.

Unit IV:

Newton Backward difference – Simple problems.

Unit V:

Central differences – Properties of the operator D – simple problems.

TEXT BOOKS:

S.No	Name of the Book	Author	Publisher	Year Of Publication
1.	Introductory methods of Numerical Analysis – 2nd Edition	S.S.Sastry	Prentice Hall of India Pvt Ltd, New Delhi	1990
2.	Numerical Methods in Science and Engineering – 2nd Edition (revised)	Dr.M.K.Venkata raman	The National Publishing Company, Chennai.	2003

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.

SEMESTER - III

VALUE ADDED COURSE-I

VAC - I		2019 - 2020
Code:M19UMAVA01	VALUE ADDED – I - VERBAL AND LOGICAL	
Credits: 2	REASONING	

Objectives:

This course introduces fundamental concepts such as verbal and logical reasoning in Quantitative aptitude. It covers concepts such as Verbal Reasoning, Non - Verbal Reasoning, Problems on seating Arrangements, Family based on problems, Odd man out and series. It provides technical skills to understand and develop various department examinations like Group Exams, TNPSC, RRB, SSC & IBPS.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind Verbal Reasoning and its problem.	K1
CO2	Understand the concepts of Verbal Reasoning and its problem.	K2
CO3	Understand the concepts of Non - Verbal Reasoning and its problem.	K2
CO4	Develop the Family based on problems.	K2
CO5	Apply the concepts to solve a problem for Odd man out and series.	K3

Unit I:

Verbal Reasoning. (Section: 4, 8)

Unit II:

Verbal Reasoning. (Section: 13, 16)

Unit III:

Non - Verbal Reasoning. (Section: 4, 5, 6, 8)

Unit IV:

Blood relations problems. (Section: 5)

Unit V:

Odd man out and series. (Section-I:35)

TEXT BOOKS:

S.No	Name of the Book	Author	Publisher	Year Of Publications
1.	Verbal and Logical Reasoning	R.S.Aggarwal	S.Chand Co Ltd,152, Annasalai, Chennai.	2001
2.	Quantitative Aptitude for competitive Examinations	R.S.Aggarwal	S.Chand Co Ltd, 152, Annasalai,C hennai.	2001

Mapping with Programme Outcomes:

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

S- Strong; **M**-Medium.

**SEMESTER - IV
VALUE ADDED COURSE - II**

VAC - II		2019 - 2020
Code:M19UMAVA02	VALUE ADDED – II - QUANTITATIVE APTITUDE EXAMINATIONS	
Credits: 2		

Objectives:

This course introduces fundamental concepts such as Numbers, system in Quantitative aptitude. It covers concepts such as Time & Work, Pipes & Cistern, Time & Distance, Problems on Trains, Boats & Streams. It provides technical skills to understand and develop various department examinations like Group Exams, TNPSC, RRB, SSC & IBPS.

Course Outcomes:

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

CO	Statement	Knowledge Level
CO1	Identify the logic behind Time & Work and its problem.	K1
CO2	Understand the concepts of Pipes & Cistern and its problem.	K2
CO3	Analyze the problems on Time & Distance and its problem.	K2
CO4	Develop the problems on Trains and its problem. .	K2
CO5	Apply the concepts to solve a problem for Boats & Streams.	K3

Unit I:

Time & Work (Section-I:15)

Unit II:

Pipes & Cistern (Section-I: 16)

Unit III:

Time & Distance (Section-I: 17)

Unit IV:

Problems on Trains (Section-I: 18)

Unit V:

Boats & Streams (Section-I: 19)

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	Year Of Publications
1.	Quantitative Aptitude for competitive Examinations	R.S.Aggarwal	S.Chand Co Ltd, 152, Annasalai, Chennai.	2001

Mapping with Programme Outcomes:

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

S- Strong; **M-**Medium.