



SREE AYYAPPA COLLEGE FOR WOMEN
(Re-accredited with B Grade by NAAC)
Chunkankadai, Nagercoil

Department of Mathematics

Syllabus

2016-2018

NA ?

Aparna SankarBaleh
syllabus I - V

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. Mathematics

S-code

(Choice Based Credit System)

(with effect from the academic year 2017-2018 onwards)

Sem	Part	Sub. No	Subject Status	Subject title	Hrs / Week	Credits	Marks				
							Maximum			Passing minimum	
							Int.	Ext.	Tot.	Ext.	Tot.
I	I	1	Language	Tamil/Other Languages	6	4	25	75	100	30	40
	II	2	Language	English	6	4	25	75	100	30	40
	III	3	Core -1	Calculus	5	4	25	75	100	30	40
		4	Core-2	Classical Algebra	5	4	25	75	100	30	40
		5	Allied-I	Statistics-I OR Physics/ Chemistry With Practicals	6	3	25	75	100	30	40
					6	4	25	75	100	30	40
IV	6	Common	Environmental Studies	2	2	25	75	100	30	40	
II	I	7	Language	Tamil/Other Languages	6	4	25	75	100	30	40
	II	8	Language	English	6	4	25	75	100	30	40
	III	9	Core-3	Analytical Geometry of Three Dimensions	5	4	25	75	100	30	40
		10	Core-4	Differential Equations	5	4	25	75	100	30	40
		11	Allied-I	Statistics -II OR Physics/ Chemistry With Practicals	6	3	25	75	100	30	40
	6				4	25	75	100	30	40	
IV	12	Common	Value Based Education/ Social Harmony	2	2	25	75	100	30	40	

Syllabus for Sem I, II for S-code.

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc. Mathematics) / Semester - I / Core-1

CALCULUS

(75 Hours)

- Unit I :** Curvature, Radius of Curvature and Centre of curvature in Cartesian and polar Coordinates
- Unit II** Pedal Equation-Involute and evolute-Asymptotes
- Unit III** Singular Points(Node, cusp, conjugate points)-Tracing of curves (cartesian only)
- Unit IV** Double and Triple Integrals - Changing the order of integration - Jacobians and change of variables
- Unit V** Beta and Gamma functions – Application of Beta and Gamma Functions in evaluation of Double and Triple Integrals, Improper Integrals.

Text Book:

Narayanan S and T.K. Manickavasagam Pillai - Calculus Volume I (2004), Volume II (2004), S. Viswanathan Printer Pvt.Ltd.

Books for Reference :

- Kandasamy P and K. Thilagavathi - Mathematics for B.Sc., Volume II – 2004, S. Chand & Co., New Delhi.
- Apostol T.M. - Calculus, Vol. I (4th edition) John Wiley and Sons, Inc., New York 1991.
- Apostol T.M. - Calculus, Vol. II (2nd edition) John Wiley and Sons, Inc., New York 1969)
- Stewart, J - Single Variable Calculus (4th edition) Brooks / Cole, Cengage Learning 2010.

CLASSICAL ALGEBRA (75 Hours)

- Unit I** Theory of Equations – Formation of equations – Relation between roots and coefficients – symmetric function of the roots.
- Unit II** Sum of the powers of the roots of an equation – Newton's theorem, Reciprocal Equations.
- Unit III** Transformation of equations, Descarte's rule of signs – Rolle's theorem
- Unit IV** Multiple roots, Sturm's Theorem, solving appropriate solution of equations using Newton's and Horner's method.
- Unit V** Biquadratic equations – solution by Ferrari's method – cubic equations – solutions by Cardon's method.

Text Book:

Manickavasagam Pillai .T.K and S. Narayanan - Algebra – Viswanathan Publishers and Printers Pvt. Ltd., - 2004.

Books for Reference :

- Kandasamy P and K. Thilagavathi - Mathematics for B.Sc., - 2004, Volume I and Volume IV, S. Chand & Co., New Delhi.
- Arumugam .S, Thangapandi Issac – Classical Algebra, New Gamma Publishing House, Palayamkottai.
- Burnside, W.S. and A.W. Panton - The Theory of Equations, Dublin University Press, 1954.
- MacDuffee, C.C. - Theory of Equations, John Wiley & Sons Inc., 1954.

SEMESTER – I/III

Statistics

(For Mathematics Students)

Paper – I (90 Hours)

- Unit I** Moments, Skewness and Kurtosis - Curve fitting - method of least squares - Fitting lines – Parabolic, Exponential and Logarithmic curves.
- Unit II** Correlation and Regression – Scatter Diagram – Karl Pearson's coefficient of correlation – Properties – Lines of Regression – Coefficient of Regression and properties – Rank Correlation.
- Unit III** Association of Attributes – Consistency of data – criteria for independence – Yule's coefficient of Association.
- Unit IV** Random variable – Distribution function – properties of Distribution function – Mathematical Expectation – Addition theorem of Expectation – Multiplication theorem of Expectation – Moment generating function – cumulants – characteristic function – Properties of characteristic function.
- Unit V** Discrete and continuous Probability Distributions - Binomial and Poisson Distribution and their moments, Generating function, characteristic function, properties and simple applications. Normal Distribution – Standard normal distribution and their properties – simple problems.

Text Book:

Gupta .S.C and V.K. Kapoor – Fundamentals of Mathematical Statistics – (2002)
Sultan Chand & Sons, New Delhi.

Books for Reference :

- Vittal, V.R. – Mathematical Statistics (2004) Maragatham Publications
- D.C. Sancheti & Kapoor – Statistics
- M.L. Khanna – Statistics
- S. Arumugam & others – Statistics

SEMESTER – I/III

Allied Mathematics
(For Science Students)

Paper – I

Algebra and Differential Equations (90 Hours)

- Unit I** Theory of Equations – Formation of Equations – Relation between roots and coefficients – Reciprocal equations.
- Unit II** Transformation of Equations – Approximate solutions to equations – Newton's method and Horner's method.
- Unit III** Matrices – Characteristic equation of a matrix – Eigen values and Eigen vectors – Cayley Hamilton theorem and simple problems.
- Unit IV** Differential equation of first order but of higher degree – Equations solvable for p , x , y – Partial differential equations – formations – solutions – Standard form $P_p + Q_q = R$.
- Unit V** Laplace transformation – Inverse Laplace transform.

Text book:

- Dr. S. Arumugam & others – Allied Mathematics – I

ANALYTICAL GEOMETRY OF THREE DIMENSIONS: (75 Hours)

- Unit I** Analytical Geometry of 3D Co-ordinate system, direction cosines, direction ratios
- Unit II** Equation of plane in different forms - angle between planes-Length of perpendicular-angle bisection.
- Unit III -** Equation of a line in different forms - image of a point – image of a line-The plane and the straight line-angle between plane and line-Coplanar lines-Shortest distance between two lines
- Unit IV** Sphere – Tangent plane – circle of intersections – Tangency of Spheres – coaxial system of spheres - Radical Planes – Orthogonal Spheres.
- Unit V** Equation of a cone-cone with vertex at the origin –Tangent plane and normal-Quadratic cone with the vertex at origin – Right circular cone – Cylinder – Right circular cylinder-enveloping cylinder

Text Book:

T.K.Manicavachagom Pillay and T.Natarajan-A text book of Analytical Geometry - Part-II Three Dimensions-S.Viswanathan(Printers&Publishers)Pvt Ltd(2012)

Books for Reference :

- Duraipandian .P. Laxmi Duraipandian and D.Muhilan - Analytical Geometry of Three Dimension - Emerald Publishers.
- Kandasamy .P. and K. Thilagavathi – Mathematics for B.Sc., Vol. IV – 2004 S.Chand and Co. New Delhi.
- Loney .S.L. - The Elements of Coordinate Geometry - Mcmillan and Company London.
- B. Stephen John - Analytical Geometry of 3D and vector differentiation : IDEAL publication.

SEMESTER – II / IV

Statistics

(For Mathematics Students)

Paper – II (90 Hours)

- Unit I** Characteristics of index numbers – Laspeyer's and Paasche's – Fisher's and Bowley's Marshall and Edgeworth's index numbers – Tests – Unit test, Commodity Reversal test, Time Reversal test, circular test.
- Unit II** Testing of Hypothesis – Null hypothesis and Alternate hypothesis – Type I and Type II errors - Critical Region, Level of significance – Test of significance for large samples – Testing a single proportion – Difference of proportions. Testing a single mean and Difference of means.
- Unit III** Tests based on t-distribution – single mean and Difference of means – Tests based on F-distribution – Variance Ratio test – Tests based on Chi-square Distribution – Independence – Goodness of fit.
- Unit IV** Analysis of variance – one way and two way classified data – Basis of experimental design – Randomized Block Design – Latin square – simple problems.
- Unit V** Statistical Quality control – Definition – Advantages, Process control – Control chart, Mean chart, Range chart, P-chart, Product Control – Sampling Inspection Plans.

Text Book:

- Gupta .S.C & V.K. Kapoor – Fundamentals of Mathematical Statistics – (2002) Sultan Chand & Sons, New Delhi.

Books for Reference :

- Vittal .P.R – Mathematical Statistic (2004) – Maragatham Publications
- DC Sancheti & Kapoor – Statistics
- M.L. Khanna – Statistics
- S. Arumugam & others – Statistics

MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc. Mathematics) / Semester – II / Allied – II

SEMESTER – II/IV

**Allied Mathematics
(For Science Students)**

Paper – II

Vector Calculus & Fourier Series (90 Hours)

- Unit I** Vector differentiation – Gradient – Divergence and curl
- Unit II** Evaluation of double and triple integrals
- Unit III** Vector integration – Line, surface and volume integrals
- Unit IV** Green's, Stokes and Divergence theorems (without proof) – simple problems.
- Unit V** Fourier series – Even and odd functions – Half range Fourier series.

Text Books:

- Dr. S. Arumugam & others – Vector Calculus
- T.K. Manicavachagom Pillai – Calculus (Vol II)



2017 onwards

MANONMANIAM SUNDARANAR UNIVERSITY,
TIRUNELVELI
UG COURSES - AFFILIATED COLLEGES
B.Sc. MATHEMATICS

Aparna Saravali
Bateh
Syllabus III - VI sem
S-code.

(Choice Based Credit System)

(with effect from the academic year 2017-2018 onwards)

Sem	Part	Sub. No	Subject Status	Subject title	Hrs / Week	Credits	Mark				
							Maximum			Passing minimum	
							Int.	Ext.	Tot.	Ext.	Tot.
III	I	13	Language	Tamil/Other Languages	6	4	25	75	100	30	40
	II	14	Language	English	6	4	25	75	100	30	40
	III	15	Core-5	Real Analysis-I	6	4	25	75	100	30	40
		16	Allied-II	Statistics-I	6	3	25	75	100	30	40
				OR Physics/ Chemistry/Computer With Practicals	6	4	25	75	100	30	40
17	Skill Based core	Vector Calculus	4	4	25	75	100	30	40		
IV		18	Non-major Elective	Any one of the following 1.1) Mathematics for Competitive Examinations-I 1.2) Fundamentals of Statistics-I	2	2	25	75	100	30	40
		19	Common	Yoga*	2	2	25	75	100	30	40

I	20	Language	Tamil/Other Languages	6	4	25	75	100	30	40
II	21	Language	English	6	4	25	75	100	30	40
III	22	Core-6	Abstract Algebra- I	6	4	25	75	100	30	40
	23	Allied-II	Statistics II	6	3	25	75	100	30	40
			OR Physics/ Chemistry/ Computer with Practicals	6	4	25	75	100	30	40
24	Skill Based Core	Trigonometry, Fourier Series and Laplace Transforms	4	4	25	75	100	30	40	
IV	25	Non-major Elective	Any one of the following 2.1) Mathematics for Competitive Examinations- II	2	2	25	75	100	30	40
			2.2) Fundamentals of Statistics II							
	26	Common	Computers for Digital Era*	2	2	25	75	100	30	40
V		Extension Activities	NCC/NSS/YRC/YWF/PE	-	1	-	-	-	-	-

✓ Present Papers

V	III	27	Core-7	Abstract Algebra II -	5	4	25	75	100	30	40
		28	Core-8	Real Analysis II -	5	4	25	75	100	30	40
		29	Core-9	Statics	5	4	25	75	100	30	40
		30	Core-10	Transforms and their Applications	5	4	25	75	100	30	40
		31	Major Elective -I	Any one of the following 1.1. Astronomy -I 1.2. Discrete Mathematics 1.3. Combinatorial Mathematics	4	4	25	75	100	30	40
		32	Major Elective-II	Any one of the following 2.1. Operations Research - I * 2.2. Stochastic Process 2.3. MS Office	4	4	25	75	100	30	40
	IV	33	Skill Based Common	Personality Development /Effective Communication / Youth Leadership	2	2	25	75	100	30	40

Objectives

• To help students understand the concepts of real analysis.

• To help students understand the concepts of real analysis and their applications.



VI	III	34	Core-11	Complex Analysis ✓	5	4	25	75	100	30	40	
		35	Core-12	Number Theory ✓	4	4	25	75	100	30	40	
		36	Core-13	Graph Theory ✓	5	4	25	75	100	30	40	
		37	Core-14	Dynamics ✓	4	4	25	75	100	30	40	
		38	Core-15	Numerical Methods ✓	4	4	25	75	100	30	40	
		39	Major Elective-III	Any one of the following 3.1 Astronomy II 3.2 Fuzzy Mathematics ✓ 3.3 Mathematical Modeling	4	4	25	75	100	30	40	
		40	Major Elective-IV	Any one of the following 4.1 Operations Research II ✓ 4.2 Coding Theory 4.3 Programming in	4	4	25	75	100	30	40	

SEMESTER – III

CORE PAPER –V

REAL ANALYSIS - I (90 Hours) (SMMA31)

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Objectives:

- To lay a god foundation of classical analysis
- To study the behaviour of sequences and series

- Unit I** **Real number system :**
The field of axioms, the order axioms, the rational numbers, the irrational numbers, upper bounds, maximum element, least upper bound (supremum). The completeness axiom, absolute values, the triangle inequality. Cauchy – schwartz's inequality. **11L**
- Unit II** **Sequences :** Bounded sequences – monotonic sequences – convergent sequences – divergent and oscillating sequences – The algebra of limits. **17L**
- Unit III** Behaviour of monotonic sequences – Cauchy's first limit theorem – Cauchy's second limit theorem – Cesaro's theorem – subsequences - Cauchy sequence – Cauchy's general principle of convergence. **19L**
- Unit IV** **Series :** Infinite series – n^{th} term test – Comparison test – Kummer's test – D'Alembert's ratio test – Raabe's test - Gauss test – Root test **23L**
- Unit V** Alternating series – Leibnitz's test - Tests for convergence of series of arbitrary terms – Multiplication of series- Abel's Throrem-Mertens theorem-Power Series- Radius of convergence **20L**

Text Books:

- Arumugam .S and Thengapandi Issac – "sequences and series", New Gamma publishing House, Palayamkottai – 627 002.
- Tom M. Apostol – Mathematical Analysis, II Edition, Narosa Publishing House, New Delhi (unit I)

Book for Reference :

- Goldberg .R – Methods of Real Analysis, Oxford and IBH Publishing Co., New Delhi.

SEMESTER – I/III

Statistics

(For Mathematics Students)

Paper – I (90 Hours)

Objectives:

- To study the concept of measures of dispersion and measures of central tendencies
- To develop the concept Probability distributions

- Unit I** Moments, Skewness and Kurtosis - Curve fitting - method of least squares - Fitting lines - Parabolic, Exponential and Logarithmic curves. **16L**
- Unit II** Correlation and Regression - Scatter Diagram - Karl Pearson's coefficient of correlation - Properties - Lines of Regression - Coefficient of Regression and properties - Rank Correlation. **16L**
- Unit III** Association of Attributes - Consistency of data - criteria for independence - Yule's coefficient of Association. **14L**
- Unit IV** Random variable - Distribution function - properties of Distribution function - Mathematical Expectation - Addition theorem of Expectation - Multiplication theorem of Expectation - Moment generating function - cumulants - characteristic function - Properties of characteristic function. **22L**
- Unit V** Discrete and continuous Probability Distributions - Binomial and Poisson Distribution and their moments, Generating function, characteristic function, properties and simple applications. Normal Distribution - Standard normal distribution and their properties - simple problems. **22L**

Text Book:

Gupta .S.C and V.K. Kapoor - Fundamentals of Mathematical Statistics - (2002)
Sultan Chand & Sons, New Delhi.

Books for Reference :

- Vittal, V.R. - Mathematical Statistics (2004) Maragatham Publications
- D.C. Sancheti & Kapoor - Statistics
- M.L. Khanna - Statistics
- S. Arumugam & others - Statistics

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MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc. Mathematics) / Semester – I / Allied – I

SEMESTER – I/III

Allied Mathematics
(For Science Students)

SAMA1

Paper – I

Algebra and Differential Equations (90 Hours)

Objectives:

- To know the order and degree of the ODE
- To understand the basic Theory of equations
- To study the concept of Laplace transforms
- To know the theory of matrices

Unit I	Theory of Equations – Formation of Equations – Relation between roots and coefficients – Reciprocal equations.	20L
Unit II	Transformation of Equations – Approximate solutions to equations – Newton's method and Horner's method. 18L	
Unit III	Matrices – Characteristic equation of a matrix – Eigen values and Eigen vectors – Cayley Hamilton theorem and simple problems	15L.
Unit IV	Differential equation of first order but of higher degree – Equations solvable for p, x, y – Partial differential equations – formations – solutions – Standard form $P_p + Q_q = R$.	20L
Unit V	Laplace transformation – Inverse Laplace transform.	17L

Text book:

- Dr. S. Arumugam & others – Allied Mathematics – I

SEMESTER III

Skill Based Core

Paper – I

VECTOR CALCULUS (60 Hours) (SSMA3A)

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Objectives:

- To provide basic knowledge of vector differentiation and vector integration
- To solve problems related to that

Unit I Vector point functions – Scalar point functions – Derivative of a Vector & Derivative of sum of vectors – Derivative of product of a Scalar and Vector point function – The vector operator 'del' – Gradient
13L

Unit II Divergence – Curl, solenoidal, irrotational vectors – Laplacian operator. 12L

Unit III Integration of point function – Line integral – Surface integral, 13L

Unit IV Volume integral – Gauss divergence theorem (statement only) – Problems. 12L

Unit V Greens theorem and Stoke's theorem (statements only) – problems. 10L

Text Book:

- Durai Pandian.P and Laxmi Durai Pandian – Vector Analysis (Revised Edition – Reprint 2005) Emerald Publishers.

Books for Reference :

- Dr. S. Arumugam and others – Vector Calculus, New Gamma Publishing House.
- Susan .J.C - Vector Calculus, (4th Edn.) Pearson Education, Boston 2012.
- Anil Kumar Sharma, - Text book of Vector Calculus, Discovery Publishing House, 1993.

SEMESTER – III

Non – Major Elective Paper – I

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2 0 0 2

Mathematics for Competitive Examinations -I (30 Hours) (SNMA3A)

Objectives:

- To learn the problems solving techniques for aptitude problems
- To enable the students prepare themselves for various competitive examinations

Unit I	Simplifications, averages	7L
Unit II	Ratio and proportion	5L
Unit III	Partnership – Percentage	5L
Unit IV	Profit and Loss	6L
Unit V	Problems on numbers	7L

Text Book:

Objective Arithmetic – R.S. Aggarwal – S.Chand & Co

Books for Reference :

- Quantitative Aptitude for Competitive examinations – Abhijit Guha – TMH
- Mathematics for life – M. Immaculate – Nanjil offset Printers

SEMESTER – III**Non – Major Elective Paper – I****Fundamentals of Statistics - I (30 Hours) (SNMA3B)****Objectives:**

- To introduce measures of central tendency to other major students
- To study correlation and regression and solving simple problems

Unit I	Classification of datas – Bar diagram – Pie chart	7L
Unit II	Measures of Central tendency : Mean, median, mode (with frequency)	5L
Unit III	Measures of dispersion : Range – standard deviation, variance – Quartile deviation	7L.
Unit IV	Correlation – rank correlation (Problems only)	6L
Unit V	Regression equations (Problem only)	5L

Text Book:

- Dr. S. Arumugam – Statistics

Books for Reference :

- S.P. Gupta – Statistics
- M.L. Khanna – Statistics
- T.Veerarajan-Fundamentals of Mathematical Statistics

SEMESTER – IV

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CORE PAPER – VI

ABSTRACT ALGEBRA-I (90 Hours) (SSMA41)

Objectives:

- To introduce the concept of Groups ,Ring and Field
- To study the concept of homomorphism

- Unit I** Groups – definition and Examples – Subgroup – order of an element – centre of a group – Normalizer and centralizer. Product of two subgroups – order of HK – Intersection and union of subgroups. **18L**
- Unit II** Cyclic groups – generators of a cyclic group – Number of generators of a cyclic groups – Cosets – Partitioning of a group by Cosets – Lagrange’s theorem – Euler’s theorem – Fermat’s theorem **16L**
- Unit III** **Normal subgroups** : Quotient groups – Group Homomorphis – Canonical homomorphism – kernel of a homomorphism – Isomorphism – Automorphism – Inner automorphism – Permutation groups – Cayley’s theorem. **20L**
- Unit IV** **Rings**: Definition and examples – Types of rings – Elementary properties of a ring – Integral domain – Field – Sub rings – Subfields – Ideals – Principal ideal – quotient ring – Maximal and prime ideals - characteristic of a ring – PID – UFD. **18L**
- Unit V** Homomorphism of rings – Isomorphism – kernel of a homomorphism – Fundamental theorem – Field of quotients of an integral domain – polynomial rings – Division algorithm **18L**

Text Book:

- Arumugam .S and Tangapandi Issac .A – “Modern Algebra”scitech publications Pvt. Ltd.

Books for Reference :

- Anton .H and C. Rorres - Elementary Linear Algebra (9th Edn) John Wiley and Sons, Inc., New York 2005.
- Manicavasagam Pillai .T.K and others – Modern Algebra, S. Viswanathan Publishers, Chennai 1993.
- Herstein .LN – Topics in Algebra, Vikas Publishing Pvt. Ltd. 1975, New Delhi.

SEMESTER – II / IV

Statistics

(For Mathematics Students)

Paper – II (90 Hours)

Objectives:

- To know the concept of index numbers
- To study the distribution functions
- To understand the Analysis of variance

- Unit I** Characteristics of index numbers – Laspeyer's and Paasche's – Fisher's and Bowley's Marshall and Edgeworth's index numbers – Tests – Unit test, Commodity Reversal test, Time Reversal test, circular test. **12L**
- Unit II** Testing of Hypothesis – Null hypothesis and Alternate hypothesis – Type I and Type II errors - Critical Region, Level of significance – Test of significance for large samples – Testing a single proportion – Difference of proportions. Testing a single mean and Difference of means. **18L**
- Unit III** Tests based on t-distribution – single mean and Difference of means – Tests based on F-distribution – Variance Ratio test – Tests based on Chi-square Distribution – Independence – Goodness of fit. **16L**
- Unit IV** Analysis of variance – one way and two way classified data – Basis of experimental design – Randomized Block Design – Latin square – simple problems. **22L**
- Unit V** Statistical Quality control – Definition – Advantages, Process control – Control chart, Mean chart, Range chart, P-chart, Product Control – Sampling Inspection Plans. **22L**

Text Book:

- Gupta .S.C & V.K. Kapoor – Fundamentals of Mathematical Statistics – (2002) Sultan Chand & Sons, New Delhi.

Books for Reference :

- Vittal .P.R – Mathematical Statistic (2004) – Maragatham Publications
- DC Sancheti & Kapoor – Statistics
- M.L. Khanna – Statistics
- S. Arumugam & others – Statistics

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MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc. Mathematics) / Semester – II / Allied – II

Allied Mathematics

(For Science Students) Paper – II

Vector Calculus & Fourier Series (90 Hours)

Objectives:

- To provide basic knowledge of vector differentiation and integration
- To solve integration problems

Unit I Vector differentiation – Gradient – Divergence and curl **20L**

Unit II Evaluation of double and triple integrals **18L**

Unit III Vector integration – Line, surface and volume integrals **18L**

Unit IV Green's, Stokes and Divergence theorems (without proof) – simple problems **17L**

Unit V Fourier series – Even and odd functions – Half range Fourier series. **17L**

Text Books:

- Dr. S. Arumugam & Issac – Vector Calculus
- T.K. Manicavachagom Pillai – Calculus (Vol II)

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MSU/ 2017-18 / UG-Colleges /Part-III (B.Sc. Mathematics) / Semester – II / Allied – II

Allied Mathematics

(For Science Students) Paper – II

Vector Calculus & Fourier Series (90 Hours)

Objectives:

- To provide basic knowledge of vector differentiation and integration
- To solve integration problems

Unit I	Vector differentiation – Gradient – Divergence and curl	20L
Unit II	Evaluation of double and triple integrals	18L
Unit III	Vector integration – Line, surface and volume integrals	18L
Unit IV	Green's, Stokes and Divergence theorems (without proof) – simple problems	17L
Unit V	Fourier series – Even and odd functions – Half range Fourier series.	17L

Text Books:

- Dr. S. Arumugam & Issac – Vector Calculus
- T.K. Manicavachagom Pillai – Calculus (Vol II)

SEMESTER – IV

L T P C

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Skill Based Core

Paper – II

TRIGONOMETRY, LAPLACE TRANSFORMS AND FOURIER SERIES

(60 Hours) (SSMA4A)

Objectives:

- To understand the concept of Trigonometry
- To know the concept of Laplace transform
- To study the concept of Fourier series

Unit I	Trigonometry : Expansions of $\sin nx$, $\cos nx$, $\tan nx$ and expansions of $\sin^n x$ & $\cos^n x$.	10L
Unit II	Hyperbolic functions – Relations between hyperbolic functions and circular functions – Inverse hyperbolic functions – Logarithm of complex numbers – Summation of series by $C + iS$ method.	13L
Unit III	Laplace Transforms – Inverse Laplace Transforms.	13L
Unit IV	Solving linear differential equations with constant coefficients and simultaneous equations using Laplace Transforms.	12L
Unit V	Fourier Series – Definition - Finding Fourier coefficients for a given periodic function with period 2π and $2l$ – Odd and even functions – Half range series.	12L

Text Books:

Arumugam .S and Tangapandi Issac .A -Trigonometry and Fourier Series

Manichavasagam Pillai, T.K., and S. Narayanan-Differential Equations and its Applications

Books for Reference :

- Manichavasagam Pillai, T.K., and S. Narayanan, - Trigonometry, Viswanathan Publishers and Printers Pvt. Ltd.
- Loney - Trigonometry.
- Robert T. Seeley - Fourier Series and Integrals, Dover Publications, New York, 2006.
- Ray Hann: J., - Fourier Series, Transforms and Boundary Value Problems, Dover Publications, New York, 2008.

SEMESTER – IV

Non – Major Elective Paper – II

Mathematics for Competitive Examinations -II (30 Hours) (SNMA4A)

L T P C

2 0 0 2

Objectives:

- To learn the problems solving techniques for aptitude problems
- To enable the students prepare themselves for various competitive examinations

Unit I	Simple Interest – Compound interest	6L
Unit II	Time and work	7L
Unit III	Time and distance	7L
Unit IV	Chain Rule	5L
Unit V	Pipes and Cistern	5L

Text Book:

- Objective Arithmetic – R.S. Aggarwal

Books for Reference :

- Descriptive Mathematics - R.S. Aggarwal, Deepak Aggarwal
- Mathematics for life – M. Immaculate – Nanjil offset Printers

SEMESTER – IV

Non – Major Elective Paper – II

Fundamentals of Statistics - II (30 Hours) (SNMA4B)

Objectives:

- To introduce measures of central tendency to other major students
- To study index numbers and simple problems
- To know the concepts of attributes

Unit I	Theory of attributes for two attributes (simple problems)	7L
Unit II	Characteristics of index numbers – Laspeyer's and Paasche's	6L
Unit III	Bowley's – Marshall index numbers	6L
Unit IV	Fisher's index number – Time Reversal test (Problems only)	5L
Unit V	Fitting a straight line	6L

Text Book:

S.Arumugam & Issac -Statistics

Books for Reference :

- S.P. Gupta – Statistics
- M.L. Khanna – Statistics
- T.Veerarajan-Fundamentals of Mathematical Statistics

SEMESTER – V

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CORE PAPER – VII ABSTRACT ALGEBRA II (75 Hours) (SMMA51)

Objectives:

- To facilitate a better understanding of vector space
- To solve problems in matrices

Unit I	Vector Spaces : Definition and examples – elementary properties – subspaces – linear transformation – fundamental theorem of homomorphism	16L.
Unit II	Span of a set – linear dependence and independence – basis and dimension – theorems	14L
Unit III	Rank and nullity Theorem – matrix of a linear transformation Inner product space : Definition and examples – orthogonality – orthogonal complement – Gram Schmidt orthogonalisation process.	15L
Unit IV	Matrices : Elementary transformation – inverse – rank – Cayley Hamilton Theorem-Applications of Cayley Hamilton Theorem	15L
Unit V	Eigen values and Eigen vectors – Properties and problems-Bilinear Forms-Quadratic Forms-Reduction of quadratic form to diagonal form	15L

Text Book:

Arumugam & Issac – Modern Algebra

Books for Reference :

- Shama J.N and Vashistha .A.R, "Linear Algebra", Krishna Prakash Nandir, 1981.
- John B. Fraleigh, "A First Course in Abstract Algebra", 7th edition, Pearson, 2002.
- Strang G., "Introduction to Linear Algebra", 4th edition, Wellesly Cambridge Press, Wellesly, 2009.
- Artin M., "Abstract Algebra", 2nd edition, Pearson, 2011

SEMESTER – V

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CORE PAPER – VIII

REAL ANALYSIS - II (75 Hours) (SMMA52)

Objectives:

- To understand the real number system and metric spaces
- To know the concepts of continuity and Riemann integrals
- To study the concept of connectedness and compactness

Unit I Metric spaces – Examples – bounded sets – open ball – open sets – subspaces – Interior of a set. **13L**

Unit II Closed sets – closure – Limit points – Dense sets – complete metric space – Cantor's intersection theorem – Baire's Category Theorem. **16L**

Unit III Continuous functions on metric spaces : Functions - continuous at a point on the real line – Functions - Continuous – uniform continuous in a metric space – Discontinuous function of \mathbb{R} . **15L**

Unit IV Connectedness and compactness : Connectedness – connected subset of \mathbb{R} – connectedness and continuity – compact metric spaces – compact subset of \mathbb{R} – Heine Borel theorem. **16L**

Unit V **Riemann Integral :**
Sets of measure zero – Existence of the Riemann integral – Derivatives – Rolle's theorem – Fundamental theorem of Calculus – Mean value theorem – Cauchy's mean value theorem – Taylor's theorem. **15L**

Text Books:

Arumugam & Issac – Modern Analysis

- Malic .S.C - Mathematical Analysis, Wiley Eastern Limited, New Delhi.

Books for Reference :

- Tom .M. Apostol – Mathematical Analysis, II Edition, Narosa Publishing House, New Delhi (Unit I) (1997)
- Goldberg .R – Methods of Real Analysis Oxford and IBH Publishing Co. New Delhi (200)
- Viswanath Naik .K – Real Analysis, Emerald Publishers, Chennai.
- Berberian .S.K – First course in Real Analysis, Springer Verlag, New York.

SEMESTER – V

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CORE PAPER – IX
STATICS (75 Hours) (SMMA53)

Objectives:

- To provide the basic knowledge of equilibrium of a particle
- To develop a working knowledge to handle practical problems

Unit I : Forces acting at a point – parallelogram Law of forces – Triangle of forces – Lami's Theorem – Problems. **16L**

Unit II: Parallel forces and moments – resultant of two parallel forces – resultant of two unlike unequal parallel forces – Varignon's Theorem – Problems. **14L**

Unit III : Equilibrium of three forces acting on a rigid body – three coplanar forces theorem – problems. **16L**

Unit IV : Friction – Laws of friction – angle of friction – equilibrium of a particle (i) on a rough inclined plane (ii) under a force parallel to the plane (iii) under any force – problems **15L**

Unit V : Equilibrium of strings – equation of the common catenary – tension at any point – Geometrical properties of common catenary – problems. **14L**

Text Book:

Venkatraman, M.K. - Statics, Agasthiar Publications, Trichy.

Books for Reference:

1. S – Statics, Emerald Publishers.

3. Duraipandian, P, Laxmi Duraipandian and Muthamizh Jayapragasam- Mechanics, S.Chand & Company.

1. Narayanan, S-Statics, S.Chand & Company, New Delhi.

2. Viswanatha Naik, K and Kasi, M

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SEMESTER-V

CORE PAPER-X

TRANSFORMS AND THEIR APPLIATIONS (75 HOURS) (SMMA54)

Objectives:

- To develop the knowledge of Transformations
- To solve the problems connected

Unit I	Fourier transforms-Properties of Fourier transforms	13L
Unit II	Infinite Fourier Cosines and Sine transforms-Properties	12L
Unit III	Finite Fourier transforms	13L
Unit IV	Z tranforms-Properties	12L
Unit V	Inverse Z transforms	10L

Text Book:

A.Singaravelu-Engineering Mathematics (Volume III)-Meenakshi Agency,Chennai

Reference Book:

A.Gangatharan-Engineering Mathematics (Volume II)-PHI (2007)

SEMESTER – V

Paper – XI

MAJOR ELECTIVE - I

1.1 ASTRONOMY - I (60 Hours) (SMMA5A)

Objectives:

- To introduce the exciting world of Astronomy to students
- To understand the movements of the celestial sphere
- To study the Kepler's laws of motion

Unit I Spherical Trigonometry

Spherical triangle – The fundamental formula of Spherical trigonometry, the sine, cosine, four parts and Napier formula (without proof) and simple problems.

13L

Unit II The celestial sphere

Celestial co-ordinates – Diurnal motion – Rising and setting of a star – sidereal time – circumpolar stars – Morning and evening stars – Twilight.

12L

Unit III Earth – length of a day – Refraction – Tangent formula – Cassini's formula – Effects of refraction

12L

Unit IV Geocentric parallax – Effects – Heliocentric parallax – Effects

11L

Unit V Kepler's laws – verification of Kepler's laws – True anomaly, mean anomaly, Eccentric anomaly – Relation between them.

12L

Text Book:

- Kumaravelu .S and Susheela Kumaravelu – Astronomy for degree classes, Rainbow Printers, Nagercoil (2005)

Book for Reference :

- Ramachandran .G.V – Astronomy

SEMESTER – V

Paper – XI

MAJOR ELECTIVE - I

1.2 DISCRETE MATHEMATICS (60 Hours) (SMMA5B)

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Objectives:

- To study the concept of Mathematical logic
- To understand the basics of Lattices and Boolean Algebra
- To know the number system and codes

Unit I	(Mathematical logic) Statement and notation – Connectives – Negation – Conjunction – Disjunctions – Statement formula and truth table – conditional and Biconditional – Well defined formulae – Tautologies 12L
Unit II	Normal forms- The theory of inference for the statement calculus- The Predicate- The theory of inference for the Predicate calculus 13L
Unit III	(Algebraic Structures) Groups and Monoids – Simple properties–group codes. 11L
Unit IV	(Lattices and Boolean algebra) Lattices and Posets – Properties of lattices – special lattices – Boolean algebra – Gating networks – Minimal sums of products. 12L
Unit V	(Number system and codes) Decimal, Binary, octal, Hexadecimal – Conversion from one to another – Binary addition, subtraction multiplication and division – BCD – weighted excess time – Gray code 12L

Text Book:

- Tremblay and Manohar – Discrete Mathematical Structures with application to Computer Science, (Tata McGraw Hill, New Delhi) 1997.

Books for Reference :

- Ralph P. Grimaldi Pearson Edelen – Discrete and Combinatorial Mathematics – an applied Introduction (IV edition)
- Maluino .A and Leech – Digital Principles and Application McgraHill.
- Venkataraman .M.K. and others – Discrete mathematics 2000 The National Publishing Company.
- Balaji .G – Discrete Mathematics – Balaji Publishers, Chennai (2013)
- Veerarajan .T – Discrete mathematics – Tata McGraw Hill – (2009)

SEMESTER - V

Paper - XI

MAJOR ELECTIVE - I

1.3 Combinatorial Mathematics (60 Hours) (SMMA5C)

Objectives:

- To know the basic concepts of Pairings
- To understand relations
- To study the concepts of designs

Unit I	Selections and Binomial coefficients – Permutations – Ordered Selections – Unordered Selections – Miscellaneous Problems.	13L
Unit II	Pairings Problems - Pairings within a set – Pairings between sets	12L
Unit III	Recurrence – Fibonacci – type relations. Using generating functions – Miscellaneous methods.	12L
Unit IV	The inclusion – Exclusion Principles	11L
Unit V	Block designs – Square Block designs	11L

Text Book:

- Ian Andersen – A first course in combinatorial Mathematics – Clarendon Press, Oxford

SEMESTER – V

Paper – XII

L T P C

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MAJOR ELECTIVE - II

2.1 Operations Research-I (60 Hours) (SMMA5D)

Objectives:

- To introduce the various techniques of operations research
- To make the students solve real life problems in Business Management
- To understand different types of LPP

Unit I	Linear Programming Problem : Mathematical formulation of LPP –Graphical Method- Simplex Method – Artificial variable technique	13L
Unit II	Concept of Duality – Primal and Dual Problems – Duality – Dual Simplex Method.	12L
Unit III	Transportation Problem : North-West Corner Rule – Matrix Minima method – Vogel's Approximation Method – MODI Method – Degeneracy and Unbalanced Transportationproblem.	12L
Unit IV	Assignment Problem : Hungarian Method – Unbalance Assignment Problem	11L
Unit V	Sequencing Problem : n jobs and 2 machines- n jobs and 3 machines- 2 jobs and m machines	12L

Text Book :

- KantiSwarup, P.K. Gupta and Manmohan – Operations Research – Sultan Chand & Sons – 2006, 12th edition.

Books for Reference :

- Gupta .P.K and D.S. Hira – Operations Research – S. Chand and Company.
- B.J. Ranganath and A.S.Srikantappa -Operations Research, Yesdee Publishing House,Chennai(2017)
- Hillier, F.S. and G.J. Lieberman - Introduction to Operations Research, 9th Ed., Tata McGrawHill, Singapore, 2009.
- Hamdy A. Taha, - Operations Research, An Introduction, 8th Ed., Prentice – Hall India, 2006.
- Hadley .G. - Linear Programming, Narosa Publishing House, New Delhi, 2002.

SEMESTER -V

Paper -XII
MAJOR ELECTIVE -II

L T P C

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2.2 STOCHASTIC PROCESS (60 Hours) (SMMA5E)

Objectives:

- To know probability and distribution functions
- To understand the concepts of stochastic process
- To identify Markov chains

Unit I Generating functions-Laplace transform of probability distribution-classification of distribution-Stochastic process-introduction-specification of Stochastic process.

12L

Unit II Markov chains-Definition and examples-Higher transition probabilities-Generalisation of Independent Bernoulli Trials-classification of states and chains-Determination of Higher transition probabilities-Stability of Markov systems-Graph theoretic approach.

12L

Unit III Markov chain with Denumerable number states-Reducible chains-Statistical inference for Markov chains-Markov chain with continuous state space-Nonhomogeneous chains

11L

Unit IV Markov process with discrete state space-Poisson process-Poisson process and related distributions-Generalisation of Poisson process-Birth and Death process

13L

Unit V Markov process with Discrete state space-Derived Markov chains-Erlang process

12L

Text Book :

Stochastic Process-J.Medhi-New Age International Publishers (p) Ltd Third Edition

Reference Books:

Applied Stochastic Process-Suddhendu Biswas -New Central Book Agency (P) Ltd Kolkatta

Introduction to Stochastic Process-Hoel Port and Stone-Universal Book Stall, New Delhi

SEMESTER -V

Paper -XII
MAJOR ELECTIVE -II

23 MS.OFFICE (60 Hours) (SMMA5F)

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Objectives:

- To know the basic knowledge of computer
- To study word,excel andpowerpoint

Unit I: MS Word

Creating a document-saving, printing, editing and closing the document -copying, pasting, finding and replacing a text -adding headers and footers.
10L

Unit II:

Formatting a document-Turning Bold on/off, Underline on/off, highlight on/off-changing font size, page setup-changing margins-bullets and numbering, working with tables-changing the column width and row height-inserting or deleting a row/column-mailmerge.
12L

Unit III: MS Excel

Creating a worksheet-entering, editing, deleting data in cells-saving and previewing the worksheet- entering formulas , working with basic functions SUM,AVERAGE,MAX and MIN -sorting
10L.

Unit IV :

Formatting a worksheet-inserting ,deleting a row/column changing font size -Graphs and charts-Simple calculations using mathematical, statistical, logical functions.
12L

Unit V: MS Power point

Creating a simple presentation -adding transition effects to a presentation-adding sound effects to a presentation-creating hyperlinks between slides-changing the background-inserting images on slides.
15L

Text Book :

Dr.P.Surwan Ahmed, "Office Automation 2010", Margham Publications 2016.

Reference Books :

1. Stephen L. Nelson, "Office 2010, Computer Reference", Tata McGraw Hill Publishing Company Ltd.
2. Sumner Wiley- "Enterprise Resource Planning", Pearson Education, inc. I Edition 2012.

SEMESTER – VI

CORE -XI
Major Paper – XIII

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COMPLEX ANALYSIS (75 Hours) (SMMA61)

Objectives:

- To understand the functions of complex variables
- To learn about elementary transformations concepts in complex variables
- To understand the singularity concepts and residues

Unit I (Analytic functions)

Functions of a complex variable – Derivatives – Cauchy – Riemann equations – sufficient conditions – Polar form – Analytic functions – Harmonic functions.
13L

Unit II (Integrals)

Definite integrals – Contours – Cauchy – Goursat theorem – antiderivatives and independence of path – Cauchy Integral formula – Morera's theorem.
17L

Unit III (Series)

Taylor's series – Examples – Laurent's series – Zeros of analytic functions – Residues – Residue theorem – Principal part of functions – Residues at poles.
16L

Unit IV (Evaluation of Integrals)

Evaluation of improper real integrals – improper integrals involving sines and cosines – Definite integrals involving sines and cosines.
14L

Unit V (Transformations)

Conformal mappings–basic properties–Bilinear maps – fixed points – Applications 15L.

Text Book:

- Arumugam.S and T. Issac – “Complex Analysis” – Scitech Publishing House – Chennai.

Books for Reference :

- Churchill .R.V. and J.W. Brown – “Complex variables and Applications” – IV edition – McGraw Hill International Editions.
- Ponnuswamy .S – “Foundations of Complex Analysis”, Narosa Publication House, New Delhi, II edition 2005.
- Duraisundaram .P and Lakshmi Duraisundaram – “Complex Analysis” – Emerald Publications, Chennai (2001)

SEMESTER – VI

L T P C

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**CORE -XII
Major Paper – XIV**

NUMBER THEORY (60 Hours) (SMMA62)

Objectives:

- To highlight the beauties in the world of numbers
- To prepare the students for coding through congruences

Unit I Peano's Axioms – Mathematical Induction – The Binomial Theorem – Early Number Theory. **11L**

Unit II Division Algorithm – GCD – Euclidean Algorithm – The Diophantine Equation $ax+by=c$. **12L**

Unit III The fundamental Theorem of Arithmetic – The Sieve of Eratosthenes – The Goldbach conjecture. **13L**

Unit IV Basis properties of congruences – Linear congruence and the Chinese Remainder Theorem. **11L**

Unit V Fermat's Theorem – Wilson's Theorem – The Fermat – Kraitchik Factorization Method. **13L**

Text Book:

- David .M. Burton - Elementary Number Theory (Sixth Edition) Tata McGraw Hill Education Pvt. Ltd.

Books for Reference :

- Ivan Niven and H, Zuckerman - An Introduction to Theory of Numbers.
- Kumaravelu .S, and Susheela Kumaravelu - Elements Theory - Nagercoil, 2002.

SEMESTER – VI

L T P C

3 2 0 4

CORE -XIII
Major Paper – XV

GRAPH THEORY (75 Hours) (SMMA63)

Objectives:

- To introduce the notion of graph theory and its applications
- To learn the techniques of combinatorics in graph theory

Unit I: Definition and examples of graphs – degrees – subgraphs – isomorphism – independent sets and coverings – matrices – operation on graphs.

18L

Unit II: Degree sequences – graphic sequences – walks – trails and paths – connectedness and components – connectivity. **18L**

Unit III: Eulerian graphs – Hamiltonian graphs – characterisation of trees – centre of a tree.

13L

Unit IV: Definition and properties of planar graphs – chromatic number and chromatic index

13L.

Unit V: Chromatic polynomials – definition and basic properties of digraphs – paths and connectedness in digraphs.

13L

Text book:

Arumugam,S and S. Ramachandran – Invitation to graph Theory, Scitech publications, Chennai.

Books for reference:

- Kumaravelu. S and Susheela Kumaravelu – Graph theory.
- Narasingh Deo – Graph theory with application to engineering and computer science, Prentice – Hall of india pvt. Ltd., New Delhi.

SEMESTER -VI
CORE -XV
MAJOR PAPER -XVII

L T P C

4 0 0 4

NUMERICAL METHODS (60 Hours) (SMMA65)

Objectives:

- To introduce the finite differences
- To solve numerical problems by different methods

- Unit I** Solution of Numerical algebraic and Transcendental Equations : bisection method – Newton's method. Criterion of order of convergence of Newton's method. Regula False method – Gauss elimination – Gauss Jacobi – Gauss Seidal method
13L
- Unit II** **Finite Difference** : First and higher order differences – Forward and backward differences – Properties of Operator – Differences of a polynomial – Factorial Polynomial
11L
- Unit III** **Interpolation** : Newton's Forward – backward, Gauss forward – backward interpolation formulae – Bessel's formula. Divided differences – Newton's divided difference formulae – Lagrange's interpolation formulae
10L
- Unit IV** **Numerical Differentiation and Integration** : Newtons forward and backward difference for differentiation – Derivatives using Bessel's formula – Trapezoidal rule, Simpson's 1/3 rule & 3/8 rule
13L
- Unit V** **Difference Equations** : Definition – order and degree of difference equation – Linear difference equation – Finding complementary function – particular Integral – simple applications.
12L

Text Book:

- Venkatraman .M.L - Numerical methods in Science and Engineering National Publishing Company V Edition 1998

Books for Reference :

- Kandhasamy .P.K. Thilagavathy and K. Gunavathy 'Numerical Methods' S. Chand & Company Ltd. Edn. 2006.
- B. Stephen John – Numerical Analysis
- Sanku Kaur and Egwwn Enc Kalu - Numerical methods with Application Abidet. Newsworld 2nd 2011.

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SEMESTER – VI

Paper – XVIII

MAJOR ELECTIVE - III

3.1 Astronomy - II (60 Hours) (SMMA6A)

Objectives:

- To understand the exiting world of Astronomy to the students
- To study the concepts of eclipses
- To facilitate the movements of celestial objects

Unit I	Equation of time – Seasons – Conversion of time.	10L
Unit II	Moon – sidereal month, Lunation and relation between them – Phases of moon – Lunar Liberation - surface of moon – metonic cycle – Tides.	14L
Unit III	Eclipses – shadow cone – Minimum and maximum number of eclipses.	12L
Unit IV	Planetary Phenomena – Bode's law – Elongation – Sidereal period, synodic period and the relation between them	14L
Unit V	Phases – Stationary points – solar system..	10L

Text Book:

- S. Kumaravelu and Susheela Kumaravelu – Astronomy Rainbow Printers, Nagercoil (2005)

Book for Reference :

- George - O - Abell – Exploration of the Universe (Second Edition)

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SEMESTER – VI

Paper – XIX

MAJOR ELECTIVE - III

3.2 FUZZY MATHEMATICS (60 Hours) (SMMA6B)

Objectives:

- To introduce fuzzy concepts to students
- To facilitate the students to study fuzzy operations and fuzzy numbers

Unit I	Crisp Sets – Fuzzy Sets – Basic Types – Basic Concepts – Characteristics and Significance of the Paradigm shift. 11L
Unit II	Additional properties of α -cuts – representations of fuzzy sets – Extension principle for fuzzy sets. 10L
Unit III	Fuzzy set operations – Fuzzy complements – Fuzzy intersections : t-norms – Fuzzy Unions : s-norms – Combinations of operations – Aggregation operators. 10L
Unit IV	Fuzzy Numbers – Linguistic variables – Arithmetic operations on intervals – Arithmetic operations of fuzzy numbers – Lattice of fuzzy numbers – Fuzzy Equations. 13L
Unit V	Fuzzy Decision Making – Individual Decision Making – Multi-person decision making – Fuzzy linear Programming. 12L

Text Book:

- George J. Klir and Bo Bo Yuan – Fuzzy sets and Fuzzy Logic Theory Applications, Prentice Hall of India, 2002, New Delhi.

Book for Reference:

- George J. Klir and Tina A. Folger – Fuzzy sets, uncertainty and Informations – Prentice Hall of India, 2003, New Delhi.

SEMESTER – VI

Paper – XX

MAJOR ELECTIVE - III

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3.3 Mathematical Modelling (60 Hours) (SMMA6C)

Objectives:

- To study the mathematical models through ODE and difference equations
- To train the students to develop mathematical models in real life problems

Unit I (Mathematical modelling through O.D.E (First order))

Linear growth and Decay models – Non-linear growth and Decay models –
Compartment Models – Dynamics Problems – Geometrical Problems.
11L

Unit II Population dynamics – Epidemics – Compartment Models – Economics,
Medicine, Arms race, Battles and International Trade.
13L

Unit III (Mathematical Modelling through O.D.E. (Second order))

Planetary motion – circular motion – Motion of satellites – Modelling through
linear difference equations of second order.
11L

Unit IV (Mathematical Modelling through difference equations)

Basic theory of difference equation with constant coefficients – Economics and
Finance – Population dynamics and genetics – Probability theory.
12L

Unit V (Modelling through graphs)

Solutions that can be modelled through graphs - models in terms of directed
graphs, signed graphs – weighted digraphs and unoriented graphs.
11L

Text Book:

- Kapur J.N – Treatment as in “Mathematical Modelling” – New Age International Publishes, 2004.

Books for Reference :

- Kapur J.N – Mathematical Modelling in Biology and Medicine – East West Press – 1985.
- Singh – Mathematical Modelling, International Book house – 2003.
- Rossi, R. Giordano, Maurice D. Weir and William P. Fox, - A first course in mathematical modelling, Thomson Learning, London and New York, 2003.

SEMESTER-VI

PAPER-XXI
MAJOR ELECTIVE-IV

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4.1 OPERATIONS RESEARCH-II (60 Hours) (SMMA6D)

Objectives:

- To introduce Games and strategies
- To understand networking problems
- To make the students solve real life problems in business and management

- Unit I **Games and Strategies** : Two Person Zero sum Games – The Maximin – Minimax Principle – Games without Saddle Points – Mixed Strategies – Graphical Solution of $2 \times n$ and $m \times 2$ games – Dominance Property **12L**
- Unit II **Replacement of items that deteriorate with time-replacement age of a machine taking money value into consideration-replacement of items that completely fail suddenly and Staffing Problems** **13L**
- Unit III **Queuing models** : General concept and definitions-characteristics-properties of Poisson process Models (M/M/1: /FCFS), (M/M/1 : N/FCFS), (M/M/S : /FCFS) **11L**
- Unit IV **Network scheduling by PERT / CPM** : Network and basic components – Rules of Network Construction – Time Calculation in network – Critical Path Method – PERT Calculation **13L**
- Unit V **Inventory Control** : Introductions – Types of Inventories – Inventory decisions – Deterministic inventory Problem– EOQ problems with shortages. **13L**

Text Book:

- Karim Swami, P.K. Gupta and Manmohan – Operations Research – Sultan Chand & Sons – 2006, 12th edition.

Books for Reference :

- Gupta, P.K. and D.S. Hira – Operations Research – S. Chand and Company.
- B.J. Rangarath and A.S. Srikantappa -Operations Research, Yesdee Publishing House, Chennai (2017)
- Hillier, F.S. and G.J. Lieberman - Introduction to Operations Research, 9th Ed., Tata McGrawhill, Singapore, 2009.
- Hamdy, A. Taha, - Operations Research, An Introduction, 8th Ed., Prentice – Hall India, 2006.
- Hadley, G. – Linear Programming, Narosa Publishing House, New Delhi, 2002

SEMESTER – VI

PAPER-XXII

MAJOR ELECTIVE - IV

4.2 Coding Theory (60 Hours) (SMMA6E)

Objectives:

- To introduce coding and decoding concepts
- To develop the students in the field of coding theory

- Unit I** Basic assumptions – Correcting and detecting error patterns – information rate – effects of error correction and detection – finding the most likely code word transmitted. **12L**
- Unit II** Linear codes – two important – subspaces independence – basic, dimension – matrices – Bases for C and C^{\perp} generating matrices on coding. **12L**
- Unit III** Parity check matrices – equivalent codes – distance of a linear code – Linear codes – cosets – MLD for linear codes – Reliability of IMLD for linear codes. **11L**
- Unit IV** Some bounds for codes – perfect codes – hamming codes – extended codes – The extended Golay code – decoding the extended Golay code – Golay code **13L**
- Unit V** Polynomials and words – introduction to cyclic codes – introduction to cyclic codes – Polynomial encoding and decoding – finding cyclic codes – Dual cyclic codes. **12L**

Text Book:

- Coding theory, the essentials – Marcel Dekker, Inc. Madtrison Avenue, Newyork.

SEMESTER – VI

Paper- XXIII
MAJOR ELECTIVE-IV

L T P C

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4.3 Programming in C (60 Hours) (SMMA6F)

Objective:

- To introduce the exiting world of programming to the students
- To train the students to run simple C programmes

Unit I

C Declarations:- Introduction – Character Set – C tokens – Keywords and Identifiers – Identifiers – Constants – Variables – Data types – Declaration of Variables – Declaration of Storage Class – Assigning Values to Variables – Defining Symbolic Constants – Declaring Variables as Constant.

11L

Unit II

Operators and Expressions:- Introduction – Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operator – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Expressions.

13L

Unit III

Managing Input and Output Operations:- getchar() – putchar() – scanf() – printf().
Decision Making and Branching:- Introduction – Decision Making with IF Statement – Simple IF statement – The IF...Else Statement – Nesting of IF...Else Statements – The ELSE IF ladder – The Switch Statement – The ?: Operator – The GOTO statement. **Decision Making and Looping:-** Introduction – The WHILE Statement – The DO Statement – The FOR statement – Jumps in Loops.

13L

Unit IV

Arrays :- Introduction – One-dimensional arrays – Declaration of One-dimensional arrays – Initialization of One-dimensional arrays – Two-dimensional arrays – Initialization of Two-dimensional arrays – Multi-dimensional arrays. **Character Arrays and Strings:-** Introduction – Declaring and Initializing String Variables – Reading Strings from Terminal – Writing Strings to Screen – String Handling Functions

12L

Unit V

User-Defined functions:- Introduction – Need for User-defined functions – Definition of functions – Return Values and their Types – Function Calls – Function Declaration – Category of functions – No Arguments and No return values – Arguments but No return Values – Arguments with return values – No arguments but a return a value – Recursion –The Scope, Visibility and lifetime of a variables.

III

Text Book:

Programming in ANSI C – 6th Edition by E Balagurusamy – Tata McGraw Hill Publishing Company Limited.

Reference Books:

- Programming with C, Third Edition, Byron S Gottfried, Tata McGraw Hill Education Private Limited.
- Programming in C Reema Thareja, Oxford University press.