MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. Mathematics

(Choice Based Credit System)

(with effect from the academic year 2016-2017 onwards)

(44th SCAA meeting held on 30.05.2016)

Sem.	Pt. I/II/III/ IV/V	Sub No.	Subject status	Subject Title	Hrs./ week	Cre-dits	Marks				
							Maximum			Passing minimum	
							Int	Ext.	Tot.	Ext.	Tot.
III	I	13	Language	Tamil/Other Language	6	3	25	75	100	30	40
	II	14	Language	English	6	3	25	75	100	30	40
	III	15	Core - 5	REAL ANALYSIS - I	6	5	25	75	100	30	40
		16	Allied – III	STATISTICS -I / PHYSICS/ CHEMISTRY	6	5	25	75	100	30	40
			For Other UG Programme	Mathematics – ALGEBRA AND DIFFERENTAL EQUATIONS (For Science Students)							
			For the Current UG Programme	STATISTICS –I (For Mathematics Students)							
	IV	17	Skilled Based Subject -I	VECTOR CALCULUS	4	4	25	75	100	30	40
	IV	18	Non-Major Elective –I (any one of the following)	(A) MATHEMATICS FOR COMPETITIVE EXAMINATIONS- I (or) (B)FUNDAMENTALS OF STATISTICS - I	2	2	25	75	100	30	40
				Subtotal	30	22					

Sem.	Pt. I/II/III/ IV/V	Sub No.	Subject status	Subject Title	Hrs./ week	Cre-dits	Marks				
							Maximum			Passing minimum	
							Int	Ext.	Tot.	Ext.	Tot.
IV	I	19	Language	Tamil/Other Language	6	3	25	75	100	30	40
	II	20	Language	English	6	3	25	75	100	30	40
	III	21	Core - 6	ABSTRACT ALGEBRA	6	5	25	75	100	30	40
		22	Allied - IV	STATISTICS -II/ PHYSICS/ CHEMISTRY	6	5	25	75	100	30	40
			For Other UG Programme	Mathematics – VECTOR CALCULUS & FOURIER SERIES (For Science Students)							
			For the Current UG Programme	STATISTICS –II (For Mathematics Students)							
	IV	23	Skilled Based Subject -II	TRIGONOMETRY, LAPLACE TRANSFORMS AND FOURIER SERIES	4	4	25	75	100	30	40
	IV	24	Non-Major Elective –II (any one of the following)	(A) MATHEMATICS FOR COMPETITIVE EXAMINATIONS-II (or) (B)FUNDAMENTALS OF STATISTICS - II	2	2	25	75	100	30	40
	V		Extension Activity	NCC, NSS, YRC, YWF		1					
Subtotal					30	23					

REAL ANALYSIS - I

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.

Unit II   **Sequences :** Bounded sequences – monotonic sequences – convergent sequences – divergent and oscillating sequences – The algebra of limits.

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.

Unit IV   Series : Infinite series – n^{th} term test – Comparison test – Kummer's test – D'Alemberls ratio test – Raabe's test - Gauss test – Root test – Canchy's condensation test (without proof)

Unit V   Alternating series – Leibnitz's test - Tests for convergence of series of arbitrary terms – Power series – Taylor's series – Maclaurins series.

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.

Allied Statistics

(For Mathematics Students)

Statistics – I

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.

Books for Reference :

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

2. Vittal, V.R. – Mathematical Statistics (2004) Maragatham Publications

3. D.C. Sancheti & Kapoor – Statistics

4. M.L. Khanna – Statistics

5. S. Arumugam & others – Statistics

(For Science Students)
Algebra and Differential Equations

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.

Books for Reference :

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

VECTOR CALCULUS

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

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

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

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

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

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.

Mathematics for Competitive Examinations -I

Unit I   Simplifications, averages

Unit II   Ratio and proportion

Unit III   Partnership - Percentage

Unit IV   Profit and Loss

Unit V   Problems on numbers

Books for Reference :

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

2. Quantitative Aptitude for Competitive examinations – Abhijit Guha – TMH

3. Mathematics for life – M. Immaculate – Nanjil offset Printers

Fundamentals of Statistics - I

Unit I   Classification of datas – Bar diagram – Pie chart

Unit II   Measures of Central tendency : Mean, median, mode (with frequency)

Unit III   Measures of dispersion : Range – standard deviation, variance – Quartile deviation.

Unit IV   Correlation – rank correlation (Problems only)

Unit V   Regression equations (Problem only)

Books for Reference :

1. S.P. Gupta – Statistics

2. Dr. S. Arumugam – Statistics

3. M.L. Khanna – Statistics

ABSTRACT ALGEBRA

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.

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.

Unit III   **Normal subgroups :** Quotient groups – Group Homomorphis – Canonical homomorphism – kernel of a homomorphism – Isomorphism – Automorphism – Inner automorphism – Permutation groups – Cayley's theorem.

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.

Unit V   Homomorphism of rings – Isomorphism – kernel of a homomorphism – Fundamental theorem – Field of quotients of an integral domain – polynomial rings – Division algorithm

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 .I.N – Topics in Algebra, Vikas Publishing Pvt. Ltd. 1975, New Delhi.

(For Mathematics Students)
Statistics – II

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 varience – 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.

Books for Reference :

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

2. Vittal .P.R – Mathematical Statistic (2004) – Maragatham Publications

3. DC Sancheti & Kapoor – Statistics

4. M.L. Khanna – Statistics

5. S. Arumugam & others – Statistics

(For Science Students)

Vector Calculus & Fourier Series

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.

Books for Reference :

1. Dr. S. Arumugam & others – Vector Calculus

2. T.K. Manicavachagom Pillai – Calculus (Vol II)

TRIGONOMETRY, LAPLACE TRANSFORMS AND FOURIER SERIES

Unit I Trigonometry : Expansions of sin nx, cos nx, tan nx and expansions of $\sin^n x$ & $\cos^n x$.

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.

Unit III Laplace Transforms – Inverse Laplace Transforms.

Unit IV Solving linear differential equations with constant coefficients and simultaneous equations using Laplace Transforms.

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.

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 Hanna J., - Fourier Series, Transforms and Boundary Value Problems, Dover Publications, New York, 2008.

Mathematics for Competitive Examinations -II

Unit I   Simple Interest – Compound interest

Unit II   Time and work

Unit III   Time and distance

Unit IV   Chain Rule

Unit V   Pipes and Cistern

Books for Reference :

1. Objective Arithmetic – R.S. Aggarwal

2. Descriptive Mathematics - R.S. Aggarwal, Deepak Aggarwal

3. Mathematics for life – M. Immaculate – Nanjil offset Printers

Fundamentals of Statistics - II

Unit I   Theory of attributes for two attributes (simple problems)

Unit II   Characteristics of index numbers – Laspeyer's and Paasche's

Unit III   Bowley's – Marshall index numbers

Unit IV   Fisher's index number – Time Reversal test (Problems only)

Unit V   Fitting a straight line

Books for Reference :

1. S.P. Gupta – Statistics

2. Dr. S. Arumugam – Statistics

3. M.L. Khanna – Statistics