MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI

UG COURSES – AFFILIATED COLLEGES

B.Sc. Mathematics with Computer Applications

(Choice Based Credit System)

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

(45th SCAA meeting held on 09.02.2017)

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	Object Orientetd Programming in C ++	4	4	25	75	100	30	40
				C++ Practical (External Examination at the end of IV semester)	2						
	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	21					

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 -I	6	5	25	75	100	30	40
		22	Allied - IV	DATA STRUCTURES	4	4	25	75	100	30	40
				C++ Practical (External Practical Examination)	2	2	50	50	100	20	40
	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	24					

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications)/Semester-III/Ppr.no.15/Core-5

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.

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications)/Semester-III/ Ppr.no.16(A)/Allied -III

Object Oriented Programming in C++

Unit I

Principles of Object Oriented Programming: Basic Concepts of Object Oriented Programming.**Classes and Objects:** Introduction – Specifying a Class – Defining Member Functions – Making an Outside Function Inline – Nesting of Member Functions - Private Member Functions – Static Data Members – Static Member Functions – Arrays of Objects – Objects as function arguments – Friendly Functions – Returning Objects .

Unit II

Constructors and Destructors: Introduction – Constructors – Parameterized Constructors – Multiple Constructors in a class – Constructors with Default Arguments – Dynamic Initialization of Objects – Copy Constructors – Dynamic Constructors – const objects - Destructors.

Unit III

Operator Overloading and Type Conversions: Introduction – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators using Friends – Rules for Overloading Operators – Type Conversions.**Inheritance (Extending Classes):** Introduction – Defining Derived Class – Single Inheritance - Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes - Abstract Classes.

Unit IV

Pointers, Virtual Functions and Polymorphism: Introduction - Pointers - Pointers to Objects – this Pointer – Pointers to Derived Classes – Virtual Functions - Pure Virtual Functions. **Managing Console I/O Operations:** Introduction – C++ Streams – C++ Stream Classes – Unformatted I/O operations – Managing Output with Manipulators.

Unit V

Working with Files: Introduction – Classes for File Stream Operations – Opening and Closing a file – Detecting end-of-file – File Modes – Sequential Input and Output Operations.**Templates:**Introduction - Class Templates – Function Templates.

Text Book:

Object Oriented Programming with C++, Sixth Edition by E. Balagurusamy, Tata McGraw Hill Publishing Company Limited.

Reference Book:

- Programming with ANSI C++, Bhushan Trivedi, 2010, Oxford UniversityPress
- The Complete Reference C++, Fourth/ Fifth Edition Herbert Schildt, Tata McGraw Hill Publishing Company Limited.
- Programming With C++ Third Edition by D. Ravichandran, Tata McGraw Hill Education, 2011.
- Programming in C++ Second Edition by Ashok N. Kamthane, Pearson Education

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications)/Semester - III & IV / Ppr.no.16 (B)/Allied Practical list

Object Oriented Programming with C++

30 hours in 3semester &30 hours in 4 semester

(External University Practical Examination in the end of 4 semester)

It is compulsory to complete all the exercises given in the list in the stipulated time.

- Program with a Class and Member Functions.
- Program to Overload Function.(minimum three geometric figures)
- Program to implement Parameterized Constructor.
- Program to implement Friend Function (minimum two classes)
- Program to Overload Unary Minus Operator.
- Program to Overload Binary Plus Operator.
- Program to implement Multiple Inheritance for Family Details.
- Program to implement Multilevel Inheritance for Bank Customer Details.
- Program to implement Hierarchical Inheritance for Students Details.
- Program to implement Virtual Function.

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications)/Semester-III/Ppr.no.17/Skilled Based -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, (4^{th} Edn.) Pearson Education, Boston 2012.
- Anil Kumar Sharma, - Text book of Vector Calculus, Discovery Publishing House, 1993.

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications) /Semester-III /Ppr.no.18(A)/Non Major Elective –I (A)

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

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications) /Semester-III / Ppr.no.18 (B) /Non Major Elective –I (B)

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

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications)/Semester-IV/Ppr.no.21/Core -6

ABSTRACT ALGEBRA -I

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 (9^{th} 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.

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications) /Semester-IV/Ppr.no.22/Allied -IV

Data Structures

Unit I

Basic Concepts:- Algorithm specification – Data Abstraction – Performance Analysis. **Arrays and Structures:-** Arrays: Abstract data type – Polynomials – Sparse Matrices – Representation of Multidimensional Arrays.

Unit II

Stacks and Queues:- Stacks – Queues – Evaluation of Expressions – Multiple Stacks and Queues. **Linked Lists**:- Singly Linked Lists and Chains – Linked Stacks and Queues – Polynomials: Polynomial Representation – Adding Polynomials. – Additional List Operations: Operations for Circularly Linked Lists. – Sparse Matrices: Sparse Matrix Representation. – Doubly Linked Lists.

Unit III

Trees:- Introduction – Binary Trees – Binary Tree Traversals: Inorder Traversal – Preorder Traversal – Postorder Traversal – Iterative Inorder Traversal. - Threaded Binary Trees – Heaps – Binary Search Trees – Selection Trees – Forests: Transforming a Forest into a Binary Tree. – Representation of Disjoint sets: Introduction – Union and Find operations. – Counting Binary Trees : Distinct Binary Trees.

Unit IV

Graphs: - The Graph Abstract Data Type-Elementary Graph Operations – Minimum Cost Spanning Trees: Kruskal's Algorithm – Prim's Algorithm. – Shortest Paths and Transitive Closure: Single Source/ All Destination: Nonnegative Edge Costs – Single Source / All Destination: General Weights – All Pairs Shortest Paths. – Activity Network: Activity-on-Vertex(AOV) Networks.

Unit V

Sorting:- Motivation – Insertion Sort – Quick Sort – Merge Sort: Recursive Merge Sort. – Heap Sort – External Sorting: Introduction – k-way Merging.**Hashing**:- Static Hashing: Hash Tables.

Text Book:

Fundamentals of Data Structures in C by Ellis Horowitz, SartajSahni, Susan Anderson-Freed – Second Edition – Universities Press (India) Private Limited.

Reference Books:

- Data Structures Using C, Second Edition by ReemaThareja – Oxford University Press
- Data Structures by Dr N Jeya Prakash – Anuradha Publi

MSU/2016-17/UG-Colleges/Part-III (B.Sc. Mathematics with Computer Applications)/Semester-IV/Ppr.no.23/ Skilled Based -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.

MSU/2016-17/UG-Colleges/Part-IV (B.Sc. Mathematics with Computer Applications)/Semester-IV/ Ppr.no. 24 (A)/ Non Major Elective –II (A)

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

MSU/2016-17/UG-Colleges/Part-IV (B.Sc. Mathematics with Computer Applications)/Semester-IV/Ppr.no.24 (B) / Non Major Elective –II (B)

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