# Hajee Karutha Rowther Howdia College

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai) Re-Accredited with "A" Grade by NAAC – (CGPA of 3.26 out of 4.00)

Uthamapalayam – 625 533.



## PG AND RESEARCH DEPARTMENT OF MATHEMATICS

## **BACHELOR OF SCIENCE - MATHEMATICS**

# Syllabus 2014-15

## HAJEE KARUTHA ROWTHER HOWDIA COLLEGE (AUTONOMOUS) UTHAMAPALAYAM Choice Based Credit System B.Sc., Mathematics(Semester) Course Scheme & Scheme Of Examinations (Effective from the academic year 2014 – 2015 onwards)

**Qualification** :Passed in H.Sc. or any other Examination accepted by the Syndicate as Equivalent with Mathematics as one of the subject in higher secondary education

Duration of the Course :B.Sc., ., Mathematics - Three academic years (6 – Semesters)

## **OBJECTIVES OF THE COURSE :**

- 1. To enable the students to understand the knowledge of Mathematics.
- 2. To acquire skills in the field of life oriented, application oriented and job oriented Mathematics.
- 3. Study of skill based subject can develop various skills in the field of Mathematics. which will enable the students to get a job.
- 4. Visit to various industries and other government department by the student will create a sound knowledge in the field of Applied Mathematics

## **SUBJECTS OF STUDY**:

- I. Part I Tamil
  - Part –II English
  - Part –III i) Core Subjects Mathematics.
    - ii) Allied Subjects
  - Part IV i) Non-major subjects ii) Skill based Subjects iii)Environmental Studies iv)Value Education
  - Part-V Extension Activities

## STRUCTURE OF THE QUESTION PAPERS:

2
True or False)
)
- 15 marks (average of 2 tests to be taken)
z - 5 marks
- 5 marks each (average of 2 to be taken )
- 25 <sup>th</sup> working days
- 50 <sup>th</sup> working days
- 75 <sup>th</sup> working days

Eligibility for the degree	- passing minimum is 40%
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## The following Passing Minimum and Aggregate Scores are proposed.

Course	Passing Minimum	Aggregate Passing Minimun
UG	40	40
PG	50	50

## Question Papers in External Examination carrying 75 marks will be in the format below.

Туре	No of questions to be	Marks
	answered	
Section A	10	10
Section B	5	35
Section C	3	30

HAJEE KARUTHA ROWTHER HOWDIA COLLEGE (AUTONOMOUS)									
B.SC., MATHEMATICS- COURSE CONTENT (2014-2015 BATCH)									
SEM	M PART SUBJECT COURSE COURSE TITLE				CREDITS	HOURS	Int. Marks	Ext. marks	Total Marks
	Ι	LANGUAGE	14UTAL11	TAMIL /OTHER LANGUAGES- I	3	6	25	75	100
	II	LANGUAGE	14UENL11	ENGLISH PAPER- I	3	6	25	75	100
	III	CORE-1	14UMAC11	CALCULUS	5	6	25	75	100
I	III	ALLIED-1	14UPHA11	PHYSICS – I	4	6	25	75	100
	IV	SBS-1	14UMAS11	ARITHMETIC ABILITY	2	2	25	75	100
	1,	SBS-2	14UMAS12	SEQUENCES AND SERIES	2	2	25	75	100
	IV	NME-1	14UMAN11	FUNDAMENTALS OF MATHEMATICS - I	2	2	25	75	100
			TOTAL		21	30	175	525	700
	Ι	LANGUAGE	14UTAL21	TAMIL /OTHER LANGUAGES II	3	6	25	75	100
	П	LANGUAGE	14UENL21	ENGLISH PAPER II	3	6	25	75	100
	III	CORE-2	14UMAC21	TRIGNOMETRY AND FOURIER SERIES	5	6	25	75	100
		ALLIED-2	14UPHA21	PHYSICS – II	4	4	25	75	100
п	111	ALLIED-3	14UPHA2P	PHYSICS-II (PRACTICAL)	1	2	40	60	100
	IV	SBS-3	14UMAS21	THEORY OF EQUATIONS	2	2	25	75	100
	10	SBS-4	14UMAS22	BUSINESS MATHEMATICS	2	2	25	75	100
	IV	NME-2	14UMAN21	FUNDAMENTALS OF MATHEMATICS - II	2	2	25	75	100
			TOTAL		22	30	215	585	800
	Ι	LANGUAGE	14UTAL31	TAMIL /OTHER LANGUAGES -III	3	6	25	75	100
	Π	LANGUAGE	14UENL31	ENGLISH PAPER –III	3	6	25	75	100
III	III	CORE-3	14UMAC31	ANALYTICAL GEOMETRY OF 3D & VECTOR CALCULUS	5	6	25	75	100
	III	ALLIED-4	14UPHA31	PHYSICS –III	4	6	25	75	100
	ш	ALLIED-5	14UMAA31	PROGRAMMING IN C-THEORY(4hr)	3	4	25	75	100
		ALLIED-6	14UMAA3P	PROGRAMMING IN C-LAB (2hr)	2	2	40	60	100
	·		TOTAL	·	18	30	165	435	600

SEM	PART	SUBJECT	CODE	TITLE OF THE PAPER	CREDITS	HOURS	Int. Marks	Ext. Marks	Total Marks
	Ι	LANGUAGE	14UTAC41	TAMIL /OTHER LANGUAGES IV	3	6	25	75	100
	Π	LANGUAGE	14UENC41	ENGLISH PAPER IV	3	6	25	75	100
IV	III	CORE-4	14UMAC41	MECHANICS	5	6	25	75	100
	Ш	ALLIED-7	14UPHA41	PHYSICS IV	4	4	25	75	100
	m	ALLIED-8	14UPHA4P	PHYSICS-IV(PRACTICAL)	1	2	40	60	100
	III	ALLIED-9	14UMAA41	PROGRAMMING IN C++(THEORY)	3	4	25	75	100
		ALLIED-10	14UMAA4P	PROGRAMMING IN C& C++(LAB)	1	2	40	60	100
	V		14UEAC61	EXTENSION ACTIVITIES	2	-	25	75	100
			TOTAL		20	30	205	495	700
	III	CORE-5	14UMAC51	REAL ANALYSIS	5	5	25	75	100
	III	CORE-6	14UMAC52	MODERN ALGEBRA	5	5	25	75	100
	III	CORE-7	14UMAC53	NUMERICAL ANALYSIS	5	5	25	75	100
v	III	CORE-8	14UMAC54	DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS	5	5	25	75	100
	III	ALLIED-11	14UMAA51	STATISTICS-I	4	6	25	75	100
	IV	SBS-5	14UMAS51	ASTRONOMY	2	2	25	75	100
	IV		14UENS51	ENVIRONMENTAL STUDIES	2	2	25	75	100
TOTAL			28	30	175	525	700		
	III	CORE-9	14UMAC61	COMPLEX ANALYSIS	5	5	25	75	100
	III	CORE-10	14UMAC62	LINEAR ALGEBRA	5	5	25	75	100
	III	CORE-11	14UMAC63	GRAPH THEORY	5	5	25	75	100
VI	III	CORE-12	14UMAC64	OPERATIONS RESEARCH	5	5	25	75	100
	III	ALLIED-12	14UMAA61	STATISTICS-II	4	6	25	75	100
	IV	SBS-6	14UMAS61	INTERNET WITH PRACTICAL	2	2	25	75	100
	IV		14UENS61	VALUE EDUCATION	2	2	25	75	100
TOTAL				30	30	200	600	800	

Semester	No. of Papers	Credits	Total mark
Ι	7	21	700
II	8	22	800
III	5	20	600
IV	7	20	700
V	7	28	700
VI	8	29	800
Grand Total	42	140	4300

#### **SEMESTER I**

#### CORE -1

## CALCULUS

14UMAC11

**Unit-I** Successive Differentiation- Expansion of functions-Leibnitz formula- Maxima and Minima functions of two variables.

**Unit-II** Sub tangent and sub normal – Polar co-ordinates-Angle between the radius vector and the tangent –Slope of tangent- Angle of intersection of two curves- Polar sub tangent and Polar sub normal.

Unit-III Envelopes-curvatures-circle, radius, and centre of curvature-Evolutes.

**Unit** – **IV** Polar co-ordinates-Radius of curvature in Polar co-ordinates- P.r. equation- ped equation of curves- Definite integrals and their properties.

**Unit-V** Reduction formula for Sin <sup>n</sup>X, cos <sup>n</sup>X, tan <sup>n</sup>X, cosec <sup>n</sup>X, sin <sup>n</sup>X cos <sup>m</sup>X- Bernoulli's formula- double and triple integrals-simple problems.

## TEXT

Calculus - Volume I and II by T.K. Manikka Vasagam Pillai and S.Narayanan.

Publications: S.Viswanathan, 1996.

**SBS -1** 

## UNIT-I

Problem on numbers.

## UNIT-II

Problems on ages

## UNIT-III

Ratio and propotion.

#### **UNIT-IV**

Time and distance.

## UNIT-V

Permutations and combinations.

## **TEXT BOOK:**

"Quantitative Aptitude For Competitive Examination" by R.S.Agarwal, revised and enlarged edition, S.Chand Publications ,New Delhi ,Reprint 2007.

**SBS -2** 

## UNIT-I

Sequences-Bounded, Convergent, divergent and Oscillating Sequences-Subsequences(Definition only)

## UNIT-II

Cauchy's Sequences-Cauchy' general principle of convergence.

## UNIT-III

Infinite series-Convergent ,Divergent series-Alternating series (Definition and Examples

## only).

## UNIT-IV

Comparison test(statement only)-simple problems.

## UNIT-V

Tests of Convergence-Kummer's Test, Raabe's Test(Statements only)-Simple problems.

## **TEXT BOOK:**

SEQUENCE AND SERIES by Dr.S.Arumugam and Mr.Thangapandi IIsac(1997 New Gamma publication

## NME 1FUNDEMENTALOFMATHEMATICS - I14UMAN11

## UNIT – I

Theory of indices - Ratio and Proportion.

## UNIT – II

Differential calculus and Integral calculus- (Simple Problems)

### UNIT – III

Theory of Matrices – Addition. Multiplication of two matrices.

## $\mathbf{UNIT}-\mathbf{IV}$

Finding the n<sup>th</sup> term and sum to n terms of an A P and G.P-Arithmetic mean

## UNIT – V

Solving the quadratic equations – finding the roots – forming the equation when roots are given. (Only second degree)

## **TEXT BOOK:**

Business Mathematics by M.Manoharan, C.Elango Paramount Publication 1994

## SEMESTER – II

## CORE -2TRIGNOMETRY AND FOURIER SERIES14UMAC22

#### UNIT – I

Expansions of  $\sin^{n}x$ ,  $\cos^{n}x$ , tan.  $x^{n}$ ,  $\sin^{n}x \cos^{n}x$ ,

## UNIT – II

Hyperbolic Functions. Inverse Hyperbolic Functions.

## UNIT – III

Logarithm of Complex Numbers.

## $\mathbf{UNIT}-\mathbf{IV}$

Summation of series.

## UNIT – V

Fourier series, Trigonometric series, even and add functions – half range Fourier series.

## TEXT

Trigonometry by T.K. Manickampillai. Calculus Volume II By Dr.S.Arumugam and Mr.Thangapandi IIsac(1997)

#### **THEORY OF EQUATIONS**

#### 14UMAS21

## UNIT – I

Theory of Equations – Imaginary roots – Irrational Roots – Relation between the roots and co-efficient – symmetric functions of the roots.

## UNIT – II

Sum of the powers of the roots of an equation – Newton's Theorem – Transformation of Equations – Roots Multiplied by a given number – Reciprocal roots – Reciprocal equations.

#### UNIT – III

Standard forms to increase and decrease the roots of a given equation by a given quantity

- Removal of terms - Descartes rule of sings.

## $\mathbf{UNIT} - \mathbf{IV}$

Multiple Roots – General Solution of cubic equations.

## $\mathbf{UNIT} - \mathbf{V}$

Ferrari's Method of solving biquadrate equation.

## TEXT

1. Algebra by T.K.M.Pillay & Nagayan.

### SBS 3

SBS 4

## UNIT-I

Fundamendals of Book keeping-methods of keeping and presenting accounts.

## UNIT-II

Bank transactions and bank reconciliation statement.

## UNIT-III

Preparation of trial balance.

## **UNIT-IV**

Objects and advandage of costing-Books and records-Elements of cost-cost sheet-unit

## cost.

## **UNIT-VI**

Control and pricing of natorials-Bin cars and stores ledgers.

## Text book

- 1. Advanced accountancy -JAIN&NARANG
- 2. M.C.shukla &T.S. Crewal:cost accounts

#### NME 2 FUNDEMENTAL OF MATHEMATICS - II 14U

## UNIT-I

Statistics- average –Mean and Median.

## UNIT-II

Dispersion - Range, Quartile deviation , standard Deviation.

## UNIT-III

Correlation - Pearson's Coefficient of correlation, rank Correlation Coefficient.

#### **UNIT-IV**

Index numbers –calculation of indices using simple aggregate method and average of price relative methods- weighted index numbers- Laspeyre's paasche's and Fisher's index numbers.

## UNIT-V

Curve fitting – Fitting of a straight line and parabola.

## **TEXT BOOK:**

Statistics by Dr.S.Arumugam, Publications: SciTech, 2006.

## **SEMESTER – III**

## CORE-3 ANALYTICAL GEOMETRY AND VECTOR CALCULUS 14UMAC31

## Unit-I

The plane – Angle between two planes - Length of perpendiculars – Bisector - Distance between two planes.

#### Unit-II

The straight line – symmetric form – image of a point- image of a line about the plane and the straight line – Angle between a plane and a Straight.

#### **Unit-III**

Coplanar lines – shortest distance between two lines –skew lines.

## Unit – IV

The sphere – Equation of the sphere – Equation of the tangent planes.

## Unit-V

Vector differentiation – Gradient – divergent – curl – properties – vector – line integrals – surface integral – volume integrals.

#### **TEXT:**

Analytical Geometry of 3D and Vector Calculus by Dr.S.Arumugam.

#### ALLIED -1 PROGRAMMING IN C (THEORY) 14UMAA31

#### UNIT – I

Overview of C: History of C – Importance of C – Basis structure of C – Programming style – Constants, Variables and Data types – declaration of constant, volatile – overflow and underflow of data. Operators and expressions: arithmetic, relational, logical, assignment operators – increment and decrement operators – conditional operators, bitwise operators, special operators – arithmetic expression – evaluation of expressions – precedence of arithmetic operators – type conversion in expression – operator precedence and associativity – mathematical functions – managing I/O operations: reading and writing a character – formatted input, output.

#### UNIT – II

Decision making and branching: if statement, if....else statement – nesting of if .....else statement – else if ladder – switch statement – the ?: operator – goto statement – the while statement – do statement – the for statement – jumps in loops.

#### UNIT – III

Arrays: one dimensional array – declaration, initialization – two dimensional array – multi dimensional array – dynamic arrays – initializations. Strings: declaration, initialization of string variables – reading and writing string – arithmetic operations on strings – putting strings together – comparison – string handling function – table of strings – features of string.

#### UNIT - IV

User defined functions: need – multi function program – elements of user defined function – definition – return values and their types – function calls, declaration, category – all types of arguments and return values – nesting of functions – recursion – passing arrays, strings to functions – scope visibility and life time of variables – multi file programs. Structures and Unions: defining a structure – declaring structure variables – accessing structure members initialization – copying a comparing – operations on individual members – arrays of structures – arrays within structures – structures within structures – structures and functions – unions – size of structures – bit fields.

#### $\mathbf{UNIT} - \mathbf{V}$

Pointers: accessing the address of a variable – declaring, initialization of pointer variables – accessing a variable through its pointers – chain of pointers and arrays – pointers and characters strings – simple programs. Files: defining, opening, closing a file. I/O operations on files – error handling during I/O operations – random access to file – command line arguments.

## **TEXT BOOK:**

E. Balagurusamy, "Programming in ANSI C", Edition 3, Tata McGraw Hil Publishing Company, 2005.

## **Reference Book:**

Programming with C (Schuman's outline series), Gottfried, Tata McGraw Hill.

## ALLIED -2 PROGRAMMING IN C-LAB 14UMAA3P

- 1. Write a c programme to find the sum ,average,standard deviation for a given set of numbers.
- 2. Write a c programme to generate "n" prime numbers.
- 3. Write a c programme to generate Fibonacci series.
- 4. Write a c programme to find simple interest.
- 5. Write a c programme to sort the given set of numbers in ascending and descending order.
- 6. Write a c programme to check whether the given string is a palindrome or not.
- 7. Write a c programme to count the number of vowels in the given sentence.
- 8. Write a c programme to find the factorial of a given number using recursive function.
- 9. Write a c programme to print the student's mark sheet.
- 10. Write a c programme to add two matrices using function.

#### SEMESTER - IV

## CORE -4

#### **MECHANICS**

#### 14UMAC41

#### $\mathbf{UNIT} - \mathbf{I}$

Forces acting at a Point – Resultant and components – Parallelogram law of forces – Triangle law of forces – Lami's Theorem – Resolution of a forces – Theorem of resolved parts – Resultant of any number of coplanar forces – condition of equilibrium.

#### $\mathbf{UNIT}-\mathbf{II}$

Forces acting on a rigid body – Parallel forces – Resultant of two like and unlike parallel forces – Moment of a forces – Varignon's Theorem – Three forces acting on a rigid body – law of friction – coefficient of friction – angle of friction – cone of friction – problems.

## UNIT – III

Projectiles – shape of projectile – range of a projectile – inclined plane.

## $\mathbf{UNIT}-\mathbf{IV}$

Impact – Impulses- impact in a fired plane – Direct and oblique impact – S.H.M. – Equation of motion – composition of S.H.M.

#### $\mathbf{UNIT}-\mathbf{V}$

Central orbit – components of velocity and acceleration along and perpendicular to radius vector – differential equation of central orbit – pedal equation.

## **TEXT BOOK:**

- 1. "Statistics" by M.K. Venkat Ramman.
- 2. "Dynamics" by M.K. Venkat Ramman.

#### UNIT – I

Principle of object oriented programming – software evolution – OOP Paradign – Basic concepts of OOP – object oriented languages – Application of OOP – Introduction to C++ - tokens – keywords – Identifiers and Constants – basic data types – symbolic constants – type compatibility – Declaration – Scope resolution operator – Memory Management operator – manipulators – type implicit conversions operators precedence and associatively – control structures.

#### $\mathbf{UNIT} - \mathbf{II}$

Functions in C++ - Main Functions – Function Prototyping – Call by reference – Return by reference – Inline function – Default arguments – Constant arguments – Function Overloading – classes and Objects – Specifying a class – Defining Member Functions – Nesting of member functions – Arrays within a class – Static Data Members – Static Member Functions – Arrays of objects – Object as function Arguments – Friendly functions – Returning objects.

#### $\mathbf{UNIT} - \mathbf{III}$

Constructors – Parameterized Constructors – Multiple Constructors – Dynamic Initialization of Objects – Copy Constructor – Dynamic Constructors – Construction Two dimensional arrays – Destructors – Defining Operator Over loading Unary Operators, Binary Operators – Overloading Operators Using Friends – Manipulation of Strings using Operators – Rules – Types Conversion.

#### UNIT - IV

Inheritance – Single Inheritance – Multilevel, Multiple, Hierarchical Inheritances – Hybrid Inheritance – Virtual Base Classes – abstract Class – Constructors in Derived Class – Nesting of Classes – Pointers to Objects – this Pointer – Pointers to Derived Class – Virtual Functions – Pure Virtual Functions.

## $\mathbf{UNIT} - \mathbf{V}$

Managing Console I/O Operation – Unformatted and Formatted Console I/O Operations – Managing Output with Manipulators – Working with Files – Classes of File Stream Objects – Opening and Closing a file – End of File Detections – File Pointers and their manipulations. Error Handling During file Operations – Command Line Arguments.

## **TEXT BOOK:**

E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, New Delhi – Second Edition.

UNIT I	:	Chapter 1, 3.1 – 3.5, 3.8-3.13.14, 3.16, 3.18, 3.21, 3.23, 3.24
UNIT II	:	Chapter 4.1, 4.9, 5.3-5.7, 5.11-5.16.
UNIT III	:	Chapter 6.7.
UNIT IV	:	Chapter 8,9
Unit V	:	Chapter 10,11,1 – 11,6, 11.9 – 11.10.

#### Allied -4

#### **PROGRAMMING IN C++ -LAB**

- 1. Write a c++ programme to find largest number among three numbers.
- 2. Write a c++ programme to convert Fahrenheit into Celsius.
- 3. Write a c++ programme to find variance and standard deviation
- 4. Write a c++ programme to display the output in triangle form.
- 5. Write a c++ programme to perform area calculation using function overloading.
- 6. Write a c++ programme to perform string manipulation using function overloading.
- Write a c++ programme to find minimum of two numbers between two class objects using friend function.
- Write a c++ programme to overload unary minus operator which changes sign of given vector.
- 9. Write a c++ programme to overload binary + operator which adds two complex numbers.
- 10. Write a c++ programme to processstudents mark list using multiple inheritance.

#### SEMESTER V

## CORE - 5 REAL ANALYSIS 14UMAC51 UNIT – I

Sequences – Definitions and examples – convergent and divergent sequences – Cauchy sequences (Definition only) Introduction of countable and uncountable sets – Holder's and Minkowski's inequality – Metric space – Definition and examples.

#### $\mathbf{UNIT} - \mathbf{II}$

Open sets and closed sets definition and examples – completeness – definition and examples – cantor's intersection theorem and Baire's category theorem.

## $\mathbf{UNIT}-\mathbf{III}$

Continuity – Definition and examples – Homeomorphism (Discontinuous functions on R are not included)

#### $\mathbf{UNIT} - \mathbf{IV}$

Connected – Definition and examples – connected subsets of R connectedness and continuity – Intermediate value theorem.

#### $\mathbf{UNIT} - \mathbf{V}$

Compactness – Definition and examples – compact subset of R – Equivalent Characterization of Compactness.

#### **TEXT BOOK:**

Real Analysis by Dr.S. Arumugam. Publications, New Gamma – 2005.

#### CORE -6

**MODERN ALGEBRA** 

## UNIT - I

Relations – Types of Relations – Functions – Binary operations – Peano's Postulates – Principle of induction – simple problems – Law of Trichotomy.

## $\mathbf{UNIT} - \mathbf{II}$

Subgroups – Definition and examples – centers – Normalizer – intersection and union of subgroups – permutations – cycles and Transpositions – Even and odd permutations – Sn and An – cycle groups – Definition and examples – cyclic groups are abelian – A group is cycle if its order is equal to the order of one of its elements – subgroups of cyclic groups are cyclic – Theorems on the number of generator of cyclic groups.

## UNIT – III

Cosets and their properties – congruence relation module a subgroup – Lagrange's theorem and its consequence – The order of an element of a finite group divides the order of the group. A group of prime order is cyclic – A group has no proper subgroup if it is a cyclic group of prime order – Euler's theorem – Format's theorem – Normal subgroups – Equivalent Conditions for a subgroup to be normal – Any subgroup of an abelian group is normal – A subgroup of index 2 is normal – Intersection of two normal subgroups – Intersection of a subgroup and a normal subgroup. If a subgroup has exactly one subgroup of given order then it is normal – Quotient group.

#### $\mathbf{UNIT}-\mathbf{IV}$

Homomorphism – Types of homomorphism – Homomorphism with reference to identity – Inverse and order of an element – its properties – Kernel of homomorphism – Homomorphism image of an abelian group is abelian – and that of a cyclic groups is cyclic – Isomorphism – Isomorphism is an equivalence relation among groups – Any infinite cyclic group is isomorphic to the group of integers – Any finite cyclic group of order n is isomorphic to Zn.

#### $\boldsymbol{UNIT}-\boldsymbol{V}$

Cayley's Theorem – the fundamental theorem of homomorphism – Rings – Definition and example – Elementary properties.

#### **TEXT BOOK:**

Modern Algebra by Dr.S. Arumugam.

## UNIT – I

Errors in computer arithmetic – Empirical relations and curve fitting Algebraic and Transcendental Equations; Iteration Method – Bisection method – Regular Falsi method – Newton Raphson method.

## $\mathbf{UNIT}-\mathbf{II}$

Simultaneous equations; Gauss elimination method – Gauss Jordan, Gauss seidet iteration methods.

## UNIT – III

Interpolation; Newton's interpolation formulae – central difference interpolation formulae – Legrange's interpolation formulae – Inverse interpolation.

## UNIT – IV

Numerical differentiation; Newton's forward and Backward difference formulae – Numerical Integration; Trapezoidal role – Simpson's rule – Eigen Values and Eigen vectors of a matrix.

#### $\mathbf{UNIT} - \mathbf{V}$

Numerical solution of differential equations; Euler's method – Taylor's series method – Range – Kutta method.

## **TEXT BOOK:**

 Numerical Method : T. Veerarajan and T. Ramachandran II<sup>nd</sup> Edition, Tata McGraw Hill – 2006.

## **REFERENCE BOOK:**

- Numerical Methods by S. Arumugam and A. Thangapandi Issac,
  A. Somasundaram, Sci Tech Publication, Chennai, 2002.
- Introductory Methods of Numerical Analysis, S.S. Sastry, Prentice Hall of India Pvt. Ltd., New Delhi, 4<sup>th</sup> Edition, 2008.
- Couputer oriented Numerical Methods.
  P. Thangadurai, Prentice Hall of India Pvt. Ltd., New Delhi 2008.

## CORE – 8 DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS 14UMAC54

## Unit-I

Exact differential equations-Equations of the first order but of higher degree- equations solvable for y – equations solvable for x and p – Clairaut's form-Equations that do not contain x,y explicitly- Equations homogeneous in x and y – Linear Equations with constant co-efficient.

## Unit-II

Linear equations with variable co-efficient- equations reducible to the linear homogeneous equations-Simultaneous linear equations.

## Unit-III

Linear equations of the second order – Reduction of the normal form – removing the first derivative method – variations of parameters.

## Unit – IV

P.D.E. of the first order – formation of P.D.E. – Lagrange's method of solving the linear equations – standard forms – equations reducible to the standard form.

## Unit-V

Laplace Transforms – theorems – problem – evaluation of integrals - inverse Laplace's Transforms – solving ordinary D.E. with constant co-efficient and variable co-efficient – Simultaneous linear equation using Laplace transforms.

## TEXT BOOK

 'Calculus' – Volume 2, T.K.Manicka Vasagam Pillai and S.Narayanan Publications: S.Viswanathan, 1996.
 Unit-1: Chapter 2(sec 6.1), Chapter 4(full), 5(sec 5.1-5.4)

**Unit-2:** Chapter 5(5.5,5.6), Chapter 6

**Unit-3:** Chapter 8(8.4)

Unit-4: Chapter 12

## ALLIED - 5 STATISTICS-I

## UNIT-I

Measures of Averages-Measures of Dispersion-Skewnesss based on Moments.

## UNIT-2

Correlation and Regression- rank Correlation Co-efficient.

## UNIT-3

Index Numbers and Time series.

## Unit-4

Curve fitting(All types of curves)

## UNIT-5

Theory of Attributes.

## Text Book: Statistics by S.Arumugam

Publications: SciTech, 2006.

## $\boldsymbol{SEMESTER}-\boldsymbol{V}$

## SBS - 5 ENVIRONMENTAL STUDIES

14UEVS51

## **Unit -1: Earth and its Environment**

- a) Earth –formation and Evolution of Earth over time structure of Earth and its Components- Atmosphere, Lithosphere, Hydrosphere and Biosphere
- b) Resources- renewable and non renewable resources

## Unit -2: Ecology and ecosystem concepts

- a) Ecology- definition- Ecosystem ; Definition- Structure and function- energy flow Food chain and food web- one example for an ecosystem
- b) Biogeochemical cycles- Nitrogen, Carbon, Phosphorous and water

## Unit-3: Biodiversity of India

- a) Introduction- definition- values of Biodiversity- Threat to Biodiversity-Conservation of Biodiversity
- b) Biodiversity of India –as a mega diversity nation- bio- geo graphical distribution-Hot spots of biodiversity – National Biodiversity conservation Board and its function

## Unit -4: Pollution and Global issues

- a) Definition ,causes,effects and control measures of Air,Water,Soil,Marine,Noise, Thermal and Nuclear pollution
- b) Global issues : Global warming and Ozone layer depletion

## **Unit-5 : Development and Disaster Management**

- a) Sustainable Development Sustainable Agriculture Organic forming ,Irrigation Water harvesting and waste recycling –Cyber Waste and Management
- b) Disaster Management Flood and Drought Earthquake and Tsunami Landslides and Avalanches – cyclones and Hurricanes – Precautions, Warnings, Rescue and Rehabilitation.

#### TEXT:

1. Environmental studies – published by Madurai Kamaraj University.

References:

- 1. Environmental studies by Dr.N.Arumugam & Prof.V.Kumarasan, Saras Publication 2009
- 2. Environmental studies by Bharathiyar University, Coimbatore 2004.

#### $\label{eq:semester} \textbf{SEMESTER} - \textbf{VI}$

#### CORE -9

## COMPLEX ANALYSIS

14UMAC61

## UNIT – I

Analytic function – C-R equation – sufficient condition – harmonic functions.

## UNIT – II

Elementary transformation – bilinear transformations – cross ratio – fixed point – special bilinear transformation – real axis to real axis – unit circle to unit circle and real axis to unit circle.

#### $\mathbf{UNIT}-\mathbf{III}$

Cauchy's fundamental theorem – cauchy's integral formula – formula for higher derivatives – Morero's Theorem – Cauchy's inequality – Lioville's theorem – Fundamental Theorem of Algebra.

## $\mathbf{UNIT}-\mathbf{IV}$

Taylor's Theorem – Lauvant's Theorem – singular point – poles – Argument principle – Rouche's theorem.

#### $\mathbf{UNIT}-\mathbf{V}$

Calculus of Residues – Evaluation of definite integrals.

## **TEXT BOOK:**

Complex Analysis Dr. S. Arumugam, T.P. Issac, S. Somasundaram.

#### **CORE -10**

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## UNIT - I

Vector spaces – Definition and examples – sub spaces – linear transformation – fundamental theorem of homomorphism.

#### UNIT – II

Span of a set – linear independence – Basis and Dimension – rank and nullity Matrix and linear transformation.

#### $\mathbf{UNIT}-\mathbf{III}$

Inner product space – Definition and examples – orthogonality – orthogonal complement.

#### $\mathbf{UNIT} - \mathbf{IV}$

Matrices – elementary transformation – inverse – Rank – test for consistency – solving linear equations – Cayley - Hamilton's theorem – Eigen Values and Eigen vectors.

## $\mathbf{UNIT} - \mathbf{V}$

Bilinear forms – Matrix of a bilinear form – quadratic forms – reduction to quadratic forms.

#### **TEXT BOOK:**

Modern Algebra by Dr.S. Arumugam. Publications: Scitech, 2006

#### **GRAPH THEORY**

## UNIT - I

Graphs – Degrees – Sub graphs – Isomorphism – Ramsey Numbers – Independent sets and coverings – Intersection Graphs and line graphs – Matrices of graphs – operation on graphs.

#### UNIT – II

Degree sequences – Graphic sequences – walks, trials and paths – connectedness and components – Blocks – connectivity – Euleriang graphs – Hamiltonian graphs.

#### $\mathbf{UNIT}-\mathbf{III}$

Trees – characterization of trees – centre of a tree –Matchings – Matchings in Bipartite graphs.

#### UNIT – IV

Planer graphs and properties – Characterization of planer graphs – thickness – crossing numbers and outer planarity chromatic number and Chromatic index – five colour Theorem and four colour theorem.

#### $\mathbf{UNIT} - \mathbf{V}$

Chromatic polynomials – Definition – basic properties of digraphs – paths and connectedness in digraphs – Matrices associated with digraphs – Tournaments.

## **TEXT BOOK:**

S. Arumugam and S. Ramachandran Invitation to Graph theory, Scitech Publication, 7/3C, Madley Road, T. Nagar, Chennai.

## UNIT – I

Linear Programming Problem – formulation of L.P.P. Mathematical form – Graphical Method – The Simplex Method – Method of Penalty – Two Phase Method.

## UNIT – II

Duality – Duel simplex method.

#### UNIT – III

Transportation problem – mathematical form – initial solutions by all methods – MODI Method for both balanced and unbalanced T.P. – Assignment Problem.

## UNIT - IV

Games Theory – Two person Zero sum game – saddle point – game in the saddle Point – solution of game by using formula – graphical method – Method of dominance and L.P.P. Method.

## $\mathbf{UNIT} - \mathbf{V}$

Sequencing – Replacement problem – Queuing theory – Queuing system – elements of queuing system – classification of queuing models – Poisson queuing system – Model I CM/M/I – FIFO) and Model II (M/M/I – N/FIFO) – simple problems.

## **TEXT BOOK:**

Operation Research by Kanti Swarup and Man Mohan Sultan Chand Publications, New Delhi, 2004.

## ALLIED - 6

#### STATISTICS-II

## Unit- I:

Theory of probability –sample space- probability function – Laws of addition- Boole's inequality-Law of multiplication=problems – Baye's Theorem-problems.

## Unit-II:

Random variables- distribution function-discrete and continuous random variables – probability density function- Mathematical expectation(one dimension only)

## Unit-III:

Moment gathering function- cumulents- Theoretical distributions- Binomial-Poisson-Normal

#### Unit – IV:

Tests of significance of Large Samples

## Unit-V:

Tests of significance of small samples - t.f. Chi-square

## **TEXTBOOK:**

Statistics by Dr.S.Arumugam, ,A.Thangapandi Issac Publishers: New Gamma Publishing House—July—2009. Unit-1--Chapter 11 Unit-2---Chapter 12 sections 12.1-12.4 Unit-3---Chapter 12 sections 12.5-12.6,Chapter 13 Unit-4---Chapter 14 Unit-5 Chapter 15,16

## SBS 6 INTERNET WITH PRACTICAL 14UMAS61

#### Unit-1

**Introduction to Internet-** History of Internet-Who runs internet? How Internet works? Information on Internet-Requirements for connecting to internet- Basic Internet terms-HTML-Net Etiquette-Internet. Services and Governance- Impact of internet on society.

## **Internet Technology and Protocols**

IP Address in internet- Introduction to networking-Networking basics-Networking terms-Types of Networking –Local Area Network-Wide areaNetworks(WAN)-Types of wide area Networks **UNIT-2** 

**Introduction world wide web-**Evolution of world wide web-Basic features-Web browser-Popular web browsers-web servers-Hypertext Transfer protocol(HTTP) –Uniform resource locator(URL)-Search engines-search engine categories- searching criterion-Hypertext.

**Browsers-** What is a browser?- Basic features of web browsers-Running a browser-working of Internet Explorer-Toolbar Buttons-Getting to a website-working with favourites-working with history-Back and forward buttons-Bookmarks-working on the web using the browsers-customization of Browsers-Netscape Browser-keyboard shortcuts for working in internet explorer.

#### Unit-3

**Working with email-**e-Mail-Opening of email account-e-mail organization-parts of e-mail Text-working with Messages-Reading a Message-reading the message-Replying to a Message – forwarding a message-Deleting a message- Changing view –using your Own stationery-starting and addressing a message-Creating Stationery-Creating a Signature-attaching a file or an Item to a Message- email protocols-Email Clients-signature file.

#### UNIT-4

Introduction to HTML command tags-Quotation Marks-Spacing –special Symbols-New Web page creation looking at your Page creation-Looking at your page in a browser-Defining web page-main body of the Text-putting headers- Adding paragraph-formatting Text in HTML-Font type-Font size-Using big and small –Using predefined Fonts-Making bold and Italic-Setting Colours-Text color- Supercripts and subscripts striking out or Underlinning text-Inserting Graphics- Scaling and Image-Images alignment- Creating Banner-adding horizontal rules-wrapping text between two images- Ending text wrap-adding space around an image-using low Resolution images –Page layouts-setting Margin-Space between paragraphs-Leaving Block of space-Line Breaks –indents-Centralizing-Creating columns-Setting Background Color-Block Quotes.

#### UNIT-5

**Advanced HTML** Tables- a way Representing Data-creating table-dividing Table into Columns- Dividing table into Horizontal sections –creating Headers-Adding a Nordberg- Putting a background image-Heading across Two or more Columns- changing Colour of a cell-aligning the contents of cells-display of Tables-working with Forms- Creating a form-working with Menus-Working with radio buttons-check Boxes-larger Text areas-password Boxes- submit Button-Resetting the form-Allowing Visitors to Upload files-Active Images.

#### **TEXTBOOK:**

Internet and Web design, ramesh Bangia, Firewall Media, (An imprint of Lakshmi publications Pvt.Ltd.).Second dition , 2006. Unit-1 : Chapters 1,2 (given topics) Unit-2 : Chapters 3,4 Unit-3 : Chapters 5

- Unit-4 : Chapters 10 (upto Block quotes)
- Unit-5 : Chapters 10 (from tables)

#### SEMESTER – I

#### ALLIED MATHEMATICS I 13UMAA21

#### UNIT – I: ALGEBRA:

Theory of equations  $-n^{th}$  degree equation has exactly n roots - Relation between the roots and the co-efficients.

#### UNIT – II: ALGEBRA:

Finding the roots upto two decimals by Newton's, Horner's Method.

#### UNIT – III: CALCULUS:

Radius of curvature, centre of curvature of Plane curves – Definite Integrals – Reduction formulas for  $\sin^n x$ ,  $\cos^n x$ ,  $\tan^n x$ ,  $\sec^n x$ ,  $\cot^n x$ ,  $\csc^n x$ , and  $\sin^m x \cos^n x$  and simple problems.

#### **UNIT – IV: TRIGONOMETRY:**

Expansions - Hyperbolic Functions - Logarithm of complex numbers.

## UNIT – V: ANALYTICAL GEOMETRY OF THREE DIMENSIONS:

Direction Cosiness, direction ratios of a line – angle between two straight line – equation of a plane – equation of straight line – Angle between a plane and a line, Co-planar lines – shortest distances.

#### **TEXT BOOK:**

"Ancillary Mathematics" Volume, by Dr. S. Arumugam, New Gamma Publications, 1999. Re print 2006.

#### **SEMESTER – II**

## ALLIED MATHEMATICS – II 13UMAA21

## UNIT – I: VECTOR CALCULUS:

Vector Differentiations – Velocity, acceleration – vector Differential operators – Gradient – Divergence – Curl and their simple properties – Directional derivatives – solenoidal – irrational vectors – Line integrals.

#### UNIT – II: ALGEBRA:

Matrices - rank - consistency of equations - Eigen values and eigen vectors.

## UNIT – III: STATISTICS:

Curve fittings – Correlation – rank – Regression.

## **UNIT – IV: STATISTICS:**

Interpolation – Lagrange's and Newton's method – attributes – Index numbers.

## **UNIT – V:** FOURIER SERIES:

Fourier series, Trigonometric series, even and add functions – half range Fourier series.

#### **TEXT BOOK:**

"Ancillary Mathematics" Volume 2, by Dr. S. Arumugam, New Gamma Publications, 2006.

#### **SEMESTER - III**

## ALLIED MATHEMATICS –III 13UMAA31

#### Unit-I

Exact differential equation – second order equations – second order equation with right hand side in form  $X^n$ ,  $e^{ax}$ , Sin ax,  $\cos ax$ ,  $e^{ax}$ ,  $\sin ax$ ,  $e^{ax}$ ,  $\cos ax e^{ax}$ ,  $X^n$ 

## Unit-II

Laplace transforms –solution of differential equations using Laplace transforms –Partial Differential Equations – Formations – solutions- standard form  $P_p + Q_p = R$ .

## Unit-III

Growth, decay and chemical reactions - Simple electric circuits and planetary motions.

## **Unit-IV**

Analytical functions – C.R. equations (without proof) – bilinear transformations – cross ratios.

#### **Unit-V**

Group – Axioms – abelian Groups – sub Groups – permutation Groups (No theorem), Homomorphism, cyclic groups.

## **TEXT BOOK**

"Ancillary Mathematics" Volume 3, by Dr. S.Arumugam, New Gamma Publications, 2006..

## **SEMESTER IV**

## ALLIED MATHEMATICS – IV 13UMAA41

## Unit-I

Definition – Nature and scope –models – definitions of a standard linear programming problems – definition of feasible solution – optimal solution – optimum basic feasible solution – degenerate solution of a LPP.

## Unit-II

Mathematical formulation of LPP – Slack and surplus variable – Graphical solution of LPP.

## **Unit-III**

Simplex method of solving a LPP charness method of penalties – concept of duality – formation of dual LPP – the dual of dual is the primal (only problems)

## **Unit-IV**

Transportation problem – finding initial feasible solutions by North -West Corner method and Vogel's Approximation method –Optimal solution of Transportation problems.

## Unit-V

Assignment problem – solution of assignment problem – travelling salesmen problem.

## **TEXT BOOK**

"Operational Research" by Kanti Swarup, Sultan Chand publicationsn, 2006 (New Delhi).