DEPARTMENT OF MATHEMATICS

SYLLABUS

2011-2014

OBJECTIVES

- To impart value based education.
- To provide strong foundation in Mathematics.
- To make the students move towards higher academic ambitions in advanced Mathematics,technology,Bio informatics etc.
- To develop the students logical,systematic and critical way of thinking to assist in problem solving in their chosen career.
- To provide students scope for acquiring extra credits.

ELIGIBLITY FOR ADMISSION:

Candidate should have passed the higher secondary examinations conducted by the Board of Higher Secondary Education,Government of Tamilnadu or any other Examination accepted by syndicate as equivalent thereto, with Mathematics as one of the subjects in Higher Secondary Education.

DURATION OF THE COURSE:

The student shall undergo the prescribed course of study for a period of three academic years(VI Semesters)

MEDIUM OF INSTRUCTION: **English**

GENERAL FRAMEWORK:

Course study-Part I, II, III, IV, V Subjects.

REGULATIONS:

1. Maximum marks for theory and practical paper is 100 each.
2. The external examinations will be conducted at end of each semester for the duration of three hours per paper.

EVALUATION:

For each course there will be Continuous Internal Assessment (CIA) and final semester examinations.

Continuous Internal Assessment (CIA) carries 25 marks.

The components of CIA are as follows:

Test	:	15
Seminar/Quiz	:	5
Assignment	:	5
Total	:	25

Total Marks for External is : 75

Question Paper Pattern :

Duration : 3 Hours

Maximum Marks : 75

Pattern	Marks
Part A:Answer all 10 Questions (Each carrying 1 mark)	10 x 1=10
Part B:Answer 5 out of 8 (Each carrying 7 marks)	5 X 7=35
Part C:Answer 3 out of 5 (Each carrying 10 marks)	3X10=30

For the LAB papers , internal marks will be 40 and external marks will be 60 ,totaling 100.

ELIGIBLITY OF DEGREE:

- No candidate will be eligible for degree without completing the prescribed courses of study, lab work etc., and passing all the prescribed external examinations.
- The candidate requires 75% of attendance to attend the semester exam.
- Three internal exams will be conducted and best of two will be considered for the internal mark consolidation.
- The passing minimum is 40%(both in internal and external separately) in each paper.
- To complete the course the students should earn a minimum of 140 credits.

COMMON COURSE STRUCTURE AND SCHEME OF VALUATION-CHOICE BASED CREDIT SYSTEM

Semester	Title of the paper	Hours	Marks/Grade			Credits
			CIA	CE	Total	
I	**Part – I** Tamil Paper -I	6	25	75	100	3
	Part – II English Paper -I	6	25	75	100	3
	Part – III Core subjects Paper 1-Calculus Paper 2-Theory of equations	5	25	75	100	4
	Trigonometry & Fourier Series	5	25	75	100	4
	Allied Subject - Physics **Paper-I**					
	Theory	3	25	75	100	5
	Practical	2	-	-	-	-
	Part-IV Skill based Course: Communicative English	2	25	75	100	2
	Value Education(theory - practical)	1	-	-	-	-
	Total	**30**			**600**	**21**
II	**Part – I** Tamil Paper -II	6	25	75	100	3
	Part – II English Paper -II	6	25	75	100	3
	Part – III Core subjects Paper 3-Analytic Geometry and Vector Calculus	5	25	75	100	4
	Paper 4-Sequence,Series and the Theory of numbers	5	25	75	100	4
	Allied Subject - Physics **Paper-II** Theory					
	Practical	3	25	75	100	5
		2	40	60	100	
	Part IV Skill Based Course: Computer Literacy	2	25	75	100	2
	Value Education (theory – Practical)	1	25	75	100	2
	Total	**30**			**800**	**23**

Semester	Title of the paper	Hours	Marks/Grade			Credits
			CIA	CE	Total	
III	**Part – I** Tamil Paper –III	6	25	75	100	3
	Part – II English Paper -III	6	25	75	100	3
	Part – III Core subjects Paper 5- Modern Algebra	5	25	75	100	4
	Paper 6 – Statics	4	25	75	100	4
	Allied Subject - PaperIII Statistics -I	5	25	75	100	5
	Part IV					
	Skill Based course: Entrepreneurship Development	2	25	75	100	2
	Non Major Elective –I Set theory and Logic	2	25	75	100	2
	Total	30			700	23
IV	**Part – I** Tamil Paper -IV	6	25	75	100	3
	Part – II English Paper -IV	6	25	75	100	3
	Part – III Core subjects Paper 7- Differential Equations and Its Applications	6	25	75	100	5
	Paper 8-Dynamics	5	25	75	100	4
	Allied Subject – Paper IV Statistics – II	5	25	75	100	5
	Part -IV Skill Based Course: Mathematical Aptitude for Competitive Examinations	2	25	75	100	2
	Part – V **Extension Activities**	-				1
	Total	**30**			**600**	**23**

Semester	Title of the paper	Hours	Marks/Grade			Credits
			CIA	CE	TOTAL	
V	**Part – III Core subjects**					
	Paper 9 – Real Analysis	6	25	75	100	5
	Paper 10 – Linear Algebra	6	25	75	100	4
	Paper 11 – Programming in 'C'					
	Theory	4	25	50	75	3
	Practical	2	-	25	25	1
	Major Elective – I Linear Programming	5	25	75	100	5
	Major Elective – II Graph Theory	5	25	75	100	5
	Part IV Skill Based Course: Solar system and stellar universe	2	25	75	100	2
	Total	**30**			**600**	**25**
VI	**Part – III Core subjects**					
	Paper 12 – Complex Analysis	6	25	75	100	5
	Paper 13 – Numerical Analysis	6	25	75	100	5
	Paper 14 – Programming in 'C++'					
	Theory	4	25	50	75	3
	Practical	2	-	25	25	1
	Major Elective – III Operations Research	6	25	75	100	5
	Part IV **Non Major Elective –II** Operations Research	2	25	75	100	2
	Skill Based Course: Fuzzy Mathematics Environmental Studies	2	25	75	100	2
		2	25	75	100	2
	Total	**30**			**700**	**25**

SEMESTER I- Paper –I

Hours: 5
Credits: 4

CALCULUS

Objectives:

To lay a strong foundation in calculus by introducing the concept of curvature

and multiple integrals.

To provide techniques in solving problems using Jacobions.

UNIT   1:

Successive differentiation-expansion of functions-Leibnitz formula-maxima and minima of functions of two variables. VOL I : (Chapter3: 1.1 to1.6 & 2.1,2.2)

(Chapter7: 1.2to 1.4 & Chapter 8: 4.1)

UNIT 2:

Curvature –Circle, radius and centre of curvature –evolutes and involutes-radius of curvature in polar coordinates-p-r equations.VOL I (Chapter10: 2.1 to 2.8)

UNIT 3:

Definite integrals and their properties –integration by parts –reduction formulas-

Bernoulli'sformula.VOL II (Chapter1: 11 , 12 , 13.1 to 13.10 ,14 , 15.1)

UNIT 4:

Double and triple integrals – change of variables VOL II : (Chapter 5 : 2.1 , 3.1 , 3.2 , 4) ,(Chapter 6 : 1.1 , 1.2 , 2.3 , 2.4)

UNIT 5:

Beta and Gamma functions – Applications of Beta and Gamma functions. VOL II

(Chapter 7 : 2.1 , 2.2 , 2.3 , 3 ,4 ,5 , 6)

Prescribed Text Book:

- **CALCULUS –VOL I & II**

 K.S. Narayanan and T.K.Manickavasagampillay,

S.Viswanathan (Printers & Publishers) PVT, Ltd., Chennai.

SEMESTER I-PAPER II

Hours: 5
Credits: 4

THEORY OF EQUATIONS, TRIGONOMETRY AND FOURIER SERIES

Objective:

To acquaint the students with the tools in mathematics to understand and solve problems.

UNIT 1:

Theory of equations - imaginary roots-rational roots - relation between the roots and

co-efficient of equation - symmetric functions of the roots - sum of the power of the roots of an equation - Newton's theorem. TB-2 (Chapter-6.1 to 14).

UNIT 2:

Transformation of equations - roots multiplied by a given number - reciprocal roots-reciprocal equations - standard forms to increase and decrease the roots of given equation by a given quantity.TB-2 (Chapter-6:15, 16, and 17).

UNIT 3:

Descartes' rule of signs - numerical solution by Horner's method and Newton's method - solution of cubic and bi-quadratic equations. TB-2(Chapter-6:24, 29.4, 30, 32, 33, 34, and 35)

UNIT 4:

Expansion of functions – sinnx, cosnx, tannx, $\sin^n x$, $\cos^n x$, series of sinx, cosx, tanx – hyperbolic functions - logarithm of complex numbers. TB -1(Chaper-1: 1.2, 1.3, and 1.4),(Chaper-2 and Chaper-3)

UNIT 5:

Definition – even and odd functions – half range Fourier series – expansion in any interval. TB (Chaper: 5)

Prescribed Text Books:

1. TRIGONOMETRY & FOURIER SERIES
Dr. s. Arumugam & others, Gamma Publishing House, Palayamkottai.
2. ALGEBRA VOL 1
T.K.ManickavasagamPillay, T.Natarajan and K.S.Ganapathy.
S. Viswanathan (printers & publishers) PVT, Ltd., Chennai.

SEMESTER II-PAPER III

Hours: 5
Credits: 4

ANALYTICAL GEOMETRY AND VECTOR CALCULUS

Objective:

To learn about three dimension geometry and to solve problems.

To appreciate idea of hierarchy in 3D.

Review:

Direction cosines, direction ratios of a straight line – plane equations – Angle between 2 planes – Length of the perpendicular – Distance between 2 planes.

UNIT 1:

Two Dimensional Analytic Geometry:

Polar Co-ordinates – distance between the points – Area of Triangles – equation of straight line, Circle, Conic – Simple Problems involving chords and Tangents. TB 2 (Chapter 9: 1 to 10).

UNIT 2:

The straight line – Symmetrical form – Image of a point – Image of a line about a plane – the plane and straight line – angle between a plane and a straight line- Coplanar lines – Shortest distance between two lines. TB 1 (Chapter 4: 4.1 and 4.2).

UNIT 3:

The sphere – equations of the sphere, tangent line – Plane section of a sphere – Equation of the circle on a sphere – Intersection of a two spheres – Equation of a tangent plane. Equation and Properties of a cone. TB 1 (Chapter 5 & 6: 6.1).

UNIT 4:

Differentiation – Gradient – Divergent- Curl and Connected Identities. TB 1(Chapter 7).

UNIT 5:

Vector Integration – Line Integeral – Surface Integral – Volume Integerals – Green's theorem – Gauss's theorem- Stoke's theorem (proof not expected) – Simple problems.

TB 1(Chapter 8).

Prescribed Text Books:

1. **ANALYTICAL GEOMETRY OF 3D AND VECTOR CALCULUS**
   Dr.S. Arumugam & Others, Gamma Publishing House, Palayamkottai.
2. **ANALYTICAL GEOMETRY OF 2D**
   T.K. ManicavachagomPillay&T.Natarajan.
   (S.VISWANATHAN (PRINTERS & Publishers) PVT., LTD).

SEQUENCES, SERIES AND THEORY OF NUMBERS

Hours: 5
Credits: 4

Objectives:

To acquire an in-depth knowledge in theory of verctors and apply the concepts in solving problems.

To learn more about the theory of numbers.

UNIT 1:

Sequences – limit of a sequence – bounded sequences – monotonic sequences – Behaviour of monotonic sequences – algebra of limits – condition for the convergence of a sequence – Cauchy's general principle of convergence. TB 1(Chapter 3:3.1 to 3.11).

UNIT 2:

Series – Convergence, divergence, oscillation of a series – comparision test – nature of the series $\sum 1/n^k$ for different values of k- Cauchy''s condensation test – D' Alembert's ratio test – Cauchy's root test – Raabe's test. TB 1(Chapter 4:4.1, 4.2, 4.4, 4.5, 4.3 (Theorem 4.8 only)).

UNIT 3:

Alternating series – absolute convergence – conditional convergence – Leibnitz''s test. TB 1(Chapter 5: 5.1 and 5.2).

UNIT 4:

Theory of numbers – prime and Composite numbers – The sieve of Eratosthenes – divisors of a given number – simple problems – Euler's function – integeral part of a real number – simple problems – product of r consecutive integers is divisible by r! TB 2 (Chapter 5:1 to 11).

UNIT 5:

Congruence-criteria of divisibility of a number- simple problems – numbers in arithmetic progression – fermat's theorem – simple problems – generalization of fermat's theorem-wilson's theorem – langranges theorem – simple problems. TB 2(Chapter 5:12 to 18).

Prescribed Text Book:

1. **SEQUENCES AND SERIES**
   Dr.S.Arumugam& others,
   Gamma publishing house, Palayamkottai.
2. ALGEBRA VOL II
   K.S.Narayanan&T.K.Manickavasagampillay,
   S.Viswanathan printers& publishers PVT,Ltd,Chennai.

Hours: 5
Credits: 4

MODERN ALGEBRA

Objectives:

To deal with elementary principles of the subject through concrete examples making abstract ideas and definitions natural.

Review:

Relations and definitions – types of relations – functions-types of functions-binary operations-groups: definition and examples-elementary properties of a group (questions not expected)

UNIT 1:

Subgroup-examples-centre-normalize-intersection and union of subgroups-permutations-cycles and transposition-permutations as a product of disjoint cycles and transpositions-even and odd permutations-S_n and A_n–cyclic groups-examples- properties-number of generators of cyclic groups. (Chapter 3:3.4, 3.5, 3.6)

UNIT 2:

Cosets and their properties – congruence relation modulo a subgroup – Lagrange's theorem and its consequences – Euler's theorem – Fermat's theorem – Normal subgroups – centre is a normal subgroup – quotient groups. (Chapter 3:3.8, 3.9).

UNIT 3:

Homomorphism – Kernel of a homomorphism – isomorphism, auromorphism – cayley's theorem – fundamental theorem of homomorphism. (Chapter 3:3.10, 3.11).

UNIT 4:

Rings – definition and examples – elementary properties of rings – division rings and fields – zero divisors of a ring – zero divisors of Z_n – Integral domain – Cancellation laws – any field is an integral domain – any finite integral domain is a field – Characteristic of a ring – Characteristic of integral domain is either zero or a prime number. (Chapter 4:4.1, 4.2, 4.4, 4.5).

UNIT 5:

Ideals – Quotient rings – maximal and prime ideals – homomorphism of rings – field of quotients of an integral domain. (Chapter 4:4.7, 4.11).

Prescribed Text Book:

- **MODERN ALGEBRA**
  Dr.S.Arumugam& Others,
  Gamma Publishing House, Palayamkottai.

SEMESTER III – PAPER-VI

STATICS

Objectives:

To promote logical thinking and to understand basic principle of statics to be applied to do problems.

UNIT 1:

Forces acting a point – Parallelogram law – Triangle law of forces – Polygon law of forces – conditions of equilibrium.(Chapter 2: Section 1 to 9 & 11 to 16).

UNIT 2:

Forces acting on a rigid body parallel forces, couple, and moment of forces – varigon's theorem.(Chapter 3: Section 1 to 13 & Chapter 4).

UNIT 3:

Three forces acting on a rigid body – conditions for equilibrium. (Chapter 5: Simple problems only).

UNIT 4:

Laws of friction – Co-efficient of friction – Angle of friction – Cone of friction.(Chapter 7: Simple problems only).

UNIT 5:

Catenary and Suspension Bridge.(Chapter 11).

Prescribed Text Book:

- **STATICS**

  M.K. Venkatraman, Agasthiar Publications.

Hours: 5

Credits: 5

STATISTICS – I

Objectives:

 To develop an ability in the students to understand more concepts in statistics and to test hypothesis of different types.

Review:

    Measures of central tendency – measures of dispersion.

UNIT 1:

 Moments – skewness and kurtosis – curve fitting – principle of least squares. (Chapter 4:4.1, 4.2 & Chapter – 5:5.1).

UNIT 2:

 Correlation – Karl pearson's correlation co-efficients – correlation co-efficeints for a bivariate frequency distribution – rank correlation – regression – regression – regression lines – regression co-efficients and its properties – angle between regression lines. (Chapter 6:6.1, 6..2, 6.3, 6.4).

UNIT 3:

 Theory of attributes – conditions for consistency of data – association of attributes – co-efficients of association – independence of attributes. (Chapter 8:8.1, 8.2).

Review:

 Theory of probability – addition theorem – multiplication theorem – random variables – discrete and continuous random variables – expectation of random variables.

UNIT 4:

 Conditional probability – Baye's theorem – Theorems on expectation and moment generating functions of a random variable and a linear combination of independent random variables – problems. (Chapter 11.2 & Chapter12:12.1, 12.2, 12.3, 12.4, 12.5).

UNIT 5:

 Binomial distribution – mean, mode, variance – moments – moment generating function – additive property – recurrence formula for moments – fitting a Binomial distribution – Poisson distribution – Poisson distribution is a limiting form of a binomial distribution – mean, mode, variance – moments – moment generating function - additive property – recurrence formula for moments – fitting a Poisson distribution. (Chapter 13:13.1, 13.2).

Prescribed Text Book:

- **STATISTICS**
  Dr. S. Arumugam & others,
  Gamma Publishing House, Palayamkottai.

SEMESTER IV– NON MAJOR ELECTIVE COURSE – I

SET THEORY AND LOGIC

UNIT 1:

Basic set operations – Union – Intersection – Difference – Complement.

UNIT 2:

Reflexive – Symmetric – Transitive – Equivalence relation.

UNIT 3:

Logic – statements – conjunction – disjunction – negation – conditional – bi-conditional.

UNIT 4:

Propositions and truth table – Tautology and Contradiction.

UNIT 5:

Logical Equivalence, Algebra of Propositions, logically true and logically Equivalent statement.

Prescribed Text Book:

- **DISCRETE MATHEMATICS**
  By
  B.S. Vatssa.

Reference Book: DISCRETE MATHEMATICS

     2000 Solved Problems by Shyam series

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SEMESTER IV – PAPER VII

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Hours: 6

Credits: 5

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DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

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Objectives:

To expose differential equation as powerful tool in solving problem in physical, social and Managerial Sciences.

Review:

Linear equations, with constant co-efficient – second order equations with constant Co-efficient.

UNIT 1:

Exact differential equations – equations of the first order but of higher degree – equations solvable for p, x and y – Clairaut's form – equation that do not contain x, y explicitly – equation homogeneous in x and y. (Chapter 1: 1.2(TYPE-b), 1.3, 1.7).

UNIT 2:

Linear equations with variable co-efficient – removal of the first derivative – variation of parameters – simultaneous linear differential equation. (Chapter II: 2.5 (TYPE- A, B, D), 2.6).

UNIT 3:

Partial differential equations – formation of partial differential equations – classification of integrals – standard form $Pp + Qq = R$ – standard types – Charpit's method. (Chapter IV: 4.0, 4.1, 4.2, 4.3, 4.4 (TYPE-1, 2, 3, 4), 4.5).

UNIT 4:

Laplace transform – theorems – problems – inverse Laplace transforms – results – problems – Solving ordinary differential equations with constant co-efficient and simultaneous linear equations by using Laplace transform. (Chapter III: 3.0, 3.1, 3.2, 3.3).

UNIT 5:

Applications of differential equations –growth, decay and chemical reactions – falling bodies and other rate problems – simple electric circuits – dynamical problems with variable mass – Newton's law of gravitation and motion of planets. (Chapter VI: 6.2, 6.6, 6.7, 6.11, 6.12).

Prescribed Text Book:

- **DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS**
  Dr.S. Arumugam & others,
  Gamma Publishing House, Palayamkottai.

Hours: 5
Credits: 4

DYNAMICS

Objectives:

  Enable students to apply Laws, Principles, and Postulates governing the Dynamics in Physical reality.

UNIT 1:

 Newton laws of motion and applications. (Chapter 4:4.1 to 4.6).

UNIT 2:

 Projectiles – equation of path of a projectile – characteristics – maximum horizontal range – two possible directions of projections to obtain a given horizontal range – range of a particle projected on an inclined plane – maximum range on an inclined plane. (Chapter 6:6.1 to 6.8, 6.12 to 6.16).

UNIT 3:

 Impulses – impact in a fixed plane – direct and oblique impacts – loss in kinetic energy. (Chapter 7:7.1 & 7.2.Chap 8: 8.1 to 8.9).

UNIT 4:

 Simple harmonic motion: equation of motion – composition of two simple harmonic motions – simple Pendulum. (Chapter 10:10.1 to 10.7 & 10.12 to 10.16).

UNIT 5:

 Central orbits – component of velocity and accelerations along and perpendicular to the radius vector – differential equations of a central orbit - Pedal equation. (Chapter 11:11.1 to 11.11).

Prescribed Text Book:

- **DYNAMICS**
     M.K. Venkataraman.
     Agasthiar Publications.

 Note: Simple problems only.

SEMESTER IV – ALLIED PAPER

Hours: 5
Credits: 5

STATISTICS II

Objectives:

To make students experts in data collections, classifications, tabulation, analysis and interpretation of numerical data to arrive at reasonable conclusions.

UNIT 1:

Normal distribution – mean, median, mode, quartile deviation, mean deviation - linear Combination of a normal variate is a normal variate – moment generating function – recurrence formula – fitting normal distribution (ordinate method, area method) – more about continuous distributions(gamma, chi-square – t, F-distribution). (Chapter 13: 13.3, 13.4).

UNIT 2:

Test of significance (large samples) – sampling – sampling distribution – testing of hypothesis – tests for proportion – means – standard deviations – correlation. (Chapter 14:14.0 to 14.3, 14.5).

UNIT 3:

Test of significance (small samples) based on distribution – test of significance based on F-test distribution – test of significance of an observed sample correlation. (Chapter 15:15.0 to 15.3).

UNIT 4:

Derivation of chi-square distribution – test based on chi-square distribution – test for population variable – to test the goodness of the fit – test for independence of attributes. (Chapter 16:16.0 to 16.3).

UNIT 5:

Analysis of variance – one way classification – two way classification – three way classifications Latin square design. (Chapter 17:17.0 to 17.3).

Prescribed Text Book:

- **STATISTICS**
  Dr.S. Arumugam & others,
  Gamma publishing House, Palayamkottai.

- **UNIT 4**
  Text: Kapoor & Saxena.

SEMESTER IV – SKILL BASED COURSE

MATHEMATICAL APTITUDE FOR COMPETITIVE EXAMINATION

UNIT 1:

Non – verbal Reasoning Tests – completion of series, classification, non-verbal analogy.

UNIT 2:

Verbal Reasoning tests – series completion verbal classification – verbal analogy – coding and decoding – blood relationship.

UNIT 3:

Average problems on ages – percentage profit and loss.

UNIT 4:

Ratio and proportion – time and work – simple interest – compound interest.

UNIT 5:

Calendar – clock – stocks and shares – true discount.

Reference Books:

1. Quantitative Aptitude - **R.S. Aggarwal.**
2. Test of Reasoning for competitive examinations – **Edgar Thorpe**.
3. A modern approach to verbal and non verbal Reasoning –
   R.S. Aggarwal – Third edition.

SEMESTER V – PAPER IX

Hours : 6
Credits: 5

REAL ANALYSIS

Objectives:

> **To introduce the basic concepts in analysis.**

> **To make the students understand fundamental ideas and theorems on metric spaces.**

UNIT 1:

Introduction – countable and uncountable sets – inequalities of Holder &Minkowski – Metric space – definition and examples – open sets – equivalent metric.(Chapter 1,Chapter 2: Section 2.1 to 2.4)

UNIT 2:

Subspace,Interior of a set – definitions only

Closed sets – closure – limit point – dense sets – completeness – definition and examples – Cantor's intersection theorem – Baire's category theorem. ,(Chapter 2: Section 2.7 to 2.10 &,Chapter 3)

UNIT 3:

Continuity: definition and examples – uniform continuity – homeomorphism – discontinuity.(Chapter 4: Section 4.1 to 4.3)

UNIT 4:

Connectedness – definition and examples – connected subsets of R – connectedness and continuity – intermediate value theorem. (Chapter 5)

UNIT 5:

Compactness – definition and examples – compact subsets of R – equivalent characterization for compactness, continuity and compactness.(Chapter 6)

Prescribed Text Book:

- **MODERN ANALYSIS**
    Dr.S. Arumugam&Issac,
    Gamma Publishing House, Palayamkottai.

SEMSTER V – PAPER X

LINEAR ALGEBRA

Objectives:

     The of this course is to be enable the students to understand the basis ideas of vector spaces, Linear transformations and their relation to matrices.

UNIT 1:

Vector Spaces – definition and examples – subspaces – linear transformations.(Chapter V – 5.0 to 5.4)

UNIT 2:

Dependency and independency of vector – basis and dimension – direct sum – rank and nullity – matrix of a linear transformation.(Chapter V – 5.5 to 5.8)

UNIT 3:

Matrices: Rank – system of linear equation – homogeneous – non-homogeneous equations – the chacteristic polynomial of a matrix – chacteristic roots and chacteristic vectors – Cayley Hamilton's theorem.(Chapter VII – 7.5 to 7.8)

UNIT 4:

Inner product space: definition and examples – orthogonality – orthogonal complement – Cauchy Schwartz inequality – Gram Scmithorthogonalization process. (Chapter VI – 6.0 to 6.3)

UNIT 5:

Bilinear forms – Quadratic forms. (Chapter VIII – 8.0 to 8.2)

Prescribed Text Book:

- **MODERN ALGEBRA**

     Dr.S. Arumugam,
     Gamma Publishing House (1997),
Palayamkottai.
     Chapter 5, 6, 7.0 to 7.4, 7.7 and Chapter 8.

Reference book:
FOR UNIT V

- **MODERN ALGEBRA – VOL II**

     S. Narayanan,   S. Viswanathan PVT Ltd., (1994).

- **MATRICES**

Vasishtha,   Chapter – 11.

Hours: 4+2
Credits: 3+1

PROGRAMMING IN C

Objectives:

In order to make the students user – friendly with the key featuresof the most powerful programming C language.

UNIT 1:

Constants, Variables and Data Types

Introduction – Character key – C tokens – Keywords and identifiers – Constants – Variables – date types – declaration of variables – Assigning values to variables – Defining symbolic constants.(Chapter 2: 2.1 to 2.8, 2.10, 2.11)

Operators and Expression

Introduction – Arithmetic of operators – Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operators – Bitwise operators – Special operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – some computational problems – Types conversions in expressions – Operator precedence and associativity – Mathematical functions.(Chapter 3: 3.1 to 3.16)

UNIT 2:

Managing input and output operators

Reading a character – Writing a character – Formatted input – Formatted output.(Chapter 4 : 4.1 to 4.5)

Managing input and output operators

Decision making with IF statement – simple IF statement – The IF ELSE statement – Nesting of IF……ELSE statement – The ELSE IF ladder – The Switch statement – The ? : Operator – The GOTO statement.. (Chapter 5: 5.1 to 5.9)

Decision making and looping

The WHILE statement – The DO statement – The FOR statement – Jumps in loops. (Chapter 6 : 6.1 to 6.5)

UNIT 3:

Arrays

One- dimensional arrays – Two – dimensional arrays – Initialization of one – dimensional arrays and two – dimensional arrays – Multidimensional arrays. (Chapter 7: 7.1 to 7.7)

Handling of character strings

Declaring and initializing string variables – Reading strings from terminal – Writing strings to screen – Arithematic operations on characters – Putting strings together – Comparison of two strings – String – Handling functions – table of strings.(Chapter8 : 8.1 to 8.9)
UNIT 4:

User – defined functions

Need for user – defined functions – A multi-function program – The form of C functions – Return values and their types – Calling a function – category of functions- No arguments and no return values – handling of non–integer functions – Nesting of functions-recursion-functions with arrays – the scope and lifetime of variables in functions – ANSI C functions..(Chapter 9: 9.1 to 9.20)

Structures and unions

Structure definition – giving values to members- structure initializing – comparison of structure variables – Arrays of structure – arrays within structures – structures within structures-structures and functions – unions – size of structure – bit fields – pointers – understanding pointers..(Chapter 10 : 10.1 to 10.14)

UNIT 5:

Pointers

Accessing the address of a variable – declaring and initializing pointers – Accessing a variable through its pointers – Pointer expressions. (Chapter 11: 11.1 to 11.8)

File management:

Definition and opening a file – closing a file. (Chapter 12: 12.1 to 12.3)

Text Book:
Programming in C
        E. Balagurusamy, Second Edition.

PRACTICAL IN C

1. Write a program to calculate the Simple Interest.
2. Write a program to calculate Salesman commission.

Amount of Sales	Commission
10,000	5%
15,000	8%
More than 15,000	10%

3. Write a program to find the sum of the digits.
4. Check whether the given number is prime or not.
5. Write a program to find the roots of the quadratic equation.
6. Write a program to reverse the given string and checking palindrome.
7. Write a program to evaluate sine function.
8. Write a program to find the nCr value using functions.
9. Write a program to sort the numbers (Ascending & Descending).
10. Write a program to multiply the two given matrices.
11. Write a program to find the determinant of the given matrix.
12. Write a program to arrange the Names alphabetically using pointers.
13. Write a program to count the number of words, characters and lines in the given text.
14. Write a program to count the occurrence of the character in a string.

Hours: 5
Credits: 5

LINEAR PROGRAMMING

Objectives:

To create a logical foundation.

To make the students familiar with the scientific approach and techniques in decision making problems.

To provide them a quantitative model for solving managerial problems.

UNIT 1:

Mathematical formulation of LPP – graphical solution to a LPP – extreme points – convex sets simplex method. (Chapter 2:2.1 to 2.4, chapter 3: 3.1 to 3.5, chapter 4: 4.1 & 4.3).

UNIT 2:

Artificial variables – Big M method – two phase method. (Chapter 4: 4.4 & 4.5)

UNIT 3:

Duality – formulation of primal – dual pairs – duality and simplex method – dual simplex method – fundamental theorem of duality. (Chapter 5: 5.1 to 5.7, 5.9)

UNIT 4:

Mathematical formulation of transportation problem – finding initial basic feasible solution – degeneracy in LPP – loops in tables – optimum solution – modi method – unbalanced transportation problem. (Chapter 10: 10.1 to 10.13)

UNIT 5:

Mathematical formulation of assignment problem – assignment algorithm – travelling salesman problem. (Chapter 11: 11.1 to 11.4 & 11.7)

Prescribed Text Book:

- **OPERATIONS RESEARCH**

    Kanti swaroop, P.K. Gupta & Manmohan.

    Sultan Chand & Sons.

Hours: 5
Credits: 5

GRAPH THEORY

Objectives:

To enable the students to acquire the general techniques of Graph Theory.

To make them understand its applications to a wide variety of subjects.

UNIT 1:

Graphs – pictorial representation – sub graphs – isomorphism and degree - walks and connected graphs – cycles in graphs.(Chapter 2:2.1 to 2.4, chapter 4: 4.1 & 4.2).

UNIT 2:

Cut – Vertices and cut edges – Eulerian graphs – Flery's algorithms.(Chapter 5: 5.1).

UNIT 3:

Hamiltonian graphs – weighted graphs – bi-partite graphs – marriage problem.(Chapter 5: 5.2, Chapter 11: 11.1 & Chapter 7: 7.1, 7.2)

UNIT 4:

Trees – connector problem – planner graphs – Euler formulas.(Chapter 6: 6.1, 6.2 & Chapter 8: 8.1).

UNIT 5:

Director graphs – connectivity in digraphs strong orientation of graphs – Eulerian digraphs.(Chapter 10: 10.1 & 10.2).

Prescribed Text Book:

- **Invitation to Graph theory**
  S. Arumugam & Others
  Scitech Publishers, India PVT. Ltd, 2000.

SEMESTER V – SKILL BASED COURSE

Paper – II –SOLAR SYSTEM AND STELLAR UNIVERSE

Objective:

To introduce the students to space science and to encourage them to become astronomers

UNIT 1: Sun and Planets.

UNIT 2: Comets – Asteroids – Meteors – Zodiacal light.

UNIT 3: Eclipses – causes – conditions – comparison – different kinds of eclipses.

UNIT 4: The Stellar Universe.

UNIT 5: Constellations – Zodiacal Constellations.

BOOKS FOR REEFERENCES:

1. Astronomy: G.V. Ramachandran.
2. Astronomy: Kumaravelu&SuseelaKumaravelu.
3. Why the sky is blue? – Scientific publications.

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SEMESTER VI – PAPER XII

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Hours:6
Credits:5

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COMPLEX ANALYSIS

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Objectives:

To provide the students an introduction to Complex Analysis of one variable.

To introduce the theory of analytic function, complex integration and some

Bilinear transformations

UNIT 1:

Continuous function – Differentiability – C-R equations in Cartesian and polar co-ordinates – analytic function – harmonic functions – conformal mapping (definition only) (Chapter 2: 2.1 to 2.8 &– conformal mappingdefinition).

UNIT 2:

Circles and straight lines – elementary transformations – bilinear transformation – cross ratio – fixed points – special bilinear transformations.(Chapter 1: 1.7 & Chapter 3: 3.1 to 3.5)

UNIT 3:

Complex integration 0- Cauchy's integral theorem, Cauchy's integral formula – higher derivatives – Cauchy's inequality – Liouville's theorem – fundamental theorem of algebra – Morera's theorem.(Chapter 6)

UNIT 4:

Taylor's series – Laurent's series – zeros of an analytic function – singularities.(Chapter 7)

UNIT 5:

Residues – Cauchy's residue theorem – argument theorem – Rouche's theorem – evaluation of definite integrals.(Chapter 8: 8.1,8.2,8.3 Type 1 only)

Prescribed Text Book:

- Complex Analysis – Dr. S. Arumugam.

  Scitech Publication (India) PVT Ltd., Chennai.

SEMESTER VI – PaperXIII

Hours:6
Credits:5

NUMERICAL ANALYSIS

Objectives:

To provide knowledge of applied Mathematics with Numerical side of Mathematical analysis.

UNIT 1:

Solution of algebraic and transcendental equations – iteration method – Newton – Raphson method – method of false positions – solutions of simultaneous linear equations – Gauss's method – Gauss Jordan method iteration method - Gauss – Seidel method. (Chapter 1: 1.0,1.1,1.2.1.5.,1.6 & Chapter 2: 2.0,2.1,2.2,2.3,2.4,2.6,2.7)

UNIT 2:

Difference operators and their basic properties – Newton's forward and backward interpolation formula. (Chapter 3: 3.0 3.1,3.2, & Chapter 4: 4.0,4.1)

UNIT 3:

Gauss's formula – Stirling's formula – Bassel's formula – Lagrange's formula – numerical differentiation upto second order – maxima and minima. (Chapter 4: 4.2,4.3& Chapter 5: 5.0 to 5.4)

UNIT 4:

Numerical integration – Quadrature (Cote's) formula – Trapezoidal rule – Simpson's one-third rule – Three-eight rule – Weddle's rule. (Chapter 6: 6.0 to 6.6)

UNIT 5:

Numerical solution of differential equation – Taylor series method – Euler's method – Modified Euler's method – Range Kutta method for second and fourth order D.E. (Chapter 7: 7.0,7.1,7.3,7.4)

Prescribed Text Book:

- **NUMERICAL ANALYSIS**
    Dr.S. Arumugam & Others,
    Gamma Publishing House, Palayamkottai.

SEMESTER VI – PAPER XIV

Hours:6
Credits:4

OBJECT – ORIENTED PROGRAMMING WITH C++

Objectives:

To offer significant software engineering benefits over C and to present the concept of object oriented analysis and design of systems.

UNIT 1:

Fundamentals of C++ - structure of C++ program – creating of source file – compiling and linking – tokens – keywords identifiers – basic data types – use defined data types – derived data types – symbolic constants – types compatibility – declaration of variables – dynamic initialization of variables – reference variables – operators – C++ - conversions operator overloading – control structures – the main function – function prototyping – inline – inline functions – function overloading – friend and virtual function. Chapter 2: 2.1 to 2.8, Chapter 3: 3.1 to 3.24 & Chapter 4: 4.1to 4.11)

UNIT 2:

Specifying a class – defining member functions – marketing an outside function inline – nesting of member functions – private member functions arrays within a class-memory allocation for objects – static data members static member functions arrays of objects – objects as function – arguments friendly functions – returning objects constant member functions – pointers to members – constructors – parameterized constructors – multiple – constructors in a class – constructors with default arguments – dynamic initialization of objects – copy constructor – constructing two dimensional arrays – destructors. Chapter 5: 5.1 to 5.19 & Chapter 6: 6.1 to 6.11)

UNIT 3:

Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends – manipulation of strings using operators – rules for overloading operators – type conversions – defining derived classes – single inheritance – making a private member inheritable – multilevel inheritance – multiple inheritance – hierarchical inheritance – hybrid inheritance. Chapter 7: 7.1 to 7.8 & Chapter 8: 8.1 to 8.8)

UNIT 4:

Pointer to objects – this pointer – pointers to derived classes – virtual functions – pure virtual functions – C++ streams – C++stream classes – unformatted I/O operations managing output with manipulators. (Chapter 9: 9.1 to 9.7 & Chapter 10: 10.1 to 10.6)

UNIT 5:

Classes of file stream operations – opening and closing a file – detecting end of file - more about open () – file modes – file pointers and the manipulations – sequential input and output operations – updating a file random access. Chapter 11: 11.1 to 11.8)

Prescribed Text Book:
OBJECT ORIENTED PROGRAMMING WITH C++

By E. Balagurusamy.

Tata McGraw - Hill Publishing company limited 1998.

PRACTICALS IN PROGRAMMING IN C++

1. Write a program to convert temperature Fahrenheit into Celsius.

2. Write a program to print the following output using for loops.
   ```
                1
                2  2
                3  3  3
                4  4  4  4 and so on.
   ```
3. Write a program to calculate variance and standard deviation of n numbers.

4. Write a macro that obtains the largest of three numbers.

5. Write a program to maintain the stock details using class.

6. Write a program to add complex numbers using operator overloading.

7. Write a program to multiply complex numbers using operator overloading.

8. Write a program to the unary minus operator is overloaded.

9. Write a program to maintain the employees information using inheritance.

10. Write a program to create a student file.

11. Write a program to find the largest value of two numbers using nesting of member function.

12. Write a program for shopping list using classes and objects.

13. Write a program to maintain the library details using constructor and destructor.

14. Write a program to overloading operators using friends.

OPERATIONS RESEARCH

Objectives:

To expose the Mathematical tools applied to social and managerial sciences.

UNIT 1:

Sequencing problem – problems with n jobs 2 machines – n jobs 3 machines – n jobs m machines – replacement problem – replacement of items whose maintenance cost increase with time (with/without change in the value of money) – replacement of items which fail completely – individual and group replacement. (Chapter 12:12.1 to 12.5 & Chapter 18: 18.1 to 18.3)

UNIT 2:

Game theory two person zero sum game – pay off matrix – solution of a game The Maxmin – Minimax principles – Saddle points – solution of a rectangular game with saddle point – without saddle points by the following methods.

1) Using formula   2) Graphical method   3) Approximation by intersection
4) Algebraic method   5) L.P. method. (Chapter 17: 17.1 to 17.9)

UNIT 3:

Queuing theory – introduction – types of Queue discipline – steady state probabilities in each classification of queuing problem.

1) $(M/M/1) : (\infty/FIFO)$
2) $(M/M/1) : (N/FIFO)$
3) $(M/M/C) : (\infty/FIFO)$
4) $(M/M/C) : (N/FIFO)$ Birth-death process. (Chapter 21: 21.1 to 21.4,21.7,21.8,21.9(Model I to model VI)

UNIT 4:

Inventory control – selective control techniques – ABC analysis – economic lot size problem – problem of EOQ with shortage – multi item deterministic problem – inventory control technique (uncertain demand). (Chapter 19:1 9.6,19.7,19.9,19.10(case I only),19.11,19.13,19.15(ABC Analysis),Chapter 20: 20.2)

UNIT 5:

PERT, CPM : applications – network – critical path method – total float – free float PERT calculations. (Chapter 25: 25.1 to 25.8)

Prescribed Text Book:

- OPERATIONS RESEARCH by Kantiswarup, P.K Gupta &Manmohan Sultan Chand.

SEMESTER VI - NON MAJOR ELECTIVE COURSE – II

Hours : 2
Credits : 2

OPERATIONS RESEARCH

UNIT 1:

Games & strategies – Introduction – two person zero – Sum games.

UNIT 2:

The Maxmin – Miinimax Principle – games without saddle point – mixed strategies.

UNIT 3:

Graphical solution of 2xn and mx2 games.

UNIT 4:

Replacement of equipment / Asset that Deteriorates gradually – Replacement of equipment that fails suddenly.

UNIT 5:

Sequencing problem – basic terms – processing n jobs through 2 machines processing n jobs through k machines.

Prescribed Text Book:

1. Operations Reasearch
   By Kantiswarup, P.K. Gupta &Manmohan.

UNIT 1: 9.1,9.2
UNIT 2: 9.3,9.4
UNIT 3: 9.6
UNIT 4: 19.2,19.3
UNIT 5: 10.1-10.4
Note: Problems only.

SEMESTER VI-SKILL BASED COURSE

Hours: 2
Credits: 2

FUZZY MATHEMATICS

UNIT 1:

Introduction – Crisp sets - properties - Introduction - Fuzzy sets – Basic types of Fuzzy sets- Basic concepts(Chapter 1:1.1 to 1.4).

UNIT 2:

Fuzzy sets verses crisp sets – Additional properties of α – cuts (Chapter 2:2.1).

UNIT 3

Representations of Fuzzy sets – Extension Principle for Fuzzy sets. (Chapter 2:2.2 & 2.3).

UNIT 4:

Operations of fuzzy sets – types of operations – Fuzzy complements –First Characterization Theorem – Second Characterization Theorem.(Chapter 3:3.1&3.2).

UNIT 5:

Fuzzy Intersection : t-norms - Fuzzy unions: t – Co norms – Fuzzy numbers

(Chapter 3:3.3,3.4& 4.1).

TEXT BOOK:

Fuzzy sets and Fuzzy Logic: Theory and applications – George J. Klir& Bo Yuan Prentice Hall of India Private Limited, New Delhi.

Hours:5
Credit:5

ALLIED MATHEMATICS
(B.Sc., Physics & Chemistry major)

ALGEBRA, CLACULUS, STATISTICS AND TRIGONOMETRY

Objectives:

To understand the fundamental concepts of Algebra.

To introduce the fundamental concepts of trigonometry.

UNIT 1:

Theory of equation - n^{th} degree has exactly n roots – relation between roots and

co-efficient – transformation of equations.TB.I(Chapter1: Section:1.0 to 1.4)

UNIT 2:

Receprocal equations – Newton's and Horner's method of finding roots up to two decimals. TB.I(Chapter1: Section:1.3,1.5)

UNIT 3:

Radius of curvature – evoluate – involuate (Cartesian) definite integrals – Reduction formula for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\csc^n x$, $\sec^n x$, $\cot^n x$ and $\sin^m x\cos^n x$. TB.I((Chapter 2 and Chapter3 : Section 3.1,3.3 and 3.5)

UNIT 4:

Correlation co-efficient – rank correlation co-efficient interpolation – lagrange's and Newton's method. TB.2(Chapter4: Section 4.1,4.2and Chapter 3: section 3.0 to 3.3)

UNIT 5:

Expansions – Hyperbolic functions – logarithm of complex numbers. TB.I(Chapter4: Section:4.1 , 4.2 & Chapter 5:)

Prescribed Text Book:

1.**ANCILLARY METHEMATICS – Paper I**

2.**ANCILLARY METHEMATICS– Paper III**

By   Dr.S. Arumugam & others.

Gamma Publishing House, Palayamkottai.

Hours:5
Credits:5

ALLIED MATHEMATICS
(B.Sc., Physics & Chemistry major)

FOURIER SERIES COMPLEX ANALYSIS, DIFFERENTIAL EQUATIONS AND APPLICATIONS AND VECTOR CALCULUS

Objectives:

To acquaint the students become familiar with tools in Mathematics to understand problems.

UNIT 1:

Fourier series – trigonometry series – even and odd functions – half range Fourier series.

TB 1(Chapter 9)

UNIT 2:

Complex analysis – analytic functions – C.R equations(statement only) – applications – bi-linear transformations – cross ratio – fixed points TB 1.(Chapter1:1.2 , 1.3 ,1.4 & Chapter2: 2.1 to 2.4)

UNIT 3:

Laplace transforms – solutions of differential equations using L.t-partial differential equations – formulations – solutions - standard form $Pp + Qq = R$ TB 2(Chapter 5 : 5.1 , 5.2 , 5.3 &Chapter 6 : 6.0 to 6.4)

UNIT 4:

(Application of DE) Growth, decay and chemical reactions – falling bodies and other rate problems – simple electric circuits. TB 2 (Chapter 7 : 7.2 , 7.6 , 7.7)

UNIT 5:

Vector differentiation – velocity – acceleration – vector differential operator – gradient – divergence and curl – simple properties (statement only) – directional detrivative – solenoidal – irrational vectors – vector integration – Gauss, Green and Stoke's theorems (without proof) – simple applications. TB 2 (Chapter 1: 1.1 , to 1.5 & TB 2 (Chapter 2 : 2.1 to 2.3)

Prescribed Text Book:

- **1. ANCILLARY MATHEMATICS PAPER III**
- **2. ANCILLARY MATHEMATICS PAPER II**
  By Dr.S. Arumugam & others,
  Gamma Publishing House, Palayamkottai.

EXTERNAL QUESTION PATTERN OF CORE, SKILL BASED NON-MAJOR ELECTIVES AND ALLIED SUBJECTS

Maximum : 75 marks   **Time : 3 hours**

PART – A   (10 X 1 = 10)

Answer ALL questions(Two questions from each Unit)

This may include multiple choice, true or false, fill up, very short answer and simple examples.

PART – B   (5 X 7 = 35)

Answer any **FIVE** questions out of **EIGHT** questions.

(Each Unit must have one question)

PART – C   (3 x 10 = 30)

Answer any THREE questions out of FIVE questions.

(One question from each Unit)