GURU NANAK COLLEGE (AUTONOMOUS)

REVISED PROPOSED SYLLABUS

By

BOARD OF STUDIES

DEPARTMENT OF MATHS

GURU NANAK COLLEGE, VELACHERY

CHENNAI – 600 042

(2017 -2018 BATCH)

APPENDIX – 11 (R & S)
UNIVERSITY OF MADRAS
GURU NANAK COLLEGE (AUTONOMOUS)
DEPARTMENT OF MATHEMATICS
Course Structure

SEMESTER	PART	SUBJECT TITLE	No.of Hours per week	Exam Hours	Credits
I	I	Language (Tamil/Hindi) Paper-I	6	3	3
	II	English Paper-I	4	3	3
	III	Core Paper 1 Algebra	4	3	4
		Core Paper 2 Differential Calculus	4	3	4
		Allied 1 Chemistry-I	8	3	5
	IV	Non Major Elective-I Functional Mathematics-I	2	3	2
		Soft Skill 1 Essentials of Language and Communication skills	2	3	3
II	I	Language (Tamil/Hindi) Paper-II	6	3	3
	II	English Paper-II	4	3	3
	III	Core Paper 3 Trigonometry and Number Theory	4	3	4
		Core Paper 4 Analytical Geometry	4	3	4
		Allied 1Chemistry-II	8	3	5
	IV	Non Major Elective-I Functional Mathematics-II	2	3	2
		Soft Skill 2 Essentials of Spoken and presentation skills	2	3	3
III	I	Language (Tamil/Hindi) Paper-III	6	3	3
	II	English Paper-III	4	3	3
	III	Core Paper 5 Differrential Equations and Laplace Transforms	5	3	4
		Core Paper 6 Integral Calculus	5	3	4
		Allied 2 Physics - I	8	3	5
	IV	Non Major Elective Environmental Studies	2	_	_
		Soft Skill 3 Personality Enrichment	2	3	3
IV	I	Language (Tamil/Hindi) Paper-IV	6	3	3
	II	English Paper-IV	4	3	3
	III	Core Paper 7 Mathematical Statistics	4	3	4
		Core Paper 8 Statics	4	3	4
		Allied 2 Physics - II	8	3	5
	IV	Non Major Elective Environmental Studies	2	3	2
		Soft Skill 4 Computing skills	2	3	3
V	III	Core Paper 9 Algebraic Structures	6	3	4
		Core Paper 10 Real Analysis-I	6	3	4
		Core Paper 11 Dynamics	6	3	4
		Core Paper 12 Programming Language C with Practicals	6	3	4
		Elective Subject I Operations Research -I	6	3	5
	IV	Soft Skill 5 Value Education	_	3	2
VI	III	Core Paper 13 Linear Algebra	6	3	4
		Core Paper 14 Real Analysis-II	6	3	4
		Core Paper 15 Complex Analysis	6	3	4
		Elective Subject II Operations Research - II	6	3	5
		Elective Subject III Elementary Number Theory	6	3	5
	IV	Soft Skill 6 Extension activities	_	_	1
				Total	**140**

UNIT I

Matrices: Symmetric; Skew Symmetric; Hermitian; Skew Hermitian; Orthogonal and Unitary Matrices; Rank of a matrix; Consistency and solutions of Linear Equations;   (12 hrs)

UNIT II

Matrices: Cayley-Hamilton theorem; Eigen values; Eigen Vectors; Similar matrices; Diagonalization of a matrix.   (12 hrs)

UNIT III

Theory of Equations : Polynomial equations; Imaginary and irrational roots; Symmetric functions of roots in terms of coefficients; Reciprocal equations.Transformations of equations.   (12 hrs)

UNIT IV

Theory of Equations : Descartes' rule of signs: Approximate solutions of roots of polynomials by Newton-Raphson method- Hornet's method; Cardan's method of solution of a cubic polynomial.   (12 hrs)

UNIT V

Summation of series: Binomial, Exponential and Logarithmic series (theorems without proof); Summation of finite series using method of differences- Simple problems.   (12 hrs)

Contents and treatment as in **Algebra- Volume I and II** by T.K.Manikavasagam Pillai and others (S.Viswanathan publishers)

Reference Books:

> 1. Algebra: S.Arumugam(New Gama Publishing house, Palayamkottai)
>
> 2. Higher Algebra: H.S Hall and S.R.Knight (HM Publications-1994)
>
> 3. Algebra, Analytical Geometry(2D) and Trigonometry: Dr.S.Sudha (Emerald Publishers)
>
> 4. Algebra and Tigonometry (I&II): P.R.Vittal (Margham Publishers)

CORE PAPER - II

DIFFERENTIAL CALCULUS

UNIT I

Differential Calculus: n^{th} Derivative; Leibnitz's theorem (without proof) and its applications; Partial differentiations. Total differentials; Jacobians; (12 hrs)

UNIT II

Differential Calculus: Maxima and Minima of functions of two independent variables Necessary and sufficient conditions (without proof); Lagrange's method (without proof)- Simple problems on these concepts. (12 hrs)

UNIT III

Curvature: Curvature; radius of curvature in Cartesian and polar coordinates; p-r equations; Simple Problems. (12 hrs)

UNIT IV

Centre of curvature, circle of curvature, envelopes, evolutes and simple problems. (12 hrs)

UNIT V

Asymptotes: Methods (without proof) of finding asymptotes of rational algebraic curves with special cases. (12 hrs)

Contents and Treatment as in **Calculus** by S.Narayanan, T.K.Manickavachagom Pillai Volume I (Viswanathan Publishers).

Reference Books:

1. Calculus: Dr.S.Sudha (Emerald Publishers)

2. Calculus(I&II): P.R.Vittal(Margham Publishers)

SEMESTER – II

CORE PAPER - III

TRIGONOMETRY AND NUMBER THEORY

UNIT - I

Trigonometry: Expansions of $sinx, cosx, tanx$ in terms of x; Expansion of $sinnx, cosnx, tannx, sin^n x, cos^n x, sin^m x cos^n x$ hyperbolic and inverse hyperbolic functions-Simple Problems. (12 hrs)

UNIT II

Summation of series: Sums of sines and cosines of n angles which are in A.P.; Summation of trigonometric series using telescopic method, C+iS method. (12 hrs)

UNIT III

Logarithms of Complex numbers. (12 hrs)

UNIT IV

Number Theory: Prime number; Composite Number; decomposition of a composite number as a product of primes uniquely(without proof); divisors of a positive integer n; congruence modulon. (12 hrs)

UNIT V

Number Theory: Euler function(without proof); highest power of a prime number p contained in $n!$; Fermat's and Wilson's theorems-Simple problems. (12 hrs)

Contents and treatment as in **Algebra- Volume I and II** by T.K.Manikavasagam Pillai and others (S.Viswanathan publishers)

Reference Books:

1. Trigonometry: P.Duraipandian (Emerald Publishers)

2. Plane Trigonometry Part 2: S.L.Loney

3. Algebra and Trigonometry(I&II): P.R.Vittal (Margham Publishers)

CORE PAPER - IV

ANALYTICAL GEOMETRY

UNIT I

Conics:

Parabola: pole, polar, conormal points, concyclic points.

Ellipse : pole, polar, conormal points, conjugate lines, conjugate diameters. (12 hrs)

UNIT II

Hyperbola: conormal points, asymptotes, conjugate diameters.

Rectangular Hyperbola: conormal points, concyclic points. (12 hrs)

UNIT III

 Planes: Planes; General equation of a plane; normal form; intercept form; intersection of planes; angle between planes.
 (12 hrs)

UNIT IV

Straight Lines: Straight Lines; symmetric form; coplanar lines; shortest distance; image of a point and a line on a plane. (12 hrs)

UNIT V

Sphere: Equation of a sphere; general equation; section of a sphere by a plane; tangent plane; orthogonal spheres. Transformation of Cartesian coordinates into spherical polar coordinates.
(12 hrs)

Contents and treatment as in**Analytical Geometry (2D & 3D)** : T.K.Manikavasagam Pillai (Viswanathan Publishers)

Reference Books:

   1. Analytical Geometry of 2 dimensions: P.Duraipandian

   2. Coordinate Geometry: Dr.P.Balasubramanian and Others(McGraw Hill   publishers)

   3. Calculus and coordinate geometry of two dimensions:P.R.Vittal (Margham Publishers)

   4. Coordinate Geometry of 3 Dimensions and probability: P.R.Vittal (Margham Publishers)

SEMESTER - III

CORE PAPER -V

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

UNIT I

Ordinary Differential Equations: First order but of higher degree equations- solvable for p, solvable for x, solvable for y, clairaut's form- simple problems.   (12 hrs)

UNIT II

Ordinary Differential Equations: Second order differential equations with constant coefficients with particular integrals for e^{ax} x^{m}, e^{ax}sinmx, e^{ax}cosmx.Second order differential equations with variable coefficients $ax^2 \frac{d^2y}{dx^2} + bx\frac{dy}{dx} + cy - q(x)$,Method of variation of parameters.   (12 hrs)

UNIT III

Partial Differential Equations: Formation of PDE by eliminating arbitrary constants and arbitrary functions;Lagrange's equations Pp+Qq=R-Simple problems.   (12 hrs)

 UNIT IV

Partial Differential Equations: complete integral; singular integral; general integral; Charpit's method and standard types f(p,q)=0, f(x,p,q)=0, f(y,p,q)=0, f(z,p,q)=0,

f(x,p)=f(y,q);Clairaut's form   (12 hrs)

UNIT V

Laplace transform: Laplace transform; inverse Laplace transform(usual types); applications of Laplace transform to solution of first and second order linear differential equations(constant coefficients) and simultaneous linear differential equations-simple problems.   (12 hrs)

Contents and treatment as in

1. Engineering Mathematics volume 3: M.K.Venkataraman (National Publishing Co.)

2. Engineering Mathematics volume 3: P.Kandasamy and others (S.Chand and Co.)

Reference Books:

1. Integral Calculus and differential equations: Dipak Chatterjee (TataMcGraw Hill Publishing Comp Ltd)

2. Advanced Engineering Mathematics:Erwin Kreyszig (John Wiley and sons New York 1999)

3. Calculus: Narayanan and others (S.Viswanathan Publishers)

4. Differential Equations and Integral Transforms: Dr.S.Sudha(Emerald Publishers)

CORE PAPER -VI

INTEGRAL CALCULUS

UNIT I

Bernoulli's formula, Reduction Formula for
$\int_0^{\frac{\pi}{2}} sin^m x cos^n x \, dx, \int_0^{\frac{\pi}{2}} cos^m x cosnx dx, \int_0^{\frac{\pi}{2}} cos^m x sinnx dx, \int x^m (logx)^n dx \ and \ s$imple
Problems. Beta and Gamma functions, properties and simple problems.   (12 hrs)

UNIT II

Multiple Integrals: Double integrals, Change of order of integration, triple integrals, area and volume using Cartesian coordinates.   (12 hrs)

UNIT III

Fourier Series: Introduction, Expansions of periodic function of period 2☐; expansion of even and odd functions; half range cosine and sine zsseries.   (12 hrs)

UNIT IV

Vector Differentiation: Gradient, divergence, curl, directional derivative, unit normal to a surface,vector identities.

(12 hrs)

UNIT V

Vector Integration: Line, Surface and volume integrals; theorems of Gauss, Stoke's and Green (without proof) -problems.   (12 hrs)

Contents and treatment as in

1. Contents and Treatment as in **Calculus** by S.Narayanan, T.K.Manickavachagom Pillai Volume II (Viswanathan Publishers).

2. Engineering Mathematics volume 3: M.K.Venkataraman (National Publishing Co.)

3. Engineering Mathematics volume 3: P.Kandasamy and others (S.Chand and Co.)

Reference Books:

1. Vector Analysis: Murray Spiegel (Schaum Publishing Company, New York)

2. Vector Analysis: P.Duraipandian and Laxmi Duraipandian (Emerald Publishers)

SEMESTER - IV

CORE PAPER - VII

MATHEMATICAL STATISTICS

UNIT I :

      Statistics: Introduction, measures of central tendency- measures of dispersion- skew ness-kurtosis.   Ch.2- 2.1 to 2.11(omit 2.11.1)   Ch.3- 3.1 to 3.12 (omit 3.9.2, 3.9.3, 3.9.4)

                               (12 hours)

UNIT II :

Sample space – Events, Definition of probability (Classiscal, Statistical & Axiomatic) – Addition and multiplication laws of probability- Independence- Conditional probability- Bayes theorem- Simple problems.

Ch.4- 4.5 to 4.6.2, 4.6.3, 4.7, 4.7.1 to 4.8   (12 hours)

UNIT III :

Random Variables (Discrete and continuous), Distribution function- Expected values , variance Moment generating function- probability generating function- Examples. Characteristic function – Uniqueness and inversion theorems (Statements and applications only) – Cumulants, Chebychev's inequality- Simple problems.

Ch.5- 5.1 to 5.4.1, 5.4.3 to 5.5.5. Ch.6- 6.1 to 6.12.   (12 hours)

UNIT IV :

Correlation: Rank correlation coefficient- Concepts of partial and multiple correlation coefficients- Regression: Method of Least squares for fitting Linear, Quadratic and exponential curves – Simple problems.

Ch.9- 9.1,9.1.1. Ch.10- 10.1 to 10.7.5 (omit 10.4)   (12 hours)

UNIT V :

Standard distributions – Binomial, Poission, Normal and Uniform distributions-Geometric, Exponential , Inter- relationship among distributions.

Ch.7- 7.2.1 to 7.2.3, 7.2.5 to 7.2.8, 7.3.1 to 7.3.7. Ch.8- 8.1 to 8.1.4, 8.2 to 8.2.9, 8.3, 8.6.(12 hours)

Contents and treatment as in " Elements of Mathematical Statistics" by S.C Gupta and V.K Kapoor

(S.Chand Publishers)

Reference Books:

1. Hogg R.V. & Craig A.T. 1988): Introduction to Mathematical Statistics, Mcmillan..

2. Mood A.M & Graybill F.A & Boes D.G (1974) : Introduction to theory of Statistics, Mcgraw Hill.

3. Dr.P.R.Vittal, Mathematical Statistics, Margham publications.

CORE PAPER- VIII
STATICS

Unit-1

Newton"s laws of motion - resultant of two forces on a particle- Equilibrium of a particle- Limiting Equilibrium of a particle on an inclined plane

Chapter 2 - Section 2 .1 , 2.2 , Chapter 3 - Section 3.1 and 3.2   (12 hrs)

Unit-2

Forces on a rigid body – moment of a force – general motion of a rigid body- equivalent systems of forces – parallel forces – forces along the sides of a triangle – couples

Chapter 4 - Section 4 .1 to 4.6   (12 hrs)

Unit-3

Resultant of several coplanar forces- equation of the line of action of the resultant- Equilibrium of a rigid body under three coplanar forces – Reduction of coplanar forces into a force and a couple.- problems involving frictional forces

Chapter 4 - Section 4.7 to 4.9 , Chapter 5 - Section 5.1, 5.2   (12 hrs)

Unit-4

Centre of mass – finding mass centre – a hanging body in equilibrium – stability of equilibrium – stability using differentiation

Chapter 6 - Section 6.1 to 6.3 , Chapter 7 - Section 7.1, 7.2   (12 hrs)

Unit-5

Virtual work – hanging strings- equilibrium of a uniform homogeneous string – suspension
 bridge Chapter 8 - Section 8.1, Chapter 9 - Section 9.1, 9.2   (12 hrs)

Contents and treatment as in "Mechanics – P. Duraipandian , Laxmi Duraipandian , Muthamizh Jayapragasham, S. Chand and Co limited 2008 .

Reference Books:
1. Dynamics – K. Viswanatha Naik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier

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SEMESTER-V
CORE PAPER- IX
ALGEBRAIC STRUCTURES

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Unit -1

Introduction to groups. Subgroups, cyclic groups and properties of cyclic groups; Lagrange"s Theorem; A counting principle
Chapter 2 Section 2.4 and 2.5   (18 hrs)

Unit -2

Normal subgroups and Quotient group; Homomorphism; Automorphism.
Chapter 2 Section 2.6 to 2.8   (18 hrs)

Unit – 3

Cayley"s Theorem; Permutation groups.
Chapter 2 Section 2.9 and 2.10   (18 hrs)

Unit -4

Definition and examples of ring- Some special classes of rings; homomorphism of rings; Ideals and quotient rings; More ideals and quotient rings.
Chapter 3 Section 3.1 to 3..5   (18 hrs)

Unit – 5

The field of quotients of an integral domain; Euclidean Rings; The particular Euclidean ring.
Section 3.6 to 3.8   (18 hrs)

Contents and treatment as in "Topics in Algebra" – I. N. Herstein, Wiley Eastern Ltd.

Reference Book :-
    1. Modern Algebra by M.L.Santiago
    2. Modern Algebra by S. Arumugam and others, New Gamma publishing House, Palayamkottai.
    3. Modern Algebra by Visvanathan Nayak

CORE PAPER-X
REAL ANALYSIS -I

Unit – 1

Sets and elements; Operations on sets; functions; real valued functions; equivalence; countability ; real numbers; least upper bounds.
Chapter 1 Section 1. 1 to 1.7   (18 hrs)

Unit – 2

Definition of a sequence and subsequence; limit of a sequence; convergent sequences; divergent sequences; bounded sequences; monotone sequences;
Chapter 2 Section 2.1 to 2.6   (18 hrs)

Unit – 3

Operations on convergent sequences; operations on divergent sequences; limit superior and limit inferior; Cauchy sequences.
Chapter 2 Section 2.7 to 2.10   (18 hrs)

Unit- 4

Convergence and divergence; series with non-negative numbers; alternating series; conditional convergence and absolute convergence; tests for absolute convergence; series whose terms form a non-increasing sequence; the class l^2
Chapter 3 Section 3.1 to 3.4, 3.6, 3.7 and 3.10   (18 hrs)

Unit – 5

Limit of a function on a real line;. Metric spaces; Limits in metric spaces.Function continuous at a point on the real line, reformulation, Function continuous on a metric space.
Chapter 4 Section 4.1 to 4.3 Chapter 5 Section 5.1-5.3   (18 hrs)

Contents and Treatment as in "Methods of Real Analysis" : Richard R. Goldberg (Oxford and IBH
Publishing Co.)

Reference Books :-
   1. Principles of Mathematical Analysis by Walter Rudin
   2. Mathematical Analysis Tom M Apostal

CORE PAPER- XI
DYNAMICS

Unit -1

Basic units – velocity – acceleration- coplanar motion – rectilinear motion under constant forces – acceleration and retardation – thrust on a plane – motion along a vertical line under gravity – line of quickest descent - motion along an inclined plane – motion of connected particles.
Chapter 1 - Section 1.1 to 1.4, Chapter 10 - Section 10.1 to 10.6   (18 hrs)

Unit – 2

Work, Energy and power – work – conservative field of force – power – Rectilinear motion under varying Force simple harmonic motion (S.H.M.) – S.H.M. along a horizontal line- S.H.M. along a vertical line – motion under gravity in a resisting medium.
Chapter 11 - Section 11.1to 11.3 , Chapter 12 - Section 12.1 to 12.4   (18 hrs)

Unit – 3

Forces on a projectile- projectile projected on an inclined plane- Enveloping parabola or bounding parabola – impact – impulse force - impact of sphere - impact of two smooth spheres – impact of a smooth sphere on a plane – oblique impact of two smooth spheres
Chapter 13 - Section 13.1 to 13.3, Chapter 14 - Section 14.1, 14.5   (18 hrs)

Unit – 4

Circular motion – Conical pendulum – motion of a cyclist on a circular path – circular motion on a vertical plane – relative rest in a revolving cone – simple pendulum – central orbits -general orbits - central orbits- conic as centered orbit.
Chapter 15 - Section 15.1 to 15.6, Chapter 16 - Section 16.1 to 16.3   (18 hrs)

Unit – 5

Moment of inertia. Two dimensional motion of a rigid body –equations of motion for two dimensional motion – theory of dimensions- definition of dimensions.
Chapter 17 -Section 17.1, Chapter 18 - Section 18.1, 18.2, Chapter 19 - Section 19.1   (18 hrs)

Contents and treatment as in "Mechanics"" – P. Duraipandian , Laxmi Duraipandian , Muthamizh Jayapragasham, S. Chand and Co limited 2008 .

Reference Books:
1. Dynamics – K. Viswanatha Naik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier

CORE PAPER- XII

PROGRAMMING LANGUAGE 'C' WITH   PRACTICALS

THEORY

Unit - 1

Introduction. Constants-Variables-Data-types (Fundamental and user defined) Operators-Precedence of operators – Library functions –Input ,Output statements-Escape sequences-Formatted outputs – Storage classes -Compiler directives.
Chapter 2 Sections 2.1 - 2.8 ,Chapter 3 Sections 3.1 – 3.7, 3.12 ,Chapter 4 Sections 4.2 – 4.5(12 hrs)

Unit – 2

Decision making and branching: Simple if, if e

lse, nested if, else if ladder and switch statement –conditional operator – go to statement.

Decision making and looping : while, do while and for statement – nested for loops – continue and break statements.
Chapter 5 Sections 5.1 – 5.9 ,Chapter 6 Sections 6.1 – 6.5   (12 hrs)

Unit - 3

Arrays : One dimensional and 2 dimensional arrays – declarations – initialization of arrays– Operation on strings-String handling functions.
Chapter 7 Sections 7.1 – 7.4 ,Chapter 8 Sections 8.1 – 8.8   (12 hrs)

Unit – 4

Functions : Function definition and declaration – Categories of functions – recursion – Concept of pointers. Function call by reference - call by value.
Chapter 9 Sections 9.1 – 9.13
Chapter 11 Sections11.1-11.5   (12 hrs)

Unit – 5

Files : Definition, operations on files- file operation functions.
Chapter 12, Sections 12.1 – 12.   (12 hrs)

Content and Treatment as in

Programming in ANSI C 2nd edition by E.Balagurusamy, Tata-Mcgraw Hill Publishing Company.

Reference Books:
1. Venugopal, programming in C
2. Gottfied, B.S : programming with C , Schaum‟s outline series, TMH 2001
3. Yashvant Kanitkar, Let us „C‟ BPB Publications

PRACTICALS   (30 hrs)

Writing „C‟ programs for the following:
1. To convert centigrade to Fahrenheit
2. To find the area, circumference of a circle
3. To convert days into months and days
4. To solve a quadratic equation
5. To find sum of n numbers
6. To find the largest and smallest numbers
7. To generate Pascal‟s triangle, Floyd‟s triangle
8. To find the trace of a matrix
9. To add and subtract two matrices
10. To multiply two matrices
11. To generate Fibonacci series using functions
12. To compute factorial of a given number, using functions
13. To add complex numbers using functions
14. To concatenate two strings using string handling functions
15. To check whether the given string is a palindrome or not using string handling functions.

ELECTIVE - I

OPERATIONS RESEARCH – I

Unit – I

      Linear programming – formulation – graphical solution – simplex method.

Unit – II

      Big – M method – Two- Phase method – duality – primal – dual relation.

Unit – III

      Dual simplex method – revised simplex method – Sensitivity analysis.

Unit – IV.

      Transportation problem – Assignment problem.

Unit – V

      Sequencing problem – n jobs through 2 machines – n jobs through 3 machines – two jobs through m machines – n jobs through m machines.

Books for reference:

1. Gauss S.I. – Linear programming, Mc Graw – Hill Book company.

2. Gupta P.K. and Hira D.S. – Problems in Operations Research, S.Chand& Co.

3. KantiSwaroop, Gupta P.K. and Manmohan – Problems in Operations Research, Sultan Chand & sons.

4. Ravindran A., Philips D.T. and Solberg J.J. – Operations Research, John Wiley & Sons.

5. Taha H.A. – Operations Research, Macmillan publishing Company, New York.

6. Dr. Paria – Linear programming, transportation, assignment game, Books and Allied (p) Ltd., 1999.

SEMESTER-VI
CORE PAPER-XIII
LINEAR ALGEBRA

Unit – 1

Vector spaces. Elementary basic concepts; linear independence and bases
Chapter 4 Section 4.1 and 4.2   (18 hrs)

Unit – 2

Dual spaces
Chapter 4 Section 4.3   (18 hrs)

Unit – 3

Inner product spaces.
Chapter 4 Section 4.4   (18 hrs)

Unit – 4

Algebra of linear transformations; characteristic roots.
Chapter 6 Section 6.1 and 6.2   (18 hrs)

Unit – 5

Matrices; canonical forms; triangular forms.
Chapter 6 Section 6.3 and 6.4   (18 hrs)

Treatment and content as in "Topics in Algebra" – I. N. Herstein-Wiley Eastern Ltd.

Reference Books:

1. University Algebra – N. S. Gopalakrishnan – New Age International Publications, Wiley Eastern Ltd.
2. First course in Algebra – John B. Fraleigh, Addison Wesley.
3. Text Book of Algebra – R. Balakrishna and N. Ramabadran, Vikas publishing Co.

Algebra – S. Arumugam, New Gamma publishing house, Palayamkottai

CORE PAPER – XIV
REAL ANALYSIS -II

Unit – 1

Open sets; closed sets; Discontinuous function on R^1. More about open sets;
Connected sets : Chapter 5 Section 5.4 to 5.6
Chapter 6 Section 6.1 and 6.2   (18 hrs)

Unit – 2

Bounded sets and totally bounded sets: Complete metric spaces; compact metric spaces,
continuous functions on a compact metric space, continuity of inverse functions, uniform
continuity.
Chapter 6 Section 6.3 to 6.8   (18 hrs)

Unit – 3

Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral;
properties of Riemann integral.
Chapter 7 Section 7.1 to 7.4   (18 hrs)

Unit – 4

Derivatives; Rolle"s theorem, Law of mean, Fundamental theorems of calculus.
Chapter 7 Section 7.5 to 7.8   (18 hrs)

Unit – 5

Taylor"s theorem; Pointwise convergence of sequences of functions, uniform convergence of
sequences of functions.
Chapter 8 Section 8.5 Chapter 9 Section 9.1 and 9.2   (18 hrs)

Content and Treatment as in "Methods of Real Analysis"- Richard R. Goldberg (Oxford and IBH
Publishing Co)

Reference Books:
   1. Principles of Mathematical Analysis by Walter Rudin
   2. Mathematical Analysis Tom M Apostal

COMPLEX ANALYSIS

Unit – 1

Functions of a complex variable - mappings, limits - theorems on limits, continuity ,derivatives, differentiation formulae - Cauchy-Riemann equations - sufficient conditions for differentiability- Cauchy-Riemann equations in polar form - Analytic functions - Harmonic functions.
Chapter 2 Section 2.9 to 2.12, 2.14 to 2.20 and 2.22   (18 hrs)

Unit – 2

Linear functions - The transformation w = 1/z - linear fractional transformations - an implicit form - exponential and logarithmic transformations – transformation w = sin z - Preservation of angles.
Chapter 8 Section 8.68 to 8.71 and 8.73, 8.74 Chapter 9 : 9.79
        (18 hrs)

Unit – 3

Complex Valued functions- contours - contour integrals - Anti derivatives - Cauchy-Goursat theorem. Cauchy integral formula - derivatives of analytic function - Liouvillie"s theorem and fundamental theorem of algebra -maximum moduli of functions.
Chapter 4 Section 4.30 to 4.42   (18 hrs)

Unit – 4

Convergence of sequences and series - Taylor"s series -Laurent"s series - zeros of analytic functions. Chapter 5 Section 5.43 to 5.47   (18 hrs)

Unit – 5

Residues - Residue theorems- Three types of isolated singular points- Residues at poles- Zeros and poles of order „m" - Evaluation of improper integrals – Improper integrals involving sines and cosines - Definite integrals involving sines and cosines – Argument principle and Rouche"s theorem.
Chapter 6 Section 6.53 to 6.57 and Chapter 7 Section 7.60 to 7.65.   (18 hrs)

Content and treatment as in

Complex variables and Applications (Sixth Edition) by James Ward Brown and Ruel V.Churchill, Mc.Grawhill Inc.

Reference Books:
1. Theory and problems of Complex Variables – Murray R.Spiegel, Schaum outline series
2. Complex Analysis – P.Duraipandian
3. Introduction to Complex Analysis S. Ponnuswamy , Narosa Publishers 1993

ELECTIVE-II

OPERATIONS RESEARCH – II

Unit – I

PERT and CPM: Project network diagram – Critical path (crashing excluded) – PERT computations.

Unit – II

Queuing theory : Basic concepts - Steady state analysis of M/M/1 and M/M/systems with infinite and finite capacities.

Unit – III

Inventory Model: Basic concepts – EOQ Models: (a) Uniform demand rate, infinite production rate with no shortages, (b) Uniform demand rate, finite production rate with no shortages – Classical newspaper boy Problem with discrete demand – purchase inventory model with one price break.

Unit – IV.

Game theory: Two person Zero-sum game with saddle point – without saddle point – dominance – solving 2 x n or m x 2 game by graphical method.

Unit – V

Integer programming: Branch and bound method.

Books for reference:

1. Gauss S.I. – Linear programming, Mc Graw – Hill Book company.

2. Gupta P.K. and Hira D.S. – Problems in Operations Research, S.Chand& Co.

3. KantiSwaroop, Gupta P.K. and Manmohan – Problems in Operations Research, Sultan Chand & sons.

4. Ravindran A., Philips D.T. and Solberg J.J. – Operations Research, John Wiley & Sons.

5. Taha H.A. – Operations Research, Macmillan publishing Company, New York.

6. Dr. Paria – Linear programming, transportation, assignment game, Books and Allied (p) Ltd., 1999.

ELECTIVE - II
ELEMENTARY NUMBER THEORY

Unit 1
Introduction – divisibility- primes- The Binomial theorem
Chapter 1 Sections - 1.1 to 1.4

Unit 2
Congruences, Solution of Congruences, Chinese Remainder Theorem- primitive roots and power Residues- Number Theory from an Algebric view point - Groups, rings and fields.
Chapter – 2 Sections 2.1 to 2.3, 2.8 (cor 2.42, Th 2.43 and cor 2.44 are omitted) - 2.10.- 2.11

Unit 3
Quadratic Residues , Quadratic reciprocity , The Jacobi Symbol
Chapter – 3 Sections 3.1 to 3.3

Unit 4
Greatest Integer Function, Arithmetic function, The Mobius Inversion formula
Combinational Number Theory
Chapter – 4 Sections 4.1 to 4.3 and 4.5

Unit 5
The equation ax+by=c, Simultaneous Linear Equations, Pythagorean Triangle, Assorted examples.
Chapter – 5 Sections 5.1 to 5.4

Content and treatment as **in** - An introduction to the Theory of Numbers (Vth edition) by Ivan Niven, Herbert S. Zuckarman and Hugh L. Montgometry John Wiley & Sons, Inc.2001.

Reference Books:
1. Elementary theory of numbers, cy. Hsiung, Allied publishers, 1995.

2. Elementary Number Theory, Allyn and Bacon Inc., Boston, 1980.

3. Introduction to Analytic Number Theory, Tom. M. Apostol, Narosa Publishing House, New Delhi, 1989.

ALLIED PAPER-I

MATHEMATICS-I

(For Physics and Chemistry)

Unit-I

ALGEBRA: Partial Fractions, binomial, exponential and logarithmic series(without proof) summation and approximation-Simple Problems.   (15 hrs)

Unit-II

THEORY OF EQUATIONS: Polynomial equations with real coefficients, irrational roots, complex roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equations. Newton's method to find a root approximately- simple problems.

                                                                                        (30 hrs)

Unit-III

MATRICES: Symmetric, Skew-Symmetric, Hermitian, Skew-Hermitian matrices, Orthogonal and Unitary Matrices. Characteristic roots and characteristic vectors-Cayley- Hamilton theorem(statement only) verification, to find the inverse using the above theorem.

(15 hrs)

Unit-IV

FINITE DIFFERENCES: Operator E, difference tables, Newton's forward and backward interpolation formulae, Lagrange's interpolation formulae.

TRIGONOMETRY: Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$. Expansions of $\sin^n\theta$, $\cos^n\theta$, $\tan^n\theta$. Hyperbolic and inverse hyperbolic function. (30 hrs)

Unit-V

DIFFERENTIAL CALCULUS:n^{th} derivatives, Leibnitz theorem (without proof) and applications, Jacobians. Curvature and radius of curvature in Cartesian coordinates, maxima and minima of functions of two variables, Lagrange's Multipliers-Simple Problems. (30 hrs)

Contents and treatment as in "Ancillary Mathematics: S.Narayanan and T.K.Manickavasagam pillai (Viswanathan Printers)"

Reference books:

1. Allied Mathematics Volume I&II: P.Kandasamy and K.Thilagavathi (S.Chand and Co.)

2. Ancillary Mathematics Volume I&II: P.Balasubramanian & K.G.Subramanian.

3. Allied Mathematics: P.R.Vittal (Margham Publications)

ALLIED PAPER-II

MATHEMATICS-II

(For Physics and Chemistry)

Unit-I

INTEGRAL CALCULUS: Bernoulli's formula, integration by parts, reduction formulae, simple problems, Fourier series for functions in $(0,2\pi),(-\pi,\pi)$. (30 hrs)

Unit-II

ORDINARY DIFFERENTIAL EQUATIONS: Second order linear differential equations with constant coefficients. $ay'' + by' + cy = \phi(x)$, where $\phi(x) = x^m$, $e^{ax}x^m$, $e^{ax}\sin mx$, $e^{ax}\cos mx$.

(15 hrs)

Unit-III

PARTIAL DIFFERENTIAL EQUATIONS: Formation, complete integrals and general integrals, four standard types of Lagrange's equations.   (30 hrs)

Unit-IV

LAPLACE TRANSFORMS: Laplace transformations of standard functions and simple properties, inverse Laplace transforms, Solving Differential equations of second order with constant coefficients using Laplace transform.

                                                                                    (15 hrs)

Unit-V

VECTOR ANALYSIS: Scalar point functions, Vector point functions, gradient, divergence, curl, directional derivatives, normal to a surface. Line and surface integrals, Gauss, Stoke's and Green's theorems (without proof)-Simple Problems.   (30 hrs)

Contents and treatment as in "Ancillary Mathematics: S.Narayanan and T.K.Manickavasagam pillai (Viswanathan Printers)"

Reference books:

1. Allied Mathematics Volume I&II: P.Kandasamy and K.Thilagavathi (S.Chand and Co.)

2. Ancillary Mathematics Volume I&II: P.Balasubramanian & K.G.Subramanian.

3. Allied Mathematics: P.R.Vittal (Margham Publications)

I M.A. , ECONOMICS

Elective-II-MATHEMATICS FOR ECONOMISTS-I

UNIT I

Set Theory: Concept and operation of sets.   **(18 hrs.)**

UNIT II

Equation of straight line – Parabola – Rectangular Hyperbola – Relationships among Total,Average and Marginal Curves.   **(18 hrs.)**

UNITIII

Logarithmic and Exponential Functions – Convex and Concave Functions – Indifference, iso-quant and Transformation Curves.   **(18 hrs.)**

UNIT IV

Concept of Limit – Techniques of Differentiation – Elasticities – Conditions for Extremum of functions of one variable. **(18 hrs.)**

UNIT V

Functions of Two variables – Partial Derivatives – Maxima and Minima – Properties of Homogeneous functions – Uses of homogeneous functions in Economics. **(18 hrs.)**

Recommended Text

1. Edward .T. Dowling　:　Mathematics for Economists

　　　　　　　　　　　　McGraw - Hill Book Company.

2. MehtaV.L&Madnani　:　Mathematics for Economists

　　　　　　　　　　　　Sultan Chand and sons.

Books for Reference:

1. Allen R.G.D　　　:　Mathematical Analysis for Economists

　　　　　　　　　　　Macmillan and company Ltd.,London.

2. Chiang A.C　　　:　Fundamental Methods of Mathematical Economics

　　　　　　　　　　　McGraw - Hill Book Company.

3. Stafford.L.W.T　　:　Mathematics for Economists.

　　　　　　　　　　　The English language Books Society and MacDonalds & evans Ltd.

4. Mabett.A.J　　　:　Mathematics for Economists,

　　　　　　　　　　　Macmillan Master series.

5. Weber　　　　　:　Mathematics for Economists.

I M.A. , ECONOMICS

Elective-IV-MATHEMATICS FOR ECONOMISTS-II

UNIT I

Constrained Maxima and Minima – Uses of Lagrange Multiplier Method – Application to utility maximization, profit maximization and cost minimization. **(18 hrs.)**

UNIT II

Matrices – Matrix operations – commutative Associative and Distributive laws – Determinants – Rank of Matrix – Matrix inverse – Cramer's Rule. **(18 hrs.)**

UNIT III

Input - Output analysis – Leontieff model. **(18 hrs.)**

UNIT IV

Linear programming – Graphical Method – Simplex method – Primal and Dual.   **(18 hrs.)**

UNIT V

Elementary Integration Techniques – Indefinite integrals – Definite Integrals – Economic applications of Integrals – Consumer's surplus - producer's surplus.   **(18 hrs.)**

Recommended Text

1. Edward .T. Dowling   :   Mathematics for Economists

                                                McGraw - Hill Book Company.

2. MehtaV.L&Madnani   :   Mathematics for Economists

                                                Sultan Chand and sons.

Books for Reference:

1. Allen R.G.D   :   Mathematical Analysis for Economists

                                                Macmillan and company Ltd.,London.

2. Chiang A.C   :   Fundamental Methods of Mathematical Economics

                                                McGraw - Hill Book Company.

3. Stafford.L.W.T   :   Mathematics for Economists.

                                                The English language Books Society and MacDonalds & evans Ltd.

4. Mabett.A.J   :   Mathematics for Economists,

                                                Macmillan Master series.

5. Weber   :   Mathematics for Economists.

ALLIED MATHEMATICS – I

   (For B.Sc. Computer Science and BCA)

UNITI:

ALGEBRA: Summation of Series - Binomial, Exponential and Logarithmic Series

(Without proof) and Simple Problems.

Chapter 2, Section 2.1.3, 2.2, 2.2.1, 2.3, 2.3.3   **(18 hours)**

UNIT II:

MATRICES: Eigen Values – Eigen Vectors - Cayley - Hamilton Theorem (without proof)

Chapter 4 Section 4.5, 4.5.2, 4.5.3   **(18 hours)**

UNIT III:

THEORY OF EQUATIONS: Polynomial equations, irrational roots, complex roots,

Reciprocal equations - Approximation of roots of a polynomial equation by Newton's Method

Chapter 3, Section 3.1 to 3.4.1   **(18 hours)**

UNIT IV:

DIFFERENTIAL CALCULUS: n^{th} derivatives - Leibnitz Theorem - Jacobians -

Radius of Curvature (Cartesian Coordinates only) – Maxima and Minima of functions of two variables.

Chapter 1, Section 1.1.1 to 1.3.1 and Section 1.4.3   **(18 hours)**

UNIT V:

TRIGONOMETRY: Expansions of Sin$n\theta$, Cos$n\theta$, tan$n\theta$ - Expansions of Sin$^n\theta$, Cos$^n\theta$ - Hyperbolic and Inverse hyperbolic functions.

chapter 6, Section 6.1 to 6.3.   **(18 hours)**

Content and treatment as in
Allied Mathematics Volume I and II by P. Duraipandian and S. Udayabaskaran, S. Chand Publications

PRESCRIBED BOOKS :

1. Allied Mathematics,A.Singaravelu.

2. Ancillary Mathematics, A. Manickavasagam Pillai and Narayanan.

3. Allied Mathematics,P.R.Vittal.

REFERENCE BOOKS :

1. Allied Mathematics, S.G. Venkatachalapathy

2. P.Kandasamy and K.Thilagavathi, Allied Mathematics Volume I and Volume II -- 2004, S.Chand and Co, New Delhi.

3. Ancillary Mathematics Volume 1 and 2 by P.Balasubramanian &K.G. Subramanian.

ALLIED MATHEMATICS – II

 (For B.Sc. Computer Science and BCA)

UNIT-I:

INTEGRAL CALCULUS : Bernoulli's formula – Reduction formula for $\int \mathrm{Sin}^n x \, dx$ - $\int \mathrm{Cos}^n x \, dx$.

Chapter 2, Sections 2.7 and 2.9   **(18 hours)**

UNIT- II:

FOURIER SERIES : Fourier series for function in $(\alpha, \alpha + 2\pi)$, Half-range Sine and cosine series

Chapter 4, Section 4.1 to 4.2   **(18 hours)**

UNIT – III:

DIFFERENTIAL EQUATION : Second order Differential Equation with Constant Coefficient s.Differential equation of the form $(aD^2+bD+C)y = e^{ax} \phi (x)$ where a, b, c are constants, $\phi (x) = $ Sin mx (or) Cos mx (or) x^m.

PARTIAL DIFFERENTIALEQUATION : Eliminating Arbitrary constants and functions - Four Standard types.f(p,q) = 0; f(x,p,q) = 0, f (y,p,q) = 0, f(z,p,q) = 0.

Chapter 5, Section 5.2, 5.2.1
Chapter 6, Section 6.1 to 6.3   **(18 hours)**

UNIT – IV:

Laplace Transformation - Basic Properties and Simple Problems -

$L [e^{at} f (t)]$ - $L [t^n f (t)]$ - $L [e^{at} t f (t)]$ - $L [f (t)/t]$.

Chapter 7, Section 7.1.1 to 7.1.4   **(18 hours)**

UNIT – V :

Inverse Laplace Transformation : - Solving Differential Equation using Laplace Transformation.

Chapter 7, Section 7.2 to 7.3   **(18 hours)**

Content and treatment as in
Allied Mathematics Volume I and II by P. Duraipandian and S. Udayabaskaran, S. Chand Publications

PRESCRIBED BOOKS :

1. Allied Mathematics,A.Singaravelu.

2. Ancillary Mathematics, A. Manickavasagam Pillai and Narayanan.

3. Allied Mathematics,P.R.Vittal.

REFERENCE BOOKS :

1. Allied Mathematics, S.G. Venkatachalapathy

2. P.Kandasamy and K.Thilagavathi, Allied Mathematics Volume I and Volume II -- 2004, S.Chand and Co, New Delhi.

3. Ancillary Mathematics Volume 1 and 2 by P.Balasubramanian &K.G. Subramanian.

STATISTICAL METHODS AND THEIR APPLICATIONS

(For B.Sc. Computer Science)

UNIT I :

Measures of location – Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean, and their properties, Merits and demerits -Diagrammatic an Graphical Representation of Data - Measures of Dispersion -- Range, Mean Deviation, Quartile Deviation, Standard deviation, Coefficient of variation, Skewness and Kurtosis and their properties.

Chapter 4, Section 4.1 to 4.4,

Chapter 5, Sectin 5.1 to 5.8

Chapter 6, Section 6.1 to 6.4

Chapter 7, 7.1 and 7.2   **(12 hours)**

UNIT II :

Probability of an Event – Addition and Multiplication theorems – Independent Events – Conditional Probability – Baye's theorem.

Chapter 8, Sction 8.1 to 8.9   **(12 hours)**

UNIT III :

Correlation and Regression Lines – Rank Correlation Coefficient – Curve fitting by the Method of Least Squares.

Chapter 13,Section 13.1 to 13.2   **(12 hours)**

UNIT IV :

Concept of Sampling Distributions – Standard Error – Test of Significance based on t, Chi-Square and F-distributions with respect to Mean and Variance – Test of Independence in Contingency table.

Chapter 24, Se24.1,24.2
Chapter 26, Section 26.1,26.2,26.3
Chapter 27
Chapter 28   **(12 hours)**

UNIT V :

Principle of Scientific Experiments – Randomization, Replication and Local Control. Analysis of Variance – One way and Two Way Classification – Analysis of CRD, RBD – Latin Square Designs.

Chapter 29, Section 29.1 to 29.9   **(12 hours)**

Content and treatment as in
Statistical and Numerical Methods by P.R.Vittal and V.Malini

PRESCRIBED BOOKS :

1. P.R.Vittal & V.Malini, Statistical and Numerical methods, Margham Publications.
2. Snedecor, G.W., & Cochran, W.G.(1967): Statistical Methods, Oxford and IBH
3. Prentice Hall 4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand & Sons

REFERENCE BOOKS :
1.   Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand

2. Wilks, S.S.: Elementary Statistical Analysis - Oxford and IBH
3. Mode, E.B.: Elements of Statistics - Prentice Hall

STATISTICAL METHODS AND THEIR APPLICATIONS-PRACTICALS

(For B.Sc. Computer Science)

COURSE OBJECTIVES: **(30 Hours)**

1. Construction of univariate and bivariate frequency distribution with samples of size not proceeding 200.

2. Diagrammatic and graphical representation of various statistical data and frequency distributions.

3. Cumulative frequency curve and Lorenz curves.

4. Computation of various measures of location, dispersion, moments, skewness and kurtosis.

5. Curve fitting by the method of least squares.

(i) $y = ax + b$; (ii) $y = ax^2 + bx + C$; (iii) $y = ae^{bx}$ (iv) $y = ax^b$

6. Computation of correlation coefficients - regression lines (raw data and grouped data) - correlation coefficients,

7. Exact test based on t, Chi-square, and F distributions with regard to mean, variance and correlation coefficients.

8. Analysis of variance – one way and two way classification, CRD,RBD

Content and treatment as in
Statistical and Numerical Methods by P.R.Vittal and V. Malini

Books for Study and References:

Mode, E.B.: Elements of Statistics - Prentice Hall

Wilks, S.S.: Elementary Statistical Analysis -Oxford and IBH

Snedecor, G.W., & Cochran, W.G.: Statistical Methods, Oxford and IBH

Simpson and Kafka: Basic Statistics

Burr, I.W.: Applied Statistical Methods, Academic Press.

Croxton, FE. and Cowden, D.J.: Applied General Statistics, Prentice Hall

Ostleo, B.: Statistics in Research, Oxford & IBH.

Sydney Siegel- Non-parametric Methods for Behavioural Sciences.

Daniel, W W- Biostatistics.

PRESCRIBED BOOKS :

1. Statistical and Numerical Methods by P.R.Vittal and V. Malini, Margham Publications

2. Statistical Mehtods by S.P.Gupta, Sultan Chand & Sons

OPERATIONS RESEARCH

(For B.Sc. Computer Science and BCA)

UNIT – I :

Introduction to Operations Research - Linear Programming - Formulation - Graphical Solution - Simplex method.

Chapter 1,Section 1.1 to 1.4

Chapter 2, Section 2.1 to 2.28

Chapter 3, Section 3.1 to 3.54

Chapter 4, Section 4.1 to 4.31   **(18 hours)**

UNIT II :

Big-M Method – Two-Phase method – Duality Dual-Primal relation – Dual Simplex Method.

Chapter 5, Section 5.1 to 5.14

Chapter 6, Section 3.1 to 6.35

Chapter 7, Section 7.1 to 7.37

Chapter 8, Section 8.1 to 8.35   **(18 hours)**

UNIT – III :

Transportation Problem -- Assignment Problem.

Chapter 10, Section 10.1 to 10.73

Chapter 11, Section 11.1 to 11.6   **(18 hours)**

UNIT – IV :

Sequencing problem , n jobs through 2 machines ,n jobs through 3 machines , 2 jobs through m machines , n jobs through m machines

Chapter 12, Section

Game theory : Two person – Zero game with saddle point – without saddle point – Dominance – solving 2 x n game or m x 2 game by graphical method

Chapter 15,   **(18 hours)**

UNIT – V :

PERT – CPM : Project Network Diagram – Critical Path (Crashing excluded) – PERT computation

Chapter 14, Section 14.1 to 14.70   **(18 hours)**

Content and treatment as in
Operations Research by P.R.Vittal and V.Malini

PRESCRIBED BOOKS :

1. V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan – Resource Management Techniques (Operations Research).

2. Introduction to Operations Research, P.R.Vittal

3. Gupta P.K. and Hira D.S.Problems in Operations Research, S.Chand & Co.

REFERENCE BOOKS :

1.Kanti Swaroop, Gupta P.K. and Manmohan – Problems in Operations Research, Sultan Chand & Sons.

2. Ravidran A., Philips,D.T. and Solberg J.J.,Operations Research, John Wiley & sons.

3.Taha H.A., Operations Research, Macmillian Publishing company, Newyork.