UNIVERSITY OF MADRAS
INSTITUTE OF DISTANCE EDUCATION
BSc MATHEMATICS
Under Choice Based Credits System
(With effect from the academic year 2018-2019)

SCHEME OF EXAMINATION

SEMESTER I COURSE COMPONENT		SUBJECTS	CREDIT	Max Marks		TOTAL
				INT	EXT	
Part I	Paper-I	Tamil or other language	3	25	75	100
Part II	Paper-I	English	3	25	75	100
Part III	Core Paper-I	Algebra	4	25	75	100
	Core Paper-II	Trignometry	4	25	75	100
	Allied Paper- I	Calculus of Finite Differences	3	25	75	100

SEMESTER II COURSE COMPONENT		SUBJECTS	CREDIT	Max Marks		TOTAL
				INT	EXT	
Part I	Paper-II	Tamil or other language	3	25	75	100
Part II	Paper-II	English	3	25	75	100
Part III	Core Paper-III	Differential Calculus	5	25	75	100
	Core Paper-IV	Analytical Geometry	4	25	75	100
	Allied Paper-II	Mathematical Economics	3	25	75	100

SEMESTER III COURSE COMPONENT		SUBJECTS	CREDIT	Max Marks		TOTAL
				INT	EXT	
Part I	Paper-III	Tamil or other language	3	25	75	100
Part II	Paper-III	English	3	25	75	100
Part III	Core Paper-V	Integral Calculus	5	25	75	100
	Core Paper-VI	Differential Equations	4	25	75	100
Part IV	NME-I	Public Relations	2	25	75	100

SEMESTER IV COURSE COMPONENT		SUBJECTS	CREDIT	Max Marks		TOTAL
				INT	EXT	
Part I	Paper-IV	Tamil or other language	3	25	75	100
Part II	Paper-IV	English	3	25	75	100
Part III	Core Paper-VII	Transform Techniques	4	25	75	100
	Core Paper-VIII	Mechanics	4	25	75	100
Part IV	NME-II	Basics of Psychology	2	25	75	100

SEMESTER V COURSE COMPONENT		SUBJECTS	CREDIT	Max Marks		TOTAL
				INT	EXT	
Part III	Core Paper-IX	Algebric Structures	4	25	75	100
	Core Paper-X	Real Analysis-I	4	25	75	100
	Core Paper-XI	Discrete Mathematics	4	25	75	100
	Core Elective-I	Mathematical Modeling	3	25	75	100
Part IV		Environmental Studies	2	25	75	100

SEMESTER VI COURSE COMPONENT		SUBJECTS	CREDIT	Max Marks		TOTAL
				INT	EXT	
Part III	Core Paper-XII	Linear Algebra	4	25	75	100
	Core Paper-XIII	Real Analysis-II	4	25	75	100
	Core Paper-XIV	Complex Analysis	4	25	75	100
	Core Elective-II	Operations Research	3	25	75	100
Part IV		Value Education	2	25	75	100

Course component		No. of paper x Credit(s)	Total	
Part I	Language Paper(4)	4x3	12	
Part II	English(4)	4x3	12	
Part III	Core paper(12)	12x4	48	
	Core paper(2)	2x5	10	
	Allied(2)	2x3	06	
Part IV	Elective(2),	2x3	06	
	NME(2),EVS(1),VE(1)	4x2	08	**102**

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BSc MATHEMATICS
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SYLLABUS

CORE PAPER I-ALGEBRA

Unit- 1

Polynomial equations; Imaginary and irrational roots; Relation between roots and coefficients: Symmetric functions of roots in terms of coefficients; Transformations of equations; Reciprocal equations

Chapter 6 Section 9 to 12, 15, 15.1,15.2,15.3, 16, 16.1,16.2.

Unit-2

Increase or decrease the roots of the given equation: Removal of term: Descartes' rule of signs: Approximate solutions of roots of polynomials by Horner's method; Cardan's method of solution of a cubic polynomial. Summation of Series using Binomial, Exponential and Logarithmic series: Chapter 6: Section 17, 19, 24, 30, 34, 34.1

Chapter 3: Section 10, Chapter 4: Section 3, 3.1, 7.

Unit-3

Symmetric; Skew Symmetric; Hermitian; Skew Hermitian; Orthogonal Matrices; Eigen values; Eigen Vectors; Cayley - Hamilton Theorem; Similar matrices; Diagonalization of a matrix.

Chapter 2, Section 6.1 to 6.3, 9.1, 9.2 , 16 , 16.1,16.2 16.3

Unit-4

Prime number; Composite number; decomposition of a composite number as a product of primes uniquely; divisors of a positive integer n; Euler function.

Chapter 5, Section 1 to 11

Unit-5

Congruence modulo n; highest power of a prime number p contained in n! ; Fermat's and Wilson's theorems

.Chapter 5, Section 12 to 17

Contents and treatment as in

Unit – 1 and 2

Algebra Volume I by T. K. Manicavachagam Pillay,T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2007

Unit – 3, 4 and 5

Algebra Volume II by T. K. Manicavachagom Pillay ,T.Natarajan ,K.S.Ganapathy, Viswanathan Publication 2008

Reference Books:-

1. Algebra: by S. Arumugam (New Gama publishing house, Palayamkottai)

CORE PAPER II-TRIGONOMETRY

Unit- 1

Expansions of powers of $\sin\theta$, $\cos\theta$ - Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta \sin^n\theta$

Chapter 2, Section 2.1, 2.1.1, 2.1.2,2.1.3

Unit-2

Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\tan(\theta_1+\theta_2+\ldots\ldots+\theta n)$ - Expansions of sin x,

Cos x, tan x in terms of x-Sum of roots of trigonometric equations – Formation of equation with trigonometric roots.

Chapter 3, Section 3.1 to 3.6

Unit-3

Hyperbolic functions-Relation between circular and hyperbolic functions - Formulas in hyperbolic functions – Inverse hyperbolic functions

Chapter 4, Section 4.1 to 4.7

Unit 4

Inverse function of exponential functions – Values of Log (u+iv) - Complex index.

Chapter 5, Section 5.1 to 5.3

Unit-5

Sums of trigonometrical series – Applications of binomial, exponential, , logarithmic and Gregory's series - Difference method.

Chapter 6, Section 6.1 to 6.6.3

Content and treatment as in Trigonometry by P. Duraipandian and Kayalal Pachaiyappa, Muhil Publishers.

Reference Books:-

1. Trigonometry by T.K. Manickavachagam Pillay

Allied Paper – I Calculus of Finite Differences

Solutions of algebraic and transcendental equations, Bisection method, Iteration method, Regulafalsi method, Newton-Raphson method.

Solution of simultaneous linear equations :

Guass-elimination method, Guass – Jordan method, Gauss – Siedel method, Crout's method.

Finite differences:

E operators and relation between them, Differences of a polynomial, Factorial polynomials, differences of zero, summation series.

Interpolation with equal intervals:

Newton's forward and backward interpolation formulae. Central differences formulae-Gauss forward and backward formulae, Sterling's formula and Bessel's formula.

Interpolation with unequal intervals:

Divided differences and Newton's divided differences formula for interpolation and Lagrange's formula for interpolation.

Inverse Interpolation – Lagrange's method, Reversion of series method.

Reference Books:

1. Calculus of finite differences and Numerical analysis by Gupta-Malik, Krishna Prakastan Mandir, Meerut.
2. Numerical methods in Science and Engineering by M.K. Venkataraman, National publishing house, Chennai.
3. Numerical Analysis by B.D. Gupta, Konark publishing.
4. Calculus of finite differences and Numerical Analysis by Saxena, S. Chand & Co.

II SEMSTER

CORE PAPER III - DIFFERENTIAL CALCULUS

Unit- 1

Successive differentiation - n th derivative- standard results – trigonometrical - transformation – formation of equations using derivatives - Leibnitz's theorem and its applications

Chapter 3 section 1.1 to 1.6, 2.1 and 2.2

Unit- 2

Total differential of a function – special cases – implicit functions - partial derivatives of a function of two functions - Maxima and Minima of functions of 2 variables- Lagrange's method of undetermined multipliers.

Chapter 8 section 1.3 to 1.5 and 1.7, Section 4, 4.1 and 5 .

Unit- 3

Envelopes – method of finding envelopes – Curvature- circle, radius and centre of curvature- Cartesian formula for radius of curvature – coordinates of the centre of curvature – evolute-and involute - radius of curvature and centre of curvature in polar coordinates – p-r equation

Chapter 10 Section 1.1 to 1.4 and Section 2.1 to 2.7

Unit- 4

P-r equations- angle between the radius vector and the tangent – slope of the tangent in the polar coordinates – the angle of intersection of two curves in polar coordinates- polar sub tangent and polar sub normal – the length of arc in polar coordinates.

Chapter 9 Section 4.1 to 4.6

Unit- 5

Asymptotes parallel to the axes – special cases – another method for finding asymptotes - asymptotes by inspection – intersection of a curve with an asymptote.

Chapter 11 - Section 1 to 4, Section 5.1 , 5.2,6 and 7

Content and treatment as in Calculus Vol- 1 by S. Narayanan and T.K. Manicavachagom pillay - S. Viswanathan publishers – 2006

Reference Books:-

1. Calculus by Thomas and Fenny ,Pearson Publication

2. Calculus by Stewart

CORE PAPER IV - ANALYTICAL GEOMETRY

Unit-1

Chord of contact – polar and pole,- conjugate points and conjugate lines – chord with (x_1,y_1) as its midpoint – diameters – conjugate diameters of an ellipse.- semi diameters- conjugate diameters of hyperbola

Chapter – 7 Sections 7.1 to 7.3 , Chapter – 8 Section 8.1 to 8.5

Unit- 2

Co-normal points, co-normal points as the intersection of the conic and a certain R.H. concyclic points – Polar coordinates, general polar equation of straight line – polar equation of a circle on A_1A_2 as diameter, equation of a straight line, circle, conic – equation of chord , tangent, normal. Equations of the asymptotes of a hyperbola.

Chapter – 9 Sec 9.1 to 9.3 , Chapter – 10 Sec 10.1 to 10.8

Unit- 3

Introduction – System of Planes - Length of the perpendicular – orthogonal projection.

Chapter 2 Sec 2.1 to 2.10

Unit- 4

Representation of line – angle between a line and a plane- co-planar lines- shortest distance 2 skew lines- Length of the perpendicular- intersection of three planes

Chapter 3 Sec 3.1 to 3.8

Unit- 5

Equation of a sphere ; general equation ; section of a sphere by a plane - equation of the circle ; tangent plane ; radical plane ; coaxial system of spheres; orthogonal spheres.

Chapter 6 Sec 6.1 to 6.9

Contents and treatment as in

1. Analytical Geometry of 2D by P.Durai Pandian- Muhil publishers for Unit – 1 and 2
2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K. Mittal for Unit – 3 to 5

Reference Books:-

1. Analytical Geometry of Two Dimension by T. K. Manikavachakam Pillai and S. Narayanan.

2. Analytical Geometry of Three Dimension by T. K. Manikavachakam Pillai and S. Narayanan

Allied Paper – II Mathematical Economics

Unit- 1

Mathematics for Economists – History of Thought – Graphs and Co-ordinates – intercept and slope of a straight line equations in Economics.

Unit-2

Elementary functions – Linear functions – non - linear functions – Economic Applications – Market Equilibrium – National Income determination.

Unit-3

Vector and matrix notations – Linear programming – Sequences and series – Simple and component interest – Investment Appraisal – Applications in Finance and Growth.

Unit-4

Differentiation – Slope of the function – applications – maximization, minimization and Optimization.

Unit-5

Exponentials and Natural Logarithms – Integration – Consumer surplus – Producer's surplus – Production and costs.

Reference Books:-

1. Renshaw, Geoff, (2009), Maths for Economics (2nd Edition), Oxford University Press, New York.

References

1. Anthony, Martin & Biggs, Norman (2009), Mathematics for Economics and Finance- Methods and Modelling, Cambridge University Press, New York.

2. Bradley, Teresa & Patton, Paul (2002), Essential Mathematics for Economics and Business, Wiley India Private Ltd., New Delhi.

3.Chiang, A.C. (1986), Fundamental Methods of Mathematical Economics, McGraw Hill, New York.

4. Weber, E. Jean, (1982), Mathematical Analysis Business and Economic Applications (4th Edition), Harper & Row, Publishers, New York.

SEMESTER-III

CORE PAPER V- INTEGRAL CALCULUS

Unit- 1

Reduction formulae –Types $\int x^n e^{ax} dx$, $\int x^n \cos ax\, dx$, $\int x^n \sin ax\, dx$ $\int cos^n x dx$, $\int sin^n x dx$, $\int sin^m x cos^n x dx$, $\int tan^n x dx$, $\int cot^n x dx$, $\int sec^n x dx$, $\int cosec^n x dx$ $\int x^n (logx)^m dx$.Bernoulli's formula.

Chapter 1 Section 13, 13.1 to 13.10,14,15.1

Unit- 2

Multiple Integrals- definition of the double integrals- evaluation of the double integrals- double integrals in polar coordinates – triple integrals – applications of multiple integrals – volumes of solids of revolution – areas of curved surfaces – change of variables – Jocobians

Chapter 5 Section 1, 2.1, 2.2, 3.1, 4, 6.1, 6.2, 6.3, 7

Chapter 6 Section 1.1, 1.2, 2.1 to 2.4

Unit- 3

Beta and Gamma functions- indefinite integral – definitions – convergence of Γ (n) – recurrence formula of Γ functions – properties of β-function- relation between β and Γ functions

Chapter 7 Sections 1.1 to 1.4 , 2.1 to 2.3, 3, 4, 5.

Unit-4

Introduction, Gradient, divergence, curl, directional derivative, unit normal to a surface. Solenoidal and irrotational. Laplacian Differential Operator.

Chapter 2 Sections 2.3 - 2.8

Unit-5

Line, surface and volume integrals; Theorems of Gauss, Stokes and Green. (Without proof) – Problems.

Chapter 3 Sections 3.1-3.8 and Chapter 4 Sections 4.1- 4.8

Content and treatment as in

1. Calculus Vol- II by S. Narayanan and T.K. Manicavachagam pillay - S. Viswanathan publishers – 2007 for Unit 1 , Unit 2 , Unit 3
2. **C**ontent and treatment as in Vector Analysis by P.Duraipandian and Laxmi Duraipandian. Emerald Publishers. For Unit 4 , Unit 5

Reference Books:-

1. Integral Calculus and differential equations : Dipak Chatterjee (TATA McGraw Hill Publishing company Ltd.)

2. Vector Algebra and Analysis by Narayanan and T.K.Manickvachagam Pillay S .Viswanathan Publishers.

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

CORE PAPER- VI-DIFFERENTIAL EQUATIONS

Unit- 1

Homogenous equations. Exact equations. Integratic factor. Linear equations, Reduction of order.

Chapter 2 Sections 7-11

Unit- 2

Second order linear differential equations introduction .General solution of homogenous equations. The use of known solution to find another. Homogeneous equation with constant coefficients-Method of undetermined coefficients; Method of variation of parameters;

Chapter 3 Sections 14-19

Unit -3

System of first order equations-Linear systems. Homogeneous linear systems with constant coefficients.(Omit non-homogeneous system of equations)

Chapter 10 Sections 55 and 56

Unit-4

Formation of P.D.E by eliminating arbitrary constants and arbitrary functions; complete integral; Singular integral; general integral: Lagrange's equations Pp + Qq=R.

Chapter 0 Sections 0.4 and 0.5

Unit-5

Charpit's method and Special types of first order equations.

Chapter 0 Sections 0.11, 0.11.1

Contents and treatment as in

1. Differential equations with Applications and Historical Notes by George F. Simmons Second Edition,Tata Mcgraw Hill Publications. Unit 1, 2 and 3
2. Introduction to Partial Differential Equations Second Edition(2009) by K.Sankara Rao,PHI Learning Private Limited. Unit 4 and 5

Reference Books:-

1. Differential equations by Simmons.

2. Partial Differential Equations by Sneddon.

3. Ordinary and partial differential equations by Dr.M.D.Raisinghania S.Chand

NON MAJOR ELECTIVE I: PUBLIC RELATIONS

Unit I: Introduction

Meaning - Nature, Scope and Importance of Public Relations - Distinction between Publicity, Propaganda, Advertising and Public Relations

Unit -II: Public Relations in Indian Environment

Changes in Socio, Economic Political and Cultural Relations - Public Relations in Government, Non-Government Organizations, Commercial and Non-Commercial Organizations

Unit -III: Public in Public Relations

Concept of Public in Public Relations: Communities, Organizations, Suppliers and Distributors and Consumers

Unit- IV: Public Relations Department

Public Relations Department: Public Relation Officer (PRO), Role & Responsibilities - Press Information Bureau: Film Divisions, Publication Division

Unit-V: Challenges of Public Relations

Public Relations Education and Training - Challenges and growth in Public Relations- Public Opinion Leaders

Books Recommended for Study:

1. Balan.K.R. Lectures on Applied Public Relations, Sultan Chand & Sons, New Delhi, 1985.
2. Ganesh, S., Introduction to Public Relations, Indian Publishers Distributors, Delhi, 1999.
3. Metha.D.S. Hand Book of Public Relations in India.
4. Moore arid Frank, Public Relations - Principle, Cases and Problems, Sur Publication, New Delhi, 1987.

SEMESTER-IV

CORE PAPER VII - TRANSFORM TECHNIQUES

Unit- 1

Introduction – Properties of Laplace transform- Laplace transform of elementary functions- Problems using properties-Laplace transform of special function, unit step function and Dirac delta function - Laplace transform of derivatives and Integrals – Evaluation of integral using Laplace Transform - Initial Value Theorem – Final Value Theorem and problems –Laplace Transform of periodic function

Chapter 2 : Section 2.1 to 2.20

Unit-2

Introduction, Properties of inverse Laplace transform, Problems (usual types); Convolution Theorem - Inverse Laplace Transform using Convolution theorem

Chapter 3, Section 3.1 to 3.11

Unit-3

Introduction, Expansions of periodic function of period 2π ; expansion of even and odd functions; half range cosine and sine series – Fourier series of change of interval.

Chapter 1, Section 1.1 to 1.11

Unit- 4

Introduction of Fourier transform - Properties of Fourier Transforms - Inverse Fourier transform – Problems, Fourier sine and cosine transforms and their inverse Fourier transform – Problems, Convolution theorem, Parseval's identity and problems using Parseval's identity.

Chapter 4, Section 4.1 to 4.12

Unit- 5

Applications of Laplace transform to solution of first and second order linear differential equations (constant coefficients) and simultaneous linear ordinary differential equations – Application of Laplace transform to partial differential equations. Application of Laplace Transform and Fourier transform to Initial and Boundary Value Problems.

Chapter 5, Section 5.1, 5.3, 5.7 to 5.11

Contents and treatment as in "Fourier Series and Integral Transforms" – Dr. S. Sreenath, S.Ranganatham, Dr. M.V.S.S.N.Prasad and Dr. V. Ramesh Babu. S.Chand and Company Ltd

Reference Books:-

1. Engineering Mathematics volume 3 : M.K. Venkataraman(National Publishing Co.)
2. Engineering Mathematics volume 3 : P.Kandasamy and others(S.Chand and Co.)

3. Advanced Engineering Mathematics : Stanley Grossman and William R.Devit (Harper and Row publishers)

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CORE PAPER- VIII –MECHANICS

Unit-I:

Forces: 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-**Forces on a right body**: Moment of a force-General motion of a right body-Forces along the sides of a triangle

Chapter 2-Section 2.1, 2.2, Chapter-3- Section 3.1,3.2, Chapter 4-Section 4.1,4.2, 4.5.

Unit-II:

Couples- Resultant of a several coplanar forces.

Centre of mass: Centre of mass-Finding mass centres.

Virtual work: Principle of Virtual work

Chapter 4, Sec. 4.6 – 4.7 ,Chapter-6-Section 6.1,6.2, Chapter-8-Section 8.1.

Unit-III:

Kinematics: Basic units-Velocity-Acceleration-Coplanar motion-**Work, energy and power**: Work-Conservative field of force-**Rectilinear motion under varying force**: Simple harmonic motion-Simple harmonic motion along a horizontal line-Simple harmonic motion along a vertical line.

Chapter-1-Section 1.1-1.4, Chapter-11-Section 11.1,11.2, Chapter-12-Section 12.1-12.3.

Unit-IV:

Projectiles: Forces on a projectile-Projectile projected on an inclined plane **Impact**-Impulsive force-Impact of a two spheres.

Chapter-13-Section 13.1,13.2, Chapter-14-Section 14.1-14.3.

Unit-V:

Circular motion: Conical pendulum-Motion of a cyclist path-Circular motion on a vertical plane. **Central orbits:** General orbits-Central orbit-**Moment of inertia**- Perpendicular and parallel axis theorems.

Chapter-15-Section 15.1-15.4, Chapter-16-Section 16.1,16.2, Chapter-17-Section 17.1.

Text Book: Mechanics by P.Duraipandian, LaxmiDuraipandian, MuthamizhJayapragasham, S.Chand& Company Limited, 2011.

Reference Books:

1. Dynamics- K.ViswanathaNaik and M.S.Kasi, Emerald Publishers.
2. Dynamics- A.V.Dharmapadam, S.Viswanatha Publishers.

NON MAJOR ELECTIVE – II :Basic of Psychology

UNIT I

Introduction – Definition psychology as Science . A brief history of Psychology – Structuralism, Functionalism, Behaviorism, Gestalt Psychology , Psychoanalytic psychology, Humanistic Psychology. Approaches to Psychology – Behavioral , Psychodynamic Approach, cognitive Approach, Behavioral Neuroscience, Evolutionary psychology, Sociocultural approach, humanistic movement, positive psychology.

UNIT II

Methods of psychology – Introduction to the Scientific Method, Research Methods: Descriptive Research – Observation, Surveys and Interviews, Standardized tests, Case Studies, Correlational Research, Experimental Research.

UNIT III

Sensation and Attention Sensation – Definition, Sensory receptors and brain, Thresholds – absolute threshold, difference threshold, Subliminal perception, sensory adaptation, Sensory Gating, Selective Attention, Determinants of attention.

UNIT IV

Perception – definition, Perceptual constancy, Perceptual organization, Depth perception, Motion perception , Perceptual learning, Motives and perception, Perceptual expectancy, Extra Sensory perception.

UNIT V

Learning – The nature of Learning, Classical Conditioning – Principles and Applications, Operant Conditioning – Principles and Applications, Observational learning, Cognitive factors in learning – Latent learning , Insight learning.

REFERENCES:

1. Santrock, J.W. (2006). Psychology Essentials (Updated 2nd ed.). new Delhi: tata McGraw Hill.

2. Coon, D., &Mitterer, J.O.(2007). Introduction to Psychology (11th ed.). New Delhi: Cengage Learning India Pvt Ltd.

SEMESTER-V

CORE PAPER- IX ALGEBRIC STRUCTURES

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

Unit -2

Normal subgroups and Quotient group; Homomorphism; Automorphism.

Chapter 2 Section 2.6 to 2.8

Unit – 3

Cayley's Theorem; Permutation groups.

Chapter 2 Section 2.9 and 2.10

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

Unit – 5

The field of quotients of an integral domain; Euclidean Rings; The particular Euclidean ring.

Section 3.6 to 3.8

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

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

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

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

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

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- DISCRETE MATHEMATICS

Unit- 1

Set, some basic properties of integers, Mathematical induction, divisibility of integers, representation of positive integers
Chapter 1 - Sections 1.1 to 1.5

Unit – 2

Boolean algebra, two element Boolean algebra, Disjunctive normal form, Conjunctive normal form
Chapter 5 - Sections 5.1 to 5.4

Unit – 3

Application, Simplication of circuits, Designing of switching circuits, Logical Gates and Combinatorial circuits.
Chapter 5 - Section 5.5, 5.6

Unit – 4

Sequence and recurrence relation, Solving recurrence relations by iteration method, Modeling of counting problems by recurrence relations, Linear (difference equations) recurrence relations with constant coefficients, Generating functions, Sum and product of two generating functions, Useful generating functions, Combinatorial problems.
Chapter 6 - Section 6.1 to 6.6

Unit – 5

Introduction, Walk, Path and cycles, Euler circuit
Chapter 7 - Sections 7.1 to 7.3

Contents and treatment as in introduction to Discrete Mathematics, 2nd edition, 2002 by M. K. Sen and B. C. Chakraborty, Books and Allied Private Ltd., Kolkata.

Reference Books:

1. Discrete mathematics for computer scientists and mathematicians by J. L. Mertt, Abraham Kendel and T. P. Baker prentice-hall, India.
2. Discrete mathematics for computer scientists by John Truss-Addison Wesley.
3. Elements of Discrete Mathematics, C. L. Liu, New York Mcgraw-Hill, 1977.

CORE ELECTIVE – I : MATHEMATICAL MODELING

Unit–1

Mathematical Modeling : Simple situations requiring mathematical modeling, characteristics of mathematical model.
Chapter 1 Sections 1.1-1.5

Unit – 2

Mathematical Modeling through differential equations: Linear Growth and Decay Models. Non-Linear growth and decay models,Compartment models.
Chapter 2 Sections 2.1- 2.4

Unit – 3

Mathematical Modeling, through system of Ordinary differential equations of first order: Prey-predator models, Competition models, Model with removal and model with immigrations.
Epidemics: simple epidemic model, Susceptible-infected-susceptible(SIS) model, SIS model with constant number of carriers.
Medicine : Model for Diabetes Mellitus.
Chapter 3 Sections 3.11,3.12,3.2.and 3.51

Unit – 4
Introduction to difference equations.
Chapter 5 Sections 5.1 and 5.2

Unit - 5
Mathematical Modeling, through difference equations:Harrod Model, cobweb model application to Actuarial Science
Sections 5.3 (5.3.3 not included)

Content and treatment as in
J N Kapur, Mathematical Modeling, New Age International publishers.(2009)

Reference Books :-

1. Mathematical Modeling by Bimal k . Mishra and Dipak K.Satpathi

SEMESTER-VI

CORE PAPER-XII - LINEAR ALGEBRA

Unit – 1

Vector spaces. Elementary basic concepts; linear independence and bases

Chapter 4 Section 4.1 and 4.2

Unit – 2

Dual spaces

Chapter 4 Section 4.3

Unit – 3

Inner product spaces.

Chapter 4 Section 4.4

Unit – 4

Algebra of linear transformations; characteristic roots.

Chapter 6 Section 6.1 and 6.2

Unit – 5

Matrices; canonical forms; triangular forms.

Chapter 6 Section 6.3 and 6.4

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

CORE PAPER – XIII- 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

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

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

Unit – 4

Derivatives; Rolle's theorem, Law of mean, Fundamental theorems of calculus.

Chapter 7 Section 7.5 to 7.8

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

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

CORE PAPER – XIV- 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

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

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

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

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.

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

CORE ELECTIVE – II : OPERATIONS RESEARCH

Unit-1

Linear programming: Formulation – graphical solution. Simplex method. Big-M method. Duality- primal-dual relation.

Chapter 6 Sections 6.1 – 6.13, 6.20 – 6.31

Unit – 2

Transportation problem: Mathematical Formulation. Basic Feasible solution. North West Corner rule, Least Cost Method, Vogel's approximation. Optimal Solution. Unbalanced Transportation Problems. Degeneracy in Transportation problems.

Assignment problem: Mathematical Formulation. Comparison with Transportation Model. Hungarian Method. Unbalanced Assignment problems

Chapter 9 Sections 9.1 – 9.12 ,Chapter 8 Sections 8.1 – 8.5

Unit – 3

Sequencing problem: n jobs on 2 machines – n jobs on 3 machines – two jobs on m machines – n jobs on m machines.

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.

Chapter 10 Sections 10.1 – 10.6 ,Chapter 12 Sections 12.1 – 12.15

Unit – 4

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

Chapter 5 Sections 5.1 – 5.18

Unit – 5

Network: Project Network diagram – CPM and PERT computations. (Crashing excluded)

Chapter 13 Sections 13.1 – 13.10

Content and treatment as in

Operations Research, by R.K.Gupta , Krishna Prakashan India (p),Meerut Publications

Reference Books :

1. Gauss S.I. Linear programming , McGraw-Hill Book Company.
2. .Gupta P.K. and Hira D.S., Problems in Operations Research , S.Chand & Co.
4. Kanti Swaroop, Gupta P.K and Manmohan , Problems in Operations Research, Sultan Chand & Sons
5. Ravindran A., Phillips D.T. and Solberg J.J., Operations Research, John wiley & Sons.
6. Taha H.A. Operation Research, Macmillan pub. Company, New York.
7. Linear Programming, Transporation, Assignment Game by Dr.Paria, Books and Allied(p) Ltd.,1999.
8. V.Sundaresan,K.S. Ganapathy Subramaian and K.Ganesan,Resource Management Techniques..A.R Publications.