DEPARTMENT OF

MATHEMATICS

Sri Dharmasthala Manjunatheshwara College

(Autonomous)

Ujire – 574240.

DEPARTMENT OF MATHEMATICS

Syllabus

B.Sc

(CREDIT BASED SEMESTER SCHEME)

2016-17 onwards.

MATHEMATICS AS A DISCIPLINE

Preamble: Our college has completed 3 cycles of NAAC accreditation in April 2015. It is quite challenging to face the fourth cycle in 2020. So it is high time for the degree colleges to revise the syllabus so as to be in tune with the requirements needed for the students in the challenging world. A drastic change in degree syllabus is required from the next academic year. While preparing the draft syllabus, care has been taken to see that the topics of PUC and degree are not overlapped and importance is given to those topics which increase the skill and reasoning capacity of the students. So as an attempt for the first time, some units in each papers of each semester are devoted for practical sessions

In this Course, students are exposed to topics like differential calculus, integral calculus, modern algebra, three dimensional analytical geometry, complex numbers and number theory. The stress is on the development of problem solving skills. Each unit in each semester includes group discussions and seminars of students. In a way it is made student centric syllabus

Course Objectives

- To be in tune with CBSE syllabus as PU board has introduced CBSE syllabus in Pre-university colleges, it is high time for the degree colleges to revise the syllabus
- To help the students understand Mathematics concepts and principles
- To acquaint the students with the basic concepts and issues of Mathematical theory, Mathematical thought, Mathematical Systems, Mathematics Institutions,
- To give importance to those topics which increase the skill and reasoning capacity of the students.
- To stress on the development of problem solving skills .
- To introduce the concept of Practical in mathematics

UNDER GRADUATE B.Sc DEGREE -CREDIT BASED SEMESTER SCHEME

OPTIONAL PAPERS- ECONOMICS- Paper Description

Sl.No	Semester	Paper No	Paper Title
1	I Semester	Mathematics I	Application of Calculus & Modern Algebra
2	II Semester	Mathematics	Application of Calculus, Modern Algebra & Number Theory
3.	III Semester	Mathematics III	Differential Equations, Functions of Several Variables & Modern Algebra
4.	IV Semester	Mathematics IV	Calculus, Complex Numbers & Number Theory
5	V Semester	Mathematics V	Differential equations, Partial Differential equations & Fourier series
6	V Semester	Mathematics VI (a)	Numerical Analysis
7.	V Semester	Mathematics VI (b)	Descrete Mathematics
7.	VI Semester	Mathematics VII	Modern Algebra & Real Analysis
8.	VI Semester	Mathematics VII (a)	Linear Programming
9.	VI Semester	Mathematics VIII(b)	Graph Theory

CONTENT OF THE COURSE AND SCHEME OF EXAMINATION

Sl. No	Semester	Paper No	Teaching Hours/ Week	Credits	Duration of Exam	Marks		
						Sem End	IA	Total
1	I Semester	Mathematics I	06	03	03	120	30	150
2	II Semester	Mathematics II	06	03	03	120	30	150
3	III Semester	Mathematics III	06	03	03	120	30	150
4	IV Semester	Mathematics IV	06	03	03	120	30	150
5	V Semester	Mathematics V	05	03	03	120	30	150
6	V Semester	Mathematics VI (a)	05	03	03	120	30	150
7	V Semester	Mathematics VI (b)	05	03	03	120	30	150
7	VI Semester	Mathematics VII	05	03	03	120	30	150
8	VI Semester	Mathematics VIII(a)	05	03	03	120	30	150
9	VI Semester	Mathematics VIII(b)	05	03	03	120	30	150

Maximum marks in Mathematics for all SIX semesters: 1200

Question Paper Pattern

SDM (Autonomous) COLLEGE

BSc DEGREE -CREDIT BASED SEMESTER SCHEME

B.Sc Mathematics

Time: 3 Hours **Max Marks: 120**

Note: 1. Answer any twelve questions from Part A. Each question carries 3 marks

2. Answer Six Full Questions from Part B, choosing One full question from each unit. Each full question carries 14 marks.

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2.

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18.

Part B

Unit I

1 a) 7 marks

b) 7 marks

2 a) 7 marks

b) 7 marks

Unit II

3 a) 7 marks

b) 7 marks

4 a) 7 marks

b) 7 marks

Unit III

5 a) 7 marks

b) 7 marks

6 a) 7 marks

b) 7 marks

Unit IV

7 a) 7 marks

b) 7 marks

8 a) 7 marks

b) 7 marks

Unit V

9 a) 7 marks

b) 7 marks

10 a) 7 marks

b) 7 marks

Unit VI

11 a) 7 marks

b) 7 marks

12 a) 7 marks

b) 7 marks

FIRST YEAR B Sc

SEMESTER I

PAPER 1: APPLICATION OF CALCULUS & MODERN ALGEBRA

Total 72 hours, 6hours per week: 120 marks

(For each unit 8 hours + 4 hours practical)

Learning Objectives:

- To understand the Geometric meaning of differentiation & Integration and concept of Groups in Modern Algebra.
- To realize the Application of Differentiation
- To help students to acquire knowledge of some of the important results of Differentiation & Integration and Groups .
- To develop the skills of solving problems through Practicals

UNIT I

Maximum and minimum function values. Application involving an absolute extremum on a closed interval. Rolle's theorem and Mean value theorem, Increasing and decreasing functions and the first derivative test.

Practical: Problems from each exercise – 4 hours

UNIT II

Concavity and points of inflection. Second derivative test. Limits at infinity. Asymptotes of a graph.

Practical: Problems from each exercise -4 hours

UNIT III

Application to drawing a sketch of the graph of a function. The polar coordinate system. Graphs of equations in polar coordinates.

Practical: Problems from each exercise -4 hours

UNIT IV

Integration :Indefinite & Definite integral (Recapitulation), Reduction formulae: $\int x^n e^{ax} dx$, $\int x^m \sin(nx) dx$, $\int x^m (\log x)^n dx$, $\int \frac{x^n}{(\log x)^m} dx$, $\int x \sin^n x dx$, $\int x \cos^n x dx$ and problems. Trigonometric functions of the form $\sin^n x$, $\cos^n x$, $\sin^p x.\cos^q x$, $\tan^n x$, $\cot^n x$, $\sec^n x$, where n, p,q are positive integers,

Practical: Problems from each exercise – 4 hours

UNIT V

Integration: Area, Definite integral as a sum and connected problems. The fundamental theorem of calculus.

Practical: Problems from each excise – 4 hours

UNIT VI MODERN ALGEBRA

GROUPS: Binary operation on a set, Algebraic structure**,** Definition of a Group - Examples (including permutation group) Properties- Subgroups; examples, Properties.

Practical: Problems from each excise- 4 hours

TEXT BOOK

1. Louis Leithold, The Calculus with Analytical Geometry (Fifth edition). Harper & Row, Publishers. New York ISBN 0-06-350413-8
2. Shanthi Narayan, P.K. Integral Calculus. Mittal, S.Chand and Co. Ltd.
3. T.Prakash Prabhu & others. A Classic text book of Mathematics (Vol II). SDM Excellent Publication Ujire.

Reference Books

1. Lipman Bers(1969). Calculus. Publishers Holt, Rinehart and Winston
2. George B.Thomus. Thomus' calculus, *Publisher*: Pearson; 13 edition
3. M.D.Raisingania, R.S Aggarwal. Integral Calculus, S. Chand & company Ltd.

4. N.Piskunov (1980). Differential and Integral Calculus –Voumes 1 and 2. Tata Mcgraw-Hill.

SEMESTER II

PAPER 2: APPLICATION OF CALCULUS, MODERN ALGEBRA & NUMBER THEORY

Total 72 hours, 6hours per week: 120 marks

(For each unit 8 hours + 4 hours practical)

Learning Objectives:

- To study the method of finding the volume of solid of revolution, length of arc and area of the region in polar coordinates.
- To create interest in number theory
- To develop the skills of solving problems through Practicals
- To understand Lagrange's theorem

UNIT I

Volume of solid of revolution: Circular disk and Circular ring methods, Volume of solid of revolution : Cylindrical shell method.

Practical: Problems from each excise – 4 hours

UNIT II

Volume of a solid having known parallel plane sections, Length of the arc of a graph of a function Area of a region in polar coordinates

Practical: Problems from each excise – 4 hours

UNIT III: Indeterminate form, L'Hospital's rule. Cauchy's mean value theorem. Taylor's formula (Statement), Maclaurin's formula.

Practical: Problems from each excise – 4 hours

UNIT IV

Relation congruence mod H, right coset . Order of an element. Lagrange's Theorem, a counting principle.

Practical: Problems from each excise – 4 hours

UNIT V: **ELEMENTARY NUMBER THEORY**:

Mathematical induction, division algorithm proof of theorems, G.C.D., problems unit. Euclidean algorithm,LCM, connected theorems.

Practical: Problems from each excise – 4 hours

UNIT VI

Diophantine equation ax+by=c, proof theorems, Primes and their distribution. Fundamental theorem of arithmetic, theory of congruences – Basic properties of congruence, special divisibility tests.

Practical: Problems from each excise – 4 hours

TEXT BOOK

1. Louis Leithold, The Calculus with Analytical Geometry (Fifth edition). Harper & Row, Publishers. New York ISBN 0-06-350413-8
2. T.K.Manicavachagam Pillay & T.Natarajan (1984). Analytical geometry (Three dimensions), Printers: S.Vishwanathan
3. I.N.Herstein. (1989) Topics in Algebra, (2nd Edn.) Wiley Eastern Ltd. New Delhi
4. David M. Burton. Elementary Number theory. (Fifth Edition) Mcgraw – Hill 2002

REFERENCE BOOKS

1. Lipman Bers(1969). Calculus. Publishers Holt, Rinehart and Winston
2. George B.Thomus. Thomus' calculus, *Publisher*: Pearson; 13th edition
3. Serge Lang (1966). First course in Calculus. Addision – Weslay
4. Gareth A Jones and J.Mary Jones. Elementary Number Theory.Publisher: Springer
5. S.Arumugam (2004). Modern Algebra. Scitech Publications Chennai.
6. by J.B.Fraleigh(1987). A First Course in Algebra (3rd Edition). Addison Wesley, Mass (Indian Print)
7. Lloyd R.Jaisingh and Frank Ayres Jr(2005). Abstract Algebra.(2nd Edition), Tata McGraw Hill Edition New Delhi.

8. M.L.Santiago (2002). Modern Algebra. Tata McGraw Hill New Delhi.
9. Surjeet Singh and Qazi Zameeruddin(1982). Modern Algebra. Vikas Publishing House Pvt. Ltd New Delhi.

SEMESTER III

PAPER 3: DIFFERENTIAL EQUATIONS, FUNCTIONS OF SEVERAL VARIABLES & MODERN ALGEBRA

Total 72 hours, 6hours per week: 120 marks

(For each unit 8 hours + 4 hours practical)

Learning Objectives:

- To study different methods of solving differential equations
- To study about functions of several variables
- To develop the skills of solving problems through Practicals
- To understand Lagrange's theorem

UNIT I

Functions of several variables: Functions of more than one variable, limits. Functions of more than one variable, limits, continuity, partial derivatives, differentiability, total derivative, chain rule, higher order partial derivatives.

Practical: Problems from each excise – 4 hours

UNIT II

Directional derivatives and gradients- tangent planes and normal to surfaces. Extrema of functions of two variables

Practical: Problems from each excise – 4 hours

UNIT III: Differential equations: Equations of order 1, separation of variables, equations with homogeneous coefficients – Recapitulation, Exact equations, linear equations, Substitution

suggested by the equation, Bernoulli's equations, Integrating factors found by inspection, determination of I.Fs.

Practical: Problems from each excise – 4 hours

UNIT IV: Applications of Ist order differential equations- velocity of escape, Newton's law of cooling, simple chemical conversion. Non-linear equations: Factorizing left hand side, Singular solutions, p- discriminant equations, eliminating dependent variable, dependent variable missing, independent variable missing, Clauiraut's equation.

Practical: Problems from each excise – 4 hours

UNIT-V: Groups

Normal sub groups, Quotient groups. Homomorphism. kernel of a homomorphism

Practical: Problems from each excise – 4 hours

UNIT VI: Isomorphism; Automorphism, properties of Permutation groups.

Practical: Problems from each excise – 4 hours

TEXT BOOKS:

1. Earl. D.Rainville and Phillip E. Bedient(1969), A short course in differential equations Publication: Macmillan 4th edition,
2. Louis Leithold, The Calculus with Analytical Geometry (Fifth edition). Harper & Row, Publishers. New York ISBN 0-06-350413-8
3. I.N.Herstein. (1989) Topics in Algebra, (2nd Edn.) Wiley Eastern Ltd. New Delhi

REFERENCE BOOKS

1. Lipman Bers(1969). Calculus. Publishers Holt, Rinehart and Winston
2. George B.Thomus. Thomus' calculus, *Publisher*: Pearson; 13th edition
3. Serge Lang (1966) . First course in Calculus, Addision – Weslay,
4. S.Arumugam. (2004) Modern Algebra. Scitech Publications, Chennai.
5. M.L.Santiago (2002) Modern Algebra, Tata McGraw Hill, New Delhi.

6. Surjeet Singh and Qazi Zameeruddin. (1982) Modern Algebra. Vikas Publishing House Pvt. Ltd. New Delhi.

SEMESTER IV

CALCULUS, COMPLEX NUMBERS & NUMBER THEORY

Total 72 hours, 6hours per week: 120 marks

(For each unit 8 hours + 4 hours practical)

Learning Objectives:

- To study double integrals and triple integrals and its application
- To study about complex numbers
- To create interest in number theory
- To develop the skills of solving problems through Practicals

UNIT I: Multiple integral: Double integral, double integrals in polar coordinate. Area of surface, triple integrals, line integrals.

Practicals: Problems from each excise – 4 hours

UNIT II :

Complex Numbers –Definition, DeMoivres theorem, Function of a Complex variable. Mappings, Limits, Continuity, Derivatives, Differentiation formulae, C.R.equations, Analytic functions, Sufficient condition for differentiability, Polar coordinates, Analytic functions, harmonic functions,

Practicals: Problems from each excise – 4 hours

UNIT III:

Elementary functions –Exponential, Other properties of exp Z, Trigonometric functions, Hyperbolic functions, Logarithmic functions and its branches, Further properties of logarithmic

functions. Mapping by elementary functions (simple problems)- Linear functions, The function 1/Z , The linear fractional transformations, Special linear fractional Transformation. Integrals – definite integrals, contours, line integrals, examples.

Practicals: Problems from each excise – 4 hours

UNIT IV

Number theory: Fermat's Theorem, Wilson's Theorem, Euler's phi function, Euler's theorem

Some properties of phi-function.

Practicals: Problems from each excise – 4 hours

UNIT V

Pythagorean triples, Fibonacci numbers. Finite continued fractions. Problems

Practicals: Problems from each excise – 4 hours

TEXT BOOKS

1. Louis Leithold, The Calculus with Analytical Geometry (Fifth edition). Harper & Row, Publishers. New York ISBN 0-06-350413-8
2. James Ward Brown and Ruel V. Churchil(1996). Complex variables and Applications, Mcgraw Hill 6th edition
3. David M. Burton(2002). Elementary Number theory Publication: Mcgraw – Hill (Fifth Edition)

REFERENCE BOOKS

1. Lipman Bers(1969). Calculus. Publishers Holt, Rinehart and Winston
2. George B.Thomus. Thomus' calculus, *Publisher*: Pearson; 13th edition
3. Serge Lang (1966) . First course in Calculus, Addision – Weslay,
4. Gareth A Jones and J.Mary Jones. Elementary Number Theory.Publisher: Springer

SEMESTER V

Paper 5: Differential equations, Partial Differential equations & Fourier series.

Total 60 hours, 5hours per week: 120 marks

(For each unit 8 hours + 4 hours practical)

Learning Objectives:

- To study the methods of solving Non homogeneous linear differential equations
- To study about Partial differentiations
- To study Fourier series
- To develop the skills of solving problems through Practicals

UNIT I

Linear differential equations-The general equation. Linear independence of homogeneous and non homogeneous equation. Differential operators. Properties of Differential operators. Linear equations with constant coefficients. Non homogeneous equations with undetermined coefficients. Inverse differential operators,

Practicals: Problems from each excise – 4 hours

UNIT II

The Laplace transform- Definition, transforms of elementary functions, transforms of derivatives, derivatives of transforms, the gamma function, periodic functions. Inverse Laplace transforms – Definitions, a step function, convolution theorem, simple initial value problems.

Practicals: Problems from each excise – 4 hours

Unit III:

Systems of differential equations – The Laplace transform method, the differential operator method, Applications-Vibration of a spring. Un damped vibrations, damped vibrations

Practicals: Problems from each excise – 4 hours

UNIT IV :

First order Partial Differential Equations: Definitions, Formation of first order PDE: Formation of first order PDE by elimination of arbitrary constants, arbitrary functions, Lagrange's Linear equation, Solution of Linear First order PDE by separation of Variable Method. Special types of Non-linear PDE's of first order: Equation of the type f(p,q) =0, Equation of the type f(p,q,z) =0, Equation of the type f(p,q) =ϕ(y,q), Equation of the type z = px + qy +f(p,q). General method of solving equations of non linear –Charpit's method.

Practicals: Problems from each excise – 4 hours

UNIT V:

Fourier series: Periodic functions, Fourier series. Fourier series, Dirchlet's conditions, Fourier series of functions with period 2 π, period 2l, Fourier series of even and odd functions, Half-range expansion.

Practicals: Problems from each excise – 4 hours

TEXT BOOKS:

1. Earl. D. Rainville and Phillip E. Bedient(1969). A short course in differential equations, Publilcation : Macmillan 4^{th} edition
2. Prof. N. Rudraiah & others. College Mathematics for final year B.Sc. Sapna Book House.
3. G.K.Ranganath. A Text Book of B.Sc Mathematics. Publications: S.Chand & company Ltd.

REFERENCE BOOKS

1. Narayanan & Pillai. Differential Equations
2. Murray R. Spiegal. Laplace Transform
3. S.B.Rao and H.R. Anuradha. Differential Equations
4. G.Stephenson(1978). An introduction to partial differential equation. 1978 Publisher: Longman Inc., New York

PAPER VI

NUMERICAL ANALYSIS (Special Paper – 6a)

(For each unit 8 hours + 4 hours practicals)

60 HOURS, 5 Hrs/week: 120 MARKS

Learning Objectives:

- To study different methods of solving algebraic and transcendental equations, Interpolation,
- To study Numerical differentiation & Integration, solving systems of Linear equations
- To study solutions of differential equations using numerical methods
- To develop the skills of solving problems through Practicals

UNIT I: (12 hours)

Errors & their computations, Absolute error, relative error, Percentage error –connected problems. Solution of algebraic & transcendental equations by bisection method, Iteration method, method of false position**.**

Practicals: Problems from each excise – 4 hours

UNIT II : (12 hours)

Interpolation: Forward differences, backward differences, symbolic relations, differences of polynomial, Newtons's formulae for interpolation, interpolation with unevenly spaced points: Langrange's Interpolation formula

Practicals: Problems from each excise – 4 hours

UNIT III: **(12 hours)**

Numerical differentiation, Max and Min values of a tabulated function. Numerical integration – Trapezoidal rule, Simpson's $^1/_3$ rule, 3/8 rule – proof of connected theorems, problems on it.

Practicals: Problems from each excise – 4 hours

UNIT IV: **(12 hours)**

Matrices and linear systems of equations, basic definitions, inverse, rank of a matrix, consistency of linear system of equations, Vector and matrix norms.

Matrix inversion method, Gauss elimination method, iterative methods of solving linear equations - Jacobi's method. Gauss Seidel method.

Practicals: Problems from each excise – 4 hours

UNIT V: (12 hours)

Numerical solution of ordinary differentiation equations. Solution by Taylor series. Picard's method, predictor corrector methods Adams Bash forth methods, Adams moulton method - connected theorems and problems.

Practicals: Problems from each excise – 4 hours

TEXT BOOKS

S.S. Shastry. Introductory methods of Numerical Analysis.

REFERENCE BOOK

M.K.Jain (1971), S.B.W. Numerical Methods for Scientists and Engineers. Publishers Delhi

PAPERVI

DESCRETE MATHEMATICS (Special Paper – VIb)

(For each unit 8 hours + 4 hours practicals)

60 HOURS, 5 Hrs/week: 120 MARKS

UNIT I: (12 hours) Introduction, sets, countability, propositions, computability & formal languages. Russe's phrase structures, grammars & languages. Permutations, combinations & discrete probability conditional probability.

Practicals: Problems from each excise – 4 hours

UNIT II: **(12 hours)** Basic concepts of graphs, Planar graphs, multi graphs, weighted graphs, shortest path in weighted graphs, Eulerlian paths & circuits, Hamiltonian paths & circuits, Factors of a graph

Practicals: Problems from each excise – 4 hours

UNIT III: **(12 hours)** spanning trees & sets, minimum spanning trees, transport Networks

Practicals: Problems from each excise – 4 hours

UNIT IV: **(12 hours)** Finite state machines, Introduction, finite state Machines. Finite state machines as models of Physical systems. Equivalent machines. Finite state machines as language recognizes. Analysis algorithm: Introduction, time complexity of algorithms, a shortest path algorithm, complexity of problems, tractable & Intractable problems .

Practicals: Problems from each excise – 4 hours

UNIT V: **(12 hours)** Generating function. Introduction numeric palation, numeric, functions, asymptotic behavior of numeric function. Generating functions, combinatorial problems. Recurrence relation & recursive alogithms, recurrence relations, linear recurrence reactions with content co-efficient.

Practicals: Problems from each excise – 4 hours

TEXT BOOKS

C.L.Liu(1985). Elements of Discrete Mathematics, McGraw- Hill (Second Edition)

REFERENCE BOOK

Ralph P. Grimaldi , B.V.Ramana. Discrete and Combinatorial Mathematics. Publisher: PEARSON, Chennai, Delhi, Chandigarh.

PAPER VI

PRACTICAL MATHEMATICS (Special Paper – 6c)

(For each unit 8 hours + 4hours practicals)

60 HOURS, 5 Hrs/week: 120 MARKS

UNIT-I : Moment of inertia: Definition, Two important theorems, Moment of inertia in a few simple cases. To find the moment of inertia, about the x-axis, Mean Values, Mean Density. Work: Work done in stretching a elastic string.

Practicals: Problems from each excise – 4 hours

Unit II :

Centre of gravity: Centre of gravity in a few simple cases, centre of gravity of an arc of a curve, centre of gravity of an area, Centre of closed area not cutting the axes, Centre of gravity of a solid of revolution, C.G of a surface of revolution ,C.G of a the area bounded by $r = f(\theta)$, $\theta = \theta_1$ and $\theta = \theta_2$

Centre of pressure: Formula for Centre of Pressure, coordinates of centre of pressure, C.P in some simple cases: a) A rectangle with one side in the surface, b) A triangle with the vertex in the surface and base horizontal, c) A triangle with the base in the surface d) A circle with the highest point in the surface – Problems.

Practicals: Problems from each excise – 4 hours

UNIT IV

Simple harmonic motion: Simple harmonic motion (S.H.M), Hook's law, Oscillations of a vertical elastic string (or spring), The simple pendulum, Gain or loss of oscillations due to change in g or l, Oscillations gained or lost due to change in position, Free oscillations, Forced oscillations, Damped oscillations.

Practicals: Problems from each excise – 4 hours

UNIT V

PROJECTILES: Velocity at time t, Velocity at height y, Equation of the path, Directrix. The magnitude of the velocity at any point of the path, Range on an inclined plane, A particle projected under gravity and a resistance, Problems.

Practicals: Problems from each excise – 4 hours

TEXT BOOK: 1. I.B.Prasad. A text book of Practical Mathematics Vol II, Khanna Publications

SEMESTER VI

PAPER VII MODERN ALGEBRA & REAL ANALYSIS

Total 60 hours, 5 hours per week: 120 marks

(For each unit 8 hours 4 hours practicals)

UNIT I (12 hours)

Ring- definitions, Examples, some special classes of rings homomorphisms. Ideals, quotient rings, the field of quotients of an integral domain

Practicals: Problems from each excise – 4 hours

UNIT II (12 hours)

Vector space: -Definition. Sub space, Quotient space, internal direct sum, external direct sum, linear span independence and bases. Inner product spaces:- definition, Schwarz inequality, orthogonal vectors. Orthogonal complement. Grahm- Schmidt orthogonalization process.

Practicals: Problems from each excise – 4 hours

UNIT III: (12 hours)

Linear transformation and matrices, matrix addition, multiplication, diagonal, permutation and triangular matrices, inverse, Rank and Nullity

Practicals: Problems from each excise – 4 hours

UNIT IV (12 hours)

Real Analysis: Sequences- Definition, convergence, some theorems, Non convergent sequences Cauchy's general principle of convergence, Cauchy's first theorem on limits, subsequences,

Practicals: Problems from each excise – 4 hours

UNIT V: (12 hours)

Infinite series, necessary condition for convergence. Cauchy's general principle of convergence of series. preliminary theorems, positive term series, geometric series, comparison test, cauchy's root test, D'Almbert's ratio test. Alternating series. Leibniz test, Absolute, conditional convergence.

Practicals: Problems from each excise – 4 hours

TEXT BOOKS

I.N.Herstein. (1989) Topics in Algebra, (2nd Edn.) Wiley Eastern Ltd. New Delhi

REFERENCE BOOKS

1.Garrett Birkhoff & Saunders mac Lane. A brief survey modern algebra, IBH publishing company Bombay 5.

2. S.Arumugam. (2004) Modern Algebra. Scitech Publications, Chennai.

3. J.B.Fraleigh (1987). A First Course in Algebra (3rd Edition) Addison Wesley, Mass. (Indian Print)

4. Lloyd R.Jaisingh and Frank Ayres,Jr. (2005) Abstract Algebra, (2nd Edition), Tata McGraw Hill Edition, New Delhi.

5. M.L.Santiago (2002) Modern Algebra, Tata McGraw Hill, New Delhi.

6. Surjeet Singh and Qazi Zameeruddin. (1982) Modern Algebra. Vikas Publishing House Pvt. Ltd. New Delhi.

PAPER 8

GRAPH THEORY(Special Paper – 8a)

(For each unit 8 hours + 4 hours practicals)

60 HOURS, 5 Hrs/week: 120 MARKS

Unit I: (12 hours)

Definition of a graph, Konigsberg bridge problem, finite and infinite graphs, incidence and degree, isolated vertex, pendant vertex and null graph, isomorphism, sub graphs, walks, paths, Circuits, connected graphs, components, Euler graphs, Operation on graphs, Euler graph.

Hamiltonian paths and circuits. Trees. Properties of pendant vertices, Distance and center, rooted and binary tree. Spanning trees, Fundamental circuits.

Practicals: Problems from each excise – 4 hours

Unit II: (12 hours)

Cut sets, properties cutsets in a graph. Fundamental cut sets and circuits. Connectivity and separability. Kurotowski's two graphs. Different representation of plannar graphs, Detection of planarity, Geometrical dual.

Practicals: Problems from each excise – 4 hours

Unit III: (12 hours)

Vector spaces of a graph: Sets with one operation, with two operations. Modular arithmetic and Galois fields – recapitulation. Vectors and vector spaces, vector space associated with a graph. Basis vectors of a graph. Circuit and cut set, subspaces, orthogonal vectors and spaces. Incidence matrix, sub matrices of A(G), Circuit matrix. Fundamental circuit matrix and rank. Cut set matrix. Path matrix adjacent of a matrix.

Practicals: Problems from each excise – 4 hours

Unit IV: (12 hours)

Chromatic number, chromatic partitioning. Chromatic polynomial coverings.

Unit V: (12 hours)

Directed graphs, Definition, types of digraph, binary relations and Directed paths and connectedness. Euler digraphs, trees with directed edges. Fundamental circuits in diagraphs, matrices A,B,C of digraphs, adjacency matrix of a digraph

Practicals: Problems from each excise – 4 hours

Text Book: Narasingh Dao. Graph Theory with application to Engineering and computer science, Prenticehall India.

PAPER VIII

LINEAR PROGRAMMING (Special Paper – 8b)

(For each unit 8 hours + 4 hours practicals)

60 HOURS, 5 Hrs/week: 120 MARKS

Unit I: (12 hours)

Geometric Linear Programming: Polyhedral convex sets, Geometric method – simplex Algorithms: Canonical slack forms for linear programming problems – Tucker Tableaus, The pivot transformation, The simplex algorithm for maximum basic feasible tableaus, simplex algorithm for maximum tableaus.

Practicals: Problems from each excise – 4 hours

Unit II: (12 hours)

Negative Transposition: The simplex Algorithm for minimum, Tableaus, Cycling, Non canonical Linear Programming problems: Introduction, unconstrained variables, Equations of constraint. Duality Theory: Introduction, Duality in Canonical Tableaus, the dual simplex Algorithm, matrix Formation of Canonical Tableaus, The Duality Equation.

Practicals: Problems from each excise – 4 hours

Unit III: (12 hours)

The Duality Theorem, Duality in Non canonical Tableaus

Matrix Games. Introduction, An Example: Two person Zero-sum Matrix Games, Linear Programming Formulation of Matrix games, The Von Neumann Minimax Theorem, concluding remarks.

Practicals: Problems from each excise – 4 hours

Unit IV: (12 hours)

Transportation and Assignment problems: Introduction. The Balanced Transportation problem, The Vogel Advanced – Start method (VAM). The transportation algorithm, Unbalanced transportation problems, the assignment problems.

Practicals: Problems from each excise – 4 hours

Unit V: (12 hours)

Network – Flow problems: Introduction, Graph – Theoretic preliminaries, the Maximal – Flow network problems. The Max – flow Min-cut theorem: the maximal – flow Algorithm, The shortest path network problem. Dikjstra's Algorithm I only.

Practicals: Problems from each excise – 4 hours

Text Book: Linear programming and its applications – James K. Strayer, Narosa Publishing House – Relevant Sections.

CERTIFICATE COURSE

PAPER - 1

MATHEMATICS FOR COMPETETIVE EXAMINATIONS

(Total 14 hours)

Objectives

To introduce concepts of mathematics with emphasis on analytical ability and computational skill needed in competitive examinations.

UNIT-I: Problems on General Arithmetic

Ratio and proportions - Inverse ratio - properties (Addendo, subtrahendo, componendo & dividendo) - ratio of four numbers - increasing and decreasing order of fractions – Problems of ages.

Section 1.12 and 1.8

UNIT-II

Percentages - gain and loss percents - partnership problems .

Section 1.10, 1.11 and 1.13

UNIT-III: **Time, Distance and Work**

Time and distance- Time and work

Section 1.17 and 1.15

UNIT-IV: Commercial Arithmetic:

Simple interest- compound interest **-** shares and stocks.

Section 1.21, 1.22 and 1.29

UNIT-V: Basic statistics

Measures of central tendencies, mean, median, mode, G.M & H.M, error corrections, application, properties.

Measures of dispersion - Range, S.D, Q.D, percentiles and deciles applications

Recommended Text

1. I to IV units_ Quantitative Aptitude - R.S. Aggarwal (S.Chand & Co - New Delhi 2008)

2. V unit Fundamentals of applied statistics – S.C. Gupta and V.K. Gupta

Reference Books

1. Quantitative Aptitude - R.S. Aggarwal (S.Chand & Co - New Delhi 2008)

2. Quantitative Aptitude for Competitive Examinations - Abhigit Guha (Tata McGraw - Hill Pub., Co., Ltd. New Delhi - III Edn.,)

3. Course in Mental Abilities and Quantitative Aptitude for Competitive Examinations - Edgar Thorpe (Tata McGraw - Hill Pub., Co., Ltd. New Delhi - II Edn.,)

4. Statistic, RSN Pillai and A. Bagavathi, S.Chand & Co.,

5. Elements of statistics, Sivadanu Pillai.

6. Algebra, Manickavachakam Pillai & Narayanan

3RD DOCUMENT – COMMUNITY ORIENTATION

1. The department conducted district level workshop **"**An Unique Workshop for 8th to 10th std students of English and Kannada medium schools of Belthangady Puttur and Bantwal taluk" on 9-2-2012
2. The department conducted district level workshop "One Day National Mathematical year (NMY) -2012 Programme" on 14th December 2012
3. The department conducted a special "One Day Workshop on Mathematics and Origamy" for B.Sc Students on 7-3-13.
4. The faculty members guided a team of students from High school under the program "SDM INCUBATOR" from 31-03-2017 to 05-04-2017 and helped them to prepare 3 projects in mathematics.