

MATHEMATICS

Teaching: 3 Hours per Week per Theory Paper

2 Hours per Week per batch for Practical

(20 candidates in each batch)

Examination:

		Duration	Max. Marks
Paper-I	Discrete Mathematics	3 hrs	24/66
Paper-II	Calculus	3 hrs.	24/66
Paper-III	Three-Dimensional	Theory: 2½ hrs.	16/44
	Geometry And		
	Optimization Theory	Practical: 2 hrs	08/24
	Total Marks		72/200

Note:

1. Paper I and II are divided into Five Units. Two questions will be set from each Unit. Candidates are required to attempt Five questions in all taking ONE questions from each Unit. All questions carry equal marks.
2. Paper III is divided into FOUR Units. TWO questions will be set from each Unit Candidates are required to attempt FOUR questions in all taking ONE question from each Unit. All questions carry equal marks.
3. Common paper will be set for both the Faculties of Social Science and Science. However, the marks obtained by the candidate in the case of Faculty of Social Science will be converted

Syllabus B.A. Part-I

according to the ratio of the maximum marks of the papers in the two Faculties.

4. Each candidate is required to appear in the Practical examination to be conducted by internal and external examiners. External examiner will be appointed by the University and internal examiner will be appointed by the Principal in consultation with Local Head/Head, Department of Mathematics in the college.
5. An Internal/external examiner can conduct Practical/ Viva-voice Examination not more than 100 (Hundred) Candidates (20 Candidates in one batch).
6. Each candidate has to pass in Theory and Practical examinations separately.

Paper-I: Discrete Mathematics

Teaching : 3 Hours per Week

Duration of Examination : 3 HoursMax. Marks: 50 (Science)

66 (Arts)

Note: This paper is divided into Five Units. Two questions will be set from each Unit. Candidates are required to attempt Five questions in all taking One questions from each Unit. All questions carry equal marks.

Units 1: Sets and Propositions- Cardinality, Principal of inclusion and exclusion Mathematical induction

Relations and Functions- Binary relations, equivalence relations and partitions, partial ordered relations and Lattices, Chains and Antichains, Pigeon Hole principle.

Unit 2: Algebraic structures-Groups, Rings, Integral domains, Fields (Definitions, simple examples and elementary properties only).

Boolean Algebras - Lattices and Algebraic structure, Duality, distributive and Complemented Lattices. Boolean Lattices, Boolean functions and expressions.

Unit 3: Computability and formal languages - Ordered sets. Languages, Phrase, Structure, Grammars, Types of Grammars and Languages.

Finite State Machine - Equivalent machines, Finite State Machines as language recognizers.

Discrete numeric functions and Generating functions. Recurrence relations and Recursive Algorithms - Linear Recurrence relations with constant coefficients. Homogeneous solutions. Particular solution. Total solution. Solution by the method of generating functions.

Unit 4: Graphs - Basic terminology, Multigraphs, Weighted graphs, Paths and circuits, Shortest paths, Eulerian paths and Circuits. Travelling Salesman problem. Union, Join, Product and composition of graphs. Planar graphs and Geometric dual graphs.

Unit 5 : Trees - Properties, Spanning tree, Binary and Rooted tree.

Digraphs - Simple digraph, Asymmetric digraphs. Symmetric digraphs and complete digraphs, Digraph and Binary relations. Matrix representation of graphs and digraphs.

Paper-II: Calculus

Teaching : 3 Hours per Week

Duration of Examination : 3 Hours Max. Marks: 50 (Science)

66 (Arts)

Note: This paper is divided into Five Units. TWO questions will be set from each Unit. Candidates are required to attempt FIVE questions in all taking ONE question from each unit. All questions carry equal marks.

Unit 1: Series - Infinite series and Convergent series. Tests for convergence of a series-Comparison test, D'Alembert's ratio test. Cauchy's n -th root test, Raabe's test, De-Morgan-Bertrant's test. Cauchy's condensation test, Gauss's test, (Derivation of tests is not required), Alternating series. Absolute convergence. Taylor's theorem. Maclaurin's theorem. Power series expansion of a function. Power series expansion of $\sin x$, $\cos x$, e^x . $109 (1+x)$, $(1+x)^n$

Unit 2: Derivative of the length of an arc. Pedal equations. Curvature- various formulae, Centre of curvature and Chord of curvature. partial differentiation. Euler's theorem for homogeneous functions. Chain rule of partial differentiation. Differentiation of implicit functions.

Unit 3: Envelopes. Maxima and Minima of functions of two variables. Lagrange's method of undetermined multipliers. Asymptotes. Multiple points. Curve tracing of standard curve (Cartesian and Polar curves).

Unit 4: Rectification Areas. Volumes and Surfaces of solids of revolution.

Unit 5: Double integrals in Cartesian and Polar Coordinates, Change of order of integration. Triple integrals. Application of double and triple integrals in finding areas and volumes. Dirichlet's integral.

Paper-III: Three- Dimensional Geometry and Optimization Theory

Teaching : 3 Hours per Week

Duration of Examination : 2½ Hours

Max. Marks: 32 (Science)

44 (Arts)

Note: (i) This paper is divided into FOUR Units. Two questions will be set from each Unit. Candidates are required to attempt four questions in all taking One question from each Unit. All questions carry equal marks.

(ii) Non-Programmable Scientific Calculators are allowed.

Unit 1 : Sphere. Cone and Cylinder.

Unit 2: Central Conicoids - Ellipsoid, Hyperboloid of one and two sheets, Condition of tangency for a plane, Director sphere, Normals, Generating lines of hyperboloid of sheet and its properties. Reduction of a general equation of second degree in three dimensions to standard forms.

Unit 3: The linear programming problem. Problem Formulation. L.P.P. in matrix notation. Graphical solution of linear programming problems. Basic solution. Some basic properties of convex sets. Theo-

Syllabus B.A. Part-I

rems based on convex sets. Fundamental theorem of L.P.P. Application of the Simplex method for solution of a L.P.P. to simple problems.

Unit 4: Duality. Fundamental theorem of duality. Properties and Simple problems of duality, Assignment problems. Transportation problems.

Practical :

Teaching: 2 Hours per Week per Batch

(20 Candidates in each Batch)

Examination :

Duration : 2 Hours

Scheme	Science	Arts
Max. Marks	18	24
Min.Pass Marks	06	08

Distribution of Marks

Two Practicals one from each group

6 Marks each	=	12 Marks (08 marks each)	16
Practical Record	=	03 Marks	04
Viva-voce	=	03 Marks	04
Total Marks	=	18 Marks	24

Group A: Modelling of industrial and engineering problems into mathematical LPP and its dual and their solution of the Dual of a LPP by Simplex Method.

Group B: Modelling of industrial and engineering problems into

Assignment Problems and (ii) balanced and unbalanced Transportation Problems and their solution.

Note:

1. Problems will be solved by using Scientific Calculators (Non-Programmable)
2. Candidates must know about all functions and operations of Scientific Calculator.
3. Each Candidate (Regular/non-Collegiate) has to prepare his/her practical record.
4. Each Candidate has to pass in Practical and Theory examinations separately.