Programme	B. Sc. Mathematics Honours			
Course Code	MAT1CJ101 / MAT1MN100			
Course Title	**DIFFERENTIAL CALCULUS**			
Type of Course	**Major**			
Semester	I			
Academic Level	100-199			
Course Details	Credit	Lecture/Tutorial per week	Practical per week	Total Hours
	4	4	-	60
Pre-requisites	Basic knowledge of Sets, Relations and Functions, School Level Algebra and Real Numbers (0-99 level).			
Course Summary	The course covers fundamental concepts in calculus, including functions, shifting of graphs, limits, continuity, differentiation, extreme values, the Mean Value Theorem, graphing with derivatives, and limits at infinity with asymptotes. Students learn techniques for evaluating limits, finding extrema, and graphing functions using derivatives, preparing them for further studies in calculus and related fields.			

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Compute domain, range of various functions and limits of functions also draw shifted graphs.	Ap	P	Internal Exam/ Assignment/ Seminar/Viva/End SemExam
CO2	Apply the concepts of continuity and differentiability of a function to solve mathematical problems	Ap	P	Internal Exam/Assignment/ Seminar/Viva/ End SemExam

CO3	Compute derivatives of different functions,Linearization and differentials.	Ap	P	Internal Exam/Assignment/ Seminar/Viva/ End SemExam
CO4	Apply first and second derivatives and related theorems to find extrema of functions.	Ap	P	Internal Exam/Assignment/ Seminar/Viva/ End SemExam
CO5	Sketch the graph of functions by computing critical points and asymptotes.	Ap	P	Internal Exam/Assignment/ Seminar/Viva/ End SemExam

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge (F), Conceptual Knowledge (C), Procedural Knowledge (P), Metacognitive Knowledge (M)

Detailed Syllabus:

Textbook	**Calculus and Analytic Geometry, 9th Edition, George B. Thomas, Jr. Ross L. Finney, Pearson Publications, 2010, ISBN: 978-8174906168**.			
Module	**Unit**	**Content**	**Hrs (48+12)**	**Marks**
				Ext: 70
I	**Module I**		**12**	**Min.15**
	1	Preliminaries: Section 3 - Functions		
	2	Preliminaries: Section 4 - Shifting Graphs.		
	3	Section 1.1-Rates of Change and Limits - Limits of Function Values onwards.		
	4	Section 1.2 - Rules for Finding Limits. Topics up to and including Example 3.		
	5	Section 1.2 - Rules for Finding Limits. Rest of the section.		

	6	Section 1.4- Extensions of the Limit Concept. Topics up to and including Example 6.		
II	**Module II**		**15**	**Min.15**
	7	Section 1.5 - Continuity.		
	8	Section 2.1 - The Derivative of a Function (The topic Graphing f' from estimated values is optional).		
	9	Section 2.2 - Differentiation Rules.		
	10	Section 2.3 - Rates of Change. Topics up to and including Example 5.		
	11	Section 2.5 - The Chain Rule. Topics up to and including Example 6.		
	12	Section 2.6- Implicit Differentiation and Rational Exponents. Topics up to and including Example 5.		
III	**Module III**		**11**	**Min.15**
	13	Section 3.1 - Extreme Values of Functions. Topics up to Finding Extrema.		
	14	Section 3.1 - Extreme Values of Functions- Topics from Finding Extrema onwards.		
	15	Section 3.2 - The Mean Value Theorem -Topics up to and including Example 4. (Proof of Theorem 3 is optional).		
	16	Section 3.2 - The Mean Value Theorem- Increasing Functions and Decreasing Functions		
	17	Section 3.3 - The First Derivative Test for Local Extreme Values.		

IV	**Module IV**		**10**	**Min.15**
	18	Section 3.4 - Graphing with y' and y'' - Topics up to and including Example 5.		
	19	Section 3.4 - Graphing with y' and y''- Topics from the Second Derivative Test for Local Extreme Values onwards.		
	20	Section 3.5 – Limits as $x \to \pm\infty$, Asymptotes and Dominant Terms. – Topics up to and including Summary for Rational Functions.		
	21	Section 3.5 – Limits as $x \to \pm\infty$, Asymptotes and Dominant Terms– Topics from Horizontal and Vertical Asymptotes up to and including Example 12.		
	22	Section 3.5 – Limits as $x \to \pm\infty$, Asymptotes and Dominant Terms–Topics from Graphing with Asymptotes and Dominant Terms onwards.		
V	**Module V (Open Ended)**		**12**	
	Trigonometric Functions, Tangent Values and Formal Definitions of Limits (From Precise Definition of limits onwards up to Example 6), Derivatives of Trigonometric Functions (Proofs are optional), Linearization and Differentials.			

References

1. Howard Anton, Biven, & Stephen Davis, Calculus, 7th Ed., Wiley India 2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Ed, John Wiley & Sons. 3. Robert T Smith and Roland B Minton, Calculus, 4th Ed. McGraw-Hill Companies 4. Soo T Tan, Calculus, 9th Ed.Brooks/Cole Pub Co.
5. Tom M. Apostol, Calculus, Vol 1: One Variable Calculus with an Introduction to Linear Algebra, 2nd Ed, John Wiley & Sons.
6. Michael Van Biezen Calculus Lectures: https://youtu.be/YZYxPclo2rg?si=qKCt6ty8m5dBR4DG

***Optional topics are exempted for end semester examination**

****70 external marks are distributed over the first four modules subjected to a minimum of 15 marks from each module.**

Mapping of COs with PSOs and POs :

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	3	2	0	2	1	3	0	2	1	3	1	3
CO 2	3	3	2	0	2	1	3	0	2	1	3	0	3
CO 3	3	3	2	2	2	1	3	0	2	1	3	1	3
CO 4	3	3	2	0	3	2	3	0	2	1	3	0	3
CO 5	3	3	2	2	3	2	3	0	2	2	3	0	3

Programme	B. Sc. Mathematics Honours			
Course Code	MAT1CJ102			
Course Title	**ELEMENTARY NUMBER THEORY**			
Type of Course	**Major**			
Semester	I			
Academic Level	300-399			
Course Details	Credit	Lecture/Tutorial per week	Practicum per week	Total Hours
	4	4	-	60
Pre-requisites	Arithmetic of integers, basic set theory and proof techniques.			
Course Summary	We start number theory with the division algorithm, g.c.d., and the Euclidean algorithm for computing it, essential for solving Diophantine equations like ax + by = c. We then prove the Fundamental Theorem of Arithmetic, discuss the infinitude of primes and the sieve of Eratosthenes. Following that, we cover Linear Congruences, the Chinese Remainder theorem, and Fermat's Little Theorem. Finally, we explore Wilson's Theorem, Euler's Phi Function, and Euler's Theorem.			

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Apply the division algorithm and Euclidean algorithm to compute greatest common divisors and solve related divisibility problems.	Ap	C	Internal Exam/ Assignment/ Seminar/Viva/End Sem Exam
CO2	Solve Diophantine equations for integer solutions, deduce prime factorization through the fundamental theorem of arithmetic, and identify prime numbers using the sieve of Eratosthenes.	Ap	C	Internal Exam/Assignment/ Seminar/Viva/ End Sem Exam
CO3	Apply the properties of congruence and the Chinese Remainder Theorem to solve systems of linear congruences.	Ap	C	Internal Exam/Assignment/ Seminar/Viva/ End Sem Exam
CO4	Apply Wilson's theorem to solve problems	Ap	C	Internal Exam/Assignment/ Seminar/Viva/ End Sem Exam
CO5	Apply Euler's theorem to solve problems	Ap	C	Internal Exam/Assignment/ Seminar/Viva/ End Sem Exam

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus:

Textbook	Elementary Number Theory, David Burton, M, Seventh Edition, Mcgraw – Hill (2007).			
Module	**Unit**	**Content**	**Hrs (60)**	**External Marks (70)**
I	**Module I**		**12**	**Min.15**
	1	Section 2.2 The division algorithm (proof of theorem 2.1 omitted).		
	2	Section 2.3 The greatest common divisor - up to and including theorem 2.3 and its corollary.		
	3	Section 2.3 The greatest common divisor - All topics from definition 2.3 onwards.		
	4	Section 2.4 The Euclidean algorithm - up to Theorem 2.7.		
	5	Section 2.4 The Euclidean algorithm - All topics from Theorem 2.7 onwards.		
II	**Module II**		**11**	**Min.15**
	6	Section 2.5 The Diophantine equation ax+by = c up to and including Theorem 2.9.		
	7	Section 2.5 - All topics from Example 2.4 onwards.		
	8	Section 3.1 The fundamental theorem of arithmetic - up to Theorem 3.2.		
	9	Section 3.1 The fundamental theorem of arithmetic - All topics from Theorem 3.2 onwards.		
	10	Section 3.2 The sieve of Eratosthenes (up to and including theorem 3.4 only)		

III	**Module III**			
	11	Section 4.2 Basic properties of congruence - up to Theorem 4.2.	**13**	**Min.15**
	12	Section 4.2 Basic properties of congruence - All topics from Theorem 4.2 onwards.		
	13	Section 4.4 Linear congruences and the Chinese remainder theorem - up to Theorem 4.8.		
	14	Section 4.4 Linear congruences and the Chinese remainder theorem - All Topics from Theorem 4.8 (proof of Theorem 4.8 omitted).		
	15	Section 5.2 Fermat's little theorem and pseudo primes - up to Lemma. (omit a different proof for Fermat's theorem)		
	16	Section 5.2 Fermat's little theorem and pseudo primes - All topics from Lemma onwards.		
IV	**Module IV**		**12**	**Min.15**
	17	Section 5.3 Wilson's theorem - Up to Theorem 5.5.		
	18	Section 5.3 Wilson's theorem - All topics from Theorem 5.5 onwards.		
	19	Section 7.2 Euler's phi-function - up to Lemma.		
	20	Section 7.2 Euler's phi-function - All Topics from Lemma onwards. (proof of Theorem 7.2 omitted).		
	21	Section 7.3 Euler's theorem. (Second proof of Euler's theorem omitted).		
	22	Section 7.4 Some properties of the phi-function (Proof of Theorem 7.8 omitted).		

V	Module V (Open Ended)		
	Proof of Theorem 4.8. Chinese Remainder Theorem and remaining portions of Section 4.4 Section 6.1 The sum and the number of divisors Linear congruences and the Chinese remainder theorem. Section 6.3 The Greatest Integer Function - up to Theorem 6.11.	**12**	

References

1. Rosen, Kenneth H. *Elementary number theory*. London: Pearson Education, 2011.
2. Eynden, Charles Vanden. *Elementary number theory*. Waveland Press, 2006.
3. Gehring, F. W., and P. R. Halmos. G*raduate Texts in Mathematics*, 1976.
4. Hsiung, C. Y. *Elementary theory of numbers*. World Scientific, 1992.
5. Hoffman P., *The man who loved only numbers: The story of Paul Erdös and the search for mathematical truth*, Little Brown & Company, 1999.

***70 external marks are distributed over the first four modules subjected to a minimum of 15 marks from each module.**

Mapping of COs with PSOs and POs :

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	2	1	0	0	0	3	0	2	1	3	0	1
CO 2	2	3	3	0	1	0	3	0	2	1	3	0	1
CO 3	2	3	2	0	0	0	3	0	2	1	3	0	2
CO4	2	3	2	0	0	0	3	0	2	1	3	0	2
CO5	2	3	2	0	0	0	3	0	2	1	3	0	2

Programme	B. Sc. Mathematics Honours			
Course Code	MAT1MN103			
Course Title	**BASIC CALCULUS**			
Type of Course	**Minor**			
Semester	I			
Academic Level	100 – 199			
Course Details	Credit	Lecture/Tutorial per week	Practicum per week	Total Hours
	4	4	-	60
Pre-requisites	Basic Set Theory including functions and their algebraic operations .			
Course Summary	This course provides a comprehensive exploration of calculus and its applications: It begins with fundamental concepts of graphs, linear models, inverse functions, laying the groundwork for calculus. Modules II and III delve into differentiation techniques, including product and quotient rules, implicit differentiation, derivatives of inverse functions, and applications like extrema, theorems (such as Rolle's and Mean Value Theorems), and curve sketching. Module IV explores integral calculus, covering the fundamental theorem of calculus, numerical integration techniques (like the Trapezoidal Rule and Simpson's Rule), and introduces hyperbolic functions and their derivatives and integrals.			

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Acquire a basic concept of functions and their graphs.	U	C	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO2	Evaluate and solve calculus problems involving limits and continuity	Ap	C	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO3	Evaluate the derivatives of functions using different methods.	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO4	Apply the results in differential calculus to analyze the graph of a function.	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO5	Understand the concept of integration.	U	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus:

Text Book		Calculus: Early Transcendental Functions (6edn), Ron Larson and Bruce Edwards Cengage Learning ISBN-13: 978-1-285-77477-0.		
Module	**Unit**	**Content**	**Hrs (48 +12)**	**Ext. Marks (70)**
I		**Foundations of Calculus: Graphs, Functions, and Limits**		
	1	A quick review of sections 1.1 and 1.2 (not for external exam) Section 1.3 – Functions and their Graphs	**13**	**Min 15**
	2	Section 1.5: Inverse Functions - Inverse Functions, Existence of an Inverse Function		
	3	Section 1.6: Exponential and Logarithmic Functions - Exponential Functions, The Number e, The Natural Logarithmic Function		
	4	Section 2.2: Finding Limits Graphically and Numerically - An Introduction to Limits, Limits That Fail to Exist, A Formal Definition of Limit (examples are optional topics)		
	5	Section 2.3: Evaluating Limits Analytically - Properties of Limits, A Strategy for Finding Limits,		
	6	Section 2.3: Evaluating Limits Analytically - Dividing Out Technique, Rationalizing Technique, The Squeeze Theorem		
II		**Continuity, Derivatives, and Differentiation Rules**		
	7	Section 2.4: Continuity and One-Sided Limits - Continuity at a Point and on an Open Interval, Properties of Continuity, The Intermediate Value Theorem.	**12**	**Mn 15**
	8	Section 3.1: The Derivative and the Tangent Line Problem - The Derivative of a Function, Differentiability and Continuity		
	9	Section 3.2: Basic Differentiation Rules and Rates of Change – The Constant Rule, The Power Rule, The Constant Multiple Rule, The Sum and Difference Rules		
	10	Section 3.2 : Basic Differentiation Rules – rest of the section.		
	11	Section 3.3: Product and Quotient Rules and Higher Order Derivatives - The Product Rule, The Quotient rule, Higher- Order Derivatives		
	12	Section 3.4 The Chain Rule.		
	13	Section 3.5: Implicit Differentiation Implicit and Explicit Functions, Implicit Differentiation, Logarithmic Differentiation		
III		**Applications of Derivatives: Extrema, Concavity, and Curve Sketching**		
	14	Section 4.1: Extrema on an Interval - Extrema of a Function, Relative Extrema and Critical Numbers, Finding Extrema on a Closed Interval	**12**	**Min 15**
	15	Section 4.2: Rolle's Theorem and The Mean Value Theorem - Rolle's Theorem, The Mean Value Theorem		
	16	Section 4.3: Increasing and Decreasing Functions and The First Derivative Test - Increasing and Decreasing Functions, The First Derivative Test		
	17	Section 4.4: Concavity and the Second Derivative Test -		

		Concavity, Points of Inflection, The Second Derivative Test		
	18	Section 4.6: A summary of Curve Sketching - Analyzing the Graph of a Function		
IV	**Integral Calculus: Fundamental Theorems and Applications"**			
	19	Section 5.1: Antiderivatives and Indefinite Integration – Antiderivatives, Basic Integration Rules, Initial Conditions and Particular Solutions.	11	**Min 15**
	20	Section 5.3: Reimann Sums and Definite Integrals – Reimann Sums, Definite Integrals, Properties of Definite Integrals.		
	21	Section 5.4: The Fundamental Theorem of Calculus - The Fundamental Theorem of Calculus, The Mean Value Theorem for Integrals.		
	22	Section 5.4: The Fundamental Theorem of Calculus - Average Value of a Function, The Second Fundamental Theorem of Calculus, Net Change Theorem		
V	**Open Ended**			
	One Sided Limits and Discontinuity, Derivatives of Inverse Functions, Derivatives of Trigonometric functions, Limits at Infinity, Numerical Integration, Hyperbolic Functions.		**12**	

References:

1. Calculus, Soo T. Tan, First Edition, Brooks/Cole, Cengage Learning, 2011.
2. Calculus & Analytic Geometry, (9/e), George B. Thomas & Ross L. Finney, Pearson Publications
3. Calculus, (7/e), Howard Anton, Biven, & Stephen Davis, Wiley India
4. Calculus, (7/e)., Howard Anton, Biven, & Stephen Davis, Wiley India.
5. Calculus: Early Transcendentals, (4/e), Dennis G. Zill and Warren S. Wright

Note: 1) Optional topics are exempted for end semester examination.

2) Proofs of all the results are also exempted for the end semester exam.,

Mapping of COs with PSOs and POs :

	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	1	3	0	1	1	3	0	1
CO 2	3	1	3	0	1	1	3	0	1
CO 3	2	1	3	0	1	1	3	0	2
CO 4	2	1	3	0	1	1	3	0	2
CO 5	2	1	3	0	1	1	3	0	2

Programme	B. Sc. Mathematics Honours			
Course Code	MAT1FM105(2)			
Course Title	**MATHEMATICS FOR COMPETITIVE EXAMINATIONS - PART I**			
Type of Course	**MDC**			
Semester	I			
Academic Level	100 - 199			
Course Details	Credit	Lecture/Tutorial per week	Practical per week	Total Hours
	3	3	-	45
Pre-requisites	Basic Arithmetic and Computational Skill			
Course Summary	The course is designed to equip students with essential arithmetic and problem-solving skills required for competitive exams. It covers topics ranging from fundamental arithmetic operations such as number systems, fractions, and roots to more advanced concepts like financial mathematics, time-speed-distance calculations, and problem-solving techniques..			

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Apply concepts of the Number System, Number Series and Fractions to solve problems in competitive examinations by improving time management and problem- solving skills.	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO2	Use fast track techniques in HCF and LCM, Square root and Cube root and simplification, to solve problems in competitive examinations.	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO3	Identify and apply arithmetic operations like average, ratio and proportion and percentage to solve problems with focus on time management skills.	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO4	Solve problems of financial Mathematics by managing time effectively	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam

CO5	Use shortcut techniques to solve problems involving work, time, speed, distance etc. with enhanced accuracy and speed	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus:

Module	Unit	Content	Hrs (36+ 9)	Ext. Marks (50)
I		**Fundamentals of Arithmetic**	9	Min 10
	1	Number System		
	2	Number Series		
	3	Simple and Decimal Fractions		
	4	HCF and LCM		
	5	Square root and Cube root		
II		**Basic Arithmetic Operations**	9	Min 10
	6	Simplification		
	7	Average		
	8	Ratio and Proportion		
	9	Problems based on ages		
	10	Percentage		
III		**Financial Mathematics**	9	Min 10
	11	Profit and Loss		
	12	Discount		
	13	Simple Interest		
	14	Compound Interest		
	15	Work and Time		

IV	**Time, Speed, and Distance**		**9**	**Min 10**
	16	Speed, Time and Distance		
	17	Problems based on trains		
	18	Boats and Streams		
	19	Clock and Calendar		
V	**Open Ended**		**9**	
	Mixture or Allegation, Partnership, Pipes and Cisterns			

References: 1. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publications India limited, 2018 (Primary Reference).
2. Objective Arithmetic for Competitive Examinations, Dinesh Khattar, Pearson Education, 2020.
3. Quicker Objective Arithmetic, Dr Lal, Jain, Upkar's publication, 2010.

Mapping of COs with PSOs and POs :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	0	3	0	3	0	0
CO 2	3	0	3	0	3	0	0
CO 3	3	0	3	0	3	0	0
CO 4	3	0	3	0	3	0	0
CO 5	1	0	2	0	2	0	0

Programme	B.Sc Mathematics Honours			
Course Code	MAT1MN104			
Course Title	**MATHEMATICAL LOGIC, SET THEORY AND COMBINATORICS**			
Type of Course	**Minor**			
Semester	I			
Academic Level	100 - 199			
Course Details	Credit	Lecture/Tutorial per week	Practical per week	Total Hours
	4	4	-	60
Pre-requisites	Higher Secondary Mathematics.			
Course Summary	This course explores mathematical logic, set theory, and combinatorics, covering fundamental ideas like propositions, logical equivalences, and quantifiers. It introduces set theory concepts such as sets, operations with sets, and cardinality. Additionally, it delves into functions and matrices, along with topics like permutations, combinations, and discrete probability in combinatorics.			

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Apply the concepts of propositional logic and equivalences	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO2	Understand basics of set theory and its operations.	U	C	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO3	Understand the concept of functions	U	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam
CO4	Apply the concept of matrices and its properties to carry out various operations on matrices	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam

CO5	Implement the concept of Combinatorics.	Ap	P	Internal Exam/Assignment/ Seminar/ Viva / End Sem Exam

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)
# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus:

Text: Discrete Mathematics with Applications, (1/e), Thomas Koshy, Academic Press (2003), ISBN: 978-0124211803.

Module	Unit	Content	Hrs (48 +12)	Ext. Marks (70)
I		**Mathematical Logic**	15	Min. 15
	1	1.1 Propositions: Conjunction, Disjunction.		
	2	1.1 Propositions: Converse, Inverse and Contrapositive.		
	3	1.1 Propositions: Biconditional Statement, Order of Precedence, Tautology, Contradiction and Contingency (Switching network and Example 1.16 are optional).		
	4	1.2 Logical Equivalences (Equivalent Switching Networks, Example 1.23, Fuzzy Logic and Fuzzy Decisions are optional)		
	5	1.3 Quantifiers (Example 1.28, De Morgan's Laws and example 1.29 are optional)		
	6	1.4 Arguments: Valid and Invalid arguments, (Example 1.33 is optional)		
II		**Set Theory**		
	7	2.1 The Concept of a Set - up to and including example 2.7 (Example 2.6 is optional).		
	8	2.1 The Concept of a Set - finite and infinite sets (Topics from the Hilbert Hotel paradoxes onwards are optional).		

	9	2.2 Operations with Sets – up to and including example 2.21.	**12**	**Min. 15**
	10	2.2 Operations with Sets – Cartesian product (Fuzzy sets, Fuzzy subsets and operations on fuzzy sets are optional).		
	11	2.4 The Cardinality of a Set (Theorem 2.2 and Algorithm subsets are optional).		
III	**Functions and Matrices**			
	12	3.1. The Concept of Functions - up to and including example 3.2	**10**	**Min. 15**
	13	3.1. The Concept of Functions – Piecewise definition, sum and product (Example 3.7 is optional).		
	14	3.2 Special Functions – up to and including example 3.13 (Proof of Theorems 3.1 and 3.2 are optional).		
	15	3.2 Special Functions- Characteristic function, Mod and Div functions (Theorem 3.3, Code dealing and The two Queens Puzzle are optional).		
	16	3.7 Matrices (Proof of theorem 3.12, algorithm product are optional).		
IV	**Combinatorics and Discrete Probability**		**11**	**Min. 15**
	17	6.1 The Fundamental Counting Principles (Example 6.7 is optional)		
	18	6.2 Permutations - up to and including example 6.13 (Proof of theorem 6.4 is optional)		
	19	6.2 Permutations - Cyclic permutations (Theorem 6.7 and Fibonacci numbers revisited are optional)		
	20	6.4 Combinations (Proof of theorem 6.10, example 6.22, theorem 6.12 and example 6.26 are optional)		
	21	6.8 Discrete Probability- up to and including example 6.49 (Examples 6.45 and 6.47 are optional)		
	22	6.8 Discrete Probability- Mutually exclusive events (Proof of theorem 6.20 is optional)		

V	**Open Ended**	**12**	
	1. Basic calculus concepts such as limits, continuity, differentiation and integration. Relations and Digraphs, Conditional Probability, Multiplication theorem of Probability, Dependent and Independent Events, Probability Distributions, Correlation and Regression, Bisection Method, Regula-Falsie Method, Gauss-Jordan Method.		

References:

1. Discrete Mathematics and Its Applications (7/e), Kenneth H. Rosen, McGraw-Hill, NY (2007).
2. Discrete Mathematics with Applications(4/e), Susanna S Epp, Brooks/ Cole Cengage Learning (2011).
3. Discrete Mathematics, Gary Chartrand, Ping Zhang, Waveland Press (2011).

Note: 1) Optional topics are exempted for end semester examination. 2) Proofs of all the results are also exempted for the end semester exam.

Mapping of COs with PSOs and POs :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	1	1	2	3	2	1
CO 2	3	0	0	1	3	0	1
CO 3	3	0	1	1	3	0	2
CO 4	3	0	0	1	3	0	1
CO 5	3	0	1	2	3	0	2