Department of Liberal Education
Era University, Lucknow
Course Outline
Effective From: 2023-24

Name of the Program	**B.A. / B.Sc. (LIBERAL EDUCATION)**			**Year/ Semester:**	**3rd / 6th**
Course Name	**Discrete Mathematics**	**Course Code:**	**MT307**	**Type:**	**Theory**
Credits	**04**			**Total Sessions Hours:**	**60 Hours**
Evaluation Spread	**Internal Continuous Assesment:**	**50 Marks**		**End Term Exam:**	**50 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do 1. Use mathematically correct terminology and notation. 2. Construct correct direct and indirect proofs. 3. Use division into cases in a proof. 4. Use counterexamples. 5. Apply logical reasoning to solve a variety of problems.				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	**Attributes**				
CO1	Understand the notion of mathematical thinking, mathematical proofs and algorithmic thinking and be able to apply them in problem solving.				
CO2	Understand the basics of discrete probability and number theory,				
CO3	Learn about ordered pair, Posets and Lattices. And s apply the methods from these subjects in problem solving.				
CO4	Learn about number theory, Euclidean Algorithms, Fibonacci Numbers, Complexity of Euclidean Algorithms.				
Pedagogy					
Internal Evaluation Mode	Mid-term Examination: 20 Marks Activity: 10 Marks Class test: 05 Marks Online Test/Objective Test: 05 Marks Assignments/Presentation: 05 Marks Attendance: 05 Marks				
Session Details	**Topic**			**Hours**	**Mapped CO**
Unit 1	**Relation:** Relations and their properties, matrix & Digraph representation of relation, Paths & connectivity, composition of relations. **Functions:** Functions; definition and examples; properties of functions one-t-one, onto, bijective, composition of functions, growth of functions, Recursive function. **Activity:** Assignment based activity.			15	CO1

Unit 2	**Algebraic Structure:** Binary operations and their properties, and examples, Semi groups and monoids, Abelian group, Properties of group, subgroup, Cyclic group, Cosets, Permutation groups, isomorphisms, automorphisms and homomorphisms and their examples/properties. **Activity:** Assignment based activity.	15	CO1
Unit 3	**Lattices:** Ordered set, Partial ordering, Posets, Hasse Diagram, Representation of Posets using Hasse diagram, Introduction to Lattices, Properties of Lattices as posets, Bounded Lattices, Distributive Lattices and Complemented Lattices. **Activity:** Assignment based activity.	15	CO3
Unit 4	**Number Theory:** Division algorithm and derived results, least common multiple, Greatest common divisor, Euclidean Algorithms, Fibonacci Numbers, Complexity of Euclidean Algorithms. Permutations & combinations, Basic theorems on permutation and combinations, Pigeonhole principle, Solving linear recurrence relations, Generating functions, Inclusion and exclusion principle and its applications. **Activity:** Assignment based activity.	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1		2		1			1		2			1
CO2									1					
CO3	2			2		1			1		2			1
CO4	1								1					

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	Liu, C.L. Elements of Discrete Mathematics, New Delhi: Tata McGraw-Hill Publishing Company Ltd.
Reference Books	1. Kolman, Busby and Ross. Discrete Mathematical Structures, Prentice Hall of India. 2. Goodaire and Parmenter. Discrete Mathematics with Graph theory, Pearson. 3. David M. Burton: Elementary Number Theory, 6th Ed.
Para Text	**Unit 1:** 1. https://www.youtube.com/watch?v=pRd96941zwE 2. https://www.youtube.com/watch?v=CClqErMJ-38 **Unit 2:** 1. https://www.youtube.com/watch?v=CxffkidIty4 2. https://www.youtube.com/watch?v=wYPEEJLVjXg **Unit 3:** 1. https://www.youtube.com/watch?v=BSWIgyPApqs 2. https://www.youtube.com/watch?v=KVdzsIjLTQk 3. https://www.youtube.com/watch?v=LUjb0tgE_uo 4. https://www.youtube.com/watch?v=Ul7cCuJzjVQ **Unit 4:** 1. https://www.youtube.com/watch?v=VWOUh4w_zVI 2. https://www.youtube.com/watch?v=HNOypQFpW3s 3. https://www.youtube.com/watch?v=h86RzlyHfUE

Recapitulation & Examination Pattern		
Internal Continuous Assesment:		
Component	**Marks**	**Pattern**
Mid Semester	20	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **0.5 mark.** **Section B:** Contains **07** descriptive questions out of which **05** questions are to be attempted. Each question carries **03 marks**.
Activity	10	Will be decided by subject teacher.
Class Test	05	Contains **05 descriptive questions.** Each question carries **01** mark.
Online Test/ Objective Test	05	Contains **10 multiple choice questions.** Each question carries **0.5** mark.
Assignment/ Presentation	05	Assignment to be made on topics and instruction given by subject teacher.
Attendance	05	As per policy
Total Marks	**50**	

Course created by: **Dr. Sheeba Rizvi**
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Signature:

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Signature: