National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	**Master of Computer Applications**	Year of Regulation	**2024-25**
Department	**Computer Science and Engineering**	Semester	**I**

Course Code	Course Name	Pre-Requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
CA405	**Mathematical Foundation of Computer Applications**		**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

			CO's	Statement	Bloom's Taxonomy
Course Objectives	1. This course introduces the elementary structures such as sets, graphs, and trees used in computer algorithms and systems. Define and understand the properties of some of the discrete structures in Mathematics.	Course Outcomes	CA405.1	Able to acquire knowledge about different discrete structures of mathematics and identification of its application in computer science area	Understand
	2. This course illustrates elementary proofs, proofs by induction, deductive proofs in propositional and first order logic.		CA405.2	Able to acquire knowledge about different methods of proofs in propositional logic and first order predicate logic and identification of application in real world problems	Understand
	3. This course explains the principles of counting; understand recurrence relations and generating functions.		CA405.3	Able to work out on different problems on counting, recurrence relations and generating functions and solve these problems in real world scenarios	Evaluate
	4. This course illustrates the understand the basic concepts of graphs, group and ring theory		CA405.4	Students will be able to apply discrete structure such as graphs to solve problems of connectivity, scheduling, optimization etc.	Apply
	5. This course introduces the formulation of generating function and series evaluations		CA405.5	Students will be able to interpret recurrence relations and solve them, represent sequences and series using generating functions.	Evaluate

COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CA405.1	**3**	**3**		**1**					**2**				**3**		**3**
CA405.2	**3**	**3**		**1**					**2**				**2**		**2**
CA405.3	**2**	**3**	**3**	**1**	**2**								**2**	**3**	**2**
CA405.4	**2**	**2**	**3**	**0**	**2**	**2**	**3**		**2**			**1**	**2**	**3**	**2**
CA405.5	**2**	**2**	**3**	**0**	**2**	**2**	**3**		**2**			**1**	**3**	**3**	**3**
CA405	2.40	2.60	3.00	0.60	2.00	2.00	3.00		2.00			1.00	2.40	3.00	2.40

SYLLABUS

No.	Content	Hours	COs
I	Introduction History and Overview of discrete structure and general problems: Basic operations on sets, cartesian products, disjoint union, power sets, inverse of functions, composition of functions, relations, properties of binary relations, equivalence relations and partitions. Principle of inclusion and exclusion, pigeonhole principle	**08**	**CA405.1**
II	Propositional Logic: Syntax and semantics, proof systems, satisfiability, validity, soundness and completeness. Introduction to first order logic.	**08**	**CA405.1**
III	Introduction to recurrence relations and generating functions	**06**	**CA405.1** **CA405.2**
IV	Posets, lattices, chains and anti-chains	**06**	**CA405.2** **CA405.3** **CA405.4**
V	Graphs and their basic properties – degree, path, cycle, subgraphs, isomorphism, Eulerian and Hamiltonian cycles, trees	**06**	**CA405.4** **CA405.5**
VI	Groups and Rings: Groups, Subgroups, Cosets, Lagrange's theorem, Homomorphisms and Normal subgroups, Rings.	**08**	**CA405.2** **CA405.4**
	Total Hours	**42**	

Essential Readings

1. Trembly, Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill.
2. C. L. Liu, D. P. Mahapatra, "Elements of Discrete Mathematics", Tata McGraw Hill.
3. Harry Lewis and Rachel Zax, "Essential Discrete Mathematics for Computer Science", Princeton University Press, 2019

Supplementary Readings

1. Norman L. Biggs, "Discrete Mathematics", Oxford University Press.
2. Albert R. Meyer, Eric Lehman, and Frank Thomson Leighton, "Mathematics for Computer Science", Samurai Media Limited, 2010
3. V.K. Balakrishnan, "Introductory Discrete Mathematics", Dover Publications Inc., 2000