Institute of Infrastructure Technology
Research And Management

Course Code:	MA 232001
Course Title:	Discrete Mathematics
Credits:	L T P C 3 1 0 4
Prerequisites (if any) :	
Frequency of Offering this Course	□ Each year

The topics covered in this course:

- Basic logic: Propositional logic: logical connectives; truth tables; normal forms (conjunctive and disjunctive); validity; predicate logic; limitations of predicate logic, universal and existential quantification; modus ponens and modus tollens. Proof techniques: Notions of implication, converse, inverse, contrapositive, negation, and contradiction; the structure of formal proofs; direct proofs; proof by counterexample; proof by contraposition; proof by contradiction; mathematical induction; strong induction; recursive mathematical definitions; well orderings.
- Basics of counting: Counting arguments; pigeonhole principle; permutations and combinations; inclusion-exclusion, recurrence relations, generating functions.
- Fundamental structures; Functions (surjections, injections, inverses, composition); relations (reflexivity, symmetry, transitivity, equivalence relations); sets (Venn diagrams, complements, Cartesian products, power sets); pigeonhole principle; cardinality and countability.
- Graph Theory, Connectivity Euler and Hamiltonian paths, shortest path.

Textbook:
1.   Discrete Mathematics and Its applications, Kenneth Rosen,

References book:

1. Discrete Mathematics by Richard Johnsonbaugh
2. Essential Discrete Mathematics for Computer Science by Harry Lewis and Rachel Zax

Learning Outcomes:
After completing this course, the students will be able to
   Basics of Discrete Mathematics which comprises the essentials for a computer science student to go ahead and study any other topics in the subject. The emphasis will be on problem-solving as well as proofs.