Course Code	EM 313
Course Title	Discrete Mathematics
No. of Credits	3
Pre-requisites	-
Compulsory/Optional	Compulsory for Computer Engineering

Aim(s): To solve problems related to propositional calculus, mathematical models for computing machines and algorithms using fundamentals of number theory, combinatorics, algebraic structures, Boolean algebras and graph theory.

Intended Learning Outcomes:

On successful completion of the course, the students should be able to;

- apply the concepts of number theory, combinatorial techniques and algebraic structures to solve advanced mathematical /physical problems.
- use mathematical logic, in designing logic circuits and in solving problems in mathematical models for computing machines.
- apply graph theory and algorithms in solving advanced mathematical/physical problems.

Time Allocation (Hours): Lectures 36 Tutorials 09 Practicals Assignments

Course content/Course description

- **Fundamentals:** set theory, relations and functions, axiomatic systems, ordinary Induction, invariants, strong induction.
- **Number Theory:** Divisibility, the greatest common divisor, Modular arithmetic, Fermat's Little theorem, RSA algorithm
- **Algebraic Structures:** Monoids, groups, rings and fields.
- **Combinatorics:** Basic counting principles with permutations and combinations, basic combinatorics.
- **Logic and Proofs:** propositional and predicate logic, proof methods and strategy.
- **Graph Theory:** graphs, representation of a graph in a computer, isomorphic graphs, Eulerian and Hamiltonian graphs, planar graphs, graph coloring, trees, spanning trees, binary trees, tree searching.
- **Algorithms:** greedy algorithms, searching and sorting algorithms, algorithms to obtain minimum spanning tree and shortest path of a weighted graph, complexity of an algorithm.
- **Mathematical models for Computing Machines:** finite state machines, finite state automata, Turing machines.

Recommended Texts :

- D. K. Joshi (1989/2015), Foundations of Discrete Mathematics, Wiley-Inter Science.
- D. K. Joshi (2001/2014), Applied Discrete Structures, New Age International.
- Thomas Koshy (2004), Discrete Mathematics with Applications, Elsevier Academic Press.
- Ian Anderson (2001), A First Course in Discrete Mathematics, Springer-Verlag London Limited.

Assessment	**Percentage Mark**
In-course Tutorials/Assignments	30
End-semester	70