R.T.M. Nagpur University, Nagpur
FOUR YEAR B.E. COURSE
(Revised Curriculum as per AICTE Model Curriculum)
Computer Science and Engineering
B.E. Second Year Proposed Scheme

Fourth Semester:-

SN	Subject	Teaching Scheme			Evaluation Scheme			Credits	Category
		L	T	P	CA	UE	Total		
1	Discrete Mathematics and Graph Theory	03	-	-	30	70	100	03	PCC-CS
2	Data Structure and Program Design	03	01	-	30	70	100	04	PCC-CS
3	Database Managements Systems	03	01	-	30	70	100	04	PCC-CS
4	Computer Networks	03	-	-	30	70	100	03	PCC-CS
5	Theory of Computation	03	01	-	30	70	100	04	PCC-CS
6	System Programming	03	-	-	30	70	100	03	PCC-CS
7	Data Structure and Program Design-Lab	-	-	02	25	25	50	01	PCC-CS
8	Database Managements Systems-Lab	-	-	02	25	25	50	01	PCC-CS
9	Computer Workshop-II (Python)	-	-	02	25	25	50	01	PCC-CS
10	Constitution of India (Audit Course)	02	-	-	-	-	-	Audit	MC
	Total	20	03	06			750	24	

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Discrete Mathematics and Graph Theory Subject Code : BECSE401T

Load	Credit	Total Marks	Sessional Marks	University Marks	Total
3 hrs (Theory)	03	100	30	70	100

Aim: The primary aim is to develop a solid background in modern computer science, in particular logic, relations, combinatorics and graph theory so that students can learn the fundamental algorithms used in computer programming.

Pre Requisites:

1. Basic concepts of logic, matrices and combinatorics.
2. Higher secondary school mathematics through trigonometry.

Course Objectives:

1. A primary objective is to provide a bridge for the student from lower-division mathematics courses to upper-division mathematics.
2. Obtain skills and logical perspectives in introductory (core) courses that prepare them for subsequent courses.
3. Develop proficiency with the techniques of mathematics and/or computer science, the ability to evaluate logical arguments, and the ability to apply mathematical methodologies to solving real world problems.

Course Outcomes:

After completing the course, the students will be able to

1. Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.
2. Gain an introduction into how mathematical models for engineering are designed, analyzed and implemented in industry and organizations.

3. Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones.

4. Analyze real world scenarios to recognize when Logic, sets, functions are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches.

5. Apply knowledge of mathematics, physics and modern computing tools to scientific and engineering problems.

6. Apply their knowledge in life-long learning.

Unit 1: Set Theory, Relations and Functions **(10 Hrs)**

Sets: Review of propositions and logical operations, Principle of mathematical induction, Review of sets, Types and operations on sets.

Relations: Ordered pairs and n-tuples, Types of relations, Composite relation, Transitive closure of a relation, Partially ordered set, Hasse diagrams.

Functions: Definition, Composition of functions, Types of functions, Characteristics function and its properties.

Unit 2: Fuzzy Set and Fuzzy Logic **(10 Hrs)**

Fuzzy sets and systems, Crisp set, Operations and combinations on Fuzzy sets, Relation between Crisp set and Fuzzy set, Fuzzy relations, Overview of Fuzzy logic and classical logic.

Unit 3: Group Theory and Ring Theory **(10 Hrs)**

Binary operation, Algebraic structure, Groupoid, Semigroup, Monoid, Group, Subgroup, Normal subgroup (Only definitions and examples), Ring, Commutative ring, Ring with unity, Zero divisor, Integral domain, Field (Only definitions and simple examples).

Unit 4: Graph Theory **(10 Hrs)**

Basic concepts of graph theory, Digraphs, Basic definitions, Matrix representation of graphs, Subgraphs and quotient graphs, Isomorphic graphs, Paths and circuits, Reachability and connectedness, Node base, Euler's path & Hamilton's path, Tree, Binary tree, Undirected tree, Spanning tree, Weighted graphs (Only definitions and examples), Minimal spanning tree by Prim's

algorithm & Kruskal's algorithm, Representation of algebraic expressions by Venn diagram and binary tree.

Unit 5: Combinatorics **(8 Hrs)**

Permutations and combinations, Pigeonhole principle with simple applications, Recurrence relations (Concept and definition only), Generating functions, Solution of recurrence relations using generating functions.

Text/ Reference Books

(1) Discrete Mathematical Structures (PHI), B. Kolman, R. Busby, S. Ross.

(2) Discrete Mathematical Structures with Applications to Computer Science (TMH), Tremblay and Manohar.

(3) Fuzzy Sets Uncertainty and Information, George, J. Klir, Tina A. Folger.

(4) Discrete Mathematics for Computer Scientists & Mathematicians, J. Mott, A. Kandel, T. Baker.

(5) Discrete Mathematics, S. Lipschutz.

(6) Neural network and Fuzzy systems (PHI), Bart Kosko.