BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, Hyderabad
FIRST SEMESTER 2019-2020
COURSE HANDOUT(PART-I)

01/08/2019

In addition to Part-I (General Handout for all courses appended to the Timetable) this portion gives further specific details regarding the course.

Course No. **:** CS F222

Course Title **:** Discrete structures for Computer Science

Instructor In Charge **: Dr. N.L.BHANU MURTHY**

Team of Instructors : Dr. Rajib Maity & Ms. Sanghamitra Samanta

Scope and Objectives of the course:

This course aims to provide the mathematical foundations for many computer science courses including data structures, algorithms, databases theory, automata theory, formal languages, compiler theory, computer security, and operating systems. This course can develop mathematical maturity to understand and create mathematical arguments. The course encompasses topics like methods of proof (induction, contradiction, proof by cases etc), set theory, functions, relations, partially ordered sets, lattices, graph theory, basic number theory and its application to cryptography, algebraic structures & coding theory.

The objectives of the course are to:

- Equip students with mathematical foundations to study computer science subjects
- Understand different methodologies to prove or disprove a given proposition
- Understand mathematical structures and solve practical problems using these structures
- Understand advanced counting techniques

TEXT BOOK :

T1. Kenneth Rosen: Discrete Mathematics and its applications, seventh editions, Tata McGrawHill Education Private Limited

REFERENCE BOOK :

R1. Mott , Abraham & Baker : Discrete Mathematics for computer scientist & Mathematicians, PHI, 2nd edition 2002.

R2. KOLMAN , BUSBY & ROSS : Discrete Mathematical Structures , PHI 2003
R3. ROSS & WRIGHT : Discrete Mathematics PHI 2nd edition , 1988.

5. COURSE PLAN:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1	To introduce the course	Introduction to Discrete Structures and its applications to Computer Science, Course overview	Class Notes
2 – 5	To understand different methodologies to prove or disprove a given proposition	Methods of Proof – Week and Strong Induction, Proof by Contradiction, Proof by cases etc. Circular Reasoning, Disproving a proposition	T1 – Ch 1.8, Ch.4.1 to 4.3
6 – 8	To learn sets, functions and their equivalent representations	Set Theory, Function, Introduction to Godel's Incompleteness Theorem and Russel's Paradox	T1 – Ch.2.1. to 2.3., Class Notes
9 – 14	To learn relations, partial ordered sets and lattice theory with applications to computer science	Relations, Partially Ordered Sets, Equivalence Relation, Lattice Theory	T1 Ch.7
15 – 22	To understand fundamentals concepts in graph theory	Graph Theory - Basic concepts, Isomorphism, Subgraphs, Special Graphs, Planar Graphs, Multi Graphs, Eulerian & Hamiltonian cycles/paths, Graph Coloring	T1 – Ch.8
23 – 26	To understand	Trees, Spanning Trees, Minimum	T1 – Ch.9

	fundamental concepts of trees, spanning trees and algorithms to generate Minimum Spanning Trees	Spanning Trees	
27-33	To learn basic number theory concepts required for cryptography	Basics in Number Theory – Primes, Factorization, GCD, Residues and application to cryptography	T1- Ch. 3.4. to 3.7
34 – 36	To understand techniques of counting	Combinatorics – Simple & Generalized Pigeonhole Principle, Inclusion-Exclusion etc.	T1 – Ch.5.1 to 5.3
37 – 39	To understand recurrence and recurrence relations	Recurrence, Recurrence Relation	T1 – Ch.4.3 & 4.4, Ch.6.1 & 6.2
40 – 42	To learn Groups, Rings, Fields and Coding Theory	Algebraic Structures – Monoids, Groups, Rings and Coding Theory	T1 – Ch.11

EVALUATION SCHEME:

Component	**Duration**	**Weightage**	**Date & Time**	**Nature of Component**
Mid Test	**90 mins**	**30%**	5/10, 9.00 -- 10.30 AM	**Close Book**
Lab Exam / Assignments	**Take Home**	**20%**		**Open Book**
Comprehensive Examination	**180 mins**	**50%**	13/12 FN	**Close Book**

CHAMBER CONSULTATION HOUR: Thursday 1600Hrs – 1700Hrs @H121

Make-up: Make-up will be granted only to genuine cases with prior permission only.

NOTICES: All notices about the course will be put on CSIS Notice Board.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor –in-charge
CS F222