Birla Institute of Technology & Science, Pilani
K. K. Birla Goa Campus
First Semester 2019-2020
Course Handout

Course Details

Course Title	:	Discrete Structures for Computer Science
Course Number	:	CS F222
Instructor	:	Anup Basil Mathew

Objectives

- To learn to read and write proofs formally.
- To learn basic objects and proof strategies in finite/discrete math.
- To learn ways of counting objects and using counting to prove results.
- To gain familiarity with some objects used in computer science.

Reading Material

Textbook

(T_1) "Discrete Mathematics and Its Applications" by *Kenneth H.Rosen,* Seventh Edition.

References

(R_1) "Mathematical Logic" by *Ian Chiswell and Wilfrid Hodges* (Only chapter 1).

(R_2) "Naive Set Theory" by *Paul Halmos*

(R_3) "Discrete Mathematics" by *Norman L.Biggs*

(R_4) "Mathematics for Computer Science" by *Eric Lehman and Frank Thomson Leighton*
https://courses.csail.mit.edu/6.042/spring17/mcs.pdf

Course Plan

Modules

Module No	Topic	Sub-Topics
I	Basic Math	Stating and proving mathematical statements; Constructing sets, relations and functions; Determining cardinality of a set; Using the induction principle and defining recursive structures; Partial-Orders, Equivalence relations.
II	Combinatorics	Basic counting and combinatorial identities; Pigeonhole priniple and Inclusion-Exclusion principle; Writing and solving recurrence relations; Asymptotics of functions.
III	Arithmetic and Graph	Modular Arithmetic; Primes and GCD/LCM; Euclids algorithm; Graphs and Trees; Connectivity and Isomorphism; Properties of Euler Graphs, Hamiltonian Graph, Planar Graph etc..
IV	Abstract Algebra	Groups and Permutations; Subgroups, Homomorphisms and Lagranges theorem; Group actions; Rings and Fields

Lecture Schedule

Module No	Week	Topics
I	1	Logic and Proofs
	2	Sets, Relation and Functions
	3	Natural Numbers, Induction and Recursion
	4	Partial-Orders and Equivalence Relations.
II	5	Basic Counting and Combinatorial Identities
	6	Pigeonhole and Inclusion-Exclusion principle
	7	Writing and Solving recurrence relations
	8	Asymptotic analysis
III	9	Modular Arithmetic, GCD/LCM and Euclids algorithm
	11	Graph and Trees: Basics
	12	Euler, Hamiltonian, Planar Graphs
IV	13	Groups, Permutations and Group Actions
	14	Homomorphisms, Subgroups and Lagranges Theorem
	15	Ring and Fields: Basic Properties

Evaluation Scheme

No	Component	Weightage	Date(s)	Remarks
1	Quiz	30%	Announced in class/moodle	Open Book
2	Mid-Semester Exam	30%	As per time-table	Closed Book
3	Comprehensive Exam	40%	As per time-table	Closed Book

Chamber Consultation

By appointment only. Please contact Ankush Soni (email-id on Moodle) to make an appointment.

Notices

Most announcements will be made on Moodle, but some may be made only in class. In case a student misses a lecture, it is his/her responsibility to find the lost announcements.

Make-up Policy

Make-up exams will be allowed only for genuine cases, at the discretion of the instructor.

Instructor
CS F222