



**SECOND SEMESTER 2022-2023
COURSE HANDOUT (PART-II)**

Date: 16/01/2023

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

Course No. : MATH F213
Course Title : Discrete Mathematics
Instructor-in-Charge : P K SAHOO
Instructor : PK Sahoo

1. Scope and Objective of the Course: Mathematics, described as a language of science, has acquired its unique position due to its precision and rigour. This makes essential the development of the sense for mathematical rigour as well as the habit of mathematical thought process. The course will achieve this by introducing the students to propositional and predicate logic. As an important follow-up, various methods of proof will be discussed. Several mathematical structures like relations and orderings are studied due to their importance, not only in mathematics but also applied subjects like computer science. The course is also useful to prepare for the study of computational study of concepts, techniques, and skills necessary to comprehend the structure of problems encountered in design and analysis of algorithms.

2. Textbooks:

1. Joe L. Mott, Abraham Kandel, Theodore P. Baker: Discrete Mathematics for Computer Scientist & Mathematicians PHI, 2nd Edition 2010.

3. Reference books

- R1. Kolman, Busby, Ross: Discrete Mathematical Structures, Pearson Education, 3rd Edition, 2007.
- R2. K H Rosen: Discrete Mathematics & its Applications, TMH, 6e, 2007.

4. Course Plan:

| Lecture No. | Learning objectives | Topics to be covered | Chapter in the Text Book |
|-------------|--|---|--------------------------|
| Self-Study | To learn the basics that are needed for this course | Sets and Operations of sets, Relations and Functions | Chap 1, Sec:1.1 to 1.3 |
| 1-5 | To learn the concepts of logic | Logic, logical inferences, methods of proof, Pigeonhole principle | Ch.1 sec. 1.5-1.7 |
| 6-10 | | First order logic & other methods of proof, quantifiers, Mathematical Induction, strong form of mathematical induction | Ch.1 sec.1.8-1.10 |
| 11-16 | To learn the concepts of Permutations and Combinations | Elementary Combinatorics, Enumeration of Combinations and Permutations with repetitions and with constrained repetitions. | Ch.2 |
| 17-21 | To learn recursive relations | Recurrence relations & solving recurrence relations with generating functions | Ch.3 sec.3.1-3.4 |

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|-------|--|--|-------------------|
| 22-23 | | Method of characteristic roots for solving recurrence relations | Ch.3 sec.3.5 |
| 24-25 | | Solving inhomogeneous & nonlinear recurrence relations | Ch.3 sec.3.6 |
| 26-31 | To learn the concept of relations and the connection between the directed graphs and relations | Relations & directed graphs, equivalence relations, partially ordered set, totally ordered set, Hasse diagrams, well ordered set, lattice theory | Ch.4 sec.4.1-4.4 |
| 32-35 | | Operations on Relations, paths and closures, adjacency matrices, Warshall's algorithm | Ch.4 sec. 4.5-4.7 |
| 36-40 | To learn concepts Boolean algebra and its applications in circuits | Boolean Algebra, Boolean functions, switching circuits. | Ch.6 sec.6.1-6.5 |

5. Evaluation Scheme:

| Component | Duration | Weightage (%) | Date & Time | Nature of Component |
|--------------------|-------------------|---------------|----------------------|---------------------|
| Mid-Semester | 1 Hour 30 Minutes | 30 | 14/03 11.30 - 1.00PM | Closed Book |
| Assignment | | 10 | | Open Book |
| Quizzes(Two) | | 20 | | Open Book |
| Comprehensive Exam | 3 Hours | 40 | 10/05 AN | Closed Book |

6. Chamber consultation Hour: To be announced in the class.

7. Notice: Notice, if any, concerning this course will be displayed only in CMS.

8. Make up: Prior permission is needed for make up; make up will only be given if enough evidence is there for not being able to take regular test.

9. 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
MATH F213