|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Type** | **Subject** | **L** | **T** | **P** | **Credits** | **CA** | **MS** | **ES** | **PCA** | **PES** | **Pre- Requisites** |
| **ITITC03** | **CC** | **Discrete Structures** | **3** | **1** | **0** | **4** | **25** | **25** | **50** | **-** | **-** | **None** |
| **COURSE OUTCOMES (CO)**  **By the end of the course students will be able to:**  **CO1:** Define the notion of mathematical thinking, mathematical proofs and algorithmic thinking.  **CO2:** Describe an understanding of relations and functions and able to determine their properties.  **CO3:** Apply counting principles to determine probabilities.  **CO4:** Evaluate a proof and give examples of each proof technique described.  **CO5:** Design problems in Computer Science using graphs and trees. | | | | | | | | | | | | |
| **COURSE CONTENT No. of hours:36**  **Unit 1**  **Set Theory:** Introduction, set operations, algebra of sets, duality, Finite sets and multi sets, counting principles, power set, partitions, Mathematical Induction, Principle of inclusion and exclusion.  [6 hrs]  **Unit 2**  **Logic and Propositional Calculus**: Propositions and compound statements, basic logical operations, truth tables, propositional functions, normal forms, tautology and contradiction, conditional and bi conditional statements, algebra of propositions, logical equivalence, arguments, quantifiers, predicate logic.  [8 hrs]  **Unit 3**  **Relations:** Introduction, Cartesian product, types of relations, closure, representation and composition of relations, posets.  **Functions:** Introduction, types of functions, recursively defined functions, Pigeonhole principle. [6 hrs]  **Unit 4**  **Boolean Algebra:** binary relations and their representations, binary operations, duality, semi groups, monoid, groups, rings, homomorphism and isomorphism, CNF and DNF, K-Maps.  [9 hrs]  **Unit 5**  **Hasse diagrams and Lattices.**  **Combinatorics:** Permutation, combinations, recurrence relations.  **Graph Theory:** Elementary graph theory, Euclidean and Hamilton paths and circuits, shortest path algorithm, Minimum Spanning Trees, coloring graphs, digraphs.    [7 hrs] | | | | | | | | | | | | |
| **SUGGESTED READINGS:**   1. C. L. Liu “Elements of Distcrete Mathematics”, McGrawHill 2. J.P. Trembley and R. Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw-Hil 3. S. Lipschutz and M. Lipson (Schaum`s Series) “Discrete Mathematics” McGraw-Hill. 4. Robin J. Wilson, “Introduction to graph theory”, 4th edition, Pearson publication. 5. Narsingh Deo, “Graph Theory with Applications to Engineering and Computer Science”, PHI. 6. Donglas B. west, “Introduction to graph theory”, 2nd Edition. 7. [Gary Chartrand](https://www.amazon.in/Gary-Chartrand/e/B0027MLJP4/ref=dp_byline_cont_ebooks_1) and [Ping Zhang](https://www.amazon.in/s/ref=dp_byline_sr_ebooks_2?ie=UTF8&field-author=Ping+Zhang&text=Ping+Zhang&sort=relevancerank&search-alias=digital-text), “A First Course in Graph Theory”, Dover Publications. | | | | | | | | | | | | |

**SYLLABUS OF CORE COURSE OF DISCRETE STRUCTURES**

**SEMESTER II**