# SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY

**(AUTONOMOUS)**

II B. Tech I Sem – Question Bank

**DISCRETE MATHEMATICS**

**(Common to CSE)**

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| **CO** | **COURSE OUTCOMES** | **BL** |
| CO 1 | Understand the logical connectives, normal forms, predicates and verify the validity of an argument by the rules of inference. | Understan d |
| CO2 | Explain functions and its properties such as homomorphism and isomorphism. | Understand |
| CO 3 | Explain the general Properties of Semigroups, Monoids, Groups, and Lattices. | Understan d |
| CO4 | Illustrate the concepts like partially ordered relation (POSET), compatibility relation  and Equivalence relations. | Apply |
| CO 5 | Find Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles, Apply Chromatic number of a graph and spanning trees in a graph. | Apply |
| CO6 | Apply the concepts of permutations, combinations, principle of inclusion and  exclusion, binomial and multinomial theorems to solve the counting problems. | Apply |

**\*Note:** 1.Remeber(**R**), 2.Understand (**U**), 3. Apply (**A**) 4. Analyze (**An**), 5. Evaluate (**E**), 6. Create(**C**)

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| **UNIT – 1 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Construct the truth table ¬ (¬ P V ¬ Q). | CO 1 | Understan d |
| 2 | What is Conjunction. Give an example. | CO1 | Remember |
| 3 | Show that the formula Q V ( P∧ **¬** Q ) V (**¬** P ∧ Q ) is a tautology. | CO 1 | Remember |
| 4 | Define Disjunction. Give an example. | CO1 | Remember |
| 5 | What is the negation of statement, “2 is even and -3 is negative”? | CO 1 | Remember |

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| **UNIT – 1 (5/10 Marks)** | | | | | | |
| **#** | | **Questions** | **M** | **CO** | | **BL** |
| 1 | | Show that S V R is tautologically implied by (P∨Q) ⋀ (P →R) ⋀ (Q →S). | | 5 | | CO 1 | Remember |
| 2 | | Explain the conjunctive normal form. | | 5 | | CO1 | Understand |
| 3 | | Explain the well - formed formulas with an example. | | 5 | | CO 1 | Understan d |
| 4 | | Explain disjunctive normal Form. | | 5 | | CO1 | Understand |
| 5 | | Explain the inference theory for predicate calculus. | | 10 | | CO 1 | Understan d |

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| **UNIT – 2 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Define the Power set. Give an example. | CO 2 | Remembe r |
| 2 | Define Inclusion and equality of sets. | CO2 | Remember |
| 3 | What is relative complement and absolute complement. | CO 2 | Remembe r |
| 4 | Given A= { 2,5,6}, B={ 3,4,2}, C={ 1,3,4}, find A- B and B – A. Show that  A – B ≠ B – A and A – C = A. | CO2 | Remember |
| 5 | What is universal set and null set. | CO 2 | Remembe r |

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| **UNIT – 2 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | Explain transitive closure with an example. | 5 | CO 4 | Understan d |
| 2 | Explain lattice and write its properties. | 5 | CO3 | Understand |
| 3 | Explain the principle of inclusion and exclusion. | 10 | CO 2 | Understan d |
| 4 | Explain relation matrix and digraph with an example. | 10 | CO4 | Understand |
| 5 | What is relation? Explain the properties of binary relations with examples. | 10 | CO 4 | Understan d |

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| **UNIT – 3 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | What is an algebraic system? | CO 3 | Remember |
| 2 | Define abelian group. | CO3 | Remember |
| 3 | Define cyclic group. | CO3 | Remember |
| 4 | Write the properties of integers. | CO 6 | Apply |
| 5 | What is congruence relation. Give an example. | CO6 | Apply |

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| **#** | **Questions** | **M** | **CO** |
| 1 | Explain Groups, Subgroups and Normal subgroups. | 10 | CO 3 |
| 2 | Explain about homomorphism. | 5 | CO 2 |
| 3 | Write the Euclidian algorithm with an example. | 10 | CO6 |
| 4 | Explain the Fermat’s theorem and Euler’s theorem with an example. | 10 | CO 6 |
| 5 | Explain division theorem. Give an example. | 10 | CO6 |

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| **UNIT – 4 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Write the basic of counting principles. | CO 6 | Understan d |
| 2 | In how many ways can the letters of the word 'READER' be arranged? | CO6 | Remember |
| 3 | Define permutation. Give an example. | CO 6 | Apply |
| 4 | Define combinations. Give an example. | CO 6 | Apply |
| 5 | In how many ways can a hand of 5 cards be selected from a deck of 52 cards? | CO 6 | Remember |

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| **UNIT – 4 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | Explain the permutations and combinations with an example. | 10 | CO 6 | Apply |
| 2 | Suppose that 200 faculty members can speak French and 50 can speak Russian, while only 20 can speak both French and Russian. How many faculty members can speak either French or Russian. | 5 | CO 6 | Understan d |
| 3 | Explain the circular permutations. Give an example. | 10 | CO 6 | Apply |
| 4 | Explain the principles of inclusion – exclusion. | 10 | CO 6 | Understan d |
| 5 | Explain pigeonhole principle and its applications. | 10 | CO6 | Understand |

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| **UNIT – 5 (2 Marks)** | | | |
| **#** | **Questions** | **CO** | **BL** |
| 1 | Define multigraph. Give an example. | CO 5 | Apply |
| 2 | How many edges are there in a graph with 10 vertices each of degree 6? | CO 5 | Remember |
| 3 | Define planar graph. Give an example. | CO 5 | Apply |
| 4 | What is bipartite graph. Give an example. | CO5 | Remember |
| 5 | Define spanning tree. | CO5 | Remember |

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| **UNIT – 5 (5/10 Marks)** | | | | |
| **#** | **Questions** | **M** | **CO** | **BL** |
| 1 | When it can be said that two graphs G1 and G2 are isomorphic? | 5 | CO 5 | Remember |
| 2 | Explain krushkal’s algorithm with an example. | 5 | CO5 | Apply |
| 3 | Differentiate between Eulerian graph & Hamiltonian graph with example. And also give an example of a graph which Eulerian but not Hamiltonian. | 10 | CO 5 | Apply |
| 4 | Write the algorithms for spanning trees with an example. | 10 | CO5 | Apply |
| 5 | Explain the matrix representation of graphs with example. | 10 | CO 5 | Apply |

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