Course Code: **20CS4T08**

BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE::ODALAREVU

(AUTONOMOUS)

**II-B. Tech II-Semester Regular End Examinations (BR20), JUNE - 2023**

**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (CSE,AI & DS, AI & ML)**

Time: 3 hours Max. Marks: 70

*------------------------------------------------------------------------------------------------------------------------------- Question Paper consists of* ***FIVE*** *units, each carrying 14 marks*

*Each unit has* ***TWO*** *questions; either of them should be answered*

*All parts of a question must be answered at one place*

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| **UNIT-I** | | |
| 1.a) | a) Construct truth tables for the following:  (i) ¬ (¬ P V ¬ Q). (ii) (P∧Q) V(Q ∧R) V (P∧¬R). | (7M) |
| 1.b) | Identify whether the following Inference is valid or Invalid. If Invalid, state the fallacy  C V D  (C VD)🡪~H  ~H🡪(A ^ ~B)  (A ^ ~B)🡪 (R v S)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  R V S | (7M) |
| **(OR)** | | |
| 1.c) | Show that the formula Q V ( P∧ ¬ Q ) V (¬ P ∧ Q ) is a tautology. | (7M) |
| 1.d) | Show that the following is inconsistent P→Q, R→S, P ∨ R, ~ (Q ∨ S). | (7M) |
| **UNIT-II** | | |
| 2.a) | Find the number of equivalence relations that can be defined on a finite set A with |A|=4 | (7M) |
| 2.b) | Calculate Transitive Closure of the following digraph. Also Specify the transitive closure in matrix, digraph and relation tabular form | (7M) |
| **(OR)** | | |
| 2.c) | Let X = {1, 2, 3, 4} and R = { (x, y) | x > y }. Draw the graph of R and give its matrix. Also, specify the type of relation. | (7M) |
| 2.d) | Explain lattice and write its properties. | (7M) |
|  | **UNIT-III** |  |
| 3.a) | From a group of professors how many ways can a committee of 5 members be formed so that at least one of professor A and professor B will be included? | (7M) |
| 3.b) | Explain the Fermat’s theorem and Euler’s theorem with an example. | (7M) |
| **(OR)** | | |
| 3.c) | Illustrate the Euclidian algorithm with an example. | (7M) |
| 3.d) | Explain the permutations and combinations with an example. | (7M) |
| **UNIT-IV** | | |
| 4.a) | Solve the recurrence relation ar+2-3ar+1+2ar=0 | (7M) |
| 4.b) | Using Generating function solve the recurrence relation given | (7M) |
| **(OR)** | | |
| 4.c) | Explain the following terms with an example:  i. Correctness of Recursive Algorithms.  ii. Complexities of Recursive Algorithms. | (7M) |
| 4.d) | Using generating functions method solve the following recurrence relation | (7M) |
| **UNIT-V** | | |
| 5.a) | Show that a connected graph ‘G’ with ‘n’ vertices has at least ‘n-1’ edges. | (7M) |
| 5.b) | Construct minimal Spanning Tree of the Following graph using Prim’s algorithm. | (7M) |
| **(OR)** | | |
| 5.c) | Explain the following Graph Representations.  i. Adjacency Matrix  ii. incidence Matrix | (7M) |
| 5.d) | Show the following two graphs is isomorphic or not. | (7M) |

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