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 & ML,AI&DS)**

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 ˅q) ˄ r (ii) (p ↓ q) ˄ (p ↓ r) | (7M) |
| 1.b) | Show that R ∨ (P∨Q) is a valid conclusion from the premises P∨Q, Q→R, P→M and ¬M. | (7M) |
| **(OR)** | | |
| 1.c) | Translate the given statements into propositional logic using the propositions provided:  P: “The message is scanned for viruses”  Q:”The message was sent from an unknown system”  i) “The message is scanned for viruses whenever the message was sent from an unknown system.”  ii) “It is necessary to scan the message for viruses whenever it was sent from an unknown system.” | (7M) |
| 1.d) | Obtain the principal conjunctive normal form of the formula S given by ( ¬ P→R ) ∧ ( Q ↔ P ). | (7M) |
| **UNIT-II** | | |
| 2.a) | Let X = { 2, 3, 6,12,24,36} and the relation ≤ be such that x ≤ y if x divides y. Draw the Hasse diagram of (X, ≤) . | (7M) |
| 2.b) | Prove that the transitive closure R + of a relation R on a set A is the smallest transitive relation on A containing R. | (7M) |
| **(OR)** | | |
| 2.c) | Let A={1, 2, 3, 4} in which ordered pairs are in the relation  R = {(a, b) | a divides b}.Outline its representation with ordered pairs | (7M) |
| 2.d) | Let f be function from {a,b,c,d} to {1,2,3,4} with f(a) = 4, f(b) = 2, f(c) = 1 and f(d) = 3. Investigate whether f is one-one, Into and Onto function. Give reasons | (7M) |
|  | **UNIT-III** |  |
| 3.a) | In how many ways can 12 of the 14 people be distributed into 3 teams where the first team has 3 members, the second has 5, and the third team has 4 members? | (7M) |
| 3.b) | Find out the coefficient of x9y3 in the expansion of (x+2y)12 using binomial theorem | (7M) |
| **(OR)** | | |
| 3.c) | Explain the testing for prime numbers with an example. | (7M) |
| 3.d) | Explain the circular permutations. Give an example. | (7M) |
| **UNIT-IV** | | |
| 4.a) | Use any method to solve the recursive relation for n=3 with initial conditions | (7M) |
| 4.b) | Solve the recurrence relation, S(n) = S(n-1) + 2 (n-1) with S(0) = 3, S(1) = 1 by finding its generating function. | (7M) |
| **(OR)** | | |
| 4.c) | Explain the following terms with an example:   1. Generating Functions 2. Recursive Algorithms | (7M) |
| 4.d) | Find the 8th term of the sequence if equals (i) (ii) | (7M) |
| **UNIT-V** | | |
| 5.a) | Define a planar graph, show that is non-planar. | (7M) |
| 5.b) | Apply Kruskal’s algorithm to find a minimal spanning tree of the following weighted graph  . | (7M) |
| **(OR)** | | |
| 5.c) | Define K- regular graph. Give examples of 2- regular, 3- regular, 4- regular graphs. | (7M) |
| 5.d) | Is the following graph Hamilton or Eulerian or both? Justify your Answer. | (7M) |

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