Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14MA2010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **DISCRETE MATHEMATICS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A survey has been taken on methods of commuter travel. Each respondent was asked to check BUS, TRAIN or AUTOMOBILE as a major method of traveling to work. More than one answer was permitted. The results reported were as follows: BUS, 30 people; TRAIN , 35 people; AUTOMOBILE, 100 people; BUS & TRAIN, 15 people; BUS and AUTOMOBILE, 15 people; TRAIN and AUTOMOBILE, 20 people; and all the three methods 5 people. Find i)How many people completed the survey form? ii) How many people respond exactly to one method of commuter travel? | CO1 | 8 |
| b. | Using Euclidean algorithm, find the G.C.D of (98, 54) and express it in the form of . Also find the LCM of (98, 54). | CO1 | 8 |
| c. | Determine whether the statement is a tautology. | CO1 | 4 |
| **(OR)** | | | | |
| 2. | a. | Prove, by mathematical induction, that if *A1, A2, …,An* are any n sets, then . | CO1 | 10 |
| b. | Solve the recurrence relation, with the initial conditions  and  . | CO1 | 10 |
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| 3. | a. | Let A *={1, 2, 3, 4, 5}* and *d*efine a relation *R* on *A* as follows: *aRb* if and only if *a|b* . Then prove that *R* is an equivalence relation and compute *A/R.* | CO1 | 10 |
| b. | If *A ={1, 2, 3, 4, 5, 6}* and the relation *R* on *A* is defined by *R={ (1,2), (1,3), (2,2), (2,6), (3,4), (3,5), (4,2), (4,3), (5,6), (6,4)}*. Find (i) MR (ii) MR2(iii) MR∞ (vi) (v) In-degrees and out degrees of all elements of A. | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | Let *A = {1,2,3,4*} and *R* a relation defined on *A* whose matrix form is given below:    Find: i) Reflexive closure of R ii) Symmetric closure of R  iii) Transitive closure of R using Warshal’s algorithm. | CO1 | 16 |
| b. | If R and S are the relations defined on the set A ={1,2,3,4} and R={(1,1), (1,3), (2,1), (2,4), (3,2), (4,1), (4,2), (4,4)} S={(1,3), (1,4), (2,1), (2,2), (2,4), (3,3), (4,2), (4,3), (4,4)}. Find MR°S and MR°R | CO1 | 4 |
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| 5. | a. | Determine whether the lattice given below is distributive.  b  c  d  0  a | CO3 | 6 |
| b. | Draw the Hasse diagram of (P(X), and determine whether it is a complemented attice where X = {1, 2, 3}. Also write complement of each element. | CO3 | 14 |
| **(OR)** | | | | |
| 6. | a. | Prove that (D30, | ) is a Boolean algebra. | CO3 | 14 |
| b. | Construct the truth table and logic diagram for the Boolean function *f:B3 →B* determined by the Boolean polynomial. | CO3 | 6 |
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| 7. | a. | Construct a rooted tree with 5 as a root using Prim’s Algorithm for the below graph. | CO3 | 10 |
| b. | Use Fluery’s algorithm to construct an Euler circuit for the following graph. | CO3 | 10 |
| **(OR)** | | | | |
| 8. | a. | Find the minimal spanning tree from the graph given below. | CO3 | 10 |
| b. | Find a maximum flow from the network given below using labeling Algorithm. | CO3 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Let G be the set of all nonzero real numbers and define an operation \* on G as a\*b = a+b + 2. Prove that (G, \*) is an abelian group. | CO2 | 10 |
| b. | If is a parity check matrix then determine the (3, 6) group code . | CO2 | 10 |