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

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**End Semester Examination – Nov/Dec – 2018**

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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 on a sample of 25 new cars showed that the cars had the following: 15 cars had air conditioners, 12 cars had radios, 11 cars had power windows, 5 cars had air conditioners and power windows, 9 cars had air conditioners and radios, 4 cars had radios and power windows, 3 cars had all the three options. Find the number of cars that had  i) only power windows ii) at least one option | CO1 | | 10 |
| b. | Find GCD(208,90) using Euclidean algorithm and express it in the form of . Also find LCM(208, 90). | CO1 | | 5 |
| c. | Verify that whetherand are logically equivalent. | CO1 | | 5 |
| (OR) | | | | | |
| 2. | a. | Using mathematical induction, show that . | CO1 | | 10 |
| b. | Solve  with initial conditions and | CO1 | | 10 |
|  |  |  |  | |  |
| 3. | a. | Let A= {1, 2, 5, 10, 15} and the relation R is defined by *a divides b*. Find R, digraph, in degrees, out degrees of the relation R. Also find *R3 and R∞* | CO1 | | 8 |
| b. | Let *A = {1, 2, 3, 4}* and *B = A* x *A*. Define a Relation *R* on *B* as  *(a, b) R (c, d)* if only if  *a + b = c +d.* Then (i). Find *R* and prove that *R* is an equivalence relation on *. (*ii). Find *R/B.* | CO1 | | 12 |
| (OR) | | | | | |
| 4. | a. | Let *A = {a,b,c,d}.* Define the relation R on A, whose matrix is    Find i) reflexive closure of *R*. ii) symmetric closure of *R.*  iii) transitive closure of *R* by using *Warshall’s algorithm*. | CO1 | | 14 |
| b. | Let and .Consider the relation and . Compute (i)  (ii) *R ° S*  (iii) *S ° R* (iv) *R – S.* | CO1 | | 6 |
|  |  |  |  | |  |
| 5. | a. | Prove that  is a bounded lattice, where *X={1,2,3}.* | CO2 | | 8 |
| b. | Draw the *Hasse Diagram* of the poset*(D60, /)* and find the complement of each elements if exists. | CO2 | | 12 |
| (OR) | | | | | |
| 6. | a. | Construct the truth table and draw the logic diagram for the Boolean polynomial | | CO2 | 6 |
| b. | Prove that *(D30, /)* is a Boolean algebra. | | CO2 | 14 |
|  |  |  | |  |  |
| 7. |  | Construct a spanning tree for the connected graph given below with “*a*” as the root.  c  d  a  b | | CO3 | 10 |
| b. | Using Kruskal”s Algorithm, find a minimal spanning tree for the graph given below.  A  B  C  D  E  F  G  H  18  24  28  27  20  24  35  33  28  32  22  30  12  9 | | CO3 | 10 |
| (OR) | | | | | |
| 8. | a. | Using Fleury’s Algorithm construct an Euler path for the graph given below  A  D  B  H  G  F  E  C | | CO3 | 10 |
| b. | Find a maximal flow in the network given below by using labeling algorithm  4  5  3  6  5  8  9  4  2 | | CO3 | 10 |
|  | | **Compulsory**: | |  |  |
| 9. | a. | Letbe a parity check matrix. Determine the (3,6) group code function . | | CO2 | 10 |
| b. | Let  be the set of nonzero real numbers and let . Show that  is an abelian group. | | CO3 | 10 |