`1Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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

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| **Code :** | **17MA2010** | **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. | Show that  is a tautology. | CO1 | 8 |
| b. | Using Euclidean algorithm, find the G.C.D of (273, 98) and express it as d = sa + tb. | CO1 | 8 |
| c. | Compute A∧B, A⊙B given | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | Prove by Mathematical Induction . | CO3 | 10 |
| b. | Solve the recurrence relation bn = 2bn-1­ +1­  with initial conditions b1 = 7. | CO2 | 10 |
| 3. | a. | Let A ={a, b, c, d, e} and let R be the relation on A defined by R = {(a,a), (a,b), (b,c), (c,e), (c,d), (d,e)}. (i) Draw the digraph of R Find (ii) in-degrees and out-degrees of the vertices (iii) R2 (iv)  (v) MR (vi) | CO1 | 10 |
| b. | Let A = {1, 2, 3, 4} and let R = {(1,1), (1,2), (2,1), (2,2), (3,4), (4,3), (3,3), (4,4)}. Determine whether the relation R on the set A is an equivalence relation. | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Use Warshall’s algorithm to find the transitive closure of R | CO2 | 10 |
| b. | Let A = Z and . Prove that R is equivalence relation. | CO3 | 10 |
| 5. | a. | Let S = {a, b, c} and A = P(S). Prove that  is a partially ordered set. | CO2 | 10 |
| b. | Draw the Hasse diagram of the set A = {1, 2, 3, 4, 12} under the relation of divisibility and verify it is a lattice. | CO3 | 10 |
| (OR) | | | | |
| 6. | a. | Draw the Hasse Diagram for the poset (D30, /) and show that D30 is a Boolean Algebra. | CO3 | 10 |
| b. | Construct the truth table for the Boolean function . Also draw the logic diagram for the polynomial . | CO5 | 10 |
| 7. | a. | Define Hamilton path. Find a Hamiltonian circuit of minimal weight for the graph shown below. | CO6 | 5 |
| b. | Construct the labeled tree of the algebraic expression  ((3 × (1 - x)) ÷ ((4 + (7 – (y + 2))) × (7 + (x ÷ y)))). | CO5 | 5 |
| c. | Find the minimal spanning tree for the graph given below.  C  E  2  3  B  A  D  F  G  H  3  6  5  2  2  6  3  4  5  4 | CO5 | 10 |
| (OR) | | | | |
| 8. | a. | Use Fluery’s algorithm to construct an Euler circuit for the following graph.  A  B  C  D  E  F  G  H | CO5 | 10 |
| b | Find a maximum flow in the given network by using Labelling Algorithm.  3  2  4  5  2  4  3  3 | CO6 | 10 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Show that (Z, +) is a commutative semigroup. | CO6 | 5 |
| b. | Let G be the set of all nonzero real numbers and let a\*b = ab / 2. Show that (G, \*) is an Abelian group. | CO6 | 7 |
| c. | Consider the (3, 6) encoding function  defined by e(000)= 000000, e(001)= 001100, e(010)= 010011, e(011)= 011111, e(100)= 100101, e(101)= 101001, e(110)= 110110, e(111)= 111010. Show that this encoding function is a group code. | CO4 | 8 |