DISCRETE MATHEMATICS

UNIT II

ASSIGNMENT QUESTIONS

1. Define set, powerset, cardinality of set, List and explain various operations performed on sets.
2. (i) For sets P = {a, b, c, d} and Q = {c, d, e, f, g}, find P ∪ Q and P - Q.
   (ii). If Set A = {2, 4, 6, 8} and Set B = {1, 3, 5, 7, 9}, find the Cartesian product A × B and B × A.
3. Let R and S be the following relations $A = \{a, b, c, d\}$ defined by
   $R = \{(a, a), (a, c), (c, b), (c, d), (d, b)\}$ and $S = \{(b, a), (c, c), (c, d), (d, a)\}$
   Find i) RoS (ii) SoR iii) RoR.
4. Let X = {1,2,3,4,5,6,7} and $R = \{(x, y)/x - y\ is\ divisible\ by\ 3\}\ in\ X$. Show that R is an equivalence relation.
5. Define Hasse diagram. Draw the Hasse diagram representing the partial ordering.

   $\{(a,b)/a\ \text{divides}\ b\}$ on $\{1,2,3,4,6,8,12\}$.

6. Define Lattice. If D(n) denotes the lattice of all the divisors of the integer n draw the Hasse diagrams of D(10), D(15), D(32) and D(45).
7. Draw the Hasse diagrams of the following sets under the partial ordering relation "divides" and indicate those which are totally ordered. {2, 6, 24}, {3, 5, 15}, {1, 2, 3, 6, 12}, {2, 4, 8, 16}, {3, 9, 27, 54}
8. Check whether the posets {(1, 3, 6, 9), D} and {(1, 5, 25, 125), D} are lattices or not. Justify your claim.
9. Consider the set D_{50} = {1, 2, 5, 10, 25, 50} and the relation divides be a partial ordering relation on D_{50} .Draw the Hasse diagram of D_{50} with relation divides. Also Determine all upper bounds of 5 and 10, lower bounds of 5 and 10, LUB of 5 and 10 and GLB of 5 and 10.
10. Let D_{100} = {1, 2, 4, 5, 10, 20, 25, 50, 100} be the divisions of 100. Draw the Hasse diagram of (D_{100}, l) where l is the relation "division".
    Find (1) glb {10, 20} (II) lub {10, 20} (III) glb {5, 10, 20, 25} (IV) lub {5, 10, 20, 25}.