SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
Department of Mathematics
Fifth Semester – Common to CSE & ECE
18MAB302T – DISCRETE MATHEMATICS FOR ENGINEERS
Assignment - 1

PART-A

1. A collection of all well-defined objects is called
   (a) set (b) group (c) coset (d) lattice

2. If the relation R is reflexive, anti-symmetric and transitive, then the relation R is called
   (a)equivalence relation (b) equivalence class
   (c) partial order relation (d) partially ordered set

3. A digraph representing the partial order relation
   (a)Helmut Hasse (b)POSET (c)graph relation (d)Hasse diagram

4. Partial order relation is
   a) Reflexive ,Symmetric,& transitive b) Symmetric & transitive
   c) Antisymmetric & transitive d) Reflexive,Antisymmetric & transitive

5. Let R be a symmetric and transitive relation on a set A, if
   a) R is reflexive then R is an equivalence relation
   b) R is reflexive then R is a parital order
   c) R is reflexive then R is not an equivalence relation
   d) R is not reflexive then R is a parital order

6. Determine which one of the following relations on the set {1, 2, 3, 4} is a function.
   (a) $R_1 = \{(1,1),(2,1),(3,1),(4,1),(3,3)\}$
   (b) $R_2 = \{(1,2),(2,3),(4,2)\}$
   (c) $R_3 = \{(4,4),(3,1),(1,2),(4,2)\}$
   (d) $R_4 = \{(1,1),(2,1),(1,2),(3,4)\}$

7. Which one of the following relations on the set {1, 2, 3, 4} is an equivalent relation
   (a) {(2,4), (4,2)}
   (b) {(2,2), (2,3), (2,4), (3,2), (3,3), (3,4)}
   (c) {(1,3), (1,4), (2,3), (2,4), (3,1), (3,4)}
   (d) {(1,1), (1,2), (2,1), (2,2), (3,3), (4,4)}

8. The domain and range are same for
   a) constant function b) absolute value function
   c) identity function d) greatest integer function

9. If $A = \{1,2,3\}$ and f, g are functions from A to A given by f = {(1,2),(2,3),(3,1)}, g={(1,2), (2,1), (3,3)} then {(1,3), (2,2), (3,1)} is the composition relation of one of the following:
   $(a)\ f \circ g$ $(b)\ g \circ f$ $(c)\ f \circ (f \circ g)$ $(d)\ f \circ (g \circ f)$

10. If $A = \{1,2,3,4\}, B = \{x, y, z\}$ and $f = \{(1,x),(2,y),(3,z),(4,x)\}$, then the function f is
    (a) both 1–1 and onto (b)1–1 but not onto (c) onto but not 1 – 1 (d) neither 1 – 1 nor onto

PART – B

1. Define closure of a relation. Find reflexive and symmetric closure of
   R ={(1,2),(2,2), (2,3), (3,2), (4,1), (4,4)}defined on A= {1, 2, 3, 4}.
2. Obtain all the partitions of the set B = {a, b, c}.
3. The relation R on the set A = { 1, 2, 3, 4, 5} is defined by the rule (a, b) ∈ R, if 3 divides a – b then list the elements of R and R^{-1}, also find domain and range of R and R^{-1}.
4. Draw the Hasse diagram for D_{30} (relation "x divides y")
5. Show that the function $f : R \rightarrow R$ defined by $f(x) = \dfrac{x}{x+4}$ is one-to-one and onto

PART – C

1. State and prove De Morgan's law in set theory.
2. If R is the relation on the set of integers such that (x, y) ∈ R, if and only if 3x + 4y = 7n for some integer n, prove that R is an equivalence relation
3. Let A={1,2,3,4,5} and the relation R={ (1,1), (1,3), (1,5), (2,3), (2,4), (3,3), (3,5), (4,2), (4,4), (5,4)} defined on A. Find the transitive closure of the relation R using Warshall's algorithm..
4. Let A={1,2,3,4} and the relation R={ (1,1),(1,3),(1,4),(2,2),(3,4),(4,1)} defined on A. Find the transitive closure of the relation R using Warshall's algorithm..
5. If f: Z ⟶ W is defined by $f(x) = \begin{cases} 2x-1, & if\ x > 0 \\ -2x, & if\ x \le 0 \end{cases}$ prove that f is one to one and onto and hence find f^{-1}.
6. If $f : A \rightarrow B$ & $g : B \rightarrow C$ are invertible functions, then prove that $g \circ f : A \rightarrow C$ is also invertible and $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$