Unit - II.

Assignment - 2

1) Explain the necessary condition for equivalence relation.

2) Give examples of relations R on $A = \{1, 2, 3\}$ having the stated property :

(i) R is both symmetric & antisymmetric

(ii) R is neither symmetric nor antisymmetric

3) Let R be an equivalence relation on set A, then prove that R^{-1} is also an equivalence relation on A.

4) Determine whether the relation R on set of all integers is reflexive, symmetric, antisymmetric, and / or transitive where aRb iff

(i) $a \neq b$

(ii) $ab > = 0$

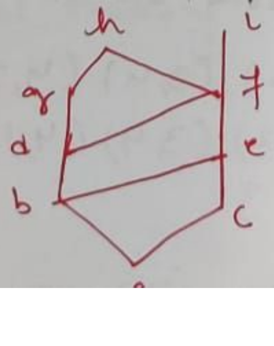
(iii) $ab \geq 1$.

5) Let $A = \{a, b, c, d\}$ and $R = \{xRy \mid (x,y) \in A \,\&\, x = y\}$. Is R an equivalence relation?

6) Define POSET with example.

7) Define GLB and LUB with example.

8) Find lower bound and upper bounds of the subset $\{a, b, c\}$ $\{i, h\}$ and $\{a, b, c, d, f\}$ in the poset with the Hasse Digram.



9. How many bit strings of length eight either start with a 1 bit or end with the two bits 00?

10. Explain – 1) pigeonhole principle
2) generalisation of Pigeonhole principle.

11. Define Lattice and give an example.

12. for poset $(\{3, 5, 9, 15, 24, 45\}, |)$

(1) find – Maximal elements
Minimal elements

(2) Is there a greatest element and a least element

13. Determine whether the poset $(\{1, 2, 3, 4, 5\}, |)$ is a lattice?

14. Explain when a lattice is called distributive lattice

15. Define – Supremum, Infimum, Maximal, Minimal elements lower bound and upper bound

16. Let $A = (\{2, 3, 4, 6, 12, 18, 24, 36\}, |)$
Draw its Hasse Diagram.

17. Let $A = \{1, 2, 3, 4, 5\}$. & $R = \{(1,1) (2,1) (3,4) (4,3) (5,1) (1,3) (5,5) (3,2)\}$
Represent the relation R using Digraph.

18. Let $R = \{(1,4) (2,1) (2,2) (2,3) (3,2) (4,3) (4,5) (5,1)\}$ on set $A = \{1, 2, 3, 4, 5\}$. Find R^* using Matrix Method.

19. Consider the following relations on $A = \{1, 2, 3, 4\}$

$R1 : \{(1,1) (1,2) (2,1) (2,2) (3,4) (4,3) (4,4)\}$
$R2 : \{(1,1) (2,2) (2,1) (3,3) (3,4) (4,1) (4,4)\}$
$R3 : \{(3,4) (4,3) (3,3)\}$

which of these relations are
i) reflexive ii) Symmetric iii) Transitive

Let f and g be the functions from the set of integers to the set of integers defined by

$f(x) = 2x+3$ and $g(x) = 3x+2$.

find $f \circ g$ and $g \circ f$.

21. If $S = \{1, 2, 3, 4, 5\}$ and if the functions f, g, h and $S \to S$ are given.

$f = \{(1,2)\ (2,1)\ (3,4)\ (4,5)\ (5,3)\}$

$g = \{(1,3)\ (2,5)\ (3,1)\ (4,2)\ (5,4)\}$

$h = \{(1,2)\ (2,2)\ (3,4)\ (4,3)\ (5,1)\}$

(i) Verify whether $f \circ g = g \circ f$.

(ii) find f^{-1} and g^{-1}.

(iii) Explain why f and g have inverse but h does not.

22. Prove that $D_{42} = \{D_{42}, D\}$ is a complemented lattice by finding the complements of all elements

$$D_{42} = \{1, 2, 3, 6, 7, 14, 21, 42\}$$

23. Draw the digraph representing the partial ordering $\{(a,b)\} \mid a \text{ divides } b\}$ on set $\{1, 2, 3, 4, 5, 6, 7, 8\}$

Reduce it to the Hasse diagram representing the given partial ordering.