SRM Institute of Science and Technology
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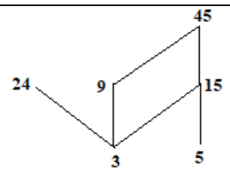
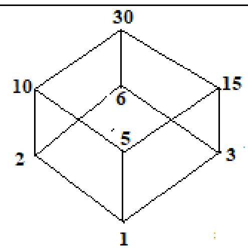
Academic Year: 2023-2024(ODD)

Tutorial sheet - 2

Date: 24/07/2023

Course Code &Title: 18MAB302T-Discrete Mathematics for Engineers
Year & Sem: III/V

Q. No	Questions	Answer keys
1	State TRUE or FALSE with proper justification for each of the following statements: (a) If R_1 and R_2 are partial order relation on A, then $R_1 - R_2$ is a partial order relation. (b) If R_1 and R_2 are equivalence relations on A, then $R_1 \cap R_2$ is an equivalence relation. (c) If $R_1$and$R_2$are transitive, then $R_1 \cup R_2$ need not be transitive. (d) If R_1 and R_2 are both symmetric, then $R_1 \circ R_2$is symmetric.	(a) False, (b) True, (c) True, (d) False.
2	For the poset $\{3,5,9,15,24,45\}$, with divisibility relation defined on it. Draw the Hasse diagram of the poset.	
3	Let$R$bethefollowingequivalencerelationonthe set$A = \{1,2,3,4,5,6\}$, and $R = \{(1,1),(1,5),(2,2),(2,3),(2,6),(3,2),(3,3),$ $(3,6),(4,4),(5,1),(5,5),(6,2),(6,3),(6,6)\}$ Find the equivalence classes of R. Hence find the partition of A induced by R.	$[1] = \{1,5\}, [2] = \{2,3,6\},$ $[3] = \{2,3,6\}, [4] = \{4,4\},$ $[5] = \{1,5\}, [6] = \{2,3,6\}.$ $P(A) = \{\{1,5\},\{2,3,6\},\{4\}$
4	For the relation $R = \{(1,2),(2,3),(3,3),(3,4),(4,2)\}$ defined on $X = \{1,2,3,4\}$, find the transitive closure of R using Warshall's algorithm.	$\begin{pmatrix} 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{pmatrix}$
5	Given A = {1, 2, 3, 4} and R = {(1,2), (1,1), (1,3), (2,4), (3,2)} and S = {(1,4), (1,3), (2,3), (3,1), (4,1)} are relations on A. Find $S \circ R$ and write its matrix representation.	$S \circ R$ = {(1,3),(1,4), (2,1),(3,3)} $\begin{pmatrix} 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$

6	Let D be a set of all positive divisor of 30. A relation is defined on D as "a R b iff a divides b", for a, b in D. Prove that R is a partial ordered relation. Hence draw the Hasse diagram of the poset.	
7	Show that $R = \{(A, B) \mid A \subseteq B\}$ on the power set of $\{a, b, c\}$ is a partial order relation.	
8	Let $A = \{1, 2, 3, 4, 5, 6\}$ and P = {{1, 5}, {2, 3, 6}, {4}} be a partition on A. Find the equivalence relation R determines P.	R= {(1,1), (1,5), (5, 1), (5,5), (2,2), (2,3), (2,6), (3,2), (3,3), (3,6), (6,2), (6,3), (6,6), (4,4)}
9	Let R is the relation on $A = \{1, 2, 3\}$ such that $(a, b) \in R$ if and only if $a + b$ is even, find the relational matrix M_R and $M_{R'}$.	$M_R = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ $M_{R'} = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$
10	Let R be a relation defined on the set of all real numbers, by 'if x, y are real numbers, x R y $\Leftrightarrow$ x – y is a rational number'. Show that R is an equivalence relation.	