

Computer Science & Information Technology

Discrete Mathematics

DPP: 3

Set Theory and Algebra

Q1 Let $A = \{a, b, c, d, e\}$.

Cardinality of the equivalence relation on set A induced by partition $\{\{a, c\}, \{d\}, \{b, e\}\}$ of set A is_____

Q2 Let A is a finite set such that $|A| = 5$, Then cardinality of largest partial order relation possible on set A is_____**Q3** Let $A = \{a, b, c, d\}$

The number of total order relations possible on set A are_____

Q4 Let $A = \{1, 2, 3, 4, 5, 6\}$.

The number of partitions of set A such that equivalence relations induced by those partitions will contain exactly 12 ordered pairs are_____

Q5 Let R and S are two equivalence relation on set A . Which of the following is true?

- (A) $R \cup S$ is also an equivalence relation on set A .
- (B) $R \cap S$ is also an equivalence relation on set A .
- (C) Both $R \cup S$ as well as $R \cap S$ are equivalence relation on set A .
- (D) Neither $R \cup S$ nor $R \cap S$ are equivalence relation on set A .

Q6 Consider the following POSET

$(\{\{1\}, \{2\}, \{4\}, \{1, 2\}, \{1, 4\}, \{2, 4\}, \{3, 4\}, \{1, 3, 4\}, \{2, 3, 4\}\}, \subseteq)$

Let X is the number of minimal elements in the POSET and Y is the number of maximal elements in the POSET,

Then $|X - Y|$ is_____

Q7 Consider the following POSET: $(\{2, 3, 4, 9, 18\}, |)$

Which of the following is/are true with respect to above POSET?

- (A) Maximum element does not exist in the POSET.
- (B) Exactly four pairs of elements in the above POSET are not comparable.
- (C) Least upper bound of 3 and 9 is 18.
- (D) Number of minimal elements and number of maximal elements are same.

Q8 Let A be a set with $|A| = n$, and let R be an equivalence relation on set A with $|R| = r$. Which of the following is TRUE?

- (A) $r - n$ will always be even.
- (B) $r - n$ will always be odd.
- (C) $r - n$ may be zero.
- (D) $r - n$ may be 1.



Answer Key

Q1 9~9
Q2 15~15
Q3 24~24
Q4 35~35

Q5 (B)
Q6 0~0
Q7 (A, D)
Q8 (A, C)



Hints & Solutions

Q1 Text Solution:

Cardinality of the equivalence relation on set A induced by partition $\{\{a, c\}, \{d\}, \{b, e\}\}$ of set A is 9.

Q2 Text Solution:

The cardinality of largest partial order relation possible on set A is 15.

Q3 Text Solution:

The number of total order relations possible on set A are 24.

Q4 Text Solution:

The number of partitions of set A such that equivalence relations induced by those

partitions will contain exactly 12 ordered pairs are 35.

Q6 Text Solution:

The value of $|X-Y|$ is 0.

Q7 Text Solution:

Maximum element does not exist in the POSET.
Number of minimal elements and number of maximal elements are same.

Q8 Text Solution:

$r - n$ will always be even.
 $r - n$ may be zero.



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