Sets and Relations

JEE-MAINS (PREVIOUS YEAR)

MCQ-Single Correct

1. Let A and B be two sets containing four and two elements respectively. Then the number of subsets of the set $A \times B$, each having at least three elements is:

   (1) 256 (2) 275

   (3) 510 (4) 219 **[2015]**

2. If $X = \{4^n - 3n - 1 : n \in N\}$ and $Y = \{9(n-1) : n \in N\}$, where N is the set of natural numbers, then $X \cup Y$ is equal to

   (1) N (2) Y – X

   (3) X (4) Y **[2014]**

3. Let A and B be two sets containing 2 elements and 4 elements respectively. The number of subsets of $A \times B$ having 3 or more elements is

   (1) 220 (2) 219

   (3) 211 (4) 256 **[2013]**

4. Let S be a non-empty subset of R. Consider the following statement:

   P: There is a rational number $x \in S$ such that x > 0.

   Which of the following statements is the negation of the statement P?

   (1) There is no rational number $x \in S$ such that $x \le 0$
   (2) Every rational number $x \in S$ satisfies $x \le 0$
   (3) $x \in S$ and $x \le 0 \Rightarrow x$ is not rational
   (4) There is a rational number $x \in S$ such that $x \le 0$ **[2010]**

5. Consider the following relations:

   R = {(x,y)|x,y are real numbers and x=wy for some rational number w};

S = $\left\{\left(\frac{m}{n},\frac{p}{q}\right) | \, m,n,\, p \, and \, q \, are \, \text{int} egers \, such \, n,q \neq 0 \, and \, qm = pn\right\}$. Then

(1) neither R nor S is an equivalence relation
(2) S is an equivalence relation but R is not an equivalence relation
(3) R and S both are equivalence relations
(4) R is an equivalence relation but S is not an equivalence relation

6. If A, B nd C are three sets such that $A \cap B = A \cap C$ and $A \cup B = A \cup C$, then

(1) A = B (2) A = C

(3) B = C (4) $A \cap B = \phi$ **[2009]**

7. Let R be the real line. Consider the following subsets of the plane $R \times R$.

S = {(x,y): y = x + 1 and 0 < x <2 }, T = {(x,y):x – y is an integer}. Which one of the following is true?

(1) neither S nor T is an equivalence relation on R
(2) Both S and T are equivalence relations on R
(3) S is an equivalence relation on R but T is not
(4) T is an equivalence relation on R but S is not **[2008]**

8. Let W denote the words in the English dictionary. Define the relation R by : **[2006]**

R = {(x,y)ε$W \times W$ | the words x and y have at least one letter in common}. Then R is

(1) Not reflexive, symmetric and transitive (2) reflexive, symmetric and not transitive

(3) reflexive, symmetric and transitive (4) reflexive, not symmetric and transitive

9. Let R = {(3,3), (6,6), (9,9),(12,12),(6,12),(3,9),(3,12),(3,6)} be a relation on the set A = {3,6,9,12} be a relation on the set A = {3,6,9,12}. The relation is

(1) reflexive and transitive only (2) reflexive only

(3) an equivalence relation (4) reflexive and symmetric only **[2005]**

10. Let R = {(1,3),(4,2),(2,4),(2,3),(3,1)} be a relation on the set A = {1,2,3,4}. The relation R is

(1) a function (2) reflexive

(3) not symmetric (4) transitive **[2004]**