ASSIGNMENT -1

CHAPTER- RELATIONS.

BASIC

ONE MARK QUESTIONS.

1.The relation R in the set {1,2,3 } given by R= { (1,2) ,(2,1) ,(1,1) } is

(a) symmetric & transitive but not reflaxive (b) reflexive &symmetric but not transitive (c) symmetric but neither reflexive nor transitive (d) an equivalence relation

2.A relation in a set A is called ---------- relation ,if each element of A is related to itself.

3. A relation R in a set A is called ------ if $(a_1 , a_2) \in R$ implies $(a_2, a_1) \in R$ for all $a_1, a_2 \in A$.

4.Let A = { 1 ,2 ,3 } . Then the no. of equivalence relations containing (1, 2)

(a) 1 (b) 2 (c) 3 (d) none of these.

5.Let R is a relation on the set of integers Z such that aR b iff a-b is divisible by 5 , where a and b are integers. Find the elements of Z related to 1.

6.The relation R on set A={1 ,2 , 3 }, defined by R= {(1 ,2) } is

(a) reflexive (b) symmetric (c) transitive (d) none of these.

7. The relation R on a set A = {x,y,z} defined by R = {(x,x)} is ?

(a) reflexive (b) symmetric and transitive (c)equivalence relation

(d) none of these.

8. The relation Ø on any set A is ?

(a) reflexive (b) symmetric and transitive (c)equivalence relation (d) none of these.

9. The relation square of in set of real numbers is ?

(a) reflexive (b) symmetric and transitive (c)equivalence relation (d) neither reflexive nor symmetric nor transitive

10. Inverse of symmetric relation is ____?

11. A relation R in a set A is called _____if $(a_1, a_2) \in R$ and $(a_2, a_3) \in R$ implies $(a_1, a_3) \in R$ for $a_1, a_2, a_3 \in A$.

12. In a Euclidean plain, which one of the following is not equivalence relation?

a) Parallelism of lines b) Congruency of triangles c) Similarity of triangles d) Orthogonality of lines

Two marks questions

1. Show that the relation R in the set $\{1, 2, 3\}$ given by $R = \{(1,1), (2, 2), (3, 3), (1, 2), (2, 3)\}$ is reflexive but neither symmetric nor transitive.
2. If $A = \{1, 2, 3\}$ and relation $R = \{(2, 3)\}$ in A. Check whether relation R is reflexive, symmetric and transitive.
3. Let A is the set of human beings and R is a relation defined on A such that aRb iff a is wife of b. Check whether relation R is reflexive, symmetric and transitive.
4. Check if the relation R in the set R of real numbers defined by $R = \{ (a,b) : a < b \}$ is (i) symmetric (ii) transitive
5. Check if the relation R in the set $A = \{ 1,2,3,4,5,6 \}$ defined by $R = \{ (x,y) : y \text{ is divisible by } x \}$ is (i) symmetric (ii) transitive
6. Give example of a relation on set A={a,b,c} which is
   i) Reflexive and symmetric but not transitive
   ii) Neither reflexive nor symmetric nor transitive
7. R is a relation on set of natural number N defined by, a R b iff $a+b<100$. Is R reflexive, symmetric or transitive? Justify your answer.

8. Let X be family of sets and R is a relation in X defined by A R B iff $A \cap B = \emptyset$ for all $A, B \in X$. Show that R is symmetric.
9. R is a relation on set of natural number N defined by, a R b iff a+b is odd. Is R reflexive, symmetric or transitive? Justify your answer.
10. R is a relation on set of natural number N defined by, a R b iff a/b is even. Is R reflexive, symmetric or transitive? Justify your answer.
11. R is a relation on set of natural number N defined by, a R b iff ab is a perfect square. Is R reflexive, symmetric or transitive? Justify your answer.

FOUR MARKS QUESTIONS

1.Let R is a relation on the set of rational numbers Q such that xRy iff $1 + xy > 0$, x & y are rational numbers . Prove that R is reflexive and symmetric but not transitive.

2. Check whether the relation R in set N of natural numbers given by R = { (a , b) : a is divisor of b } is reflexive, symmetric or transitive. Also determine whether R is an equivalence relation .

3. Show that the relation R in the set A = { 1,2,3,4,5,6 } ,given by R = { (a,b) : $|a - b|$ is divisible by 2 } is an equivalence relation.

4.Prove that the relation R on Z set defined by R ={(x, y) : x – y is divisible by 5 } is an equivalence relation.

5.R is a relation on set of Natural number N,defined by (a ,b) $\in$ R iff a/b is an integral power of 3.Prove that R is an equivalence relation on N.

6. R is a relation on set of Natural number N,defined by (a ,b) $\in$ R iff $b = a + 5$,$a < 4$ .Determine whether R is reflexive symmetric or transitive relation on N.

7. show that the relation $x \cong y \bmod(5)$ on the set of integersis an equivalence relation.

ASSIGNMENT-2

CHAPTER- RELATIONS

STANDARD

ONE MARK QUESTIONS

1.The maximum number of equivalence relation on the set A={1,2,3} is/are __

2. Let R be the relation in set N given by R={(a,b): a=b-2,b>6}. choose the correct answer.

(a) (2,4) ∈ R (b)) (3,8) ∈ R (c)) (6,8) ∈ R (d)) (8,7) ∈ R

3.The relation R on set N, defined by aRb iff a+b ≥ 100 is

(a) symmetric & transitive but not reflaxive
(b) reflexive &symmetric but not transitive
(c) symmetric but neither reflexive nor transitive
(d) an equivalence relation

4. A relation is given by R such that x R y is given by $xy \geq 0$: then the relation R is

a) Reflexive and symmetric

b) Reflexive, transitive and symmetric

c) Symmetric and transitive.

d) Reflexive and non symmetric

5. Give example of the smallest equivalence relation containing (1,2)on set A={1,2,3}.

TWO MARKS QUESTIONS

1.Show that the relation S in the set R of real numbers, defined as $S = \{(a, b) : a, b \in R$ and $a \leq b^3\}$ is neither reflexive nor symmetric nor transitive.

2.Give example of a relation on set A= {a,b,c} which is

i. Symmetric and transitive but not reflexive.
ii. Reflexive and symmetric but not transitive.

3.Let S be the set of all points in a plane and R be a relation in S defined as R ={(a,b): distance between points a and b is < 2 units}. Show that R is reflexive and symmetric but not transitive.

4.R is a relation on set of natural number N defined by, a R b iff a+b is not divisible by 5. Is R reflexive, symmetric or transitive? Justify your answer.

5.R is a relation on set of natural number N defined by, m R n iff mn is divisible by 2. Is R reflexive, symmetric or transitive? Justify your answer.

FOUR MARKS QUESTIONS

1.Determine whether the relation R defined on the set R of all real numbers as $R = \{(a, b) : a, b \in R$ and $a - b + \sqrt{3} \in S$, where S is the set of all irrational numbers$\}$, is reflexive, symmetric & transitive

2.Let A = {1,2,3……,9} and R be the relation in A x A defined by $(a, b)\ R\ (c, d)$ if $a + d = b + c$ for $(a, b), (c, d)$ in $A\ X\ A$. Prove that R is an equivalence relation and also obtain the equivalence class [(2,5)].

3. Let N be the set of natural numbers and R be the relation on N x N set defined by (a ,b) R (c ,d) iff ad = bc , for all a, b ,c ,d ∈ N. Show that R is an equivalence relation.

4. Is Ø reflexive, symmetric or transitive on any non empty set A? Justify your answer.

5. If Q is the set of rational numbers and R is a relation defined on Q by x R y iff $|x-y| \leq 1/2$, then prove that R is not an equivalence relation.

ASSIGNMENT-3

CHAPTER- RELATIONS

Advanced(Hots)

ONE MARK QUESTIONS

1.The number of reflexive relations on A= {1, 2 ,3 } is

(a) 32 (b) 64 (c) 8 (d) 512

2. The number of symmetric relations on A= {1, 2 ,3 } is

(a) 32 (b) 64 (c) 8 (d) none of these

3.The smallest equivalence relation on the set A= {x , y , z }is _____.

4. Let R be the relation in the set {1,2,3,4} given by R={(1,2),(2,2),(1,1),(4,4),(1,3),(3,3),(3,2)} choose the correct answer:

a) R is reflexive and symmetric but not transitive.

b) R is reflexive and transitive but not symmetric.

c) R is symmetric and transitive but not reflexive.

d) R is an equivalence relation.

TWO MARKS QUESTIONS

1.Prove that union of two symmetric relation is symmetric.

2.Prove that the relation Ø on any set A= {3,4,5} is transitive.

3.Let f:X→ Y be a function. Define a relation R in X given by R = { (a,b) : f(a)= f(b)}.Examine whether R is an equivalence relation or not.

FOUR MARKS QUESTIONS

1.Let N denotes the set of natural numbers and R be the relation on N x N defined by $(a,b)R(c,d)$ if ad (b+c) = bc (a+d). Prove that R is an equivalence relation and also obtain the equivalence class [(1,3)]

2. Prove that the intersection of two equivalence relation is also an equivalence relation.

3. Union of two equivalence relation may not be equivalence. Justify your answer.

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