Assignment

Relations

Basic Level

1. A relation from P to Q is **[AMU 1998]**

(a) A universal set of $P \times Q$ (b) $P \times Q$ (c) An equivalent set of $P \times Q$ (d) A subset of $P \times Q$

2. Let R be a relation from a set A to set B, then

(a) $R = A \cup B$ (b) $R = A \cap B$ (c) $R \subseteq A \times B$ (d) $R \subseteq B \times A$

3. Let $A = \{a, b, c\}$ and $B = \{1, 2\}$. Consider a relation R defined from set A to set B. Then R is equal to set**[Kurukshetra CI**

(a) A (b) B (c) $A \times B$ (d) $B \times A$

4. Let $n(A) = n$. Then the number of all relations on A is

(a) 2^n (b) $2^{(n)!}$ (c) 2^{n^2} (d) None of these

5. If R is a relation from a finite set A having m elements to a finite set B having n elements, then the number of relations from A to B is

(a) 2^{mn} (b) $2^{mn} - 1$ (c) $2mn$ (d) m^n

6. Let R be a reflexive relation on a finite set A having n-elements, and let there be m ordered pairs in R. Then

(a) $m \geq n$ (b) $m \leq n$ (c) $m = n$ (d) None of these

7. The relation R defined on the set $A = \{1, 2, 3, 4, 5\}$ by $R = \{(x, y) : |x^2 - y^2| < 16\}$ is given by

(a) $\{(1, 1), (2, 1), (3, 1), (4, 1), (2, 3)\}$ (b) $\{(2, 2), (3, 2), (4, 2), (2, 4)\}$

(c) $\{(3, 3), (3, 4), (5, 4), (4, 3), (3, 1)\}$ (d) None of these

8. A relation R is defined from $\{2, 3, 4, 5\}$ to $\{3, 6, 7, 10\}$ by; $xRy \Leftrightarrow x$ is relatively prime to y. Then domain of R is

(a) $\{2, 3, 5\}$ (b) $\{3, 5\}$ (c) $\{2, 3, 4\}$ (d) $\{2, 3, 4, 5\}$

9. Let R be a relation on N defined by $x + 2y = 8$. The domain of R is

(a) $\{2, 4, 8\}$ (b) $\{2, 4, 6, 8\}$ (c) $\{2, 4, 6\}$ (d) $\{1, 2, 3, 4\}$

10. If $R = \{(x, y) | x, y \in Z, x^2 + y^2 \leq 4\}$ is a relation in Z, then domain of R is

(a) $\{0, 1, 2\}$ (b) $\{0, -1, -2\}$ (c) $\{-2, -1, 0, 1, 2\}$ (d) None of these

11. If $A = \{1, 2, 3\}$, $B = \{1, 4, 6, 9\}$ and R is a relation from A to B defined by 'x is greater than y'. The range of R is

(a) $\{1, 4, 6, 9\}$ (b) $\{4, 6, 9\}$ (c) $\{1\}$ (d) None of these

12. R is a relation from $\{11, 12, 13\}$ to $\{8, 10, 12\}$ defined by $y = x - 3$. Then R^{-1} is

(a) $\{(8, 11), (10, 13)\}$ (b) $\{(11, 18), (13, 10)\}$ (c) $\{(10, 13), (8, 11)\}$ (d) None of these

13. Let A = {1, 2, 3}, B = {1, 3, 5}. If relation R from A to B is given by R ={(1, 3), (2, 5), (3, 3)}. Then R^{-1} is

(a) {(3, 3), (3, 1), (5, 2)} (b) {(1, 3), (2, 5), (3, 3)} (c) {(1, 3), (5, 2)} (d) None of these

14. Let R be a reflexive relation on a set A and I be the identity relation on A. Then

(a) $R \subset I$ (b) $I \subset R$ (c) $R = I$ (d) None of these

15. Let A = {1, 2, 3, 4} and R be a relation in A given by R = {(1, 1), (2, 2), (3, 3), (4, 4), (1, 2), (2, 1), (3, 1), (1, 3)}. Then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) An equivalence relation

16. An integer m is said to be related to another integer n if m is a multiple of n. Then the relation is

(a) Reflexive and symmetric (b) Reflexive and transitive (c) Symmetric and transitive (d) Equivalence relation

17. The relation R defined in N as $aRb \Leftrightarrow b$ is divisible by a is

(a) Reflexive but not symmetric (b) Symmetric but not transitive (c)

18. Let R be a relation on a set A such that $R = R^{-1}$, then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) None of these

19. Let R = {(a, a)} be a relation on a set A. Then R is

(a) Symmetric (b) Antisymmetric

(c) Symmetric and antisymmetric (d) Neither symmetric nor anti-symmetric

20. The relation "is subset of" on the power set $P(A)$ of a set A is

(a) Symmetric (b) Anti-symmetric (c) Equivalency relation (d) None of these

21. The relation R defined on a set A is antisymmetric if $(a,b) \in R \Rightarrow (b,a) \in R$ for

(a) Every (a, b) $\in R$ (b) No $(a,b) \in R$ (c) No $(a,b), a \neq b, \in R$ (d) None of these

22. In the set A = {1, 2, 3, 4, 5}, a relation R is defined by R = {(x, y)| x, y $\in$ A and $x < y$}. Then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) None of these

23. Let A be the non-void set of the children in a family. The relation 'x is a brother of y' on A is

(a) Reflexive (b) Symmetric (c) Transitive (d) None of these

24. Let A = {1, 2, 3, 4} and let R= {(2, 2), (3, 3), (4, 4), (1, 2)} be a relation on A. Then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) None of these

25. The void relation on a set A is

(a) Reflexive (b) Symmetric and transitive (c) Reflexive and symmetric (d) Reflexive and transitive

26. Let R_1 be a relation defined by $R_1 = \{(a,b) | a \geq b, a, b \in R\}$. Then R_1 is

(a) An equivalence relation on R (b) Reflexive, transitive but not symmetric

(c) Symmetric, Transitive but not reflexive (d) Neither transitive not reflexive but symmetric

27. Let A = {p, q, r}. Which of the following is an equivalence relation on A

(a) R_1 = {(p, q), (q, r), (p, r), (p, p)} (b) R_2 = {(r, q), (r, p), (r, r), (q, q)}

(c) R_3 = {(p, p), (q, q), (r, r), (p, q)} (d) None of these

28. Which one of the following relations on R is an equivalence relation

(a) $a R_1 b \Leftrightarrow |a| = |b|$ (b) $aR_2b \Leftrightarrow a \geq b$ (c) $aR_3b \Leftrightarrow a$ divides b (d) $aR_4b \Leftrightarrow a < b$

29. If R is an equivalence relation on a set A, then R^{-1} is

(a) Reflexive only (b) Symmetric but not transitive (c) Equivalence (d)

30. R is a relation over the set of real numbers and it is given by $nm \geq 0$. Then R is

(a) Symmetric and transitive (b) Reflexive and symmetric (c) A partial order relation(d)

31. In order that a relation R defined on a non-empty set A is an equivalence relation, it is sufficient, if R

(a) Is reflextive (b) Is symmetric

(c) Is transitive (d) Possesses all the above three properties

32. The relation "congruence modulo m" is

(a) Reflexive only (b) Transitive only (c) Symmetric only (d) An equivalence relation

33. Solution set of $x \equiv 3$ (mod 7), $x \in Z,$ is given by

(a) {3} (b) $\{7p-3 : p \in Z\}$ (c) $\{7p+3 : p \in Z\}$ (d) None of these

34. Let R and S be two equivalence relations on a set A. Then

(a) $R \cup S$ is an equivalence relation on A (b) $R \cap S$ is an equivalence relation on A

(c) $R-S$ is an equivalence relation on A (d) None of these

35. Let R and S be two relations on a set A. Then

(a) R and S are transitive, then $R \cup S$ is also transitive (b) R and S are transitive, then $R \cap S$ is also transitive

(c) R and S are reflexive, then $R \cap S$ is also reflexive (d) R and S are symmetric then $R \cup S$ is also symmetric

36. Let R = {(1, 3), (2, 2), (3, 2)} and S = {(2, 1), (3, 2), (2, 3)} be two relations on set A = {1, 2, 3}. Then RoS =

(a) {(1, 3), (2, 2), (3, 2), (2, 1), (2, 3)} (b) {(3, 2), (1, 3)}

(c) {(2, 3), (3, 2), (2, 2)} (d) {(2, 3), (3, 2)}

37. In problem 36, $RoS^{-1} =$

(a) {(2, 2), (3, 2) (b) {(1, 2), (2, 2), (3, 2)} (c) {(1, 2), (2, 2)} (d) {(1, 2), (2, 2), (3, 2), (2, 3)}

Advance Level

38. Let R be a relation on the set N be defined by {(x, y)| x, $y \in N$, $2x + y = 41$}. Then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) None of these

39. Let L denote the set of all straight lines in a plane. Let a relation R be defined by $\alpha R\beta \Leftrightarrow \alpha \perp \beta, \alpha, \beta \in L$. Then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) None of these

40. Let T be the set of all triangles in the Euclidean plane, and let a relation R be defined on T by aRb iff $a \approx b, a, b \in T$. Then R is

(a) Reflexive but not transitive(b) Transitive but not symmetric (c) Equivalence

41. Two points P and Q in a plane are related if $OP = OQ$, where O is a fixed point. This relation is

(a) Partial order relation (b) Equivalence relation (c) Reflexive but not symmetric (d)

42. Let r be a relation over the set $N \times N$ and it is defined by $(a,b)r(c,d) \Rightarrow a+d=b+c.$ Then r is

(a) Reflexive only (b) Symmetric only (c) Transitive only (d) An equivalence relation

43. Let L be the set of all straight lines in the Euclidean plane. Two lines l_1 and l_2 are said to be related by the relation R iff l_1 is parallel to l_2. Then the relation R is

(a) Reflexive (b) Symmetric (c) Transitive (d) Equivalence

44. Let n be a fixed positive integer. Define a relation R on the set Z of integers by, $aRb \Leftrightarrow n|\ a-b\ |$. Then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) Equivalence

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Answer Sheet

Answer Sheet (Advance & Basic Level)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
d	c	c	c	a	a	d	d	c	c	c	a	a	b	a,b	b	a	b	c	b
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
c	c	b,c	c	b	b	d	a	c	d	d	d	c	b	b,c,d	c	b	d	b	c
41	42	43	44																
b	d	a,b,c,d	a,b,c,d																