RAVI MATHS TUITION & TEST PAPERS , WHATSAPP 8056206308

Relations and Functions previously asked

12th Standard

Maths

Multiple Choice Question 7 x 1 = 7

1) A function f : R $\rightarrow$ R defined as f(x) = x^2 - 4x + 5 is

(a) injective but not surjective (b) surjective but not injective. (c) both injective and surjective.

(d) neither injective nor surjective.

2) Select the correct option out of the four given options
Let R be a relation in the set N given by
R = {(a, b):ab - 2,b > 6}
Then,

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

3) Let A (3,5). Then, number of reflexive relations on A is

(a) 2 (b) 4 (c) 0 (d) 8

4) A relation R in set A = {1,2,3} is defined as R = {(1,1), (1, 2), (2, 2), (3, 3)}. Which of the following ordered pair in R shall be removed to make it an equivalence relation in A?

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

5) Let the relation R in the set A = {x ∈ Z : 0 ≤ x ≤ 12}, given by R = {(a, b): ab is a multiple of 4}. Then [1], the equivalence class containing 1, is

(a) {1, 5, 9} (b) {0,1,2,5} (c) ф (d) A

6) The function f : R→ R defined as f(x) = x^3 is

(a) one-one but not onto (b) not one-one but onto (c) neither one-one nor onto (d) both one-one and onto

7) Let A = {1,2,3}, B = {4,5,6, 7) and let f = {(1, 4), (2, 5), (3,6)} be a function from A to B. Based on the given information f is best defined as

(a) surjective function (b) injective function (c) bijective function (d) None of the above

Assertion and reason 1 x 1 = 1

8) Assertion (A) : The relation f: {1, 2, 3, 4} → {x, y, z, p} defined by
f = {(1, x), (2, y), (3, 2)) is a bijective function.
Reason (R) : The function f: {1, 2, 3} → {x, y, z, p} such that f = {(1, x), (2, y), (3, z)} is one-one.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true and R is false.
(d) A is false, but R is true.

2 Marks 20 x 2 = 40

9) If the binary operation * on the set of integers Z is defined by a*b=a+3b^2 then find the value of 2 * 4.

10) If the binary operation * defined on Q is defined as a*b=2a+b-ab, for all $a, b \in Q$, find the value of 3*4.

11) The binary operation *: R x $R \rightarrow R$ is defined as a * b = 2a+b. Find (2 * 3)*4.

12) For the set A = {1, 2, 3} define a relation R in the set A is follows:
R = {(1,1), (2, 2), (3, 3), (1, 3)}. Write the ordered pairs to be added to R to make it the smallest equivalence relation.

13) State the reason why the Relation R = [(a, b) : $a \leq b^2$ on the set R of the real numbers is not reflexive

14) Define Reflexive. Give one example.

15) Define symmetric Relation. Give one example

16) Define Transitive Relation. Give one example.

17) Let f:$X \rightarrow Y$ be a function Define a relation R on X given be R=[(a,b) ; (f(b)] Show that R is an equivalence relation ?

18) If the binary operation * on the set of integers Z is defined by a*b = a + $3b^2$ then find the value of 8*3

19) If R = {(x, y) : x + 2y = 8} is a relation on N, write the range of R.

20) Let R = {(a, a^3) : a is a prime number less than 5} be a relation. Find the range of R.

21) How many reflexive relations are possible in a set A whose n(A)=3?

22) Check whether the function f:R → R defined as f(x) = x^3 is one-one or not.

23) A relation R is S = {1,2,3} is defined as R = {(1, 1), (1, 2), (2, 2), (3,3)}. Which element(s) of relation R be removed to make R an equivalence relation?

24) A relation R in the set of real numbers R defined as R = {(a, b): √a = b) is a function or not. Justify.

25) If R = {(x, y):x + 2y = 8) is a relation on N, then write the range of R

26) If A {1, 2, 3}, B = {4, 5, 6, 7} and f = {(1, 4), (2, 5), (3, 6)} is a function from A to B. State whether fis one-one or not.

27) A function f: A → B defined as f (x) = 2x is both one-one and onto. If A = {1, 2, 3, 4}, then find the set B.

28) Prove that the function f is surjective, where f : N →N such that

$$f(n) = \begin{cases} \frac{n+1}{2}, & \text{if } n \text{ is odd} \\ \frac{n}{2}, & \text{if } n \text{ is even} \end{cases}$$

Is the function injective? Justify your answer.

3 Marks 6 x 3 = 18

29) Let N denote the set of all natural numbers and R be the relation on $N \times N$ defined by:
(a, b)R(c, d) if ad(b+c)(a+d) = bc(a + d)
Show that R is an equivalence relation.

30) Show that the function f: $R \rightarrow R$ defined by:
$f(x) = \frac{4x-3}{5}, x \in R$ is one-one and onto function.

31) Check whether the relation R in the set Z of integers defined as R = {(a, b):a + b is "divisible by 2"} is reflexive, symmetric or transitive. Write the equivalence class containing 0 i.e. [0].

32) Check if the relation R in the set R of real numbers defined as R = {(a, b): a < b} is
(i) symmetric, (ii) transitive

33) If f: R → R is the function defined by f (x) = $4x^3$ +7, then show that f is a bijection.

34) Show that the relation S defined on set N x N by (a, b) S (c, d) ⇒ a + d = b + c is an equivalence relation.

5 Marks 19 x 5 = 95

35) Let Z be the set of all integers and R be the relation on Z defined as R = {(a,b) : a,b ∈ Z, and (a-b) is divisible by 5}. Prove that R is an equivalence relation.

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

37) Let A = {1, 2, 3, r 9} and R be the relation in A x A defined by (a, b) R (c, Ii) if a + d =
b + c for (a, b), (e, Ii) in A x A. Prove that R is an equivalence relation. Also obtain the
equivalence class [(2, 5)]

38) Show that the relation R in the Set A = {1, 2, 3, 4, 5} given by R = {(a, b) : Ia - b I is divisible by 2} is an equivalence relation. Write all the equivalence classes of R.

39) Check whether the relation R defined in set A = {1.2,3, ...,13, 14} as R = {(x, y) : 3x - y = 0} is reflexive, symmetric and transitive.

40) 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)].

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

42) Let $A = \{x \in Z : 0 \leq x \leq 12\}$ Show that R = {(a, b) : a, be A, |a - b| is divisible by 4} is an equivalence relation. Find the set of all elements related to 1. Also, write the equivalence class [2].

43) Show that the relation R in the set A of real numbers defined as R = {(a, b) : a $\leq$ b} is reflexive and transitive but not symmetric.

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

45) Let R be a relation defined on the set of natural numbers N as R = {(x,y): x ∈N, y∈N and 2x + Y = 24}.Then, find the domain and range of the relation R. Also, find whether R is an equivalence relation or not.

46) Show that the relation R defined by (a, b) R (e, d) ⇒ a + d = b + e on the set N x N is an equivalence relation.

47) If N denotes the set of all natural numbers and R is the relation on N x N defined by (a, b) R (c, d), if ad(b + c) = bc (a + d). Show that R is an equivalence relation.

48) Show that the relation R in the set A of points in a plane given by R = {(P, Q): distance of the point P from the origin is same as the distance of the point Q from the origin}, is an equivalence relation. Further, show that the set of all points related to a point P $\neq$ (0, 0) is the circle passing through P with origin as centre

49) A relation R is defined on a set of real numbers **R** as $R = \{(x, y) : x \cdot y$ is an irrational number $\}$.
Check whether R is reflexive, symmetric and transitive or not.

50) Show that a function $f : R \rightarrow R$ defined as $f(x) = \frac{5x-3}{4}$ is both one-one and onto.

51) Let $f : R - \left\{-\frac{4}{3}\right\} \rightarrow R$ be a function defined as $f(x) = \frac{4x}{3x+4}$. Show that f is a one-one function. Also, check whether f is an onto funciton or not.

52) A function $f : [-4, 4] \rightarrow [0, 4]$ is given by $f(x) = \sqrt{16 - x^2}$. Show that f is an onto function but not a one-one function. Further, find all possible values of a for which $f(a) = \sqrt{7}$.

53) Show that the relation R on the set Z of allintegers defined by (x, y) ∈ R ⇔ (x - y) is divisible by 3 is an equivalence relation.

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