

# RELATIONS & FUNCTIONS

Assignment 4 Practice by O.P. GUPTA • M. +91-9650350480

Q01. The relation  $R$  in the set  $\{1, 2, 3\}$  given by  $R = \{(1,2), (2,1), (1,1)\}$  is  
(a) symmetric and transitive, but not reflexive  
(b) reflexive and symmetric, but not transitive  
(c) symmetric, but neither reflexive nor transitive  
(d) an equivalence relation

Q02. The function  $f : R \rightarrow [-1, 1]$  defined by  $f(x) = \cos x$  is  
(a) both one-one and onto  
(b) not one-one, but onto  
(c) one-one, but not onto  
(d) neither one-one, nor onto

Q03. Let  $A = \{1, 3, 5\}$ . Then the number of equivalence relations in  $A$  containing  $(1, 3)$  is  
(a) 1  
(b) 2  
(c) 3  
(d) 4

Q04. A relation in a set  $A$  is called \_\_\_\_\_ relation, if each element of  $A$  is related to itself.  
(a) reflexive  
(b) non-reflexive  
(c) identity  
(d) None of these

Q05. A relation  $R$  on a set  $A$  is called \_\_\_\_\_, if  $(a_1, a_2) \in R$  and  $(a_2, a_3) \in R$  implies that  $(a_1, a_3) \in R$  for  $a_1, a_2, a_3 \in A$ .  
(a) symmetric  
(b) transitive  
(c) reflexive  
(d) None of these

Q06. 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  $a_1, a_2 \in A$ .  
(a) symmetric  
(b) transitive  
(c) reflexive  
(d) equivalence

Q07. Check whether the function  $f : R \rightarrow R$  defined as  $f(x) = x^3$  is one-one or not.

Q08. How many reflexive relations are possible in a set  $A$  whose  $n(A) = 3$ ?

Q09. A relation  $R$  in the set  $S = \{1, 2, 3\}$  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?

Q10. A relation  $R$  in the set of real numbers  $\mathbf{R}$  defined as  $R = \{(a,b) : \sqrt{a} = b\}$  is a function or not. Justify.

Q11. An equivalence relation  $R$  in  $A$  divides it into equivalence classes  $A_1, A_2, A_3$ . What is the value of  $A_1 \cup A_2 \cup A_3$  and  $A_1 \cap A_2 \cap A_3$ ?

Q12. Write the smallest reflexive relation on set  $A = \{a, b, c\}$ .

Q13. If  $f = \{(1,2), (2,4), (3,1), (4,k)\}$  is a one-one function from set  $A$  to  $A$ , where  $A = \{1, 2, 3, 4\}$ , then find the value of  $k$ .

Q14. Check whether the relation  $R$  defined on the set  $\{1, 2, 3, 4\}$  as  $R = \{(a,b) : b = a + 1\}$  is transitive. Justify your answer.

Q15. If the relation  $R$  on the set  $A = \{x : 0 \leq x \leq 12\}$  given by  $R = \{(a,b) : a = b\}$  is an equivalence relation, then find the set of all elements related to 1.

Q16. Show that the function  $f : R - \{-1\} \rightarrow R - \{1\}$  given by  $f(x) = \frac{x}{x+1}$  is one-one and onto.

Q17. Check if the relation  $R$  on the set  $A = \{1, 2, 3, 4, 5, 6\}$  defined as  $R = \{(x,y) : y \text{ is divisible by } x\}$  is (i) symmetric (ii) transitive.

Q18. Check whether the relation  $R$  in the set  $N$  of natural numbers given by  
$$R = \{(a,b) : a \text{ is divisor of } b\}$$
 is reflexive, symmetric or transitive. Also determine whether  $R$  is an equivalence relation.

Q19. Check if the relation  $R$  in the set  $R$  of real numbers defined as  $R = \{(a,b) : a < b\}$  is (i) symmetric, (ii) transitive.

Q20. Show that the function  $f : R \rightarrow R$  defined by  $f(x) = \frac{x}{x^2 + 1}$ ,  $\forall x \in R$  is neither one-one nor onto.

Q21. Let  $R$  be the relation in the set  $Z$  of integers given by  $R = \{(a, b) : 2 \text{ divides } a - b\}$ . Show that the relation  $R$  is transitive. Write the equivalence class  $[0]$ .

Q22. Let  $f : A \rightarrow B$  be a function defined as  $f(x) = \frac{2x+3}{x-3}$  where  $A = R - \{3\}$  and  $B = R - \{2\}$ . Is the function  $f$  one-one and onto?

Q23. Let  $W$  denote the set of words in the English dictionary. Define the relation  $R$  by  $R = \{(x, y) \in W \times W \text{ such that } x \text{ and } y \text{ have at least one letter in common}\}$ . Show that this relation  $R$  is reflexive and symmetric, but not transitive.

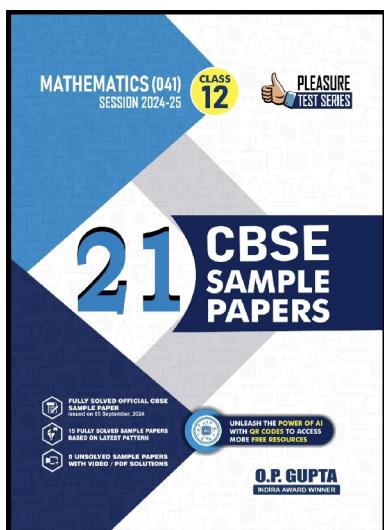
Q24. Show that the function  $f : (-\infty, 0) \rightarrow (-1, 0)$  defined by  $f(x) = \frac{x}{1+|x|}$ ,  $x \in (-\infty, 0)$  is one-one and onto.

Q25. Let  $N$  be the set of natural numbers and  $R$  be the relation on  $N \times N$  defined by  $(a, b) R (c, d)$  iff  $ad = bc$  for all  $a, b, c, d \in N$ . Show that  $R$  is an equivalence relation.

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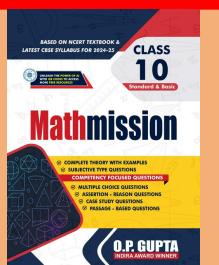
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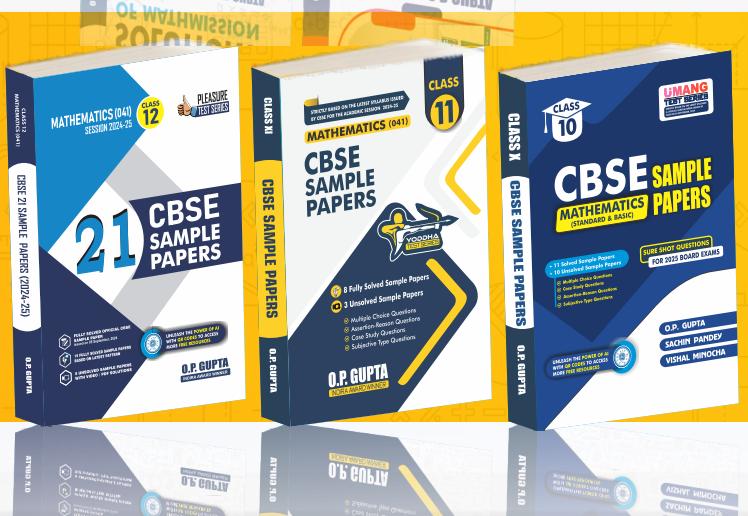
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