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 $f : R \to [-1, 1]$ 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 $f : R \to R$ 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 **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 $A = \{x : 0 \le x \le 12\}$ 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 $f : R - \{-1\} \to R - \{1\}$ given by $f(x) = \dfrac{x}{x+1}$ 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 $f: R \to R$ defined by $f(x) = \dfrac{x}{x^2+1}$, $\forall\ x \in R$ 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 $f: A \to B$ be a function defined as $f(x) = \dfrac{2x+3}{x-3}$ 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 $R = \{(x,y) \in W \times W$ such that x and y have at least one letter in common$\}$. Show that this relation R is reflexive and symmetric, but not transitive.

Q24. Show that the function $f: (-\infty, 0) \to (-1, 0)$ defined by $f(x) = \dfrac{x}{1+|x|}$, $x \in (-\infty, 0)$ 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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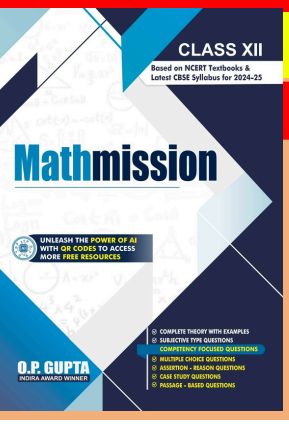

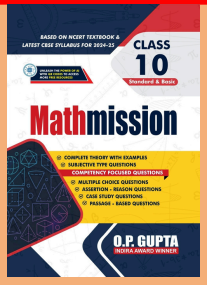

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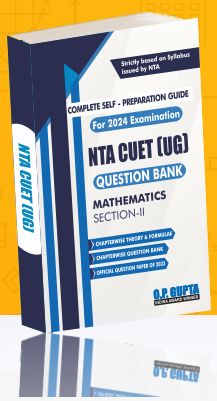

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