NCERT Exemplar MCQs

1. Let T be the set of all triangles in the Euclidean planen and let a relation R on T be defined as aRb, if a is congruent to b, $\forall\ a, b \in T$. Then, R is
(a) reflexive but not transitive
(b) transitive but not symmetric
(c) equivalence
(d) None of these

2. Consider the non-empty set consisting of children in a family and a relation R defined as $a\ R\ b$ if a is brother of b. Then R is
(a) symmetric but not transitive
(b) transitive but not symmetric
(c) neither symmetric nor transitive
(d) both symmetric and transitive

3. The maximum number of equivalence relations on the set $A = \{1, 2, 3\}$ are
(a) 1 (b) 2
(c) 3 (d) 5

4. If a relation R on set $\{1, 2, 3\}$ be defined by $R = \{(1, 2)\}$, then R is
(a) reflexive (b) transitive
(c) symmetric (d) None of these

5. Let us define a relation R in R as aRb if $a \geq b$. Then R is
(a) an equivalence relation
(b) reflexive, transitive but not symmetric
(c) symmetric, transitive but not reflexive
(d) neither transitive nor reflexive but symmetric

6. The relation $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)\}$ on set $A = \{1, 2, 3\}$ is
(a) Reflexive but not symmetric
(b) Reflexive but not transitive
(c) Symmetric and transitive
(d) Neither symmetric nor transitive

7. The identity element for the binary operation * defined on $Q - \{0\}$ as $a * b = \frac{ab}{2}$, $\forall\ a, b \in Q - \{0\}$ is
(a) 1 (b) 0
(c) 2 (d) None of these

8. If the set A contains 5 elements and the set B contains 6 elements, then the number of one-one and onto mapping from A to B is
(a) 720 (b) 120
(c) 0 (d) None of these

9. If $A = \{1, 2, 3, \ldots, n\}$ and $B = \{a, b\}$. Then, the number of surjections from A into B is
(a) ${}^nP_2$ (b) $2^n - 2$
(c) $2^n - 1$ (d) None of these

10. Let $f : R \to R$ be defined by $f(x) = \frac{1}{x} \forall x \in R$. Then f is
(a) one-one (b) onto
(c) bijective (d) f is not defined

11. Let $f : R \to R$ be defined by $f(x) = 3x^2 - 5$ and $g : R \to R$ by $g(x) = \frac{x}{x^2 + 1}$. Then gof is
(a) $\frac{3x^2 - 5}{9x^4 - 30x^2 + 26}$ (b) $\frac{3x^2 - 5}{9x^4 - 6x^2 + 26}$
(c) $\frac{3x^2}{x^4 + 2x^2 - 4}$ (d) $\frac{3x^2}{9x^4 + 30x^2 - 2}$

12. Which of the following functions from Z into Z are bijective?
(a) $f(x) = x^3$ (b) $f(x) = x + 2$
(c) $f(x) = 2x + 1$ (d) $f(x) = x^2 + 1$

13. If $f : R \to R$ be the function defined by $f(x) = x^3 + 5$, then $f^{-1}(x)$ is equal to:
(a) $(x + 5)^{1/3}$ (b) $(x - 5)^{1/3}$
(c) $(5 - x)^{1/3}$ (d) $(5 - x)$

14. If $f : A \to B$ and $g : B \to C$ be the bijective functions, then $(gof)^{-1}$ is
(a) $f^{-1}og^{-1}$ (b) fog
(c) $g^{-1}of^{-1}$ (d) gof

15. Let $f : R - \left\{\frac{3}{5}\right\} \to R$ be defined by $f(x) = \frac{3x + 2}{5x - 3}$. Then
(a) $f^{-1}(x) = f(x)$ (b) $f^{-1}(x) = -f(x)$
(c) $(fof)x = -x$ (d) $f^{-1}(x) = \frac{1}{19} f(x)$

16. If $f(x)$ is defined on $[0, 1]$ by the rule

$$f(x) = \begin{cases} x & : x \text{ is rational} \\ 1 - x & : x \text{ is irrational} \end{cases}$$

then for all $x \in R$, $f(f(x))$ is
(a) constant (b) $1 + x$
(c) x (d) None of these

17. If $f : [2, \infty) \to R$ be the function defined by $f(x) = x^2 - 4x + 5$, then the range of f is
(a) R (b) $[1, \infty)$
(c) $[4, \infty)$ (d) $[5, \infty)$

18. Let $f : N \to R$ be the function defined by

$f(x)=\frac{2x-1}{2}$ and $g: Q \to R$ be another function defined by $g(x) = x + 2$. Then $(gof)\ \frac{3}{2}$ is

(a) 1 (b) 0 (c) $\frac{7}{2}$ (d) 3

19. Let $f: R \to R$ be defined by

$$f(x)=\begin{cases}2x & : \quad x>3 \\ x^2 & : \quad 1<x\le 3 \\ 3x & : \quad x\le 1\end{cases}$$

Then $f(-1) + f(2) + f(4)$ is

(a) 9 (b) 14
(c) 5 (d) None of these

20. Let $f: R \to R$ be given by $f(x) = \tan x$. Then $f^{-1}(1)$ is

(a) $\frac{\pi}{4}$ (b) $\left\{n\pi+\frac{\pi}{4}: n \in Z\right\}$
(c) does not exist (d) None of these

Past Year MCQs

21. If g is the inverse of a function f and $f'(x)=\frac{1}{1+x^5}$, then $g'(x)$ is equal to: **[JEE MAIN 2014, C]**

(a) $\frac{1}{1+\{g(x)\}^5}$ (b) $1+\{g(x)\}^5$
(c) $1 + x^5$ (d) $5x^4$

22. Let $f: R \to R$ be a function defined by $f(x)=\frac{x-m}{x-n}$, where $m \neq n$, then **[BITSAT 2014, A]**

(a) f is one-one onto (b) f is one-one into
(c) f is many-one onto (d) f is many-one into

23. If $\rho = \{(x, y) | x^2 + y^2 = 1; x, y \in R\}$. Then, ρ is **[BITSAT 2015, A]**

(a) reflexive (b) symmetric
(c) transitive (d) anti-symmetric

24. Let $f(x)=\frac{ax+b}{cx+d}$, then $fof(x) = x$, provided that : **[BITSAT, 2016, A]**

(a) $d = -a$ (b) $d = a$
(c) $a = b = 1$ (d) $a = b = c = d = 1$

25. The function $f: R \to \left[-\frac{1}{2}, \frac{1}{2}\right]$ defined as $f(x)=\frac{x}{1+x^2}$, is : **[JEE MAIN 2017, A]**

(a) neither injective nor surjective
(b) invertible
(c) injective but not surjective
(d) surjective but not injective

26. Let f and g be functions from R to R defined as

$$f(x)=\begin{cases}7x^2+x-8, & x\le 1 \\ 4x+5, & 1<x\le 7, \\ 8x+3, & x>7\end{cases} \quad g(x)=\begin{cases}|x|, & x<-3 \\ 0, & -3\le x<2 \\ x^2+4, & x\ge 2\end{cases}$$

Then **[BITSAT 2017, S]**

(a) $(fog)(-3) = 8$ (b) $(fog)(9) = 683$
(c) $(gof)(0) = -8$ (d) $(gof)(6) = 427$

Ans.

1	(c)	**4**	(d)	**7**	(c)	**10**	(d)	**13**	(b)	**16**	(c)	**19**	(a)	**22**	(b)	**25**	(d)		
2	(b)	**5**	(b)	**8**	(c)	**11**	(a)	**14**	(a)	**17**	(b)	**20**	(b)	**23**	(b)	**26**	(b)		
3	(d)	**6**	(a)	**9**	(d)	**12**	(b)	**15**	(a)	**18**	(d)	**21**	(b)	**24**	(a)				