CBT TEST- APRIL(2026-27)

SUBJECT:MATHEMATICS

CLASS: 12

Q1. The relation R in the set of natural numbers N defined as R = { (x, y) : y = x + 5 and x < 4 } is :

(a) reflexive
(b) symmetric
(c) equivalence
(d) none of these

Ans. (d) none of these
Explanation:
R = {(1, 6), (2, 7), (3, 8)}
∵ (6, 6) ∉ R
⇒ R is not Reflexive.
For (2, 7) ∈ R
⇒ (2, 7) ∈ R but (7, 2) ∉ R
⇒ R is not symmetric.
Now, since there is no pair in R such that (x, y)and (y, z)∈R, then (x, z) cannot belong to R.
∴ R is transitive.
⇒ R is not equivalence

Q2. For the set A = { 1, 2, 3 }, define a relation R in the set A as follows R = { (1, 1), (2, 2), (3, 3), (1, 3)} Then, the ordered pair to be added to R to make it the smallest equivalence relation is

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

Ans. (b) (3, 1)

Explanation:
(1, 1,), (2, 2) and (3, 3)∈ R
⇒ R is Reflexive.
(1, 3) ∈ R
(1, 3) ∈ R but (3, 1) ∉
R ⇒ R is not symmetric.
To make R an equivalence we can add (3, 1).
Clearly R is reflexive and transitive. For R to be symmetric we should add (3, 1) in R.

Q3. Let A = {1, 2, 3} and B = {a, b, c, d }. Which of the following relation from A to B is not a function?

(a) R1 = {(1, a), (2, b), (3, c)}
(b) R2 = {(1, a), (2, b), (3, d)}
(c) R3 = {(1, a), (1, b), (2, c), (3, d)}
(d) R4 = {(1, a), (2, c), (3, d)}

Ans. (c) R3 = {(1, a), (1, b), (2, c), (3, d)}

Explanation:
*R*3 is not a function since 1 ∈ A has two images a, b ∈ B. *R*1 and *R*2 are functions since in these relations, every element of A has a unique image in B.

Q4. 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. State whether

(a) f is one-one only
(b) f is onto only
(c) f is one one and onto both
(d) none of these

Ans. (a) f is one-one only

Explanation:
Here, f : A ⟶ B is defined as {(1, 4), (2, 5), (3, 6)}.
Since the images of distinct elements of A under f are distinct as :
f(1) = 4, f(2) = 5 and f(3) = 6
From above it is evident that $x_1 \neq x_2$ and $f(x_1) \neq f(x_2)$ i.e. $x_1 = x_2$ and $f(x_1) = f(x_2)$.
f : A ⟶ B is one-one.

Therefore, f is one-one only.

Q5. The number of all possible matrices of order 2 × 3 with each entry 1 or 2 is:

(a) 64
(b) 12
(c) 36
(d) 28

Ans. (a) 64
Explanation:
In a 2 X 3 matrix, the number of elements is 6.
Each place could have 2 elements.
Total possible outcomes = 2 x 2 x 2 x 2 x 2 = 64

Q6. If A and B are symmetric matrices of the same order, then (AB– BA) is a:

(a) Skew symmetric matrix
(b) Null matrix
(c) Symmetric matrix
(d) None of these

Ans. (a) Skew symmetric matrix

Explanation:
Since A and B are symmetric matrices such that A′ = A and B′ = B
(AB - BA)′ = (AB)′ - (BA)′
= B′A′ - A′B′
= BA - AB
= - (AB - BA)
Hence, (AB– BA) is a skew symmetric matrix.

Q7. What are the possible orders if a matrix has 28 elements?

(a) 5 (b) 6 (c) 4 (d) 7

Ans: (b) 6

Explanation:
The possible orders are
1 x 28, 2 x 14, 4 x 7, 7 x 4, 14 x 2, 28 x 1.

Q8. If A is a square matrix, then A – A’ is a

(a) Skew-symmetric matrix

(b) Symmetric matrix

(c) Diagonal matrix

(d) None of these

Ans: (a) Skew-symmetric matrix

Explanation: It is given that A is a square matrix

Now transpose of A - A’

(A - A’)’

A’-(A’)’

A’- A = -(A – A’)

It is skew symmetric

INSTRUCTIONS FOR Q9 AND Q10

The following questions consist of two statements – Assertions (A) and Reason(R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is the correct explanation for A

(b) Both A and R are true and R is not the correct explanation for A

(c) A is true but R is false

(d) A is false but R is true

Q9. Assertion (A): Every identity function is one-one and onto.
Reason (R): An identity function maps each element to itself.

Ans. Option (a) is correct.
Explanation: The identity function satisfies both injectivity (one-one) and surjectivity (onto), and the reason correctly supports this.

Q10. Assertion: $\sin^{-1}(\sin 2\pi/3) = \pi/3$

Reason: $\sin^{-1} (\sin \theta) = \theta$, $when\ \theta$ ϵ [- π/2, π/2]

Ans. Option (a) is correct.

Explanation: The principal branch of $\sin^{-1}$ is [- π/2, π/2], and π/3 ϵ [- π/2, π/2]