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1st Periodic Assessment (2024-2025)

Class:- 12   **Subject: Mathematics**
Time:- 2 Hours   Total :- 50 Marks

Name of the student :   Roll: Stream:

General instructions :

- This question paper contain 5 sections A, B, C and D.
- Section A contain 15 question each carry 1 marks.
- Section B contain 5 question each carries 2 marks.
- Section C contain 5 question each carries 3 marks.
- Section D contain 2 question each carries 5 marks.

SECTION:- A   **1 x 15 = 15**

1. A and B any two sets such that n(A)=3 n(B)=2, then the number of relation from A to B is –

   (i) 6   (ii) 2^6 (iii) 16   (iv) 2^3

2. Let R be the relation in the Set N given by   R={$(a,b): a = b - 2, b > 6$}

   Choose the correct answer

   (i) $(2,4) \in$ R   (ii) $(3,8) \in$ R   (iii) $(6,8) \in$ R   (iv) $(8,7) \in$ R

3. A function f: x→y is one one if $f(x_1) = f(x_2), \forall x_1, x_2 \in$ X, then

   (i) $x_1 > x_2$ (ii) $x_1 \neq x_2$ (iii) $x_1 = x_2$ (iv) $x_2 > x_1$

4. Let f: R → R be defined as f(x)=3x then choose the correct answer
   (i) f is one one onto   (ii) f is many one onto
   (iii) f is one one but not onto   (iv) f is neither one one nor onto

5. Let R be the relation in the set {1,2,3,4} given by R={$(1,2),(2,2),(1,1),(4,4),(1,3),(3,3),(3,1)$}
   Choose the correct answer
   (i) R is reflexive and symmetric but not transitive
   (ii) R is reflexive and transitive but not symmetric
   (iii) R is symmetric and transitive but not reflexive
   (iv) R is equivalence relation

6. A is orthogonal matrix, then choose the correct answer-

   (i) A is zero matrix   (ii) $A.A^T=I$ (iii) $A^{-1}=A$ (iv) $|A| = 0$

7. A = $\begin{bmatrix} 2 & 5 \\ 4 & x \end{bmatrix}$, A is singular matrix, then the value of x is

   (i) 2   (ii) 0   (iii) 10   (iv) -10

8. If $\begin{bmatrix} x+y & 3 \\ 5 & y \end{bmatrix}$ = $\begin{bmatrix} 10 & 3 \\ 5 & 6 \end{bmatrix}$, then the value of x is –

   (i)10   (ii) 5   (iii) 4   (iv) -4

9. A = $\left[a_{ij}\right]_{m \times n}$ is a square matrix if

   (i) m<n   (ii) m>n   (iii) m=n   (iv) m≠n

10. A is a matrix of order $2 \times p$, and B is a matrix of order 3×5, If $A \times B$ is possible then the value of p is

   (i) 3   (ii) 2   (iii) 5   (iv) 6

11. If A is a square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to

$\quad$ (i) A $\qquad\qquad$ (ii) I-A $\qquad\qquad$ (iii) I $\qquad\qquad$ (iv) 3A

12. The value of the $\begin{vmatrix} \cos \propto & -\sin \propto \\ \sin \propto & \cos \propto \end{vmatrix}$ is

$\quad$ (i) 0 $\qquad\qquad$ (ii) 1 $\qquad\qquad$ (iii) $\cos^2 \propto$ $\qquad\qquad$ (iv) $2\sin^2 \propto$

13. $\quad$ The principal value of $\sin^{-1}\left(\frac{-1}{2}\right)$ is

$\qquad$ (i) $\frac{\pi}{6}$ $\qquad\qquad$ (ii) $\frac{\pi}{3}$ $\qquad\qquad$ (iii) $\frac{-\pi}{6}$ $\qquad\qquad$ (iv) None of these

14. $\quad tan^{-1} \sqrt{3} - \cot(-\sqrt{3})$ is equal to –

$\qquad$ (i) π $\qquad\qquad$ (ii) $\frac{-\pi}{2}$ $\qquad\qquad$ (iii) 0 $\qquad\qquad$ (iv) $2\sqrt{3}$

15. $\quad cos^{-1} \cos\left(\frac{7\pi}{2}\right)$ is equal to

$\qquad$ (i) 7π $\qquad\qquad$ (ii) $\frac{5\pi}{6}$ $\qquad\qquad$ (iii) $\frac{\pi}{3}$ $\qquad\qquad$ (iv) $\frac{\pi}{6}$

SECTION:- B

2 x 5 = 10

16. Prove that $cos^{-1}\frac{4}{5} + cos^{-1}\frac{12}{13} = cos^{-1}\left(\frac{33}{65}\right)$

17. If A = $[1\ 2\ 3\ 4]$ and B = $\begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$, find BA (if exist).

18. Find the value of k for which the function f defined as

$$f(x) = \begin{cases} \frac{1-\cos kx}{x\sin x}, & x \neq 0 \\ \frac{1}{2}, & x = 0 \end{cases} \text{ is continuous at x=0.}$$

19. $\quad$ A = $\begin{vmatrix} 2 & 3 & 5 \\ 6 & x & y \\ 7 & 8 & 0 \end{vmatrix}$, find the cofactor of x and y.

20. Let R = $\{(x, y): x + 2y = 8\}$ be a relation on N find the range and dom R.

SECTION:- C

3 x 5 = 15

21. Evaluate $\begin{vmatrix} a + ib & c + id \\ -c + id & a - ib \end{vmatrix}$

22. Prove that $tan^{-1}\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}} = \frac{\pi}{4} - \frac{1}{2}cos^{-1}x$

23. If A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I = 0$

24. Consider the function f: $R^+ \rightarrow [-9, \infty)$ given by $f(x) = 5x^2 + 6x - 9$. Prove that f is invertible function.

25. Show that A = $\begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ is orthogonal matrix.

SECTION : D

5 x 2 = 10

26. Show that the relation G defined on R to R given by G = $\{(a, b) : a - b \text{ is even}\}$ is an equivalence relation.
27. Solve the equation by matrix method :
$$x - y + 2z = 1, \qquad\qquad 2y - 3z = 1, \qquad\qquad 3x - 2y + 4z = 2$$