

FIRST QUARTERLY TEST AUGUST 2024

CLASS : II PUC

SUBJECT : MATHEMATICS (35)

Max. Marks : 40

TIME : 1 Hr. 30 Mins.

PART - A

I Answer All the Multiple Choice Questions :

7x1=7

- 1) Let R be the relation in the set N given by $R = \{(a, b) : a = b-2, b > 6\}$ choose the correct answer.
A) $(2, 4) \in R$ B) $(3, 8) \in R$ C) $(6, 8) \in R$ D) $(8, 7) \in R$
- 2) In a relation R on the set $\{1, 2, 3\}$ given by $R = \{(1, 2) (2, 1)\}$ is
A) Reflexive B) Symmetric C) Transitive D) Equivalence relation
- 3) If $f: R \rightarrow R$ be given by $f(x) = 3x$ then f is
A) one-one and onto. B) many-one and onto.
C) one-one but not onto. D) neither one-one nor onto.
- 4) The number of all possible matrices of order 3×3 with each entry 0 or 1 is
A) 27 B) 8 C) 81 D) 512
- 5) $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$ is equal to
A) π B) $-\pi/3$ C) $\pi/3$ D) $2\pi/3$
- 6) If $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$ then the value of x is
A) 2 B) 4 C) 8 D) $\pm 2\sqrt{2}$
- 7) The derivative of $\sin(ax + b)$ with respect to x is
A) $\cos(ax + b)$ B) $a \sin(ax + b)$ C) $a \cos(ax + b)$ D) $-\cos(ax + b)$

II Answer the following questions by choosing the correct answers in the brackets: 3x1=3

- $\left[-1, \frac{\pi}{2}, 1, 0\right]$
- 8) The principal value of $\sin^{-1}(1)$ is _____.
 - 9) If A is a singular matrix then $|A|$ is _____.
 - 10) If $x - y = \pi$ then $\frac{dy}{dx} =$ _____.

PART-B

III Answer any THREE questions :

3x2=6

- 11) If $f: R \rightarrow R$ and $g: R \rightarrow R$ are given by $f(x) = \cos x$ and $g(x) = 3x^2$ find $\text{gof}(x)$ and $\text{fog}(x)$.
- 12) Prove that $2\sin^{-1}x = \sin^{-1}(2x\sqrt{1-x^2})$, $\frac{-1}{\sqrt{2}} \leq x \leq \frac{1}{\sqrt{2}}$.
- 13) Find the equation of line joining (3, 1) and (9, 3) using determinants.
- 14) If $x^2 + xy + y^2 = 100$ find $\frac{dy}{dx}$.
- 15) Find $\frac{dy}{dx}$ if $y = x^{\sin x}$ when $x > 0$.

(P.T.O.)

PART-C

IV Answer any THREE questions :

3x3=9

- 16) Show that the relation R in the set $A = \{1, 2, 3, 4, 5\}$ given by $R = \{(a, b) : |a-b| \text{ is Even}\}$ is equivalence relation.

- 17) Write in the simplest form $\tan^{-1} \left(\frac{\sqrt{1+x^2}-1}{x} \right)$, $x \neq 0$.

- 18) Express $A = \begin{bmatrix} 1 & 5 \\ -1 & 2 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrix.

- 19) Find the value of k, so that the function, $f(x) = \begin{cases} kx^2 & \text{if } x \leq 2 \\ 3 & \text{if } x > 2 \end{cases}$ is continuous at $x = 2$.

- 20) Find $\frac{dy}{dx}$ if $x = a(\theta - \sin \theta)$, $y = a(1 + \cos \theta)$

PART-D

VI Answer any THREE questions :

5x3=15

- 21) Let $f : N \rightarrow Y$ be a function defined as $f(x) = 4x + 3$, where $Y = \{y \in N : y = 4x + 3, \text{ for some } x \in N\}$ show that f is invertible. Find the inverse of f.

- 22) If $A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 2 & 1 \end{bmatrix}$. Verify that $(AB)' = B'A'$.

- 23) Solve by matrix method :

$$x - y + z = 4, \quad 2x + y - 3z = 0, \quad x + y + z = 2.$$

- 24) If $y = (\tan^{-1} x)^2$ show that $(1+x^2)^2 \frac{d^2y}{dx^2} + 2x(1+x^2) \frac{dy}{dx} = 2$.

- 25) Show that the matrix $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ satisfy the equation $A^2 - 4A + I = 0$. Where I is the identity

matrix of order 2 and 0 is the zero matrix of order 2 using this equation find A^{-1} .
