B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

PRE MID TERM EXAMINATION 2025-26
MATHEMATICS

Class: XII A **Time: 1hr**
Date: 06/08/25 **Max Marks: 25**
Admission no: **Roll no:**

General Instructions:
Question 1 to 5 carries ONE mark each. Questions 6 to 9 carries TWO marks each.
Questions 10 to 13 carries THREE marks each.

---

1. The function f(x) = $\frac{4-x^2}{4x-x^3}$

(A) Discontinuous at only one point

(B) Discontinuous exactly at two points.

(C) Discontinuous at exactly three points.

(D) None of these

2 If x= a$\cos\theta$, y= a$\sin\theta$, then $\frac{dy}{dx}$ at $\theta=\frac{\pi}{4}$.

(A) 1 (B) 0 (C) -1 (D) None of these

3 If y= $1+e^{3x}$, find $\frac{d^2y}{dx^2}$

(A) 0 (B) $6e^{3x}$ (C) $9e^{3x}$ (D) None of these

4 If $x=t^2$ and $y= t^3$ then $\frac{d^2y}{dx^2}$

(A) 3/2 (B) 3/4t (C) 3/2t (D) 3/4

Assertion and Reasoning questions: In the following two questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

5 Assertion (A): The function f(x) = $e^{-|x|}$ continuous for all x.
Reason (R): f(x) = $e^{-|x|}$ is differentiable for all x.

6 Determine the value of 'k' for which the following function is continuous at x=3 , f(x)= $\begin{cases} \frac{(x)^2-9}{x-3}, & x \neq 3 \\ k, & x = 3 \end{cases}$.

7 If xy =1, Prove that $\frac{dy}{dx}$ +y^2 = 0

8 Differentiate $(\sin x)^{\cos x}$ with respect to x.

9 The volume of a cube is increasing at a constant rate. Prove that the increase in Surface area varies inversely as the length of the edge of the cube.

10 If the function f(x), given by f(x) = $\begin{cases} 3ax+b, if\ x>1 \\ 11, \quad if\ x=1 \\ 5ax-2b, if\ x<1 \end{cases}$ is continuous at x=1.

11 If $x^2+2xy+y^2$ =42, find $\frac{dy}{dx}$.

12 If y= $\sin^{-1}x$, show that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$.

13 Find the intervals in the function f(x) = $2x^3+9x^2+12x+20$, (i) increasing, (ii) decreasing.

****