BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL

PREMID TERM EXAMINATION (2024-25)

MATHEMATICS (041)

Class: XII Science
Date: 01/08/24
Admission Number: _____

Duration: 1 Hour
Max. Marks: 25
Roll number: ____

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) = $e^{|x|}$

(A) Continuous everywhere but not differentiable at x=0

(B) Continuous and differentiable everywhere

(C) not continuous at x=0

(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^x, find $\frac{d^2y}{dx^2}$

(A) 0 (B) e^x (C) e^{-x} (D) None of these

4 Function f(x) = a^x is increasing on R, if

(A) a> 0 (B) a< 0 (C) 0< a < 1 (D) a> 1

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 $|log_e x|$ and $\log_e x$ are both continuous for all x.
Reason (R): Continuity of $|f(x)| \Rightarrow$ continuity of f(x).

6 Find all the points of discontinuity of f(x), where f(x) is defined by f(x) = $\begin{cases} x+1\,, if\ x \geq 1 \\ x^2+1, if\ x < 1 \end{cases}$.

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

8 Differentiate $x^{sin^{-1}x}$ with respect to x.

9 The radius of a circle is increasing at the rate of 0.5cm/sec. Find the rate of increase of its Circumference.

10 Determine the value of 'k' for which the following function is continuous at x=3

f(x)= $\begin{cases} \frac{(x+3)^2-36}{x-3}, & x \neq 3 \\ k, & x = 3 \end{cases}$.

11 Differentiate $\cot^{-1}\left(\frac{3-2tanx}{2+3tanx}\right)$ w.r.t. x.

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

13 Find the smallest value of polynomial x^3-18x^2+96x in [0,9]

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