B.K. BIRLA CENTRE FOR EDUCATION

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

PRE MID TERM 2025-26
APPLIED MATHEMATICS

Class: XII | **Time: 1hr**
Date: 02/08/25 | **Max Marks: 25**
Admission no: | **Roll no:**

General Instructions:

1. This Question Paper has 4 Sections A, B, C and D.
2. Section A has 5 MCQs carrying 1 mark each
3. Section B has 2 questions carrying 02 marks each.
4. Section C has 2 questions carrying 03 marks each.
5. Section D has 2 questions carrying 05 marks each.
6. All Questions are compulsory.

SECTION A

1. Derivative of x^x w.r.t x is **1m**
(a) $x^x(1-\log x)$ (b) $x^x(\log x-1)$ (c) $x^x(2+\log x)$ (d) None of these

2. Derivative of log x w.r.t 1/x is **1m**
(a) $-1/x^3$ (b) $-1/x$ (c) $-x$ (d) None of these

3. If x is real, the minimum value of $x^2-8x+17$ is **1m**
(a) -1 (b) 0 (c) 1 (d) None of these

4. The maximum slope of the curve $y = -x^3+3x^2+ 9x -27$ is **1m**
(a) 0 (b) 12 (c) 16 (d) None of these

5. The function $f(x) = a^x$ is increasing on R if **1m**
(a) $a > 0$ (b) $a < 0$ (c) $0 < a < 1$ (d) $a > 1$

SECTION B

6. If $y = x^x$, prove that $y'' - (y')^2 \frac{1}{y} - \frac{y}{x} = 0$ **2m**

7. Find the absolute maximum and the absolute minimum values of the function $f(x) =(x-1)^2 + 3$ in $[-3,1]$, also find the points of absolute maxima and minima **2m**

SECTION C

8. **Differentiate $\frac{x^3}{1-x^3}$ $w.r.t$ x^3** **3m**

9. **Find the intervals in which the following function is strictly increasing or strictly decreasing.** **3m**
$f(x) = 10 - 6x - 2x^2$

SECTION D

10. **(a) If $x^y = y^x$, prove that $y' = \frac{y(xlogy-y)}{x(ylogx-x)}$.** **5m**
(b) Find the second order derivative of $x^3 logx$.

11. **(a) The side of an equilateral triangle is increasing at the rate of 2cm per second .At what rate its area increasing when the side of the triangle is 20 cm?** **5m**
(b) It is known that cost of producing 100 units of a commodity is Rs. 250 and the cost of producing 200 units is Rs. 300.Assuming that AVC is constant, Find the cost function.

******BEST OF LUCK******