



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-MARKING SCHEME

Class: XII
Date: 02/08/25
Admission no:

Time: 1hr
Max Marks: 25
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
(a) $x^x(1-\log x)$ (b) $x^x(\log x-1)$ (c) $x^x(2+\log x)$ (d) None of these 1m
2. Derivative of $\log x$ w.r.t $1/x$ is
(a) $-1/x^3$ (b) $-1/x$ (c) $-x$ (d) None of these 1m
3. If x is real, the minimum value of $x^2-8x+17$ is
(a) -1 (b) 0 (c) 1 (d) None of these 1m
4. The maximum slope of the curve $y = -x^3+3x^2+ 9x -27$ is
(a) 0 (b) 12 (c) 16 (d) None of these 1m
5. The function $f(x) = a^x$ is increasing on \mathbb{R} if
(a) $a > 0$ (b) $a < 0$ (c) $0 < a < 1$ (d) $a > 1$ 1m

SECTION B

6. If $y = x^x$, prove that $y'' - (y')^2 \frac{1}{y} - \frac{y}{x} = 0$ 2m
- A:- ... $y' = y(1+\log x)$... 1m
... $y'' = y/x + 1/y \cdot y' \cdot y'$ 1m
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

A:-	Maximum value: 19	
	Minimum value: -39	1m
	Point of maxima: x = -3	
	Point of minima: x = 1	1m

SECTION C

8.	Differentiate $\frac{x^3}{1-x^3}$ w.r. to x^3	3m
A:-	$y' = 3x^2 / (1-x^2)^2 \dots$	1m
	$z' = 3x^2$	1m
	$y'/z' = 1/(1-x^3)^2$	1m
9.	Find the intervals in which the following function is strictly increasing or strictly decreasing. $f(x) = 10 - 6x - 2x^2$	3m
A:-	$x = -3/2$	1m
	f is strictly decreasing in $\left[-\frac{3}{2}, \infty\right)$	2m

SECTION D

10.	(a) If $x^y = y^x$, prove that $y' = \frac{y(x \log y - y)}{x(y \log x - x)}$.	5m
	(b) Find the second order derivative of $x^3 \log x$.	
A:-	(a) $(\log x - x/y)y' = \log y - y/x$	1m
 $y' = \frac{y(x \log y - y)}{x(y \log x - x)}$.	2m
	(b) $y' = x^2(1 + 3 \log x)$	1m
	$y'' = x(5 + 6 \log x)$	1m
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	
A:-	(a) $A' = \sqrt{3}/2 a \, da/dt$	1m
	$dA/dt = 20\sqrt{3} \text{ cm}^2/\text{sec}$	1m
	(b) $a + 100b = 250, a + 200b = 300$	1m
 $c(x) = 200 + 1/2x$	2m

****BEST OF LUCK****