



B.K. BIRLA CENTRE FOR EDUCATION

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

PERIODIC TEST-2, 2025-26 APPLIED MATHEMATICS

Marking key

Class: XI B
Date: 10 /11/25
Admission no:

Time: 1hr
Max Marks: 25
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.

- $\lim_{x \rightarrow 1} \frac{x^m - 1}{x^n - 1}$ is equal to :
a) 1 b) m/n c) -m/n d) m²/m²
- The value of $\lim_{x \rightarrow 0^+} [x]$:
a) -1 b) 0 c) 1 d) does not exist
- The number of points of discontinuity of f defined by $f(x) = |x| - |x - 1|$:
a) 1 b) -1 c) R d) No point of discontinuity
- The derivative of e^{x^2} :
a) $2xe^{x^2}$ b) xe^x c) e^{x^2} d) $-2xe^x$
- If $f(x) = 1 + x + \frac{x^2}{2} + \dots + \frac{x^{100}}{100}$, then find $f'(1)$ is equal to:
a) 50 b) 100 c) 200 d) 400

6. Find the limit of $\lim_{x \rightarrow 1/2} \frac{4x^2 - 1}{2x - 1}$.

Sol: By using the formula: $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$.

$$2.2(1/2)^{2-1} = 2.1 = 2.$$

7. Determine whether the following limit exist: $\lim_{x \rightarrow 0} \frac{x}{|x|}$.

Sol: LHL = -1, RHL = 1, Now, LHL \neq RHL

Hence limit does not exist.

8. If $f(x) = x^2 - 9x + 20$, find $f'(x)$ and hence find $f'(22)$.

Sol: $f'(x) = 2x - 9$

$$f'(22) = 2 \times 22 - 9 = 44 - 9 = 35.$$

9. Find the derivative of the following: $(2x+3)\sqrt{x}$.

Sol: By using the product rule:

$$f'(x) = 2(\sqrt{x}) + (2x+3)\left(\frac{1}{2\sqrt{x}}\right) = \frac{3(2x+1)}{2\sqrt{x}}$$

10. If $y = \sqrt{x} - \frac{1}{\sqrt{x}}$, show that $2x \frac{dy}{dx} + y = 2\sqrt{x}$.

Sol: $\frac{dy}{dx} = \frac{1}{2\sqrt{x}} + \frac{1}{2x^{3/2}}$, LHS = $2x \frac{dy}{dx} + y = 2x \left(\frac{1}{2\sqrt{x}} + \frac{1}{2x^{3/2}}\right) + \sqrt{x} - \frac{1}{\sqrt{x}} = 2\sqrt{x} = \text{RHS}$

11. Differentiate the following w.r.t.x $\log(e^{mx} + e^{-mx})$.

Sol: $\frac{dy}{dx} = \frac{1}{e^{mx} + e^{-mx}} [me^{mx} + (-m)e^{-mx}]$

$$= \frac{me^{mx} - me^{-mx}}{e^{mx} + e^{-mx}}$$

12. Evaluate : $\lim_{x \rightarrow 4} \frac{3 - \sqrt{5+x}}{1 - \sqrt{5-x}}$.

Sol: By using the concept of rationalisation, we have

$$\lim_{x \rightarrow 4} (-1) \frac{1 + \sqrt{5-x}}{3 + \sqrt{5+x}} = -\frac{2}{6} = -1/3$$

13. If $\lim_{x \rightarrow -a} \frac{x^9 + a^9}{x+a} = 9$, find the values of a.

Sol: $\lim_{x \rightarrow -a} \frac{x^9 - (-a)^9}{x - (-a)} = 9$

$$9(-a)^8 = 9$$

$$(-a)^8 = 1$$

$$(a)^8 = 1$$

$$a = \pm 1$$

