Model Question Paper

Differential Calculus Part I - Part V

12th Standard

Maths

Reg.No. : | | | | | | |

I.Answer all questions.

II.Use blue pen only.

Time : 01:00:00 Hrs

Total Marks : 85

Section-A

5 x 1 = 5

1) $\lim_{x \to a} \frac{x}{tanx}$ is

(a) 1 (b) -1 (c) 0 (d) ∞

2) f is a real valued function defined on an interval $I \subset R$ (R being the set of real numbers) increased on I. Then

(a) $f(x_1) \leq f(x_2)$ whenever $x_1 < x_2 \quad x_1, x_2 \in I$ (b) $f(x_1) \geq f(x_2)$ whenever $x_1 > x_2 \quad x_1, x_2 \in I$

(c) $f(x_1) \leq f(x_2)$ whenever $x_1 > x_2 \quad x_1, x_2 \in I$ (d) $f(x_1) > f(x_2)$ whenever $x_1 > x_2 \quad x_1, x_2 \in I$

3) If a real valued differentiable function $y = f(x)$ defined on an open interval I is increasing then

(a) $\frac{dy}{dx} > 0$ (b) $\frac{dy}{dx} \geq 0$ (c) $\frac{dy}{dx} < 0$ (d) $\frac{dy}{dx} \leq 0$

4) The function $f(x) = x^3$ has

(a) absolute maximum (b) absolute minimum (c) local maximum (d) no extrema

5) If f has a local extremum at a and if f ' (a) exists then

(a) f ' (a) < 0 (b) f ' (a) > 0 (c) f ' (a) = 0 (d) f " (a) = 0

Section-B

6 x 6 = 36

6) Using Rolle's theorem find the points on the curve $y = x^2 + 1, -2 \leq x \leq 2$ where the tangent is parallel to x – axis.

7) Determine where the curve $y = x^3 - 3x + 1$ is concave upward and where it is concave downward. Also find the inflection points.

8) Find the equation of the tangent and normal to the curves $y = x - \sin x \cos x, \quad at \quad x = \frac{\pi}{2}$

9) Find the equation of the tangent and normal to the curves $y = 2 \sin^2 3x \quad at \quad x = \frac{\pi}{6}$

10) Find the equation of the tangent and normal to the curves $y = \frac{1+\sin x}{\cos x} \quad at \quad x = \frac{\pi}{4}$

11) Evaluate the limit for the following if exists . $\lim_{x \to 0} (\cos x)^{1/x}$

Section-C

5 x 10 = 50

12) Evaluate: $\lim_{x \to \pi/2^-} (tan\ x)^{cosx}$

13) Find the intervals of concavity and the points of inflection of the following functions : $f(\theta) = sin2\theta \quad in \quad (0, \pi)$

14) Obtain the Maclaurin's series expansion for $tan\ x, \frac{-\pi}{2} < x < \frac{\pi}{2}$

15) a) Find the local minimum and maximum values of $f(x) = 2x^3 + 3x^2 - 36x + 10$

(OR)

b) Find the equations of the tangent and normal to the ellipse x=a cosθ, y=b sinθ at the point $\theta = \frac{\pi}{4}$

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