Model Question Paper

Differential Calculus Part I - Part II

12th Standard

Maths

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

I.Answer all questions.

II.Use blue pen only.

Time : 01:00:00 Hrs

Total Marks : 100

Section-A

3 x 1 = 3

1) A spherical snowball is melting in such a way that its volume is decreasing at a rate of 1 cm^3 /min. The rate at which the diameter is decreasing when the diameter is 10cms is

   (a) $\frac{-1}{50\pi}$ cm /min (b) $\frac{1}{50\pi}$ cm/min (c) $\frac{-11}{75\pi}$ cm/min (d) $\frac{-2}{75\pi}$ cm/min

2) The slope of the tangent to the curve $y = 3x^2 + 3\sin x$ at x = 0 is

   (a) 3 (b) 2 (c) 1 (d) -1

3) The slope of the normal to the curve $y = 3x^2$ at the point whose x coordinate is 2 is

   (a) 1/13 (b) 1/14 (c) -1/12 (d) 1/12

Section-B

6 x 3 = 18

4) Obtain the Maclaurin's Series expansion for: e^{2x}

5) Evaluate: $\lim_{x\to\infty} \frac{x^2}{e^x}$

6) Evaluate the limit for the following if exists. $\lim_{x\to\infty} \frac{\log_e x}{x}$

7) Prove that e^x is strictly increasing function on R.

8) Prove that log x is strictly increasing function on $(0, \infty)$

9) Which of the following functions are increasing or decreasing on the interval given e^{-x} on $[0, 1]$

Section-C

4 x 6 = 24

10) Apply Rolle's theorem to find points on curve $y = -1 + \cos x$, where the tangent is parallel to x – axis in $[0, 2\pi]$.

11) Verify Lagrange's law of the mean for $f(x) = x^3$ on $[-2, 2]$

12) A cylindrical hole 4mm in diameter and 12 mm deep in a metal block is rebored to increase the diameter to 4.12 mm. Estimate the amount of metal removed.

13) Suppose that $f(0) = -3$ and $f'(x) \leq 5$ for all values of x, how large can $f(2)$ possibly be?

Section-D

3 x 10 = 30

14) Prove that the sum of the intercepts on the co-ordinate axes of any tangent to the curve $x = acos^4\theta, y = asin^4\theta, 0 \leq \theta \leq \frac{\pi}{2}$ is equal to a.

15) a) Find the absolute maximum and absolute minimum values of $f(x) = x - 2sinx, 0 \leq x \leq 2\pi$.

(OR)

b) Find the local minimum and maximum values of $f(x) = x^4 - 3x^3 + 3x^2 - x$.

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