Model Question Paper

Differetial Calculus Part II - Part II

12th Standard

Maths

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

I.Answer all questions.

II.Use blue pen only.

Time : 01:00:00 Hrs

Total Marks : 85

Section-A

3 x 1 = 3

1) If $x = r\cos\theta, y = r\sin\theta \quad , \quad then \quad \frac{\partial r}{\partial x}$ is equal to

(a) $\sec\theta$ (b) $\sin\theta$ (c) $\cos\theta$ (d) $cosec\theta$

2) Identify the true statements in the following (i). if a curve is symmetrical about the origin, then it is symmetrical about both axes. (ii). if a curve is symmetrical about the both the axes, then it is symmetrical about the origin. (iii). A curve $f(x, y) = 0$ is symmetrical about the line $y = x$ if $f(x, y) = f(y, x)$. (iv). for the curve $f(x, y) = 0$,,if $f(x, y) = f(-y, -x)$then it is symmetrical about the origin.

(a) $(ii), (iii)$ (b) $(i), (iv)$ (c) $(i), (iii)$ (d) $(ii), (iv)$

3) If $u = \log\left(\frac{x^2+y^2}{xy}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is

(a) 0 (b) u (c) $2u$ (d) u^{-1}

Section-B

3 x 3 = 9

4) Find the approximate change in the volume V of a cube of side x meters caused by increasing the side by 1%

5) Find the differential dy and evaluate dy for the given values of x and dx: $y = x^4 - 3x^3 + x - 1, x = 2, dx = 0.1$

6) Find the differential dy and evaluate dy for the given values of x and dx: $y = (x^2 + 5)^3, x = 1, dx = 0.05$

Section-C

5 x 6 = 30

7) Using Euler's theorem prove the following $u = xy^2 sin(\frac{x}{y})$show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3u$

8) Compute the values of Δy and dy if $y = f(x) = x^3 + x^2 - 2x + 1$where x changes (i) from 2 to 2.05 and (ii) from 2 to 2.01.

9) Use differentials to find an approximate value for $\sqrt[3]{65}$.

10) The time of swing T of a pendulum is given by $T = k\sqrt{\ell}$ where k is a constant. Determine the percentage error in the time of swing if the length of the pendulum / changes from $32.1cm$ to $32.0cm$.

11) A circular template has a radius of $10cm$ (± 0.02) Determine the possible error in calculating the area of the templates. Find also the percentage error.

Section-D

5 x 10 = 50

12) Trace the following curve: $y = x^3$

13) Verify Euler's theorem for $f(x, y) = \frac{1}{\sqrt{x^2+y^2}}$ $(x^2 + y^2)^{-1/2}$

14) Prove $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{1}{2}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)\cos\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ if $u = \sin\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$

15) a) Verify $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$ for the function $u = sin[\frac{x}{y}]$

(OR)

b) Verify $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$ where $u = \frac{x^2}{y} - \frac{2y^2}{x}$

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