Model Question Paper

Differetial Calculus Part II - Part III

12th Standard

Maths

Reg.No. :

I.Answer all questions.

II.Use blue pen only.

Time : 01:30:00 Hrs

Total Marks : 90

Section-A

3 x 1 = 3

1) If $u = f\left(\frac{y}{x}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to

   (a) 0 (b) 1 (c) $2u$ (d) u

2) The curve $9y^2 = x^2\left(4 - x^2\right)$ is symmetrical about.

   (a) y axis (b) x axis (c) $y = x$ (d) both the axes

3) The curve $ay^2 = x^2\left(3a - x\right)$ cuts the y axis at.

   (a) $x = -3a, x = 0$ (b) $x = 0, x = 3a$ (c) $x = 0, x = a$ (d) $x = 0$

Section-B

3 x 3 = 9

4) Find the differential dy and evaluate dy for the given values of x and dx: $y = \sqrt{1 - x}, x = 0, dx = 0.02$

5) Find the differential dy and evaluate dy for the given values of x and dx: $y = cosx, x = \frac{\pi}{6}\ dx = 0.05$

6) $u = e^{\frac{x}{y}}\ \sin\frac{x}{y} + e^{\frac{y}{x}}\cos\frac{y}{x}$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 0$

Section-C

6 x 6 = 36

7) if u is a homogeneous function of $x$and y of degree n, prove that $x\frac{\partial^2 u}{\partial x^2} + y\frac{\partial^2 u}{\partial x \partial y} = (n-1)\frac{\partial u}{\partial x}$

8) if $V = ze^{ax+by}$and z is a homogenous function of degree n in x and y prove that $x\frac{\partial V}{\partial x} + y\frac{\partial V}{\partial y} = (ax + by + n)V$

9) Use differentials to find an approximate value for the given number $\sqrt{36.1}$

10) Use differentials to find an approximate value for the given number $\frac{1}{10.1}$

11) Find $\frac{\partial w}{\partial u}$ and $\frac{\partial w}{\partial v}$ if $w = x^2 + y^2$ where $x = u^2 - v^2, y = 2uv$

12) Find $\frac{\partial w}{\partial u}$ and $\frac{\partial w}{\partial v}$ if $w = sin^{-1}xy$ where $x = u + v, y = u - v$

Section-D

4 x 10 = 40

13) Verify $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$ for $u = sin3xcos4y$

14) Verify $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$ for $u = tan^{-1}(\frac{x}{y})$

15) a) Verify Euler's theorem for $f\left(x, y\right) = \frac{1}{\sqrt{x^2 + y^2}}$

(OR)

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

****