

Reg. No. :

Name :

Second Semester B.A. Degree Examination, September 2023

First Degree Programme under CBCSS

Mathematics

Complementary Course For Economics

MM 1231.5 : MATHEMATICS FOR ECONOMICS – II
(2021 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions. These questions carry 1 mark each.

1. If $y = e^x$ then find $\frac{dy}{dx}$.
2. The derivative of a constant is _____.
3. If $y = \frac{1}{2}x + 1$, find $\frac{dy}{dx}$.
4. Find the derivative of $y = x^3 + 1$.
5. Find $\frac{dy}{dx}$ when $y = 2x^{5/2}$.
6. Define a concave upward curve.
7. Write the conditions for minimum value.
8. Find the slope of the tangent to the curve $y = x^2 + 4x + 7$ at $x = 1$.

33. (a) Find $\frac{dy}{dx}$ if $y = \frac{1-\sqrt{x}}{1+\sqrt{x}}$.

(b) If $xy^3 - x^3y = x$, find $\frac{dy}{dx}$.

34. (a) Find $\frac{dy}{dx}$ if $y = (4x^2 - 1)(7x^3 + x)$.

(b) Find $\frac{dy}{dx}$ if $y = \frac{x^3 + 2x^2 - 1}{x + 5}$.

35. (a) Find the maximum and minimum values of the function
 $y = 3x^4 - 10x^3 + 6x^2 + 5$.

(b) If $y = 5x^3 - 3x^2 + 11x + 15$, evaluate all derivatives at $x = 1$.

(2 × 15 = 30 Marks)

9. State product rule of differentiation.

10. Find the second order derivative of $y = x^5$.

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions. These questions carry **2** marks each.

11. If $y = \sqrt{6x}$, find $\frac{dy}{dx}$.

12. Find the derivative of $y = 5x^2 + 3x - 7$.

13. Find the derivative of $y = e^{5x}$.

14. Find $\frac{dy}{dx}$ if $y = \frac{1}{x^7}$.

15. If $y = \sqrt{3x - 2}$ find $\frac{dy}{dx}$.

16. Find $\frac{dy}{dx}$ if $y = 3x^4 + x^2 + 1$.

17. Find $\frac{dy}{dx}$ if $y = \frac{1}{\sqrt{x^2 + 1}}$.

18. Show that $y = \frac{1}{2x + 1}$ is a monotonically decreasing function.

19. Differentiate the functions $\frac{x^2 + 1}{x^2 + 1}$ with respect to x .

20. Find $\frac{dy}{dx}$, if $\sqrt{x} + \sqrt{y} = \sqrt{a}$.

21. Find the second order derivative of $y = 12x^3$.

22. Find the fourth order derivative of $y = 20x^4$.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. These questions carry **4** marks each.

23. If $y = (x - 1)(x - 2)$, find $\frac{dy}{dx}$.

24. Find $\frac{dy}{dx}$ if $y = \frac{2x + 1}{x - 1}$.

25. Find $\frac{dy}{dx}$ if $y = (4x^3 - 5x^2 + 1)^4$.

26. Find $\frac{dy}{dx}$ when $x^2 + y^2 + 2y = 15$.

27. Find $\frac{dy}{dx}$ if $y = (5x + 1)^{1/3}$.

28. If $y = x^4 + 4x^3 + 6x^2 + 4x + 10$, show that $\frac{dy}{dx} = 4(x + 1)^3$.

29. If $x^2 - y^3 = xy$, find $\frac{dy}{dx}$.

30. Find $\frac{dy}{dx}$ at (1,1) if $x^2 + y^2 + 4x + 6y + 10 = 0$.

31. Write all the derivatives of $y = x^4 - 3x^3 - 9x^2 + 11x + 15$.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. These questions carry **15** marks each.

32. (a) If $y = \sqrt{\frac{1-x}{1+x}}$, prove that $(1-x^2)\frac{dy}{dx} + y = 0$.

(b) If $y = (x^2 + 5)^{10} (5x + 8)^7$ find $\frac{dy}{dx}$.