

SECTION – IV

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

32. (a) If $f(x) = x^2$ and $g(x) = x^3$, find $(fog)(x)$ and $(gof)(x)$

(b) Is $(fog)(x) = (gof)(x)$ always? Justify.

(c) Find $f(2)$, where $f(x) = \frac{x^2 - 3x + 4}{x^2 + 5x + 9}$.

33. Given that total revenue $R(x) = 600x - 5x^2$ and total cost $C(x) = 100x + 10500$

(a) Express profit as a function of x

(b) Determine maximum level of profit

(c) Sketch the graph of profit function

34. Differentiate the following equations.

(a) $\frac{e^x \log x}{x^2}$

(b) $\sqrt{\frac{1+x}{1-2x}}$

(c) $x^3 + y^3 + 3xy = 0$

35. Find the inverse function of $y = \frac{2x-1}{x+1}$ and show that it is single-valued.

Represent it graphically and explain the behavior in the neighbourhood of $x = -1$ and $y = 2$.

(2 × 15 = 30 Marks)

(Pages : 4)

S – 2660

Reg. No. :

Name :

First Semester B.A. Degree Examination, January 2024

First Degree Programme under CBCSS

Mathematics

Complementary Course I for Economics

MM 1131.5 : MATHEMATICS FOR ECONOMICS – I

(2013 – 2020 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – I

All the first **10** questions are compulsory. They carry **1** mark each.

1. Define linear function.

2. If $f(x) = 2x + 1$ and $g(x) = 3x - 5$, find $f - g$.

3. Define equilibrium price.

4. $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = \dots\dots\dots$

5. Write an example of a continuous function.

6. Write the derivative of $\tan x$.

7. State quotient rule of differentiation.

8. Find $\frac{d}{dx} (x^3 + 4x^2)$.

9. If total cost is $ax^2 + bx + c$, find marginal cost.
10. When do we say that a function is differentiable at a point?

SECTION – II

(10 × 1 = 10 Marks)

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

11. Find the natural domain of $\frac{x+2}{x-3}$.
12. Graph the function $y = 2x - 1$.
13. If the linear demand function $Q = -8P + 425$, find the total revenue function for the producer.
14. If the total revenue and total cost functions are $R(x) = 60x$ and $C(x) = 35x + 450$, find the profit at $x = 70$.
15. Show that the marginal revenue can be expressed as $p + x \frac{dp}{dx}$.
16. Discuss the continuity of $\sqrt{16 - x^2}$.
17. Find $\lim_{x \rightarrow 5} \frac{7x^2 - 9x}{x + 8}$.
18. Find the derivative of $y = \frac{x^2}{x^3 + 1}$.
19. Find the critical points of $f(x) = 3x^3 - 54x^2 + 288x - 22$.
20. Find $\frac{dy}{dx}$ where $x = \sin t$ and $y = \tan t$.

21. Find $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$.

22. If x and y satisfy the equation $x^2 + y^2 = 1$, prove that $\frac{dy}{dx} = -\frac{x}{y}$.

(8 × 2 = 16 Marks)

SECTION – III

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

23. Find the value of k so that $f(x) = \begin{cases} x^2 - 3x, & \text{if } x \geq 2 \\ x + k, & \text{if } x < 2 \end{cases}$ is continuous.
24. Plot the curve $y = 2x^2$.
25. Solve $3x^2 - 35x + 22$.
26. Find $f + g$, $f - g$, fg and f/g , where $f(x) = 2x - 4$ and $g(x) = x - 2$.
27. Find equilibrium price and equilibrium quantity given Supply $Q = 5P + 10$ and Demand : $Q = -3P + 50$, using
(a) Equations
(b) Graphs.
28. Find the 4th derivative of e^{3x} .
29. If $f(x) = 4 + \frac{1}{1 + \frac{1}{1-x}}$, $0 < x < 1$, find $\lim_{x \rightarrow 1} f(x)$.
30. Examine the function $y = \frac{2-x}{2+x}$ from the point of view of continuity and illustrate it graphically.
31. If $f(x) = 5x^4 + 8x^3 + 7x^2$, find $f'(x)$, $f''(x)$, $f'''(x)$ and $f^{(4)}(x)$.

(6 × 4 = 24 Marks)