Reg. No. : ....

Name : ....

First Semester B.A. Degree Examination, November 2019

First Degree Programme Under CBCSS

Complementary Course I for Economics

MM 1131.5 : MATHEMATICS FOR ECONOMICS I

(2014 Admission onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – I

Answer **all ten** questions are compulsory:

1. Find the domain and range of $y = 2x + 3$.

2. What is $\lim\limits_{x \to 0} \dfrac{\sin x}{x}$?

3. Find $\lim\limits_{x \to 5} (2x + 3 + 3x^2)$

4. Define continuity of a function at a point x_0?

5. Find dy/dx if $y = x^5$

6. What is the derivative of constant?

7. State quotient rule for differentiation.

8. Find the derivative of 1/x.

9. Define the elasticity of demand η ?

10. Obtain a relationship between x and y if $x = t^2$ and $y = 2t$?

(10 × 1 = 10 Marks)

SECTION – II

Answer any **eight** questions.

11. If $(x) = 1 - x^2 + x^4$ then prove that $f(-x) = f(x)$.

12. Find $\displaystyle \lim_{x \to 1} \left[\frac{x^2 - 1}{x - 1} \right]$

13. Check the continuity of $f(x) = \begin{cases} x^2, x \neq 2 \\ 0, x = 2 \end{cases}$

14. Illustrate chain rile with a suitable example.

15. Find the second derivative of y with respect to .x if y= x^6+x^4+x.

16. If y=5 N+1, find dy/dx?

17. What is the relationship between marginal cost and average cost?

18. Discuss the continuity of the function $f(x) = 2 / x$?

19. If the total cost function is $\pi = 10 + 10q - 4q^2 + q^3$, then find the marginal cost and average cost?

20. For what values of k, the following function can be continuous?

$$f(x) = \begin{cases} k, x = 3 \\ \dfrac{x^2 - 9}{x - 3}, x \neq 3 \end{cases}$$

21. Find dy / dx if $y = \ln(3x^2 - 2x^3)$.

22. Find the domain of $y = (1 + x)/(1 - x)$.

(8 × 2 = 16 Marks)

H – 1956

SECTION – III

Answer **any six** questions.

23. Evaluate $f(x) = \dfrac{2x^2 - 7x + 6}{5x^2 - 11x + 2}$ when $x \to 2$.

24. If $f(x) = x^2$ and $g(x) = \sin x$ is $f \circ g(x) = g \circ f(x)$ for all x is R?

25. If $y = (3x^2 + 1)(x^3 + 2x)$, find $\dfrac{dy}{dx}$ using product rule.

26. Find $\dfrac{dy}{dx}$ in two different ways and very if $y = \dfrac{3x^2 + 1}{x}$.

27. The demand function of a monopolists is given by $p = 1500 - 2x - x^2$ find

    (a) the revenue function

    (b) the marginal revenue function when $x = 20$.

28. Discuss briefly the various cases of limits of $f(x)$ as $x \to \pm\infty$.

29. Show that the gradient of the demand curve is numerically equal to p/x at the output where the marginal revenue is zero.

30. Find dy/dx if $y = \dfrac{e^x \ln x}{x}$.

31. Differentiate

    (a) $y = \dfrac{x^3}{x^2 + 1}$

    (b) $y = (2x^2 - 1)\ln(2x^2 - 1)$.

(6 × 4 = 24 Marks)

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SECTION – IV

Answer **any two** questions.

32. (a) Find all points at which $f(x) = (x-7)/(x^2 - 1)$ is discontinuous.

   (b) Draw the graph of $f(x) = \dfrac{|x|}{x}, x \neq 0$. Is it continuous at $x = 0$?

   (c) Find $\lim\limits_{x \to 1} \dfrac{x-1}{\sqrt{x^2 + 3} - 2}$.

33. (a) If $f(x) = 5 - \dfrac{2}{1 + \dfrac{1}{1-x}}, x < 1$, find $\lim\limits_{x \to 1} f(x)$.

   (b) Differentiate between total revenue curve and marginal revenue curve.

   (c) For the curve $q = 10 - 2p - p^2$, find elasticity of demand η for $p = 4$.

34. (a) Find $\dfrac{dy}{dx}$ if $y = \sqrt{\dfrac{1+x}{1-2x}}$.

   (b) Find the third derivative of y with respect to x if $y = x^6 + x^4 + x$.

   (c) Find dy/dx if $x^2 + y^2 + 2x = 4y = 3$.

35. (a) If $f(x) = \dfrac{x^2 - 3x + 2}{x^2 - 2x - 4}$, express $f(2a)$ in terms of a.

   (b) From the function, $xy + 2x + y - 1 = 0$, find the limit of y as x tends to –1 and limit of x as y tends to 1, Is y a continuous function of x?

(2 × 15 = 30 Marks)