



MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :.....

Name :.....

First Semester B.A. Degree Examination, November 2016

First Degree Programme under CBCSS

Complementary Course: Mathematics – I (for Economics)

AUMM131.1a: Mathematics for Economics – I

(Common for **Regular** – 2016 Admn. and **Improvement** – 2015 Admn.)

Time: 3 Hours

Max. Marks: 80

SECTION – A

Answer ALL questions / problems in one or two sentences.

1. Write the general implicit quadratic function relating the variables x and y
2. If $f(x) = 2 - x^2$ and $g(x) = 2 + x^3$, evaluate $f(x) + g(x)$ at $x = -1$
3. Write the roots of the equation: $x^2 - x - 6 = 0$
4. Write: $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$
5. What is the derivative of 2^x with respect to x
6. Find the natural domain of the function: $f(x) = \sqrt{x - 1}$
7. Give an example of a function which is continuous but not differentiable at a point.
8. If the demand for certain commodity is given in the form: $D = \frac{a}{p+b} - c$, at what price would the demand be zero ?
9. Write the differential coefficient of $1 - x$ with respect to $1 + x$
10. Find $\frac{dy}{dx}$ if $x^2 + 4xy - y^2 = 2$

(10 × 1 = 10 Marks)

SECTION – B

Answer any EIGHT questions / problems, not exceeding a paragraph.

11. Obtain a relation between x and y when it is given that $x = at^2$ and $y = 2at$

P.T.O.

1639

12. Draw the graph of the cost function: $C = -3x + 1$
13. Define limit of a function.
14. Evaluate: $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1}$
15. Find the points of discontinuity of the function, $f(x) = \frac{2+x}{9-x^2}$
16. State quotient rule for differentiation.
17. Differentiate $(\log x)^x$ with respect to x
18. Find $\frac{dy}{dx}$ if $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$
19. Find $\frac{dy}{dx}$ if $x = t^2 - 2t + 2$ and $y = t^2 + 2t - 2$
20. If $y = \sqrt{x^2 + a^2}$, show that $y \frac{dy}{dx} - x = 0$
21. Differentiate $x^2 + \log x$ with respect to $x^2 + 4$
22. Find the marginal revenue function for the demand: $p = \sqrt{a - bx}$

(8 × 2 = 16 Marks)

SECTION – C

Short essay type problems : Answer any SIX questions.

23. Plot a graph of the function: $y = 5x - 2x^2$. Show that y has a greatest but no least value. Locate the greatest value as accurately as you can from the graph. Between what values of x is y positive?
24. Draw $f(x) = \log_e x$. What is its domain and range ? At which point will the curve touch the x -axis ?
25. Describe cost function and revenue function.
26. Evaluate: $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$
27. If the function given below is continuous at $x = 3$, find the value of k :
$$f(x) = \begin{cases} 3x - 5, & x < 3 \\ x + 1, & x > 3 \\ k, & x = 3 \end{cases}$$
28. Define the differentiability of a function.
29. If $xy = ae^x + be^{-x}$, show that $x \frac{dy}{dx} + xy + y = 2ae^x$

30. Find the point on the curve: $y = 3x^2 - 12x + 10$, where the tangent is parallel to the x-axis.
31. For the demand function, $p = \frac{a}{x+b}$, where a and b are positive constants, show that the demand increases from zero to infinitely large amount, as price decreases.

(6 × 4 = 24 Marks)

SECTION – D*Long essay type problems : Answer any TWO questions.*

32. a) Define continuity of a function in a closed interval $[a, b]$
 b) Examine the continuity of $f(x)$ at $x = a$, if

$$f(x) = \begin{cases} \frac{|x-a|}{x-a}, & x \neq a \\ 1, & x = a \end{cases}$$

33. a) Establish the geometrical meaning of derivative of a function.
 b) Find $\frac{dy}{dx}$ if $y = \sqrt{\frac{x^2+1}{(2x+2)(1-2x^3)}}$
34. a) It is given that $y = 1 + u^2$ and $u = 1 - x^2$. Find y as a function of x . Write down the derivatives of y with respect to u and of y and u with respect to x . Verify the rule $\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$. Name the rule.
 b) From the function $xy + 2x + y - 1 = 0$,
 (i) Find the limit of y as $x \rightarrow -1$
 (ii) Find the limit of x as $y \rightarrow 1$.
 (iii) What restriction must be added to the statement for y to be a continuous function of x ?
35. a) Given supply: $Q = 5P + 10$, and demand: $Q = -3P + 50$. Find equilibrium price and quantity.
 b) Find $\frac{dy}{dx}$ if $y = a^x + x^x$

(2 × 15 = 30 Marks)

[*][*][*][*][*][*][*][*][*][*][*][*][*][*][*]