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Reg. No. :

Code No. : 10272 E Sub. Code : AMEC 41

B.A. (CBCS) DEGREE EXAMINATION, APRIL 2025.

Fourth Semester

Economics – Core

BASIC MATHEMATICS FOR ECONOMICS – II

(For those who joined in July 2020 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. If $y = x^{-7}$, $\frac{dy}{dx}$ is

- (a) $7x^6$ (b) $-7x^{-8}$
(c) $-7x^8$ (d) $7x^8$

2. If $y = e^{-x}$, dy/dx is

- (a) e^{-x} (b) e^x
(c) e^1 (d) $-e^{-x}$

3. If $u = 4x^2 + 2y^3 - 9$, $\partial u/\partial x$ is

- (a) $8x + 6y$ (b) $4x$
(c) $8x + 2y^3$ (d) $6y^2$

4. If $u = 5xy - y^2$ marginal utility of y is

- (a) $5 - 2y$ (b) $5x - 2y$
(c) $5x$ (d) $5xy$

5. $\int \frac{1}{x^7} dx$ is

- (a) $\frac{x^{-8}}{-8} + c$ (b) $\frac{1}{x^{-8}} + c$
(c) $\frac{x^{-6}}{-6} + c$ (d) $\frac{1}{x^{-6}} + c$

6. $\int mR dx$ is

- (a) AR (b) TR
(c) π (d) None

7. If $A = \begin{pmatrix} 8 & 2 \\ 2 & 1 \end{pmatrix}$, $|A|$ is

- (a) -4 (b) 12
(c) 4 (d) 10

8. Formula for the determination of A^{-1} is

- (a) $|A|adjA$ (b) $\frac{|A|}{Adj A}$
(c) $\frac{Adj A}{|A|}$ (d) $Adj A$

9. Father of input-output analysis is

- (a) Adam smith (b) Karl Marx
(c) Wassily Leontief (d) Alfred marshal

10. The money value of total output is the firm's _____.

- (a) Total revenue
(b) Marginal revenue
(c) Total cost
(d) Marginal cost

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Determine dy/dx for $y = \frac{x-1}{x+1}$.

Or

(b) Find first, second and third derivatives of y , if $y = 3x^6 + 2x^4 + x^2$.

12. (a) Determine marginal utilities of x and y at $x = 3$ and $y = 2$ for the total utility function $u = 5x^2y + 2xy^3 + 3x + 9y$.

Or

(b) Compute marginal productivities of labour capital at $L = 2$ and $K = 3$ for the production function

$$u = 2L^2K + 3LK + 6L + 9K.$$

13. (a) Evaluate $\int 9x^4(x^5 + 7)^8 dx$.

Or

(b) Evaluate $\int_1^2 (x^3 - 2x - 3) dx$.

14. (a) Find B , if $-A + 2B = 6C$, where

$$A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix} \text{ and } C = \begin{bmatrix} 2 & -1 & 7 \\ 3 & 0 & 0 \\ 4 & -1 & -5 \end{bmatrix}$$

Or

(b) If $A = \begin{bmatrix} 3 & 5 & -7 \\ 9 & -3 & 3 \\ 7 & -9 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 3 & 5 \\ 7 & 9 & 1 \\ -3 & 5 & -5 \end{bmatrix}$,

verify that $(A + B)^T = A^T + B^T$.

15. (a) What are the types of input-output analysis?

Or

- (b) What are the important of Input-output analysis?

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Give an account of application of derivatives in economics.

Or

- (b) Find the maxima or minima of the function $y = x^2 - 4x - 5$.

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17. (a) Find the first and second order partial derivatives of the following function $z = 2x^3 + 5x^2y + xy^2 + y^3$ and also verify that

$$\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$$

Or

- (b) If $u = x^3 + y^3 + z^3 - 3xyz$, prove that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 3u$$

18. (a) Evaluate $\int \frac{8x}{(x^2 - 5)^3}$.

Or

- (b) The supply function for a commodity $p = x^2 - x + 5$, where x denotes supply. Find the producer's surplus when the price is Rs. 11.

19. (a) Find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 3 & -4 \\ -1 & -2 & 1 \\ 2 & 4 & -5 \end{bmatrix}$$

Or

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- (b) Solve the following equations by using Cramer's rule.

$$2x_1 + 3x_2 - x_3 = 9$$

$$x_1 + x_2 + x_3 = 9$$

$$3x_1 - x_2 - x_3 = -1$$

20. (a) Give an account of limitations of Input Output Analysis.

Or

- (b) In an economy of two industries A and B, the data is given below in million of rupees.

		Purchases by		Final	Total
		A	B	Demand	Output
Sales by	A	12	6	6	24
	B	6	3	9	18

Determine the Total Output, if the final demand changes to 18 for A and 36 for B.