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Code No. : 30400 E   Sub. Code : AMEC 41

B.A. (CBCS) DEGREE EXAMINATION, APRIL 2023.

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 $y = \dfrac{x^3}{x}$ then $\dfrac{dy}{dx}$

   (a) $3x^2$ (b) x^2

   (c) $\dfrac{x^3}{3}$ (d) x^3

2. If $y = x^5$ then $\dfrac{dy}{dx}$

   (a) $5x$ (b) $5x^4$

   (c) $4x^5$ (d) $\dfrac{x}{5}$

3. If $z = x^2 - y^2$, then $\dfrac{\partial z}{\partial x}$ is

   (a) $2x$ (b) $-2x$

   (c) $2y$ (d) $-2y$

4. If $U = x^2 + 3x + y^2$ then $\dfrac{\partial u}{\partial x}$

   (a) $2x + 3$ (b) $3x + 2y$

   (c) $2x + y$ (d) $3x + y$

5. If $\dfrac{dy}{dx} = x^n$, then $\int x^n \cdot dx$

   (a) $n + 1$ (b) $\dfrac{1}{n+1}$

   (c) $\dfrac{1}{n+1}x^{n+1} + c$ (d) x^{n+1}

6. $\int x^4 dx$

   (a) $x^5 + c$ (b) $\dfrac{x^5}{5} + c$

   (c) $\dfrac{x^4}{4} + c$ (d) $x^4 + c$

7. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 5 \end{pmatrix}$, then $|A|$ is

   (a) -1 (b) 1

   (c) -4 (d) 5

8. If $A = \begin{bmatrix} 5 & 4 \\ 6 & 1 \end{bmatrix}$, A^T is

   (a) $\begin{bmatrix} 5 & 4 \\ 1 & 6 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & 6 \\ 4 & 1 \end{bmatrix}$

   (c) $\begin{bmatrix} 6 & 1 \\ 5 & 4 \end{bmatrix}$ (d) $\begin{bmatrix} 6 & 5 \\ 1 & 4 \end{bmatrix}$

9. Input-Output Analysis was first introduced by

   (a) W. Leontief   (b) Quesnay

   (c) Walras   (d) Samuelson

10. Input co-efficients are also called as

   (a) technical co-efficient

   (b) factor co-efficient

   (c) production

   (d) production co-efficient

PART B — (5 × 5 = 25 marks)

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

11. (a) If $y = (x^2 + 5)(x^2 - 4)$, find dy/dx.

Or

   (b) If $y = \dfrac{7x - z}{5x + 3}$ find dy/dx.

12. (a) Find the possible partial derivatives of $z = x^2 - 3xy + 2y^2$.

Or

   (b) Find elasticity of demand if the demand function is $x = 25 - 4P + P^2$ when $P = 8$.

13. (a) Find $\int (5x^3 - 3x^2 + 5x + 10)dx$.

Or

   (b) Find $\int 2x(x^2 + 5)\,dx$.

14. (a) Explain the properties of a Matrix.

Or

   (b) If $A = \begin{bmatrix} 1 & 2 & -3 \\ 4 & -5 & 6 \\ 7 & 8 & -9 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -3 & 2 \\ 1 & 6 & -4 \\ -7 & 1 & 3 \end{bmatrix}$, show that $2(A + B) = 2A + 2B$.

15. (a) State the importance of Input-Output Analysis.

Or

(b) Describe the basic concepts of input-output analysis.

PART C — (5 × 8 = 40 marks)

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

16. (a) What are the conditions for maximum and minimum values?

Or

(b) If $Q = 200 - 10P$ is the demand function determine the level of Q and P where total revenue is maximum.

17. (a) Find the first and second order partial derivatives of the following function $U = x^2 y^2 + x^5 + y^6$ and also verify that $\dfrac{\partial^2 u}{\partial x \partial y} = \dfrac{\partial^2 u}{\partial y \partial x}$.

Or

(b) Find the total differential of $z = \dfrac{x}{x+y}$.

18. (a) Evaluate : $\displaystyle\int \dfrac{3x}{\left(x^2 - 2\right)^2} dx$.

Or

(b) Find Consumers Surplus if $p = 40 - q - q^2$ and the consumer is at equilibrium when $q = 4$.

19. (a) Find the inverse of the matrix $A = \begin{bmatrix} 0 & -1 & 2 \\ 1 & -2 & -3 \\ 3 & 1 & 1 \end{bmatrix}$.

Or

(b) Solve the equations by using Cramer's Rule.
$2x - 3y + 4z = 5$
$x + 2y - 3z = 9$
$x - y - z = 1$

20. (a) Describe the uses of Input-Output Analysis.

Or

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

	Purchase by		Final Demand	Total output
	A	B		
Sales by A	12	6	6	24
Sales by B	6	3	9	18

Determine the total output, if the final demand changes to 18 for A and 36 for B.