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Reg. No. :

Code No. : 30397 E Sub. Code : EMEC 32/
FCEC 32

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

Third Semester

Economics — Core

MATHEMATICS FOR ECONOMICS

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A symbol which can take different values is called
(a) Variable (b) Constant
(c) Function (d) Equation
2. If $2x - 1 = 7$, then x is
(a) 5 (b) 4
(c) 8 (d) 2

3. A matrix having equal number of rows and columns is called
(a) Row matrix (b) Square matrix
(c) Column matrix (d) Null matrix
4. The transpose of a 2×3 matrix is of order
(a) 3×2 (b) 2×2
(c) 2×3 (d) 1×3
5. Hawkins-Simon condition ensures
(a) Unviability
(b) Viability of input-output model
(c) Negative production.
(d) Zero output
6. The Father of Input-Output Analysis is
(a) Adam Smith (b) Karl Marx
(c) Wassily Leontief (d) Alfred Marshall
7. The derivative of x^2 is
(a) $2x$ (b) X
(c) x^2 (d) 0
8. A function is increasing if
(a) $f'(x) > 0$ (b) $f'(x) < 0$
(c) $f'(x) = 0$ (d) None

9. The second derivative of $y = x^3 + 2x^2$ is

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

10. Total revenue is maximized when

- (a) $MR = 0$ (b) $MR > 0$
(c) $MR < 0$ (d) $AR = 0$

PART B — (5 × 5 = 25 marks)

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

11. (a) Define variables and constants with examples.

Or

(b) Solve : $x^2 + 5x + 6 = 0$.

12. (a) Add the matrices $(A+B) = ?$

$$A = \begin{bmatrix} 3 & 2 \\ 4 & 2 \\ 7 & 6 \end{bmatrix} \quad B = \begin{bmatrix} 7 & 9 \\ 1 & 2 \\ 8 & 6 \end{bmatrix}.$$

Or

(b) Write down the properties of determinants.

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13. (a) Write down the types of Input-Output analysis.

Or

(b) Explain Hawkins-Simon condition for viability.

14. (a) If $y = 4x^5 + 3x + 5$, Find first, second and third order derivatives.

Or

(b) Evaluate $\frac{dy}{dx}$, if $y = (3x^2 + 2x)(x + 9)$.

15. (a) Find the profit-maximizing output if $TC = Q^3 - 15Q^2 + 100Q$ and $TR = 200Q$.

Or

(b) Explain cost minimization using marginal cost.

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PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Discuss the limitations of using Mathematics in Economics.

Or

(b) Solve : $\frac{x-4}{2} - \frac{2x-1}{3} = 7 + \frac{7x-12}{5}$.

17. (a) Solve the following equations by using Cramer's Rule

$$2x - 3y + z = 2$$

$$x + 5y - 4z = -5$$

$$4x + y - 3z = -4$$

Or

- (b) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$ then find AB and BA .

18. (a) Find the Input — Output analysis for the following industries.

Sector	Agriculture	Manufacturing	Final Demand	Total Demand
Agriculture	40	20	40	100
Manufacturing	10	20	70	100

Or

- (b) Explain Leontief's Input-Output Model. Discuss its uses and limitations.

19. (a) If $TR = 20Q - Q^2$, find AR and MR .

Or

- (b) Given the following Revenue (R) and Cost (C) functions for a firm $R = 20q - q^2$ and $C = q^2 + 8q + 2$. Find the equilibrium level of output, price, total revenue, total cost and profit.

20. (a) Find AC , MC and determine output level for cost minimization if $TC = 2Q^2 + 10Q + 50$.

Or

- (b) Discuss profit maximization under discriminating monopoly with an example.