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Reg. No. :

Code No. : 20712 E Sub. Code : AMEC 41

B.A. (CBCS) DEGREE EXAMINATION, APRIL 2022

Fourth Semester

Economics — Core

BASIC MATHEMATICS FOR ECONOMICS — II

(For those who joined in July 2020 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. If $y = 7x^5$, find dy/dx

- (a) $35x^4$ (b) $35x^{12}$
(c) $35x^{13}$ (d) $35x^{10}$

2. If $y = 8$, find dy/dx

- (a) 0 (b) 7
(c) 5 (d) 11

3. Find the $\partial u/\partial x$ and $\partial u/\partial y$ for the functions :

$$u = x^2y$$

- (a) $\partial u/\partial x = 2xy$ and $\partial u/\partial y = x^2$
(b) $\partial u/\partial x = xy$ and $\partial u/\partial y = 2x$
(c) $\partial u/\partial x = y$ and $\partial u/\partial y = x$
(d) $\partial u/\partial x = 3x$ and $\partial u/\partial y = 4y$

4. Find out $\partial Q/\partial L$ and $\partial Q/\partial K$ for the production function $Q = 2KL - 10L^5 - 8K^3$

- (a) $\partial Q/\partial L = 2K - 50L^4$ and $\partial Q/\partial K = 2L - 24K^2$
(b) $\partial Q/\partial L = 20L$ and $\partial Q/\partial K = 16K$
(c) $\partial Q/\partial L = 4K$ and $\partial Q/\partial K = 40L^4$
(d) $\partial Q/\partial L = K$ and $\partial Q/\partial K = 400L^4$

5. Calculate $\int 6dx$

- (a) $6x + C$ (b) 6
(c) x (d) $x + C$

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6. Find $\int x^5 dx$

- (a) $\frac{x^6}{6} + C$ (b) 5
(c) x (d) $x + C$

7. A matrix of order $(1 \times n)$ having only one row and n columns is called a _____

- (a) row matrix (b) column matrix
(c) square matrix (d) rectangular matrix

8. If $A = \begin{pmatrix} 2 & 4 \\ 1 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 4 \\ 1 & 5 \end{pmatrix}$ then $A = B$ It is called _____ matrix.

- (a) Zero matrix
(b) Equal matrix
(c) Rectangular matrix
(d) Square matrix

9. _____ is called as the 'Father' of the Input - output analysis.

- (a) Wassil W. Leontief
(b) Adam Smith
(c) Keynes
(d) Marshall

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10. Input - output analysis is used to study the _____

- (a) Inter - industry relations
(b) Relations
(c) Industry
(d) Independent industry

PART B — $(5 \times 5 = 25 \text{ marks})$

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

Each answer should not exceed 250 words.

11. (a) If $y = (2x^3 + 9)(x^2 + 3x)$ find dy/dx .

Or

(b) If $y = 4x^5 + 3x + 5$, find dy/dx , d^2y/dx^2 and d^3y/dx^3 .

12. (a) Find the total differentiation of $u = 3x^2 + xy - 2y^3$.

Or

(b) For $u = x^3 + 3x^2y + y^3$, find all the partial derivatives.

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[P.T.O.]



13. (a) Find the value $\int \left(e^x + \frac{1}{x^3} \right) dx$.

Or

- (b) Evaluate $\int \frac{x}{x^2+1} dx$.

14. (a) Compute the cofactor for the matrix

$$A = \begin{pmatrix} 1 & 1 & -3 \\ -1 & 5 & 1 \\ 1 & 3 & 2 \end{pmatrix}.$$

Or

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

$$2x_1 + 3x_2 = 13$$

$$x_1 + 7x_2 = 23$$

15. (a) Write the basic concepts of input – output analysis.

Or

- (b) Explain the limitations of input – output analysis.

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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) Find the maxima and minima of the following function $y = 2x^3 - 3x^2 - 36x + 10$.

Or

- (b) Consider a Monopolist who faces a linear demand function $P = 100 - 2q$ and a linear total cost function $C = 50 + 2q$. Determine the profit maximization.

17. (a) Find the maxima or minima of the function $x = -x^2 + xy - y^2 + 2x + y$.

Or

- (b) Prove $L.(\partial Q/\partial L) + K.(\partial Q/\partial K) = Q$ for $Q = AL^\alpha K^\beta$ by using Euler's theorem.

18. (a) Compute Total Average and Average Variable Costs for the Marginal Cost function $C = 4 + 7x - 5x^2$, if the Total Fixed Cost is 40.

Or

- (b) Given the demand function $P = 8 - 2x$ and the supply function $P = 2 + x$, find the consumer's surplus and the producer's surplus.

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19. (a) Solve the following equations by using Cramer's rule

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

$$x_1 + x_2 + x_3 = 9$$

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

Or

- (b) Find the inverse of $A = \begin{pmatrix} 4 & 0 & 2 \\ 2 & 10 & 2 \\ 3 & 9 & 1 \end{pmatrix}$.

20. (a) Explain the importance of input – output analysis.

Or

- (b) Explain the assumptions of input – output analysis.

