(6 pages) **Reg. No. :**.....

Code No. : 12447 E **Sub. Code : SMEC 41**

B.A. (CBCS) DEGREE EXAMINATION, APRIL 2021.

Fourth Semester

Economics — Main

MATHEMATICAL METHODS — II

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. If $y = x^n$, then $\frac{dy}{dx}$ =

   (a) x^n (b) nx^n

   (c) nx^{n-1} (d) nx

2. If $y = 6x^3 + 5x^2 + 3x + 10$, then $\frac{d^2y}{dx^2}$ =

   (a) $18x + 10x + 3x + 10$ (b) $18x^2 + 10x + 3$

   (c) $36x + 10$ (d) None

3. If the total utility function $U = 2x^3y$, then marginal utility of y =

(a) $6x^2$ (b) $2x^3$

(c) $6x^2y$ (d) $2y$

4. If $y = 2xy$, then $\frac{\partial u}{\partial y} =$

(a) 2 (b) $2x$

(c) xy (d) $2y$

5. $\int dx$ =

(a) $x + c$ (b) $1 + c$

(c) $x^2/2 + c$ (d) 0

6. Consumer's surplus is the difference between

(a) Willing to pay and actual pay

(b) Marginal revenue and cost

(c) Willing to pay and ability to pay

(d) Total revenue and cost

7. Diagonal matrix is a

(a) Row matrix (b) Column matrix

(c) Null matrix (d) Square matrix

8. If A is singular matrix then

(a) $A^T = A$ (b) $|A| = 0$

(c) $A^2 = A$ (d) $A^{-1} = A$

9. The Input-Output analysis was developed by

(a) Leontief (b) Karl Pearson

(c) Fisher (d) Spearman

10. The assumption of the input-output analysis is

(a) Constant returns to scale

(b) Technology remain constant

(c) Labour is the only input

(d) All the above

PART B — (5 × 5 = 25 marks)

Answer ALL the questions, choosing either (a) or (b) in about 250 words.

11. (a) Find the third order derivative of the function $y = x^4 + 2x^3 + 8x^2 - 7x + 6$.

Or

(b) What are the conditions for maxima and minima of the function $y = f(x)$?

12. (a) Explain the rules of partial derivatives.

Or

(b) Enumerate the applications of partial derivatives in Economics.

13. (a) Evaluate $\int \left(8x^3 - 3x^2 + x - 1\right) dx$.

Or

(b) Given the total cost $TC = 4Q^2 + 2Q + 10$. Find Marginal Cost (*MC*) at $Q = 5$.

14. (a) Explain the Row matrix and Column matrix with an example.

Or

(b) Check whether $A = \begin{pmatrix} 1 & 2 \\ 2 & 4 \end{pmatrix}$ is singular matrix or non-singular matrix.

15. (a) How can you compute technical coefficient?

Or

(b) Explain the importance of Input-Output analysis.

PART C — (5 × 8 = 40 marks)

Answer ALL the questions, choosing either (a) or (b) in about 600 words.

16. (a) Discuss the rules of derivatives.

Or

(b) Find maxima or minima of the function $Z = 48 - 4x^2 - 2y^2 + 16x + 12y$.

17. (a) If $U = x^3y + x^2y^2 + 4x^3 + y^2z^2 + z^2 + x^2 - 4xy + 4x + 5y + 3z + 2$, then find $\frac{\partial u}{\partial x}$, $\frac{\partial u}{\partial y}$ and $\frac{\partial u}{\partial z}$.

Or

(b) Evaluate Euler's theorem.

18. (a) If the demand function is $P = 35 - 2x - x^2$, find consumer's surplus at $x = 3$.

Or

(b) Evaluate $\int 4x^2\left(x^3 + 5\right)^3 dx$.

19. (a) Define matrix and explain its different types with suitable examples.

Or

(b) Find inverse of the matrix $A = \begin{pmatrix} 1 & 2 & 3 \\ -5 & -7 & -4 \\ 2 & 1 & 3 \end{pmatrix}$.

20. (a) Define input and output. And analyze the input output analysis.

Or

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

Selling sector	Buying sector		Final Demand	
	Industry A	Industry B	A	B
Industry A	18	08	10	36
Industry B	09	24	15	48

Determine total output to be produced by the two industries to meet the new demand for 30 units of Industry A and 40 units of Industry B.

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