SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.A.(Eco) END SEMESTER EXAMINATION APRIL-2023
SEMESTER - V
UEC/CT/5012 - Mathematics for Economists

Total Duration : 3 Hrs   Total Marks : 75

Section A

Answer any **TEN** questions $(10 \times 2 = 20$ Marks)

1. If A $= \begin{bmatrix} 1 & 2 & -3 \end{bmatrix}$ and B $= \begin{bmatrix} 8 & -5 & -2 \end{bmatrix}$ find AB.
2. What is an Upper triangular matrix?
3. State 'Hawkins – Simon' conditions.
4. What is an open input – output model?
5. Find the second order derivative for y $= 5u^2$ - 3u + 1/u.
6. Find the first two derivatives for the following:
   R(t) $= 3t^2 + 8t^{1/2} + e^t$
7. What are the conditions for maxima and minima of a function y = f(x)?
8. If C $= (x^3/10) + 200$, find Marginal Cost when x = 10.
9. State the meaning of homogenous function.
10. If Z $= e^{x^2+y^2}$, Find $(\delta Z/\delta$x) and $(\delta Z/\delta$y)
11. Find (dy/dx), given y=xe^x
12. Define: Rank of a matrix.

Section B

Answer any **FIVE** questions $(5 \times 5 = 25$ Marks)

13. Solve the following set of linear simultaneous equations by the method of Matrix Inverse.
    2x+3y $= 5$
    11x-5y $= 6$
14. The data below are about an economy of two industries A and B. The values are in millions of rupees.

Selling Sector	Buying Sector		Final Demand	Total Output
	A	**B**		
A	18	8	10	36
B	19	24	15	48

    Determine the total output, if the final demand changes to 20 for A and 30 for B.
15. Given: y $= 2x^3 + 5x^2 - 7$x + 4; find $(d^2$y$/dx^2)$.
16. Compute total cost and average cost for the marginal cost function
    MC $= 4 + 7$x $- 5x^2$. Also find TC, when output is 2.
17. Find the second order derivatives of the function Z $= (x^2y^2 + x^6 + y^5)$.
18. What is transpose of a matrix? List out the properties of transpose of a matrix with examples.
19. Suppose that the demand and total cost functions of a monopolist are P $= 20 - 4$x and C $= 4$x respectively and a tax of Re. ½ per unit is imposed, find out the maximum profit.

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Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks$)$

20. Solve the given set of equations using Cramer's rule:

    $3x + 2y - z = 4$
    $-x - y + 3z = 6$
    $5x - 3y + z = 2$

21. For the following transaction matrix, find the gross output to meet the final demand of 200 units of agriculture and 800 units of industry.

Producing Sector	Purchasing Sector		
	Agriculture	**Industry**	**Final demand**
Agriculture	300	600	100
Industry	400	200	400

22. (a) If $y = u^2 + 4u$ and $u = x^2 + 4$, find (dy/dx)
    (b) If $x^2 + y^2 = 1$, Verify that $(dy/dx)\,(dx/dy) = 1$

23. A firm has the following Total Cost and demand function:
    $C = (1/3)q^3 - 7q^2 + 111q + 50$; where $q = 100 - p$
    Find the profit maximizing output and the maximum profit.

24. Check the degree of homogeneity for Cobb Douglas production function:
    $Q = A\,L^\alpha\,K^\beta$.