M.A DEGREE EXAMINATION, NOVEMBER 2023
BRANCH III - ECONOMICS
FIRST SEMESTER

COURSE   **: ELECTIVE**
PAPER   **: MATHEMATICS FOR ECONOMICS**
SUBJECT CODE: **23EC/PE/ME15**
TIME   **: 3 HOURS**   **MAX. MARKS: 100**

Q. No.	**SECTION A** **PART – A** **(2 X 5 = 10)** **Answer any TWO out of THREE questions in about 150 words each**	CO	KL
1	Find the inverse of A $\begin{bmatrix} 7 & 9 \\ 6 & 12 \end{bmatrix}$	1	1
2	Find the First and second order Direct Partial Derivatives $Z = 13x^2 + 6xy + 9y^3$	1	1
3	If Average Cost = $12t^2 - 18t + 28$ Find TC and MC.	1	1
Q. No.	**PART – B** **(2 X 5 = 10)** **Answer any TWO out of THREE questions in about 150 words each**	CO	KL
4	Explain the concepts of Slack and Surplus Variables.	**2**	**2**
5	Evaluate $$\int_{2}^{4} (5x^3 + 2x^2 + 3x)\,dx$$	**2**	**2**
6	Find dy/dx of $4x^3 - y^3 = 97$	**2**	**2**
Q. No.	**SECTION B** **PART – A** **(2 X 8 = 16)** **Answer any TWO out of THREE questions in about 400 words each**	CO	KL
7	Solve by Cramer's Rule : $5x_1 - 2x_2 + 3x_3 = 16$ $2x_1 + 3x_2 - 5x_3 = 2$ $4x_1 - 5x_2 + 6x_3 = 7$	**3**	**3**

8	Determine the sign definiteness for matrix A $\begin{bmatrix} 10 & 3 \\ 3 & 4 \end{bmatrix}$	3	3
9	Derive Samuelson's Multiplier Accelerator model.	3	3
Q. No.	**PART – B** **(2 X 8 = 16)** **Answer any TWO out of THREE questions in about 400 words each**	CO	KL
10	Solve by the Graphical method Minimize C = 20x + 40 y Subject to the Constraints $36x + 6y \geq 108$ $\qquad\qquad 3x + 12y \geq 36$ $\qquad\qquad 20x + 10y \geq 100$ Where $x, y \geq 0$	4	4
11	Find the Second order direct Partial Derivatives $Z = (7x + 3y)^3$	4	4
12	The technology matrix of an economic system with two industries is $\begin{bmatrix} 0.50 & 0.30 \\ 0.41 & 0.33 \end{bmatrix}$ Test whether the system is viable as per the Hawkins-Simon Condition.	4	4
	SECTION C **PART – A** **(2 X 12 = 24)** **Answer any TWO out of FOUR questions in about 700 words each**		
13	Find the profit maximizing level of output, price and profit $Q_1 = 5200 - 10P_1$ $Q_2 = 8200 - 20P_2$ $C = 0.1Q_1^2 + 0.1Q_1Q_2 + 0.2Q_2^2 + 325$	5	5
14	Determine the total demand for industries 1,2 and 3, given the matrix of technical coefficients A and the final demand vector B. $A = \begin{bmatrix} 0.4 & 0.3 & 0.1 \\ 0.2 & 0.2 & 0.3 \\ 0.2 & 0.4 & 0.2 \end{bmatrix} \qquad B = \begin{bmatrix} 140 \\ 220 \\ 180 \end{bmatrix}$	5	5
15	Enumerate the various applications of Linear Programming	5	5

16	Calculate the General Solution of the differential equation $dy/dt + 3t^2 y = t^2$	5	5
	PART – B　　　　**(2 X 12 = 24)** **Answer any TWO out of FOUR questions in about 700 words each**		
17	Given the demand function $P_d = 113Q^2$ and the Supply function $P_s = (Q +1)^2$ under Pure Competition, Find Consumers' and Producers' Surplus.	6	6
18	A monopolistic firm has the following demand functions for each of its products x and y $x = 72 - 0.5 P_x$ $y = 120 - P_y$ The combined cost function is $c = x^2 + xy + y^2 + 35$ and the maximum joint production is 40. Find the profit maximizing level of output, price and profit.	6	6
19	Construct an Input -Output Transaction Table and list the limitations of Input -Output analysis.	6	6
20	Examine the features of Solow Growth Model.	6	6

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