LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.A. DEGREE EXAMINATION – **ECONOMICS**

FIRST SEMESTER – **NOVEMBER 2022**

PEC1MC04 – MATHEMATICS FOR ECONOMISTS

Date: 28-11-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

	SECTION A		
	Answer ALL the questions		
1	**Choose the right answers** **(5 x 1 = 5 Marks)**		
a)	The outcome that is generated after the choice of strategies by the players is called _____ a. Plan of Action c. Pay-off b. Choice d. Saddle point	K1	CO1
b)	Hessian is formed with _____ order partial derivatives of a function. a. 1^{st} c. 3^{rd} b. 2^{nd} d. 4^{th}	K1	CO1
c)	If $\frac{dy}{dt}$ = 15, the value of $Y_{(t)}$ is a. 15 c. 15t + C b. 0 d. None of the above	K1	CO1
d)	In case of a boundary solution, a local maximum can also occur on the vertical axis where a. $x_1 < 0$ c. $x_1 = 0$ b. $x_1 > 0$ d. $x_1 \neq 0$	K1	CO1
e)	The necessary condition for maximization is a. $\Delta_1>0, \Delta_2>0, \Delta_3>0$ c. $\Delta_1<0, \Delta_2<0, \Delta_3<0$ b. $\Delta_1<0, \Delta_2>0, \Delta_3<0$ d. $\Delta_1>0, \Delta_2<0, \Delta_3<0$	K1	CO1
2	**State True or False** **(5 x 1 = 5 Marks)**		
a)	Lagrange multipliers will always be non-negative.	K2	CO1
b)	Differential equations are used in studies of variables over discrete sets of time values.	K2	CO1
c)	The Kuhn Tucker cannot be applied for s non-linear programing model	K2	CO1
d)	The equation (1 – c) Y* - I = 0 shows Y* as a function of 'I' explicitly.	K2	CO1
e)	Slack variables are added to the objective function.	K2	CO1
	SECTION B		
	Answer any THREE of the following in 500 words **(3 x 10 = 30 Marks)**		
3	Find the characteristic vectors of $\begin{pmatrix} 0 & -1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 1 \end{pmatrix}$	K3	CO2
4	'The non-negativity restriction $x_1 \geq 0$ gives rise to three possible situations'. Explain those situations in the light of Kuhn Tucker conditions with relevant diagrams.	K3	CO2
5	What are difference equations? Give an account of the various types of difference	K3	CO2

	equations.		
6	Find minimax and maximin for A = $\begin{bmatrix} 5 & 8 & 6 \\ 12 & 13 & 6 \\ 11 & 10 & 9 \end{bmatrix}$	K3	CO2
7	Enumerate the procedure for general comparative static analysis in case of one endogenous variable.	K3	CO2
	SECTION C		
Answer any TWO of the following in 500 words		**(2 x 12.5 = 25 Marks)**	
8	Prove that $y = 2Cx^2 + C^2$ is the solution of the equation $\left(\frac{dy}{dx}\right)^2 + 8x^3\left(\frac{dy}{dx}\right) = 16x^2y$.	K4	CO3
9	Given the input coefficient matrix A = $\begin{bmatrix} 0.1 & 0.2 \\ 0.5 & 0 \end{bmatrix}$ and final demand F = $\begin{bmatrix} 16 \\ 8 \end{bmatrix}$, find the output levels.	K4	CO3
10	Examine whether the function $Z = x^2 - 3xy + 3y^2 + 4yz + 6z^2$ has maximum or minimum values.	K4	CO3
11	Derive the equilibrium solution for the general Cobweb model: $q_t = \alpha + \beta p_{t-1}$ $p_t = \gamma + \delta q_t$	K4	CO3
	SECTION D		
Answer any ONE of the following in 1000 words		**(1 x 15 = 15 Marks)**	
12	Find the optimum value of the function $Z = x^2 + y^2 + w^2$ subject to the constraint $x + y + w = 1$.	K5	CO4
13	Find AB if A = $\left[\begin{array}{cc\|cc} 1 & 0 & 0 & 1 \\ 2 & 1 & 0 & 1 \\ \hline 1 & 3 & 1 & 1 \end{array}\right]$ and B = $\left[\begin{array}{c\|c} 1 & 0 \\ 2 & 2 \\ \hline 1 & 1 \end{array}\right]$	K5	CO4
	SECTION E		
Answer any ONE of the following in 1000 words		**(1 x 20 = 20 Marks)**	
14	Solve graphically: Maximize Z = 2x + 5y subject to the constraints $x + 4y \leq 24$ $3x + y \leq 21$ and $x + y \leq 9$ $x \geq 0$ and $y \geq 0$	K6	CO5
15	In the linear market model, take the functions D = 100 – p + 2y S = 50 + 2p with y = 10 initially and then y = 20. Solve for the equilibrium prices and draw the diagram to represent the shifts in equilibrium price.	K6	CO5