Reg. No.: .....

Name: .....

University of Kerala

U9174

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

MATHEMATICS

UK2DSCMAT107 - Mathematics for Social Sciences - II

Academic Level: 100-199

Time: 2 Hours(120 Mins) **Max. Marks: 56**

Part A.6 Marks:Time 5 Minutes.(Cognitive Level :Remember(RE)/Understand(UN)) Objective Type.1 mark each, Answer all questions

Qn No.	Question	CL	CO
1	The derivative of $\cos x$ is	RE	1
2	Define a pay off matrix.	RE	4
3	Give an example of a row matrix.	UN	3
4	If a function has a minimum value at a point a then its second derivative at a is	UN	1
5	Find $\frac{d}{dx}(x^2+1)$	UN	1
6	If player 1 has 30 strategies and player 2 has 25 strategies, how many possible outcomes of the game will be there?	UN	4

Part B.10 Marks.Time:20 Minutes (Cognitive Level:Understand(UN)/Apply(AP))Two-three sentences.2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Differentiate the function $y = \frac{x^2+4}{x}$.	UN	1
8	If $A = \begin{bmatrix} 1 & -3 & 0 \\ 4 & 0 & 1 \\ 0 & -2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 3 & 2 \\ -4 & 0 & 1 \\ 0 & 2 & 4 \end{bmatrix}$ find $A - B$	UN	3
9	If $A = \begin{bmatrix} 3 & 7 & 4 \\ 5 & 1 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 9 & 5 & 8 \\ 7 & 11 & 3 \end{bmatrix}$ are pay-off matrices, Verify whether the game is a constant sum game.	AP	4
10	If $A = \begin{pmatrix} 3 & 8 \\ 1 & 2 \end{pmatrix}$, find A^2.	AP	3

Qn No.	Question	CL	CO
11	Check whether the curve $y = x^3$ is increasing?.	AP	2

Part C.16 Marks.Time:35 Minutes.(Cognitive Level :Apply(AP)/Analyse(AN))Short Answer.4 marks each, Answer all 4 questions,choosing among options * within each question

Qn No.	Question	CL	CO
12	A) Examine the nature of the curve $y = 10 + 4x - x^2$. OR B) a)In game theory, what are the two important assumptions to obtain solutions? b) Briefly explain a two person zero sum game.	AP	2, 4
13	A) If $y = (4 - x^2)^3$. Find $\frac{dy}{dx}$ at $x = 1$ and $\frac{d^2y}{dx^2}$ at $x = 0$ OR B) Show that the adjoint of the matrix $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ is itself.	AP	1, 3
14	A) Does the function $f(x) = 4x^2 + 5x + 3$ possesses inflection points? OR B) Check whether $y = 6x^2 - 4x + 11$ is concave up?	AN	2, 2
15	A) A. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -1 \\ 6 & 7 \end{bmatrix}$. Find $B'A'$.	AN	3, 1

Qn No.	Question	CL	CO
	OR B) Find $\frac{dy}{dx}$ if $y = \frac{dy}{dx}$, if $y = \sqrt{x}(2x-1)(x^2+x+1)$.		

Part D.24 Marks.Time: 60 Minutes.(Cognitive Level :Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer 6 Marks each.Answer all 4 questions choosing among options * within each question

Qn No.	Question	CL	CO
16	A) (a) Show that $f(x) = 3x^3 + 3x^2 + x - 1$ is an increasing function. (b) Check whether $y = 2 - x^2$ is convex from below. OR B) Prove that: $\begin{vmatrix} a-b-c & 2a & 2b \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^2$	AN	2, 3
17	A) Given: $A = \begin{bmatrix} 5 & 8 & 6 \\ 12 & 13 & 6 \\ 11 & 10 & 9 \end{bmatrix}$. (i) Find maximin and minimax (ii) Is there a saddle point? Which element is it? (iii) What are the optimal strategies for the two players? (iv) What is the payoff to player 1? OR B) Find the maximum and minimum value of the function $f(x) = 3x^4 - 4x^3 - 12x^2 + 12$.	EV	4, 2
18	A) If $A = \begin{bmatrix} 9 & 1 \\ 4 & 3 \end{bmatrix}$, and $B = \begin{bmatrix} 1 & 5 \\ 7 & 12 \end{bmatrix}$. Find the matrix X such that $3A + 5B + 2X = 0$. OR B) A. a) Find $\frac{dy}{dx}$ if $y = \frac{x+2}{x-7}$. b) Find $\frac{dy}{dx}$ if $x^2y + y + x = 0$.	EV	3, 1
19	A)	CR	2, 4

Qn No.	Question	CL	CO
	Which of the following functions are concave upwards. (i) $y = 2 + 3x + x^2$ (ii) $w = 3x^2 + 7$ (iii) $u = 3 - x^2$. OR B) Solve the two-person game $\begin{bmatrix} 15 & 0 & -2 \\ 0 & -15 & -1 \\ 1 & 2 & 0 \end{bmatrix}$		