

Reg. No.:



Name:

University of Kerala

U8950

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	Define a symmetric matrix.	RE	3
2	When we say a function is concave up?	RE	1
3	Is $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ a null matrix?	UN	3
4	What is the sign of second derivative for a function to have maximum value?	UN	2
5	The derivative of 10 is	UN	1
6	Give an example of a two person zero sum game.	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	Examine the curve $y = x^3 - 3x^2 - 9x + 6$ for convexity.	UN	2
8	State Minmax and Maxmin principle.	UN	4
9	Find the second order derivative of $y = x^3 - 9x^2 + 9x$	AP	1
10	Find the saddle point of the game $\begin{bmatrix} 1 & 0 \\ -4 & 3 \end{bmatrix}$.	AP	3
11	Find the values of a and b given that $\begin{bmatrix} a-b & b+a \\ 7 & 6 \end{bmatrix} = 0$	AP	3

Qn No.	Question	CL	CO
12	A) If $y = \sqrt{x^2 + 3x - 2}$, find $\frac{dy}{dx}$ when $x = 3$. OR B) A. a) If the total pay off for the two players in a constant -sum game is Rs.500, write out the matrix B in the case $A = \begin{bmatrix} 240 & 125 \\ 360 & 315 \end{bmatrix}$ b) For the pay off matrices $A = \begin{bmatrix} 5 & 10 \\ 7 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -3 \\ 0 & 6 \end{bmatrix}$, check whether the game is zero-sum or constant sum,	AP	1, 4
13	A) If $y = (x^2 + 3)(2x^2 + 7)^3$ find $\frac{dy}{dx}$. OR B) If $A = \begin{bmatrix} 3 \\ 0 \\ 5 \\ 1 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 2 & -1 & 0 \end{bmatrix}$. Find AB and BA.	AP	2, 3
14	A) (i) Show that $y = \frac{1}{\sqrt{x^2 + 1}}$ is a monotonically decreasing function. (ii)Find the points of inflection of the curve $f(x) = x^3 + 1$. OR B) Write a short note on classification of games.	AN	2, 4
15	A) If $A = \begin{bmatrix} 1 & 2 & 0 & 4 \\ 2 & 4 & -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 0 & 3 \\ 1 & -1 & 2 & 3 \end{bmatrix}$. Find a 2×4 matrix X such that $A - 2X = 3B$. OR B)	AN	3, 1

Qn No.	Question	CL	CO
	Find $\frac{dy}{dx}$, if $y = \frac{1+\sqrt{x}}{1-\sqrt{x}}$.		

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. Define Saddle point. Locate the saddle point of $\begin{bmatrix} 5 & 3 & 2 \\ 3 & 4 & 0 \end{bmatrix}$. OR B) a) Find $\frac{dy}{dx}$ if $x^3 + 5x^2y + yx = 5$. b) If $y = \frac{1-x^2}{x^2+2}$, then find $f'(1)$ and $f'(-1)$.	AN	4, 1
17	A) If $Y = 3x^2 + 9x + 8$ and $Z = x^3 + 10$, find the derivative of (i) YZ (ii) Z^2 with respect to x at $x = 1$. OR B) A. Find the maximum and minimum values of $x^3 - 6x^2 + 9x$.	EV	1, 2
18	A) If $A = \begin{bmatrix} 1 & 2 & 0 \\ -1 & 6 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 3 \\ 1 & 1 \\ -1 & 1 \end{bmatrix}$. Show that $(AB)^T = A^T B^T$. OR B) Use chain rule find $\frac{dy}{dx}$ if $y = \sqrt{x^2 + 1}(2x + 4)$.	EV	3, 1
19	A) a) Define Monotonic Function. b) Show that $y = \frac{1-x}{1+x}$ is a monotonically decreasing function.	CR	2, 4

Qn No.	Question	CL	CO
	c) Find the second derivative of $y = x^4 - 3x^2 + 7x + 5$. OR B) Solve the two-person game: $\begin{bmatrix} 6 & 0 & 7 \\ 3 & 1 & 6 \\ 5 & 4 & 2 \end{bmatrix}.$		