

Reg. No.:



Name:

University of Kerala

W7042

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Core Course

MATHEMATICS**UK3DSCMAT209-Mathematics in Social Science - III**

Academic Level: 200-299

2024 Admission

Time: 2 Hours (120 Mins.)**Max. Marks: 56****Part A 6 Marks. Time: 6 Minutes. (Cognitive Level: Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each. Answer all questions**

Qn.No.	Question	CL	CO
1	$\int e^x dx \dots\dots\dots$	RE	1
2	What is the general form of first order linear differential equation?	RE	1
3	Define order of a differential equation	UN	2
4	Evaluate f_x if $f = 3x^2y$.	UN	1
5	Solve $\frac{dy}{dx} = 1$	UN	2
6	Write the complementary function of the differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$.	UN	3

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	Find the integrating factor of $\frac{dy}{dx} + y = x$	UN	2
8	Find all the first order partial derivatives of $Z = 4x^2 + 4xy + y^2$	UN	2
9	Check whether $y = e^{-x}(x + c)$ is a solution of $\frac{dy}{dx} + y = e^{-x}$.	AP	4

Qn.No.	Question	CL	CO
10	Evaluate $\int_0^{\pi} \sin^2 x \, dx$	AP	1
11	Solve $\frac{dy}{dx} = \frac{x}{y}$	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) Find f_x, f_y, f_{xx}, f_{yy} if $f = x^3 e^{2y}$. OR B) Evaluate the following integrals (i) $\int \frac{x \, dx}{2x^2 + 3}$ (ii) $\int (1 - 3x^2 - \frac{1}{2\sqrt{x}}) \, dx$	AP	1
13	A) Check whether $y = \sin x + 2e^{-\sin x}$ satisfy the differential equation $\frac{dy}{dx} + y \cos x = \frac{1}{2} \sin 2x$. OR B) Integrate $\int x(\cos(x^2) + \sin(x^2)) \, dx$.	AP	3
14	A) Solve $\frac{d^2 y}{dx^2} - 7 \frac{dy}{dx} + 12y = 0$	AN	3

Qn.No.	Question	CL	CO
	OR B) Solve $\frac{dy}{dx} + y = 3e^{2x}$		
15	A) Solve $dy + (4xy - 4x)dx = 0$. OR B) Solve the differential equation $\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 16 = e^x$	AN	3

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) Verify that the cross partial derivatives are same for the function $Z = \frac{x+y}{x-y}$ OR B) Find all saddle points of the function $Z = x^2 + xy - y^2$.	AN	1
17	A) Evaluate the integrals (a) $\int xe^x dx$ (b) $\int \log x dx$	EV	1

Qn.No.	Question	CL	CO
	OR B) (a).Solve the first order linear differential equation $\frac{dy}{dx} + 2y = e^x$ (b). Solve $xdx + ydy = 0$		
18	A) Solve $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = e^{2x}$. OR B) Find first and second order partial derivatives of each of the following functions: (a) $Z = 2x^2 + 5x^2y + xy^2 + y^2$ (b) $U = x^3y^3z^3 + xyz$	EV	2
19	A) Solve $\frac{dy}{dx} = e^{x-y} + x^2e^{-y}$ OR B) Find the minimum and maximum values of $Z = y^3 + y^2 - xy + x^2 + 4$.	CR	4