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Department of Nutrition and Food Engineering
Faculty of Health and Life Sciences
B.Sc. in Nutrition and Food Engineering
Midterm Examination Fall 2026

Course Code: 0541-111 **Course Title:** Mathematics
Level and Term: L-1, T-2 **Section:** 262 All **Course Teacher Initials:** MRA/DMAI/SRM
Time: 1 hour 30 minutes **Total Marks:** 25

"Maintaining the order of the questions is highly encouraged"

				Marks
1	(a)	Define Domain and Range of a function. Find the Domain and Range of the function $f(x) = \frac{3x-7}{8x+5}$	[CLO1,PLO2,C1]	3
	(b)	Define Homogeneous Function. Determine whether the function $f(x, y) = \frac{x^2y^2 + xy^3 - x^3y}{x^2 - 2xy + xy}$ is a homogeneous or not.	[CLO1,PLO2,C1]	2
2	(a)	State the conditions for the existence of the limit of a function. If $f(x) = \frac{1}{1+e^{1/x}}$, does the limit exist at x = 0.	[CLO1,PLO2,C2]	3
	(b)	If $f(x) = \begin{cases} 3 - ax^2 & when\ x < 1 \\ x + 1 & when\ x \geq 1 \end{cases}$ for what value of a, $f(x)$ is continuous at x = 1.	[CLO1,PLO2,C3]	2
3	(a)	Sketch the graph of the function $y = \sqrt{(2x - 4)} + 3$.	[CLO1,PLO2,C4]	2
	(b)	Discuss the differentiability of the function at $x = 1$, where $f(x) = \begin{cases} x + 1 & when\ x \leq 0 \\ x^2 & when\ 0 < x < 1 \\ \frac{1}{x} & when\ x \geq 1 \end{cases}$	[CLO1,PLO2,C4]	3
4	(a)	Find the differential coefficient $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at point $x = 2$ for the function $y = 1 + x^2 + x^3 + x^4 + x^5 + x^6$	[CLO2,PLO2,C3]	2
	(b)	Find the differential coefficient $\frac{dy}{dx}$ for the following function: (i) $y = e^{\sin^{-1} x} + \tan^{-1} x$ (ii) $y = \frac{\cos x}{1+\sin x}$	[CLO2,PLO2,C3]	3
5	(a)	If $u = x^2 + y^2 + z^2$ then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 2u$.	[CLO3,PLO2,C2]	2
	(b)	State Rolle's theorem. Verify Rolle's theorem for the function $f(x) = x^2 - 3x + 2$ in the interval (1, 2).	[CLO3,PLO2,C3]	3