Daffodil International University
Department of Business Administration
Course Title: Differentiation and Integral Calculus
Course Code: 0541-214

Semester: Summer 2025 **Examination: Midterm**
Time: 1 Hour 30 minutes **Full Marks: 25**
Section: All **Teachers' Initial: MP, DMSA, AA, ARE, JI**

[NB: Answer all the following questions]

01	a)	Discuss the price elasticity of demand with examples.	(CLO 2, L2) 2
	b)	Distinguish between relation and function.	(CLO 4, L4) 3
02	a)	Solve the domain and range of the function $y = \frac{5}{2x-3}$	(CLO 3, L3) 1.5
	b)	Sketch the graph of the function $y = x^2 - 2$	(CLO 3, L3) 1.5
	c)	Solve for limiting value of $\lim_{x\to 1} \frac{x^2-1}{x^2-3x+2}$	(CLO 3, L3) 2
03	a)	Examine $\frac{dy}{dx}$	
		i. $y = 4x^3 + 2x^{\frac{5}{2}} + 10x + 40$ ii. $y = (x+1)(x^2 - x - 2)$	(CLO 3, L3) 3
	b)	After x weeks, the number of people using a new rapid transit system was approximately $N(x) = 4x^3 + 30x + 3500$. Apply the rules of differentiation to find at what rate was the use of the system changing with respect to time after 4 weeks.	(CLO 3, L3) 2
04		A manufacturer estimates that when x units of a particular commodity are produced, the total cost will be $C(x) = 0.2x^2 + 4x + 57$ dollars, and furthermore that all x units will be sold when the price is $p(x) = \frac{1}{4}(36 - x)$ dollars per unit	(CLO 3, L3)
	a)	Develop the marginal cost and the marginal revenue function	2
	b)	Apply the marginal cost function to estimate the cost of producing the ninth unit.	1.5
	c)	Identify the actual cost of producing the ninth unit.	1.5

05		A book publisher estimates that when q thousand copies of a book are printed each month, the total cost will be $C(q) = 2.5q^2 + 4q + 60$ thousand dollars, and the selling price per book is given by $p(q) = 36 - 1.5q$ dollars per copy.	
	a)	Determine the number of units that results in maximum profit.	(CLO 3, L3) 3
	b)	Identify the value of the maximum profit.	(CLO 3, L3) 2