



Daffodil International University
Faculty of Science & Information Technology (FSIT)
Department of Computer Science and Engineering (CSE)
Final Examination, Fall 2024

Course Code: CSE 226, Course Title: Numerical Methods

Time: 02 Hours

Level: 2, Term: 2, Batch: 64

Marks: 40

Answer ALL Questions:

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially]

1	a)	Apply Gauss Elimination Method to solve the system of linear equations: $\begin{aligned} a+x-3y+z &= 2 \\ 3x-5a-y+z &= 0 \\ 2y+a-z &= 1 \\ a+x &= 0 \end{aligned}$	[5]	CO2										
	b)	Solve the System of Linear Equations using the Gauss Seidel's Method: $\begin{aligned} 2x+5y-z &= 16 \\ 3x+y+z &= 11 \\ 2z &= 5 \end{aligned}$ Use the initial guess $x_0 = y_0 = z_0 = 0$ and iterate until the solution converges three decimal places.	[5]											
2		Solve the following first order Ordinary Differential Equation using 4th order Runge-Kutta Method: $\frac{dy}{dx} = x^3 e^x + y; y(0) = 1$ Find the value of $y(0.3)$ and $y(0.6)$, also Find the Percentage Error.	[10]	CO2										
3		Calculate the approximate value of $I = \int_{0.2}^{2.4} \frac{(1+x)e^x}{\cos ec(xe^x)} dx$ by using Simpson's 1/3, Simpson's 3/8 and Weddle's rule. Find the Exact Value of I and then Compare and Comment on it.	[10]	CO3										
4	a)	Determine the Second Degree Polynomial using Least Square method which fits to the following data: <table border="1"><tr><td>x</td><td>1.2</td><td>2.4</td><td>3.6</td><td>4.8</td></tr><tr><td>y</td><td>6.1</td><td>11.3</td><td>18.5</td><td>27.7</td></tr></table> Hence, find $y(8)$.	x	1.2	2.4	3.6	4.8	y	6.1	11.3	18.5	27.7	[5]	CO3
	x	1.2	2.4	3.6	4.8									
y	6.1	11.3	18.5	27.7										
b)	Estimate the value of $y(10)$ for which the following data fits the Exponential Equation $y = ae^{bx}$ <table border="1"><tr><td>x</td><td>1.4</td><td>2.6</td><td>3.8</td><td>4.1</td><td>5.2</td></tr><tr><td>y</td><td>2.0</td><td>3.5</td><td>5.3</td><td>6.0</td><td>7.5</td></tr></table>	x	1.4	2.6	3.8	4.1	5.2	y	2.0	3.5	5.3	6.0	7.5	[5]
x	1.4	2.6	3.8	4.1	5.2									
y	2.0	3.5	5.3	6.0	7.5									