



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: $a + x - 3y + z = 2$ $3x - 5a - y + z = 0$ $2y + a - z = 1$ $a + x = 0$	[5]	CO2												
	b)	Solve the System of Linear Equations using the Gauss Seidel's Method: $2x + 5y - z = 16$ $3x + y + z = 11$ $2z = 5$ <p>Use the initial guess $x_0 = y_0 = z_0 = 0$ and iterate until the solution converges three decimal places.</p>	[5]													
2		Solve the following first order Ordinary Differential Equation using 4th order Runge-Kutta Method: $\frac{dy}{dx} = x^3 e^x + y; y(0) = 1$ <p>Find the value of $y(0.3)$ and $y(0.6)$, also Find the Percentage Error.</p>	[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" style="margin: 10px auto; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">1.2</td> <td style="padding: 5px;">2.4</td> <td style="padding: 5px;">3.6</td> <td style="padding: 5px;">4.8</td> </tr> <tr> <td style="padding: 5px;">y</td> <td style="padding: 5px;">6.1</td> <td style="padding: 5px;">11.3</td> <td style="padding: 5px;">18.5</td> <td style="padding: 5px;">27.7</td> </tr> </tbody> </table> <p>Hence, find $y(8)$.</p>	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" style="margin: 10px auto; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">1.4</td> <td style="padding: 5px;">2.6</td> <td style="padding: 5px;">3.8</td> <td style="padding: 5px;">4.1</td> <td style="padding: 5px;">5.2</td> </tr> <tr> <td style="padding: 5px;">y</td> <td style="padding: 5px;">2.0</td> <td style="padding: 5px;">3.5</td> <td style="padding: 5px;">5.3</td> <td style="padding: 5px;">6.0</td> <td style="padding: 5px;">7.5</td> </tr> </tbody> </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											