



COMSATS University Islamabad - Lahore Campus
Defence Road, Off Raiwind Road, Lahore

Terminal Exam (SP24)

Course Title:	Numerical Computing			Course Code:	CSC475	Credit Hours:	3
Course Instructor/s:	Dr. Muhammad Rafiullah Dr. Imran Zulfiqar Cheema			Program Name:	BSE		
Semester:	5 th	Batch:	FA21-BSE	Section:		Date:	13-6-2024
Time Allowed:	3 Hours			Maximum Marks:	50		
Student's Name:				Reg. No.			
Important Instructions / Guidelines: <ul style="list-style-type: none">• Attempt all questions.• Do all parts of a question in a sequence.• Do not write anything on question paper except your name and registration number• Calculator sharing is not allowed.							

Question 1: The growth rate of **product A** in 7 months of a **Silver AI Company** shown in the figure 1. Approximate the **4th degree polynomial** with the help of highlighted data points given in the table 1. Use **Newton's divided interpolation formula** to find $P_4(t)$.

CLO4, SO(2,4)
Marks 10

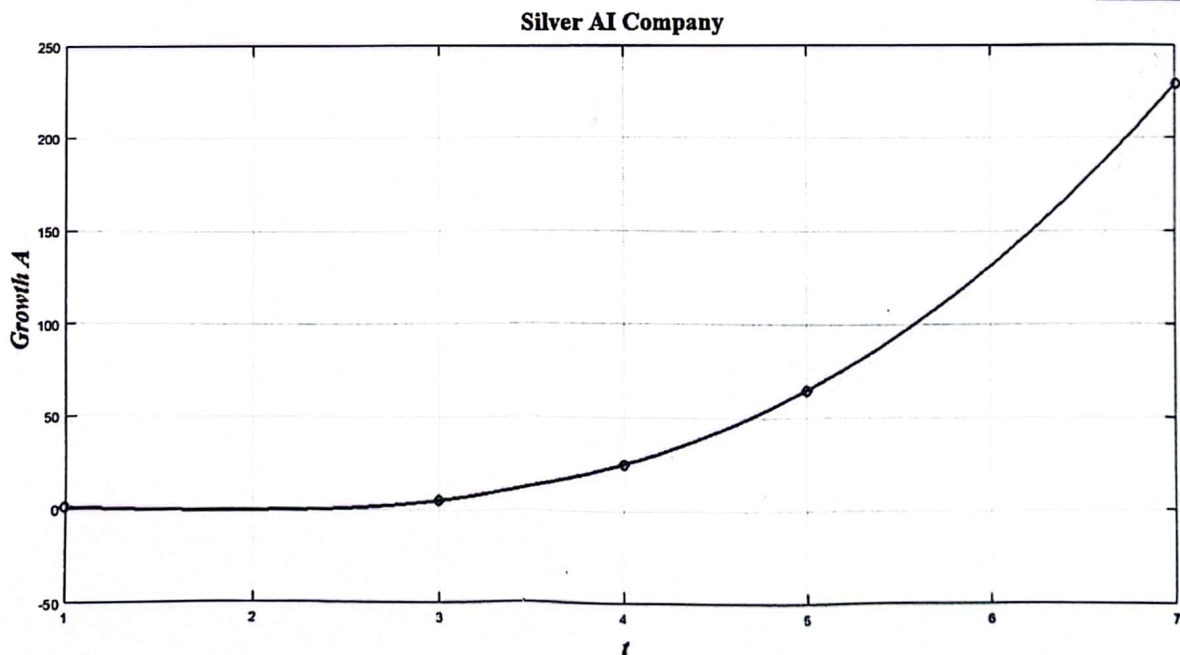


Figure 1

Table 1

t	1	3	4	5	7
$f(t)$	1	5	25	65	229

Question 2: A robotic car traveling on a straight road is marked with different points. The observational data was obtained from Google Maps which is given in the following table where the time considered is in seconds, and distance is in feet.

Time, t	1	2	3	4	5
Distance, d	3	22	91	270	643

CLO5, SO(2,4)
Marks 10

Calculate the distance covered by the car at $t = 1.5, 0.5, 4.75$.

Question 3: Use the **Jacobi iterative method** to approximate the solution up to 3 decimal places of following system of linear equations by taking initial guess $x_0 = 0.5$, $y_0 = 0.5$ and $z_0 = 0.5$.

$$8x + y - 4z = 5$$

$$-x + y + 3z = 2$$

$$x + 5y - 3z = 4$$

CLO5, SO(2,4)
Marks 10

Question 4: Evaluate $\int_0^4 \frac{1}{1+x^2} dx$ taking $n = 4$ and using given methods

1. Simpson's $\frac{1}{3}$ rule
2. Trapezoidal rule
3. Simpson's $\frac{3}{8}$ th rule

CLO5, SO(2,4)
Marks 10

Question 5: Apply the fourth order **Runge-Kutta method** to find an approximate solution to the following initial value problem, and compare with actual solution $y(x) = x + \frac{1}{1-x}$.

$$\frac{dy}{dx} = 1 + (x - y)^2, \quad y(2) = 1,$$

$$2 \leq x \leq 3, \quad h = 0.5$$

CLO6, SO(2,4)
Marks 10

BEST OF LUCK