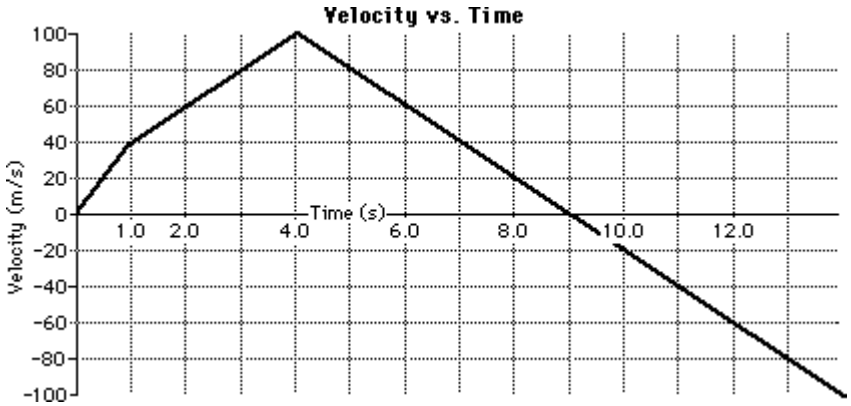
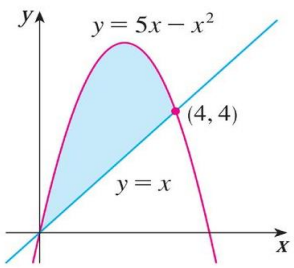
National University of Sciences and Technology
College of Electrical and Mechanical Engineering
Department of Basic Sciences & Humanities
2nd OHT – Spring Semester 2019

Subject Code :	**MATH-352**	**Subject:**	**Numerical Methods**
Date :	**06 May 2019**	**Timing:**	**1200-1300 Hrs**
Max Marks :	**50**	**Max Time :**	**1 Hrs**
Instructor :	**Dr. Syed Tayyab Hussain**	**Degree :**	**38 Mts A&B**

Note: This is an **OPEN BOOK and Notes** exam. Attempt all Questions. Marks are given against each question. The answer should be logically developed, relevant and to the point.
No queries will be entertained.

S/No		Marks
Q. 1	a) The velocity-time graph for a two-stage rocket is shown below. Use the graph and your understanding of slope calculations to determine the acceleration of the rocket at t=2.0 sec using at least three data points  b) Using the provided data in part (a) calculate the acceleration at $t = 2.5\ sec$ by using central difference scheme.	**[8+7]**
Q. 2 **CLO 3** **PLO 1**	The area under the curve in a velocity time graph (see graph Q.1) gives you the displacement. *Apply* numerical technique to calculate the displacement of the rocket in the time interval [1-5] sec.	**[10]**
Q. 3 **CLO 3** **PLO 1**	If 0.05-liter paint is required to cover unit square meter area, *Construct* the integral and estimate the total paint required to cover the shaded region.  	**[12]**

Q.4 **CLO 4** **PLO 1**	a) Write down a 4×4 *general* matrix such that it's Cholesky's decomposition is possible and choose suitable conditions on matrix elements so that it satisfy the conditions to be a positive definite matrix. (no particular values of matrix elements should be taken) b) *Convert* the matrix A into LU decomposition form $A = \begin{bmatrix} 3 & 1 \\ -6 & -4 \end{bmatrix}$	**[6+7]**

****Good luck****