



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



Subject Code : <u>MATH-352</u> Date : <u>06 May 2019</u> Max Marks : <u>50</u> Instructor : <u>Dr. Syed Tayyab Hussain</u>	Subject: <u>Numerical Methods</u> Timing: <u>1200-1300 Hrs</u> Max Time : <u>1 Hrs</u> Degree : <u>38 Mts A&B</u>
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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	<p>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</p> <div style="text-align: center;"> <p>Velocity vs. Time</p> </div> <p>b) Using the provided data in part (a) calculate the acceleration at $t = 2.5$ sec by using central difference scheme.</p>	[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. <i>Apply</i> numerical technique to calculate the displacement of the rocket in the time interval [1-5] sec.	[10]
Q. 3 CLO 3 PLO 1	<p>If 0.05-liter paint is required to cover unit square meter area, <i>Construct</i> the integral and estimate the total paint required to cover the shaded region.</p> <div style="text-align: center;"> </div>	[12]

Q.4 CLO 4 PLO 1	<p>a) Write down a 4×4 <i>general</i> 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)</p> <p>b) <i>Convert</i> the matrix A into LU decomposition form</p> $A = \begin{bmatrix} 3 & 1 \\ -6 & -4 \end{bmatrix}$	[6+7]
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****Good luck****