

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE – SEMESTER- VII EXAMINATION-SUMMER 2023****Subject Code: 3170110****Date: 26/06/2023****Subject Name: Introduction to Aero Elasticity****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

	<b>MARKS</b>
<b>Q.1</b> (a) What is Aero elasticity?	<b>03</b>
(b) Explain Energy method.	<b>04</b>
(c) Draw typical section of airfoil with control surfaces.	<b>07</b>
<b>Q.2</b> (a) Define: Swept wing.	<b>03</b>
(b) Classify Aero elastic problem in detail.	<b>04</b>
(c) Write a note on divergence of 2D airfoil.	<b>07</b>
<b>OR</b>	
(c) Explain Geometry of typical section of airfoil with sketch and appropriate equation.	<b>07</b>
<b>Q.3</b> (a) What is the solution of aero elastic problem?	<b>03</b>
(b) Difference b/w straight and swept wing.	<b>04</b>
(c) Explain collar triangle.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Write down application of swept wing.	<b>03</b>
(b) What is structure deformation? Explain it.	<b>04</b>
(c) Write a note on wing loading.	<b>07</b>
<b>Q.4</b> (a) What is flutter divergence?	<b>03</b>
(b) What are the types of control reversal in a flying aircraft?	<b>04</b>
(c) Explain control effectiveness.	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) What is the zero aerodynamic damping?	<b>03</b>
(b) What is control reversal?	<b>04</b>
(c) Write a note on influence coefficients.	<b>07</b>
<b>Q.5</b> (a) What is static divergence?	<b>03</b>
(b) Explain on 1D aero elastic model of airfoil.	<b>04</b>
(c) Explain the physics of bending-torsion flutter.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) What is dynamic aero elasticity?	<b>03</b>
(b) Draw rolling of a straight wing.	<b>04</b>
(c) Write a note on Theodorsen theory.	<b>07</b>

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