**R18**

Code No: 157EJ

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech IV Year I Semester Examinations, February/March-2022**
**BASICS OF AERONAUTICAL ENGINEERING**
**(Civil Engineering)**

**Time: 3 Hours**　　　　　　　　　　　　　　　　　　　　　**Max. Marks: 75**

**Answer any Five Questions**
**All Questions Carry Equal Marks**
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1.a) Derive the equation for the speed of sound and discuss their importance in dynamics.
  b) State Bernoulli's equation and define static pressure, dynamic pressure and total pressure. [7+8]

2.a) List different layers in atmosphere? Explain their significance.
  b) Derive an expression for pressure and density in troposphere and stratosphere? [7+8]

3. A two-dimensional flow field is defined as,

$$\bar{V} = \hat{i}y - \hat{j}x$$

Define the equation of Streamline passing through the point (1, 0). [15]

4.a) How are streamlines and equipotential lines related in a flow? Explain with neat sketches.
  b) Explain the difference between two and three- dimensional airflows and give examples. [8+7]

5.a) Explain the characteristics of an airfoil, when subjected to different angle of attacks.
  b) List the factors that affect the aerodynamic moment and explain the forces acting on it. [7+8]

6. Discuss the pressure distribution on an airfoil? Sketch the pressure distribution on an airfoil at various angles of attack. [15]

7.a) Explain i) Aspect Ratio ii) Centre of pressure and iii) Aerodynamic center
  b) Difference between symmetrical and unsymmetrical airfoil? Explain with neat sketches and plots. [7+8]

8.a) Describe the use of an irrotational flow model for incompressible aerodynamics applications.
  b) What is meant by subsonic and transonic speed regime? Explain their significance. [8+7]

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