

R09

Code No: C7605

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech I Semester Examinations March/April-2011

FUNDAMENTALS OF AEROSPACE ENGINEERING

(AEROSPACE ENGINEERING)

Time: 3hours

Max.Marks:60

Answer any five questions
All questions carry equal marks

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1. Explain the variation of temperature with altitude. Define various altitudes and give the relationships between them. Calculate the pressure, pressure ratio, temperature, density & density ratio at an altitude of 14 km. [12]
2. Starting from continuity equation derive Bernoulli's equation and explain its application in air speed indicators and wind tunnels. A wind tunnel located at a pressure altitude of 500 meters ($\rho = 1.1674 \text{ kg/m}^3$, $p = 95472 \text{ N/m}^2$), has a circular test section with 3 meter diameter. The air speed is 80 m/sec in the test section, which is vented to the ambient atmosphere. The air speed in the larger diameter section just upstream of the contraction is 16 m/sec. Calculate upstream diameter, dynamic pressure in the test section, upstream pressure and height of mercury column. [12]
3. Explain in detail about vortex flow and generation of lift through circulation. [12]
4. Describe about supersonic flow and temperature effect of hypersonic flow? [12]
5. Discuss in detail about:
 - a) Leading & trailing edge devices.
 - b) Deep stall.
 - c) Effect of sweep back on maximum lift.
 - d) Airfoil selection & wing design. [12]
6. Describe about stability and control of an airplane and give the conditions for static longitudinal stability. Also explain about static margin and neutral point. [12]
7. What are the structural elements and materials used in the construction of an aircraft? [12]
8. Explain in detail about elliptical orbits & Kepler's laws of planetary motion. [12]

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