R09

Code No: C7605

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS APRIL/MAY-2012
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.a) Explain the working principle of a low-speed subsonic wind tunnel.
b) Write a detailed note on the anatomy of a space vehicle. Differentiate between expendable and recoverable launch vehicles.

2.a) Discuss Bernoulli's equation in detail and apply it to the operation of an air speed indicator.
b) Define 'Mach number' and obtain an expression for it. Distinguish between subsonic, and supersonic regions in terms of Mach number.

3.a) Write detailed notes on laminar and turbulent boundary layers.
b) Discuss the characteristics of supersonic flow with special emphasis on shock waves and Mach waves.

4.a) Introduce the term 'Reynolds number' and discuss its nature.
b) Discuss how the drag coefficient (C_d) varies with Mach number (M) and how prediction of the drag divergence Mach number is carried out.

5.a) Explain in detail the effect of wing sweep back on lift produced.
b) Write a brief note on 'leading edge' and 'trailing edge' devices designed for producing high lift.

6. Taking all the basic forces acting on an airplane under steady, unaccelerated conditions, describe a method to estimate its rate of climb as a function of excess power.

7.a) Differentiate between the working principles of 'gas turbine' and 'ramjet' propulsive systems. Use neat sketches to support the explanation.
b) Bring out the importance of fatigue with reference to aircraft structural design.

8.a) Illustrate the need for developing multistage rockets and explain various configurations currently in use.

b) Discuss in detail orbital maneuvers with the help of neat sketches.

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