

II B.Tech I Semester Supplementary Examinations, November 2006
FUNDAMENTALS OF AERONAUTICAL ENGINEERING
(Aeronautical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the design features of a Turboshift Engine.
(b) Explain the following terms: [8+8]
 - i. Twist
 - ii. Taper
 - iii. Aerodynamic Center
 - iv. Antidrag wires
2. (a) How do the primary controls of a Helicopter differ from that of a fixed wing aircraft ? [12]
(b) Define dorsal and explain its function. [4]
3. Name the instrument for measuring altitude of operation of an aircraft. How many kinds of such instruments are available for this purpose? Sketch and explain the details of one based upon Pressure at that altitude. - [16]
4. Discuss the characteristics of stratosphere. How does the temperature vary in this layer of atmosphere? How can you obtain temperatures in this regime? [16]
5. What are the loads on the fuselage in different conditions, explain with the help of a sketch. [16]
6. How the loads are transferred in a geodesic construction, explain the characteristics of the components used in the construction. [16]
7. (a) Explain the principle, construction and working of piston engine.
(b) Give the altitude and speed limitations for piston engine and discuss their effect on the engine. [8+8]
8. What are the different types of rockets? Discuss their relative merits and applications. [16]

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1. (a) Explain the design features of a Turboprop Engine. [10]
(b) Who worked on the concept of Sir George Cayley and how do you assess the success of the development of his concept ? [6]
2. (a) Distinguish between a fixed wing a/c, helicopter and tilt rotor aircraft. Give example of each. [9]
(b) What are the various types of undercarriages used for a helicopter ? Explain. [7]
3. What are the instruments essential for flying an aircraft? List the same and explain the role of each one. Arrange these instruments as in the instrument panel of a light airplane. How will it look for a modem, high capacity airliner? [16]
4. What is understood by the term “STABILITY OF ATMOSPHERE”? Work out the conditions under which atmosphere is stable. [16]
5. Describe the characteristics of the airfoil. Differentiate between the subsonic and supersonic airfoils. What are the applications of a symmetrical airfoil? [16]
6. Compare the pure monocoque and semi-monocoque wing construction with their field of applications. [16]
7. (a) Explain the principle, construction and working of turbo jet engine.
(b) Give the altitude and speed limitations for turbojet engine and discuss their effect on the engine. [8+8]
8. Explain the principle of jet thrust and propeller thrust. Enumerate the differences between propeller thrust and jet thrust in airplanes. [16]

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1. (a) Distinguish between swept forward and swept back wings. [10]
(b) 'Aeronautical Triangle' dominated the early development of aeronautics in United States during 1886-1916. Discuss. [6]
2. (a) Distinguish between Wheel type, Skiing type and Float type undercarriages.
(b) Explain the functioning of primary control surfaces of an aircraft. [8+8]
3. Explain that the basic mechanism and principal of an air speed indicator and altimeter are essentially same. Where are the differences and what is the significance? Make use of sketches. - [16]
4. Flight-testing is normally carried out in early hours of the day. What are the reasons for the same? Why it should not be carried out during the noon period of the day? Explain how one can make a preliminary guess of the stability of atmosphere? [16]
5. (a) Can an airplane fly upside down, if yes how?
(b) Discuss the maneuvers of a helicopter. [8+8]
6. Compare making labeled sketches the monocoque, semi-monocoque and geodesic construction for airplane wing. [16]
7. (a) Describe the principle, construction and working of turboprop engine used in airplanes.
(b) Give the altitude and speed limitations for turboprop engine and discuss their effect on the engine. [8+8]
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1. (a) Explain the following terms and their function
 - i. Bulkheads
 - ii. SparS
 - iii. Ribs and
 - iv. Stringers(b) Distinguish between Turboprop, Turbojet and Turbofan Engines. [8+8]
2. Define an aircraft. How do you classify the various flight vehicles ? [16]
3. Explain a typical power assisted longitudinal control for a civil airliner. How does it differ from a conventional pitch control mechanism for a light airplane? Explain with sketches. [16]
4. Explain the usefulness of atmosphere in generating lift drag and moments on a lifting body with sketches and principles of physics. What if atmosphere were not around? [16]
5. How the aerodynamic loads are transferred in a wing of the airplane. What are the points which are most stressed. Describe the function of ribs in a wing. [16]
6. Draw a neat sketch of a semi-monocoque fuselage construction and describe each component of it. [16]
7. (a) Explain the various elements of the jet unit used in airplanes. .
(b) With the help of neat sketch explain the use of jet unit for production of thrust in airplanes. [8+8]
8. What are the different types of rockets? Discuss their relative merits and applications. [16]
