

**II B.Tech. I Semester Regular Examinations, November -2005**  
**FUNDAMENTALS OF AERONAUTICAL ENGINEERING**  
**(Aeronautical Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. Discuss the developments in the field of aircraft materials over the years. [16]
2. (a) Discuss the various high lift devices used in a modern aircraft.  
(b) What are the major design differences between an airplane and a helicopter ? [8+8]
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 modern, high capacity airliner? [16]
4. How is an airplane given rotation about its lateral axis? Explain the theoretical part and describe the mechanism to accomplish the same with a neat sketch (s). [16]
5. What is airfoil? Describe the various airfoil shapes with the help of neat sketches. [16]
6. What are the general types of construction of wings and fuselage, give practical examples of each type with neat sketches. [16]
7. Compare and contrast the differences between the following types of engines used in airplanes. [16]
  - (a) Piston type
  - (b) Turboprop type
  - (c) Jet type.
8. What are the different types of rockets? Discuss their relative merits and applications. [16]

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1. Discuss the developments in the field of materials used for various parts of Piston and Turbine Engines over the years. [16]
2. (a) What is the purpose of an undercarriage ? Explain briefly the various types of undercarriages.  
(b) List down the advantages of a rotory wing aircraft over fixed wing a/c. [8+8]
3. An airplane is required to perform rolling maneuver. How could this be achieved? Provide the required description from theory and with mechanism. Make use of neat sketches. [16]
4. Describe with a neat sketch, Principal, details and functioning of a radio altimeter. Does it have some limitations? Discuss. [16]
5. Define the terms associated with airfoil and describe the effect of each on the lift and drag coefficient of the airfoil. [16]
6. Explain the monocoque construction and its relative advantages and disadvantages [16]
7. What are the various components of turboprop engine? Describe them briefly. Discuss the different types of turboprop engines. [16]
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. Discuss the developments in the field of Aircraft Structures over the years. [16]
2. (a) Explain Nose wheel and Tail wheel type landing gears with the help of sketches. Write down the merits and demerits of each type.  
(b) Classify the various aerospace vehicles based on design features and roles to be accomplished. [8+8]
3. It is well known that roll and yaw maneuvers are often employed together. Explain the mechanism for providing roll and yaw maneuvers with sketches? [16]
4. 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]
5. Explain the nomenclature of NACA 4 digit series, NACA 5 digit series. Draw and explain the  $C_L-\alpha$  curve for an airfoil. [16]
6. Give details of a geodesic construction; describe the components of this type of construction. [16]
7. What are the various components of turbo jet engine? Describe them briefly. Discuss the different types of turbo jet engines. [16]
8. Explain the principle and working of rocket. Describe the different components of a rocket. [16]

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1. Discuss the developments in the field of Aerodynamics over the years. [16]
2. Explain the collective pitch and cyclic pitch controls of a Helicopter. [16]
3. Describe the functioning of a Mach-meter with a neat sketch. Explain that it combines an altimeter and airspeed indicator in itself in its simplest form. [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. What are the structural components of a wing? Draw a neat-labeled diagram of a typical wing showing all the components and discuss their significance. [16]
6. Compare the pure monocoque and semi-monocoque wing construction with their field of applications. [16]
7. What are the various components of piston engine? Describe them briefly. Discuss the different types of piston engines. [16]
8. Elaborate the principle and working of a jet engine and rocket engine. Enumerate the differences between jet engine and rocket engine. [16]

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