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CODE NO: R09222106 | R09 | SET No - 1

II B.TECH - II SEMESTER EXAMINATIONS, APRIL/MAY, 2011
FLIGHT MECHANICS - I
(AERONAUTICAL ENGINEERING)

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

Answer any FIVE questions
All Questions Carry Equal Marks
- - -

1.a) Describe with the help of a diagram the mission profile of a civil transport aircraft. What is involved in performance estimation process and where performance estimation can be applied?
b) Define the terms airspeed indicator reading, indicated airspeed, calibrated airspeed, equivalent airspeed and true airspeed as used in the calibration of airspeed indicator. [8+7]

2.a) Why aerodynamic forces and propulsive forces are of importance to the performance of an aircraft? Explain with the help of diagrams how the lift characteristic of a plain, cambered airfoil can be modified by leading edge and trailing edge flaps.
b) Explain minimum drag speed and minimum power speed and describe their Importance in aircraft performance studies. [8+7]

3. Derive expressions for range and endurance for aircraft with thrust producing engines and explain the cruising method of constant angle of attack and constant Mach number. [15]

4. Why climb performance is one of the critical areas in both the design and operation of an aircraft? Derive expressions for climb gradient and climb rate for aircraft with thrust producing engines. 15]

5. What are the reasons for the maneuver performance of an aircraft to be limited by the structural strength of the airframe? Discuss the main elements of a typical maneuver envelope with the help of a schematic diagram. [15]

6. What are the purposes for which the performance of an aircraft needs to be measured in flight? Explain the parametric forms for aerodynamic forces and thrust with the help of diagrams. [15]

7. What are the phases into which the fight is divided for the purpose of flight planning? Explain with the help of diagram the airfield distances available for take-off. [15]

8. Explain the payload-range diagram through a schematic diagram in terms of its basic elements. How payload-range diagram differs from block time and block fuel summarized in block performance. [15]

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CODE NO: R09222106 | R09 | SET No - 2

II B.TECH - II SEMESTER EXAMINATIONS, APRIL/MAY, 2011
FLIGHT MECHANICS - I
(AERONAUTICAL ENGINEERING)

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

Answer any FIVE questions
All Questions Carry Equal Marks
- - -

1.a) Discuss vertical structure of the atmosphere and its various layers through a diagram.
b) Explain air data computer system using a diagram. [8+7]

2.a) Discuss aircraft force system needed for formulating the performance equations of motion.
b) Explain minimum drag speed and minimum power speed and their importance in aircraft performance analysis. [7+8]

3. Derive Breguet range equation. Discuss cruise method for constant angle of attack and constant altitude. [15]

4. Explain the equations of motion of an aircraft with thrust producing engines in a climb. Derive expressions for climb gradient and climb rate. [15]

5. Describe the equations of motion of an aircraft undergoing lateral maneuver or level turn and derive an expression for radius of turn. Discuss with the help of a diagram the maneuver boundaries for turning performance. [15]

6. Discuss cruise performance measurement and climb performance measurement using parametric performance data analysis. [15]

7. Define the performance classes used to classify aircraft in meeting the requirements of certificate of airworthiness. Discuss through a diagram the climb segments that make up the after take-off climb with one engine inoperative. [15]

8. What is the purpose of flight planning? How performance data have to be organized and presented to meet the requirements of flight planning and in particular for performance planning and fuel planning? [15]

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CODE NO: R09222106 | R09 | SET No - 3

II B.TECH - II SEMESTER EXAMINATIONS, APRIL/MAY, 2011
FLIGHT MECHANICS - I
(AERONAUTICAL ENGINEERING)

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

Answer any FIVE questions
All Questions Carry Equal Marks
- - -

1.a) What for aircraft performance measurement is required? Show with the help of diagrams typical military aircraft mission profiles.
b) Discuss the steps involved in constructing International Standard Atmosphere useful for aircraft operations. State the assumptions involved. [7+8]

2.a) Discuss aircraft force system needed for formulating the performance equations of motion
b) Explain with the help of diagrams how the lift characteristic of a plain, cambered airfoil and how they can be modified by leading edge and trailing edge flaps. [7+8]

3. Derive expressions for range and endurance for aircraft with power producing engines. Explain through diagrams how range function and endurance function vary with relative speed. [15]

4. Describe the phases of descending flight through a diagram and discuss the various criteria that govern the manner in which the aircraft is flown in each phase. [15]

5. Explain the process of take-off with the help of a diagram and discuss how take-off distances are estimated. [15]

6. Explain parametric performance data analysis and discuss how it can be used for take-off and landing performance measurement. [15]

7. Discuss the space available and space required for landing performance. What are the issues relating to discontinued landing? [15]

8. Discuss block performance and payload-range diagram used in making performance summary. [15]

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CODE NO: R09222106 | R09 | SET No - 4

II B.TECH - II SEMESTER EXAMINATIONS, APRIL/MAY, 2011
FLIGHT MECHANICS - I
(AERONAUTICAL ENGINEERING)

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

Answer any FIVE questions
All Questions Carry Equal Marks
- - -

1.a) Discuss vertical structure of the atmosphere and its various layers through a diagram.
b) Define the terms airspeed indicator reading, indicated airspeed, calibrated airspeed, equivalent airspeed and true airspeed as used in the calibration of airspeed indicator. [7+8]

2.a) Explain with the help of diagrams how the lift characteristic of a plain, cambered airfoil and how they can be modified by leading edge and trailing edge flaps.
b) Explain minimum drag speed and minimum power speed and their importance in aircraft performance analysis. [8+7]

3. Derive Breguet range equation. Discuss cruise method for constant angle of attack and constant Mach number. [15]

4. Describe the phases of descending flight through a diagram and discuss the estimation of landing distances. [15]

5. Discuss the space available and space required for take-off performance. [15]

6. Explain parametric performance data analysis and discuss how it can be used for cruise performance measurement. [15]

7. What are the phases into which the flight is divided for the purpose of flight planning? Discuss through a diagram the climb segments that make up the after take-off climb with one engine inoperative. [15]

8. Write short notes on the following:
a) Block performance
b) Drag polar
c) Endurance. [15]

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