Module – 4

FLIGHT MECHANICS BASIS

Syllabus:

Flight mechanics basis - Review of concepts, Positioning the lift vector on a drawing, Positioning the lift vector on a drawing, expressing speed and load factor, Computing a realistic case.

MCQs

1. What is the primary force that allows an aircraft to achieve lift?

a) Thrust

b) Drag

c) Weight

d) Lift

2. In which direction does the lift force act on an aircraft?

a) Upward

b) Downward

c) Forward

d) Backward

3. Which law of motion is related to the principle of action and reaction?

a) Newton's First Law

b) Newton's Second Law

c) Newton's Third Law

d) Kepler's Law

4. Load factor is the ratio of:

a) Thrust to drag

b) Lift to weight

c) Lift to drag

d) Weight to thrust

5. If an aircraft is flying straight and level, what can you say about the net force acting on it?

a) Net force is zero

b) Net force is upward

c) Net force is downward

d) Net force is forward

6. The angle between the chord line of an aircraft's wing and the oncoming airflow is known as:

a) Angle of attack

b) Angle of incidence

c) Dihedral angle

d) Sweep angle

7. Which factor affects the stall speed of an aircraft?

a) Thrust

b) Weight

c) Wing area

d) Altitude

8. Which of the following is NOT a primary control surface on an aircraft wing?

a) Aileron

b) Elevator

c) Rudder

d) Flap

9. Expressing the speed of an aircraft in relation to the speed of sound is referred to as:

a) True airspeed

b) Indicated airspeed

c) Mach number

d) Groundspeed

10. What does the term "computing a realistic case" in flight mechanics refer to?

a) Calculating maximum altitude

b) Estimating fuel consumption

c) Analyzing emergency procedures

d) Performing flight simulations

11. The weight of an aircraft is equivalent to the force of:

a) Thrust

b) Drag

c) Lift

d) Gravity

12. Which parameter is NOT typically associated with aircraft performance?

a) Range

b) Altitude

c) Paint color

d) Speed

13. Which force opposes the motion of an aircraft through the air?

a) Thrust

b) Lift

c) Weight

d) Drag

14. The aircraft's attitude refers to its orientation in relation to the:

a) Horizon

b) Tower

c) Engine

d) Tailfin

15. When an aircraft exceeds its critical angle of attack, it experiences a(n):

a) Roll

b) Yaw

c) Stall

d) Dive

16. Which of the following is a longitudinal control surface?

a) Rudder

b) Aileron

c) Elevator

d) Flap

17. The point where all the aircraft's weight is considered to act is known as the:

a) Center of gravity

b) Aerodynamic center

c) Center of lift

d) Center of thrust

18. Which factor does NOT affect the lift force generated by an aircraft wing?

a) Wing area

b) Angle of attack

c) Air density

d) Thrust

19. Which of the following statements about load factor is correct?

a) Load factor is always less than 1

b) Load factor is a measure of drag

c) Load factor affects the aircraft's lift-to-drag ratio

d) Load factor can affect passenger comfort

20. What is the name for the imaginary line that represents the average path of an aircraft through the air?

a) Centerline

b) Wing line

c) Flight path

d) Glide slope

21. The force that opposes the motion of an aircraft through the air is called:

a) Thrust

b) Lift

c) Weight

d) Drag

22. The angle between the chord line of an aircraft wing and the longitudinal axis of the aircraft is known as the:

a) Angle of attack

b) Angle of incidence

c) Dihedral angle

d) Sweep angle

23. The point at which all the aircraft's lift is considered to act is known as the:

a) Center of gravity

b) Aerodynamic center

c) Center of lift

d) Center of thrust

24. Which parameter is used to express the efficiency of an aircraft's wing in generating lift?

a) Aspect ratio

b) Airfoil thickness

c) Wing sweep

d) Fuselage length

25. When an aircraft pitches up, the angle between its longitudinal axis and the horizon:

a) Increases

b) Decreases

c) Remains constant

d) Reverses

26. The net aerodynamic force that opposes the aircraft's motion is:

a) Lift

b) Thrust

c) Weight

d) Drag

27. Which of the following is NOT a primary control surface for yaw control?

a) Rudder

b) Elevator

c) Aileron

d) Spoiler

28. What is the speed of sound in dry air at sea level and standard atmospheric conditions?

a) 343 meters per second

b) 299,792,458 meters per second

c) 186,282 miles per second

d) 768 miles per hour

29. The angle between the chord line of an aircraft wing and the oncoming airflow is known as the:

a) Angle of attack

b) Angle of incidence

c) Dihedral angle

d) Sweep angle

30. In a coordinated turn, what is the role of the rudder?

a) To increase lift

b) To decrease drag

c) To balance the aircraft

d) To control roll

31. The force that opposes an aircraft's forward motion through the air is called:

a) Thrust

b) Drag

c) Lift

d) Weight

32. What does the term "load factor" in aviation refer to?

a) The amount of cargo carried by an aircraft

b) The ratio of lift to drag

c) The ratio of thrust to weight

d) The force experienced by an aircraft due to acceleration or gravity

33. What is the primary purpose of the elevator control surface on an aircraft's tail?

a) To control roll

b) To control yaw

c) To control pitch

d) To control altitude

34. The point where all the aircraft's weight is considered to act is known as the:

a) Center of gravity

b) Aerodynamic center

c) Center of lift

d) Center of thrust

35. The angle between the chord line of an aircraft wing and the longitudinal axis of the aircraft is known as the:

a) Angle of attack

b) Angle of incidence

c) Dihedral angle

d) Sweep angle

36. Which of the following parameters has a significant impact on an aircraft's lift production?

a) Fuselage length

b) Engine power

c) Airfoil shape

d) Cockpit color

37. What does the term "aerodynamic center" refer to in aircraft design?

a) The point where all the lift is considered to act

b) The location of the aircraft's center of gravity

c) The point on an airfoil where the pitching moment remains constant

d) The point where all the drag is concentrated

38. What is the primary purpose of winglets on aircraft wings?

a) To increase lift

b) To reduce drag

c) To control pitch

d) To improve engine efficiency

39. The weight of an aircraft is equivalent to the force of:

a) Thrust

b) Drag

c) Lift

d) Gravity

40. Which of the following parameters affects the stall speed of an aircraft?

a) Wing area

b) Maximum altitude

c) Fuselage length

d) Cockpit color

41. What is the purpose of an aileron on an aircraft's wing?

a) To control pitch

b) To control roll

c) To control yaw

d) To control thrust

42. The net force acting on an aircraft in steady, level flight is:

a) Lift

b) Thrust

c) Weight

d) Drag

43. In a coordinated turn, what is the role of the rudder?

a) To increase lift

b) To decrease drag

c) To balance the aircraft

d) To control roll

44. What is the term for the ratio of an aircraft's true airspeed to the speed of sound?

a) Groundspeed

b) Mach number

c) Indicated airspeed

d) Vertical speed

45. The point where all the aircraft's lift is considered to act is known as the:

a) Center of gravity

b) Aerodynamic center

c) Center of lift

d) Center of thrust

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a) Groundspeed

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54. Which parameter is used to express the efficiency of an aircraft's wing in generating lift?

a) Aspect ratio

b) Airfoil thickness

c) Wing sweep

d) Fuselage length

55. When an aircraft pitches up, the angle between its longitudinal axis and the horizon:

a) Increases

b) Decreases

c) Remains constant

d) Reverses

56. The net aerodynamic force that opposes the aircraft's motion is:

a) Lift

b) Thrust

c) Weight

d) Drag

57. Which of the following is NOT a primary control surface for yaw control?

a) Rudder

b) Elevator

c) Aileron

d) Spoiler

58. What is the speed of sound in dry air at sea level and standard atmospheric conditions?

a) 343 meters per second

b) 299,792,458 meters per second

c) 186,282 miles per second

d) 768 miles per hour

59. The angle between the chord line of an aircraft wing and the oncoming airflow is known as the:

a) Angle of attack

b) Angle of incidence

c) Dihedral angle

d) Sweep angle

60. In a coordinated turn, what is the role of the ailerons?

a) To control pitch

b) To control roll

c) To control yaw

d) To control thrust

61. What is the term for the force that pulls an aircraft toward the center of the Earth?

a) Lift

b) Thrust

c) Weight

d) Drag

62. Which of the following statements is true regarding the angle of attack and lift production?

a) Increasing angle of attack decreases lift

b) Angle of attack does not affect lift

c) Lift is maximized at a certain angle of attack

d) Angle of attack only affects drag

63. The primary purpose of a vertical stabilizer (fin) on an aircraft is to provide:

a) Lift

b) Thrust

c) Roll control

d) Yaw stability

64. The point around which an aircraft pivots in pitch is called the:

a) Center of gravity

b) Center of lift

c) Center of rotation

d) Center of thrust

65. Which parameter is used to express the efficiency of an aircraft's wing in generating lift?

a) Aspect ratio

b) Wing area

c) Airfoil thickness

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66. The angle between the chord line of an aircraft wing and the longitudinal axis of the aircraft is known as the:

a) Angle of attack

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67. What is the primary purpose of wing flaps on an aircraft?

a) To increase lift

b) To decrease drag

c) To control roll

d) To control pitch

68. Which force opposes the motion of an aircraft through the air?

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b) Lift

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69. When an aircraft pitches up, the angle between its longitudinal axis and the horizon:

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70. Which of the following statements about load factor is true?

a) Load factor is always less than 1

b) Load factor is a measure of drag

c) Load factor affects the aircraft's lift-to-drag ratio

d) Load factor can affect passenger comfort

71. What is the primary control surface used for roll control on an aircraft?

a) Elevator

b) Rudder

c) Aileron

d) Flap

72. Which of the following factors affects the lift generated by an aircraft's wing?

a) Fuselage length

b) Wing sweep

c) Engine power

d) Altitude

73. The point around which an aircraft pivots in roll is called the:

a) Center of gravity

b) Center of lift

c) Center of rotation

d) Center of thrust

74. What is the angle of attack when an aircraft's wing is aligned with the oncoming airflow?

a) 0 degrees

b) 45 degrees

c) 90 degrees

d) 180 degrees

75. What is the purpose of the elevator control surface on an aircraft's tail?

a) To control pitch

b) To control roll

c) To control yaw

d) To control thrust

76. The net aerodynamic force that opposes the aircraft's motion is:

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