Principles of Flight

Question overview:

1 - Using the table in picture no. 1, determine which of the above statements is correct as a whole.

1. The length is denoted by m, the unit is l and the expression m/t corresponds to it.
2. Time is denoted by t, the unit is s and the expression l / t corresponds to it.
3. Mass is denoted by kg, the unit is bar and the expression m x a corresponds to it
4. Mass is denoted by m, the unit is kg, and the expression - corresponds to it.

2 - Using the table in picture no. 1, determine which of the above statements is correct as a whole.

1. Mass is denoted by kg, the unit is bar and the expression m x a corresponds to it
2. Temperature is denoted by T, the unit is K(°C) and the expression corresponds to it -
3. The area is denoted by S, the unit is m3, and the expression F/S corresponds to it.
4. The volume is denoted by Q, the unit is m3, and the expression l3 corresponds to it.

3 - Using the table in Figure 1, determine which of the above statements is correct as a whole.

1. The force is denoted by F, the unit is N and the expression m x a corresponds to it.
2. The speed is denoted by E, the unit is kg/s and the expression m x a corresponds to it
3. Acceleration is denoted by a, the unit is m/s and the expression l/t2 corresponds to it.
4. The speed is denoted by V, the unit is m/s2 and the expression m/V corresponds to it.

4 - Using the table in picture no. 1, determine which of the stated statements is correct as a whole.

1. The flow is denoted by Q, the unit is kg/s and the expression m x a corresponds to it.
2. Energy is denoted by E, the unit is J and the expression F x l corresponds to it.
3. The flow is denoted by Q, the unit is kg/s and the expression l / t corresponds to it.
4. Energy is denoted by E, the unit is bar and the expression l2 corresponds to it.

5 - Using the table in picture no. 1, determine which of the stated statements is correct as a whole.

1. Density is denoted by T, the unit is kg/m3, and the expression F x l corresponds to it
2. Density is denoted by R, the unit is kg/s and the expression F/S corresponds to it.
3. Pressure is denoted by p, the unit is bar and the expression F x l corresponds to it
4. Pressure is denoted by p, the unit is bar and the expression F/S corresponds to it.

6 - Using the Bernoulli equation, define the change (increase / decrease) of the flow parameter

(p, v, S), in relation to the geometry of the tube of variable section. Using picture no.3 choose which one

the answer is completely correct.

1. v1 < v2 > v3 < v1
2. S1 > S2 > S3 < S1
3. S1 > S2 < S3 < S1
4. p1 > p2 < p3 > p1

7 - Using Bernoulli's equation, define the change (increase / decrease) of flow parameters

(p, v, S), in relation to the geometry of the tube of variable section. Using picture no.3 choose which one

the answer is completely correct.

1. p1 > p2 > p3 < p1
2. v1 < v2 > v3 > v1
3. S1 > S2 > S3 < S1
4. v1 < v2 > v3 < v1

8 - With which letter is the underpressure zone in the air flow

1. B
2. C
3. A
4. D

9 - In picture no. 5 in the attachment are marked with letters:

1. A - profile chord, B - skeletal line, C - angle of attack
2. B - profile chord, A - skeletal line, C - angle of attack
3. B - profile chord, C - skeletal line, A - angle of attack
4. C - profile chord, B - skeletal line, A - angle of attack

10 - What letter is used to mark picture no. 6 on which the speed of flow in boundary layer?

1. A
2. B
3. C
4. D

11 - In the attached picture No. 7 are marked with letters:

1. A – X axis, B – center of gravity, C – Z axis, D – chord length.
2. A - thrust force, B - center of gravity, C drag force, D - chord length
3. A – Z axis, B –drag force, C – center of gravity, E – distance CT from the leading edge
4. A –drag force, B – chord length, C – center of gravity, E – X axis

12 - In the standard atmosphere, three basic parameters are indicated: Figure no. 19

1. A
2. D
3. C
4. B

13 - Density values = 1.14 kg/m3; pressure = 0.95 bar and temperature = 8.5 °C in standard the atmosphere corresponds to a height of:

1. 5,000 meters
2. 1,000 meters
3. Sea level
4. 10,000 meters

14 - Density values = 0.8 kg/m3; pressure = 0.62 bar and temperature = -17.5 °C in standard the atmosphere corresponds to a height of:

1. 1,000 meters
2. 5,000 meters
3. Sea level
4. 10,000 meters

15 - Picture no. 8 shows the basic command and aerodynamic surfaces of the sailplane and marked essential geometric quantities.

1. 1 – wing, 2 – horizontal stabilizer, 3 – vertical stabilizer, 4 – wings

2. 1 – wings, 2 – horizontal stabilizer, 3 – vertical stabilizer, 4 – wing

3. 1 – wing, 2 – vertical stabilizer, 3 – horizontal stabilizer, 4 – wings

4. 1 – wing, 2 – ailerons, 3 – vertical stabilizer, 4 – ailerons

16 - Picture no. 8 shows the basic control and aerodynamic surfaces of the sailplane and marked essential geometric quantities.

1. 5 - ailerons, 6 - aerodynamic brakes, 7 - horizontal rudder, 8 - vertical rudder

2. 5 - flaps, 6 - aerodynamic brakes, 7 - horizontal rudder, 8 - vertical rudder

3. 5 - ailerons, 6 - flaps, 7 - vertical rudder, 8 - horizontal rudder

4. 5 - wings, 6 - aerodynamic brakes, 7 - horizontal stabilizer, 8 - vertical stabilizer

17 - The aspect ratio of the wing is marked and is equal to: (Image no. 8)

1. T = 2 l/ b

2. /\ = b / l

3. P= l / b

4. There are no marks on the picture

18 - Which of the following statements is not true:

1. The horizontal stabilizer has the effect of drifting / descending

2. Wings have the effect of rolling the glider

3. Flaps have the effect of reducing the minimum speed

4. Wings have the effect of turning the glider

19 - Which of the following statements is not true:

1. Aerodynamic brakes have the effect of limiting the speed in the crash

2. Aerodynamic brakes have the effect of reducing minimum speed

3. Flaps have the effect of reducing the minimum speed

4. The horizontal stern has the effect of drifting / descending

20 - Which expression for the aerodynamic lift force is correct? (Picture no. 15)

1. A

2. B

3. C

4. D

21 - Which symbols in the aerodynamic lift force formula are incorrect? (Picture no. 17)

1. B

2. D

3. A

4. C

22 - Which expression for the aerodynamic drag force is correct? (Picture no. 16)

1. A

2. D

3. C

4. B

23 - Which markings in the aerodynamic drag force formula are incorrect? (Picture no. 18)

1. D

2. C

3. B

4. A

24 - What affects the change in the drag coefficient?

1. Adjacent surfaces, air density, movement speed, profile shape.

2. Profile shape, angle of attack, speed of movement

3. Speed through the air stream, angle of attack, surface roughness

4. Profile shape, wing surface roughness, angle of attack, adjacent surfaces

25 - What affects the change in the coefficient of frictional drag?

1. Profile shape

2. Smoothness of the surface

3. Air density

4. Movement speed

26 - What affects the change in the induced drag coefficient?

1. Magnitude of lift force

2. Air density

3. Movement speed

4. Profile shape

27 - What affects the change in the interference drag coefficient?

1. Movement speed

2. Air density

3. Magnitude of lift force

4. Adjacent aerodynamic surfaces

28 - On the attached picture no. 9 are marked:

1. 1. induced drag coefficient curve, 2. polar, 3. lift coefficient curve

2. 1st polar of the lift coefficient, 2nd polar, 3rd curve of the drag coefficient

3. 1. lift coefficient curve, 2. polar, 3. drag coefficient curve

4. 1. drag coefficient curve, 2. polar, 3. lift coefficient curve

29 - In the attached picture no. 9, the drawing marked with number 1, the letter K is marked:

1. Extended lift

2. Maximum drag

3. The highest induced drag

4. Stall

30 - On the attached picture no. 9, the drawing marked with number 2, the letter D shows:

1. Point with optimal circulation parameters

2. Maximum flight speed

3. Point with minimum induced drag

4. The point with the parameters of the largest range

31 - In the attached picture no. 9, the drawing marked with number 2, :

1. The ordinate is denoted by Cz, and the abscissa by Cx

2. The ordinate is denoted by Fz (lift), and the abscissa by Fx (drag).

3. The ordinate is denoted by Cy, and the abscissa by Cs

4. The ordinate is denoted by V (velocity), and the abscissa by Fz (lift).

32 - The attached picture no. 10 shows:

1. Polara of drag

2. Polar speed

3. Polar wings

4. Polar lift

33 - In the attached picture no. 10 V1, V2, V3 and W1 indicate in the same order:

1. Optimum circling speed, maximum flight speed, maximum speed, speed descending

2. Minimum speed, speed at minimum descending, maximum flight speed, minimum descending

3. Minimum speed, minimum descending speed, maximum speed, minimum descending

4. Landing speed, take-off speed, maximum speed, minimum descending

34 - Bringing the sailplane into the high angles of attack state leads to:

1. Increase in lift, decrease in speed, increase in drag, controllability decreases

2. Lift decreases, speed decreases, drag increases, better controllability.

3. Increase in lift, decrease in speed, increase in drag, better controllability

4. Lift decreases, speed decreases, drag increases, controllability decreases

35 - In the attached picture no. 11, moving the stick forward leads to:

1. Lowering the depth rudder and reducing the speed of the sailplane

2. Lowering the depth rudder and increasing the speed of the sailplane

3. Raising the depth rudder and increasing the speed of the sailplane

4. Raising the depth rudder and reducing the speed of the sailplane

36 - In the attached picture no. 12, moving the right foot pedal forward leads to:

1. Deflection of the rudder to the right and turning to the left

2. Deflection of the rudder to the left and turning to the left

3. Deflection of the rudder to the right and turning the sailplane to the right.

4. Deflection of the rudder to the left and turning the sailplane to the right

37 - In the attached picture no. 13, the observation point is in front of the sailplane. Moveing the stick to the left leads to:

1. Lowering the right and raising the left aileron and tilting to the left.

2. Lowering the left and raising the right aileron and tilting to the left.

3. Lowering the left and raising the right aileron and tilting to the right.

4. Lowering the right and raising the left aileron and tilting to the right.

38 - The sailplane is in a turn. How will the load factor change if it is increased side slope?

1. Declining

2. It depends on the speed

3. It remains the same

4. It is riseing

39 - In the stationary turn of the glider there is a balance of the following vectors: weight, aerodynamic resultant, inertial force.

1. It depends on the height

2. No

3. It depends on the speed

4. Yes

40 - Observing the forces acting in the turn on the attached picture no. 14, which of the above of vector equations is correct?

1. G + Fin = R

2. R + Fin = G

3. G + R = Fin

4. G - Fin = R

41 - According to which value of the load coefficient nmax are standard sailplanes designed?

1. 4.7

2. 2.8

3. 3.5

4. 5.3

42 - Which tilt of the sailplane in the turn corresponds to the limit value of the load coefficient?

1. 45°

2. 79°

3. 88°

4. 56°

43 - The stability of a glider is the characteristic that, after a disturbance in the flight path, it tries to:

1. Return to the original path
2. Continue moving along the new path
3. Begin a coordinated turn
4. The covit begins

44 - Good controllability of a sailplane is the property that a small deflection of the control surfaces causes:

1. Proportional reaction of the sailplane
2. Small loss of speed
3. Inert path change
4. The glider does not respond

45 - Due to the longitudinal maneuverability of the sailplane, the following are prescribed:

1. Permissible pilot weight and pilot seat position
2. Wing surface size
3. The size of the trunk section
4. The size of the flap surface

46 - An almost vertical dive with the beak down and turning around the longitudinal axis of the glider is:

1. Spin
2. Stalling
3. Vertical dive
4. Autorotation

47 - How to get out of a stall:

1. By pulling out the brakes
2. By reducing the speed
3. Pulling the stick back
4. By reducing the angle of attack