Technical questions:

Subsonic airflow

1. “A line connecting the leading and trailing edge midway between the upper and lower surface of a aerofoil”. This definition is applicable for:
   1. The mean aero dynamic chord line
   2. The upper camber line
   3. The chord line
   4. **The camber line**
2. A body is placed in an airstream. The velocity increases by factor of 4, the aerodynamic drag will increase with a factor ;
   1. **16**
   2. 12
   3. 4
   4. 8
3. A body is placed in a certain airstream, the density of the airstream decreases to the half of the original value. The aerodynamic drag will decrease with a factor of:
   1. **2**
   2. 1.04
   3. 8
   4. 4
4. A boundry layer fence on a swept wing will”
   1. Improve the high speed characteristics
   2. **Improve the low speed characteristics**
   3. Improve the lift coefficient of trailing edge flaps
   4. Increase the critical mach mo
5. A cambered aerofoil with zero angle of attack, will in flight produce:
   1. Some lift with no drag
   2. No lift and no drag
   3. **Some lift and some drag**
6. A deployed slat will:
   1. Increase the boundary layer energy and increase the suction peak on the fixed part of the wing, so that stall is postponed to the higher angles of attack.
   2. **Increase the boundary layer energy and move the suction peak from fixed part of the wing to the slat, so that stall is postponed to the higher angles of attack.**
   3. Increase the camber of the aerofoil and increase the effective angle of attack, so that CLmax is reached at higher angle of attack
7. A higher aspect ratio wing produces:
   1. An increase in induced drag
   2. A decrease in stall speed
   3. **A decrease in induced drag**
8. A high aspect ratio wing:
   1. **Has a long span and short chort**
   2. Has a long span and long chord
   3. Has a short span and short chord
9. A jet aeroplane cruises buffet free at high constant altitude in significant turbulence, which type of stall can occur if this aeroplane decelerates:
   1. Shock stall
   2. **Accelerated stall**
   3. Low speed stall
10. A laminar layer is a layer, in which:
    1. The velocity is constant
    2. The vortices are weak
    3. **No velocity component exist, normal to the surface**
11. A low wing loading (aircraft weight has been reduced)
    1. Increase take off run, stalling speed and landing speed
    2. Increase landing speed
    3. **Decrease stalling and landing speed**
12. A plain flap will increase CLmax by:
    1. **Increasing the camber of the aerofoil**
    2. Centre of lift movement
    3. Boundary layer control
13. A slat will:
    1. Increase the lift by increasing the wing area and the camber of the aft portion of the wing
    2. **Increase the boundary layer energy and prolongs the stall to a higher angle of attack**
    3. Increase the camber of the aerofoil and divert the flow around the sharp leading edge
14. A slotted flap will increase the CLmax by:
    1. **Increasing the camber of the aerofoil and improving the boundary layer**
    2. Increasing only the camber of the aerofoil
    3. Increasing the critical angle of attack
15. A strongly swept wing stalls, if the wake of the wing contacts horizontal tail, the effect of the stall behavior could be:
    1. **Nose up tendency and /or lack of elevator response**
    2. Nose down tendency
    3. Tendency to increase speed after initial stall
16. A symmetrical aerofoil section at CL=0 will produce
    1. No aerodynamic force
    2. **Zero pitching moment**
    3. Nose down pitching moment
17. A wing has span of 50 feet and area of 200 square feet. Its mean chord would be:
    1. 2.5 feet
    2. 10 feet
    3. **4 feet**
18. A wing stalling angle is:
    1. **Unaffected by turn**
    2. Increase in high rate of turn
    3. Decrease in any turn
19. A wing with higher span compared with a lower wing span (equal wing surface):
    1. High profile drag
    2. Higher induced drag
    3. **A lower induced drag**
20. After take- off, the slats(when installed) are always retracted later than flaps, why?
    1. Because Vmca with slats extended is more favorable compared to the flaps extended
    2. Because flaps extended gives large decrease in stall speed with relatively less drag
    3. **Because slats extended gives a large decrease in stall speed with relatively less drag**
21. After the transition point between the laminar and turbulent boundary layer
    1. The boundary layer gets thicker and speed decreases
    2. The boundary layer gets thinner and speed increases
    3. **The mean speed and friction drag increases**
22. An aeroplane accelerates from 80 kts to 160 kts at a load factor equal to 1. The induced drag and induced drag coefficient alter with the following factor:
    1. ¼, 2
    2. ½, 1/16
    3. **1/16, ¼**
23. An aircraft has a stall speed of 100 kts and load factor is 1. In a turn with a load factor of 2, the stall speed is;
    1. **141 kt**
    2. 282 kt
    3. 70 kt
24. An aeroplane has the following flap settings, 0°, 15°,30° and 45°, slats can be selected too. Which of the given selections will produce greatest negative influence on CL/CD ratio:
    1. Flaps from 15 to 30
    2. **Flaps from 30 to 45**
    3. The slats
25. An aeroplane maintains straight and level flight while IAS is doubled. The change in lift coefficient will be:
    1. X0.5
    2. **X0.25**
    3. X4.0
26. An aeroplane performs a a straight and level horizontal flight at the same angle of attack, at two different altitudes (all other factors of important being constant, assume ISA condition and no compressibility effects)
    1. TAS at higher altitude is lower
    2. TAS is same at both altitudes
    3. **TAS at higher altitude is higher**
27. An aeroplane with sweep back is equipped with slats and or leading edge flaps. One possible efficient way to arrange leading edge devices on the wing is:
    1. **Wing root: LE flaps; wing tip:Slats**
    2. Wing root: LE flaps, Wing tip; No devices
    3. Wing root: Slats, wing tip LE flaps
28. An increase in angle of attack( below the stalling angle) increases lift because:
    1. **The lift coefficient increases**
    2. Induced drag is reduced
    3. The vertical component of weight is reduced
29. Angle of attack is the angle between:
    1. Local airflow and chord line
    2. **Undisturbed airflow and chord line**
    3. Local airflow and mean camber line
30. As the CG changed recovery from a stall becomes progressively:
    1. **More difficult as the CG moves aft**
    2. Less difficult as CG moves aft
    3. More difficult as CG moves forward
31. As the speed of the aircraft at 20000 feet increases, profile drag:
    1. Decreases at first, then increases
    2. Decreases
    3. **Increases as the square of TAS**
32. At the point of stall:
    1. **Lift decreases, drag increases**
    2. Lift decreases, drag increases
    3. Lift constant, drag increases
33. Berboulli’s equation states that:
    1. The sum of centre of pressure and dynamic pressure is total pressure
    2. **The sum of static pressure and dynamic pressure is stagnation pressure**
    3. Dynamic pressure equals stagnation pressure
34. By what approximate percentage will the stall speed increases in a horizontal coordinated turn with a bank angle of 45°
    1. 41%
    2. **19%**
    3. 31%
35. Cambered wing section give….. maximum CL at relatively…… angles of attack:
    1. Low;High
    2. Low ; low
    3. **High ; low**
36. CDi is proportional to:
    1. CL
    2. Square root of CL
    3. **CL²**
37. Compared with level flight prior to the stall, the Lift….. and drag….. in the stall change as follows
    1. Decreases, decreases
    2. Increases, decreases
    3. **Decreases, increases**
38. Compared with stalling airspeed VS, in a given configuration, the airspeed at which stick shaker will be triggered is;
    1. 1.2VS
    2. 1.3VS
    3. Greater than VS
39. Cpmpared with flap up configuration the maximum AOA for the flaps down configuration is:’
    1. Larger
    2. Unchanged
    3. **smaller**
40. comparing the lift coefficient and drag coefficient at a normal angle of attack:
    1. **CL is much greater than CD**
    2. CL is lower than CD
    3. CL has approximately dame value as CD
41. Consider a certain stream line tube. The velocity of the stream in the tube is V, an increase in temperature of the stream at constant value of V
    1. Not affect the mass flow
    2. **Decreases the mass flow**
    3. Increases the mass flow

1. Consider an airfoil with a certain camber and a positive AOA. At which location will the highest flow velocities occur:
   1. In the stagnation point
   2. **Upper side**
   3. Lower side
2. Considering a positive cambered airfoil, the pitch moment when CL=0
   1. Zero
   2. **Pitch down**
   3. Pitch up
3. Deflection of LE flaps will
   1. Decrease drag
   2. **Increase critical angle of attack**
   3. Not affect critical AOA
4. Deploying a fowler flap, the flap will:
   1. **Move aft, turn down**
   2. Turn down, move aft
   3. Just move aft
5. Dihedral of a wing is:
   1. **The angle between 0.25 chord line of the wing lateral axis**
   2. The angle between the leading edgeof the wing with lateral axis
   3. The angle between 0.25 chord line of the wing and horizon
6. Drag is in the direction of the ---- and lift is perpendicular to the
   1. Longitudinal axis
   2. **Relative wind**
   3. Chord line
7. During an erect spin recovery:
   1. **The ailerons are held in neutral position**
   2. The control stick is moved sideways, in the direction of bank
   3. The control stick is moved opposite to the direction of bank
8. During cruise, Vmd will:
   1. Increase or decrease depending on the CG position
   2. Remain unchanged
   3. **Decrease**
9. During flap down selection in a continuous straight and level flight and constant IAS and weight:
   1. The CL and CD increases
   2. **The CP moves aft**
   3. The stall speed increases
10. During the extension of the flaps at a constant angle of attack the aeroplane starts to (all aother factor being constant)
    1. Yaw
    2. Sink suddenly
    3. **Climb**
11. Entering the stall, the CP of staright wing(1) and of swept wing(2) will:
    1. (1) move aft (2) move aft
    2. (**1) move aft (2) move forward**
    3. (1) move forward (2) move aft
12. Excluding constants, the CDi is the ratio of:
    1. cl² and S
    2. CL and CD
    3. **CL² and aspect ratio**
13. Extending airbrakes during an approach will:
    1. Decrease profile drag
    2. Increase induced drag
    3. **Reduce Vmd**
14. Extension of the fowler flap trailing edge device, will produce:
    1. **A nose down pitching moment**
    2. Nose up pitching moment
    3. no pitch moment
15. flap selection at constant IAS in straight and level flight will incease the:
    1. CL and drag
    2. Stall speed
    3. **CLmax and drag**
16. Floating due to ground effect during an approach to land will occur:
    1. **When the height is less than half of the wing span above the surface**
    2. When higher than normal AoA is used
    3. When the height is less twice the length of the wing span above the surface
17. For a given AoA, a swept wing will:
    1. Have the same CL as an equivalent straight one
    2. **Have a lower CL than an equivalent straight one**
    3. Have the same lateral stability as an equivalent straight one
18. For an aircraft in level flight, if the wing CP is aft of the CG and no thrust drag couple, the tailplane
    1. **Downward**
    2. Upward
    3. Zero
19. Geometric washout means:
    1. The tip of the wing has more angle of attack than the root
    2. **The tip of the wing has less AoA than root**
    3. There is an airflow along the wing that keeps it clean
20. Ground effect has the following effect on the landing distance:
    1. **Increase**
    2. Decrease
    3. Does not change
21. High AR as compared to low AR, has the effect of:
    1. Increase induced drag and deceasing critical AOA
    2. Increasing lift and critical AOA
    3. **Decreasing induced drag and critical AOA**
22. How does aerodynamic drag varies when airspeed is doubled:
    1. **4**
    2. 1
    3. 16
23. How does the total drag vary as speed is increased from VS to VNE in a straight and level flight at constant weight:
    1. **Decreasing then increasing**
    2. Increasing
    3. Increasing then decreasing
24. How does the wing center of pressure moves with increasing angle of attack:
    1. To the rear
    2. **Forward**
    3. To the right
25. How is the pitching moment affected if flaps are deployed in straight and level flight?
    1. Pitch up
    2. **Pitch down**
    3. Depends on the CG position
26. If an aeroplane flies in the ground effect:
    1. Drag and lift are reduced
    2. **Lift is increased and drag is decreased**
    3. Induced angle of attack is increased
27. if the AOA is increased beyond the critical angle of attack, the lift coefficient….and stagnation point moves….
    1. Increases, forwad
    2. **Decreases, rearward**
    3. Decreases, forward
28. If density is kept constant, the dynamic pressure increases proportionally with:
    1. Velocity
    2. Inversely with square of velocity
    3. **The square of velocity**
29. If flaps are deployed at a constant IAS in straight and level flight, the magnitude of tip vortices will eventually: (flap span less than wing span)
    1. **Decreases**
    2. Remains same
    3. Increases
30. If IAS is doubled, by which factor should the original CL be multiplied to maintain level flight:
    1. 2.00
    2. 4.00
    3. **0.25**
31. If the ice is present on the leading edge of the wings, it may increase the landing distance due to higher Vref with
    1. 40-50%
    2. 5-10%
    3. **30-40%**
32. If pressure increases, with OAT and TAS is constant, what happens to Drag
    1. Remain constant
    2. Decreases
    3. **Increases**
33. If pressure is kept constant, temperature increases, the density:
    1. **Decreases**
    2. No effect
    3. Increases
34. If the AOA is maintained constant, what happens to the CL when flaps are deployed:
    1. **Increased**
    2. Remains constant because AOA is same
    3. Changes with square of IAS
35. If the aspect ratio of a given wing area is decreased:
    1. CL increases for the given AOA
    2. Induced drag decreases for given AOA
    3. **Induced drag increases for given AOA**
36. If the continuity equation is applicable, what will happen to the air density (rho) if the cross-sectional area of a tube changes(low speed, subsonic and incompressible flow)
    1. **Rho1=Rho 2**
    2. Rho1< Rho2
    3. The density depends on the change of the tube area
37. If the weight of the aircraft is increased, the maximum Lift to drag ratio will:
    1. Decrease
    2. Increase
    3. **Not affected**
38. If Vs is 100 kts in level flight, during a 45° bank, Vs will be:
    1. **119**
    2. 100
    3. 80
39. If you are flying at 100 kts, you double your speed, whay will happen to profile drag:
    1. Remains same
    2. **Quadruples**
    3. Increases 100%
40. If you want to maintain constant TAS during climb, you should during the climb:
    1. **Reduce to a lower IAS**
    2. Increase AOA
    3. Maintain stable IAS
41. In a stream tube, if the density is halved, drag will reduce by a facto of:
    1. 4
    2. **2**
    3. 6
42. In a turn, load factor n and stalling speed Vs will be:
    1. N smaller than 1, Vs higher
    2. N smaller than 1, Vs same
    3. **N greater than 1 and Vs higher**
43. In a turn, wing stalling angle:
    1. **Remains unchanged**
    2. increases
    3. Decreases with rate of
44. In a two dimensional flow pattern, where the streamlines converge the static pressure will:
    1. Increase
    2. **Decrease**
    3. Increase initially, then decrease
45. In flight, the CP by increasing the AOA, will reach its most forward point of an airfoil:
    1. At the stall
    2. At the stalling angle
    3. **Just below the stalling angle**
46. In order to maintain straight and level flight at a constant speed, when flaps are being retracted, the angle of attack will:
    1. Decrease
    2. **Increase**
    3. Remains constant
47. In a straight and level flight, the CP is behind the CG. With the resultant force from the elevator and tailplane action to maintain straight and level flight, the force acting would be:
    1. Horizontally
    2. **Downward**
    3. Upward
48. In subsonic flight, which is correct for VMD:
    1. CL and CD are minimum
    2. **Best glide range achieved**
    3. Parasite drag greater than induced drag
49. In what way, induced drag and parasite drag alter with increasing airspeed:
    1. **Decrease, increase**
    2. Increase, decrease
    3. Decrease, decrease
50. In which phase of take off is the aerodynamic effect of ice located on the wing leading edge is most critical:
    1. The take- off run
    2. **Last part of the rotation**
    3. All phases of take- off are equally critical
51. Increase of wing loading will:
    1. **Increase the stall speed**
    2. Decrease the take off speed
    3. Increase CLmax
52. Increasing air pressure will have the following effect on the drag of an aeroplane:
    1. No effect
    2. **The drag increases**
    3. The drag decreases
53. Induced drag at constant IAS is effected by:
    1. Engine thrust
    2. Aeroplane wing location
    3. **Aeroplane weight**
54. Induced drag may be reduced by:
    1. Increase in the taper ratio of the wing
    2. Decrease of the aspect ratio
    3. **Increase of the aspect ratio**
55. Interference drag can be reduced using:
    1. **Fairing**
    2. Winglets
    3. Fairings, fillets and winglet
56. It is possible to reduce the span wise airflow over swept wings, due to adverse pressure gradients by:
    1. Trailing edge vortex generator
    2. **Wing fences**
    3. Leading edge stall inducers
57. Lowering the inboard flaps causes the wing CP
    1. To move m inboard towards the root
    2. To move forward
    3. **To move inward and forward**
58. On a swept wing aircraft, in which locations would krugger falps be fitted:
    1. Leading edge
    2. Trailing edges
    3. **Inboard leading edge**
59. On a swept wing aircraft, at low airspeed, the pitch up phenomenon
    1. **Caused by wingtip stall**
    2. Never occurs
    3. Caused by boundary layer fences mounted on the wings