

## Questions

1. On a reciprocating engine aeroplane, with increasing altitude at constant gross mass, constant angle of attack and configuration, the power required:
  - a. remains unchanged but the TAS increases
  - b. increases and the TAS increases by the same percentage
  - c. increases but TAS remains constant
  - d. decreases slightly because of the lower air density
2. Moving the centre of gravity from the forward to the aft limit: (gross mass, altitude and airspeed remain unchanged).
  - a. increases the power required
  - b. affects neither drag nor power required
  - c. increases the induced drag
  - d. decreases the induced drag and reduces the power required
3. For jet engine aeroplanes operating below the optimum altitude, what is the effect of increased altitude on specific range?
  - a. It does not change
  - b. Increases only if there is no wind
  - c. Increases
  - d. Decreases
4. If the thrust available exceeds the thrust required for level flight:
  - a. the aeroplane accelerates if the altitude is maintained
  - b. the aeroplane descends if the airspeed is maintained
  - c. the aeroplane decelerates if it is in the region of reversed command
  - d. the aeroplane decelerates if the altitude is maintained
5. Given a jet aircraft, which order of speeds is correct?
  - a.  $V_s'$ , Maximum range speed,  $V_x$
  - b. Maximum endurance speed, Maximum range speed,  $V_x$
  - c.  $V_s'$ ,  $V_x'$ , Maximum range speed
  - d. Maximum endurance speed, Long range speed, Maximum range speed
6. The pilot of a light twin engine aircraft has calculated a 4000 m service ceiling with a take-off mass of 3250 kg, based on the general forecast conditions for the flight. If the take-off mass is 3000 kg, the service ceiling will be:
  - a. less than 4000 m
  - b. unchanged, equal to 4000 m
  - c. only a new performance analysis will determine if the service ceiling is higher or lower than 4000 m
  - d. higher than 4000 m

7. Consider the graphic representation of the power required for a jet aeroplane versus true airspeed (TAS). When drawing the tangent out of the origin, the point of contact determines the speed of:
- critical angle of attack
  - maximum endurance
  - minimum power
  - maximum specific range
8. In the drag versus speed curve for a jet aeroplane, the speed for maximum range corresponds with:
- the point of contact of the tangent from the origin to the drag curve
  - the point of intersection of the parasite drag curve and the induced drag curve
  - the point of contact of the tangent from the origin to the parasite drag curve
  - the point of contact of the tangent from the origin to the induced drag curve
9. The speed  $V_s$  is defined as the:
- speed for best specific range
  - stalling speed or minimum steady flight speed at which the aeroplane is controllable
  - safety speed for take-off in case of a contaminated runway
  - design stress speed
10. What is the effect of a headwind component, compared to still air, on the maximum range speed (IAS) and the speed for maximum climb angle respectively?
- Maximum range speed decreases and maximum climb angle speed decreases
  - Maximum range speed increases and maximum climb angle speed increases
  - Maximum range speed increases and maximum climb angle speed stays constant
  - Maximum range speed decreases and maximum climb angle speed increases
11. A jet aeroplane is flying at the long range cruise speed at the optimum altitude. How does the specific range / fuel flow change over a given time period?
- Decrease / decrease
  - Increase / decrease
  - Increase / increase
  - Decrease / increase
12. The maximum indicated airspeed of a piston engine aeroplane, in level flight, is reached:
- at the service ceiling
  - at the practical ceiling
  - at the lowest possible altitude
  - at the optimum cruise altitude

13. The optimum cruise altitude increases:

- a. if the aeroplane mass is decreased
- b. if the temperature (OAT) is increased
- c. if the tailwind component is decreased
- d. if the aeroplane mass is increased

14. What effect has a tailwind on the maximum endurance speed?

- a. No effect
- b. Tailwind only affects holding speed
- c. The IAS will be increased
- d. The IAS will be decreased

15. Which of the equations below defines specific air range (SR)?

- a. SR = Ground speed/Total Fuel Flow
- b. SR = True Airspeed/Total Fuel Flow
- c. SR = Indicated Airspeed/Total Fuel Flow
- d. SR = Mach Number/Total Fuel Flow

16. Which of the following statements, with regard to the optimum altitude (best fuel mileage), is correct?

- a. An aeroplane usually flies above the optimum cruise altitude, as this provides the largest specific range
- b. An aeroplane sometimes flies above the optimum cruise altitude, because ATC normally does not allow an aeroplane to fly continuously at the optimum cruise altitude
- c. An aeroplane always flies below the optimum cruise altitude, as otherwise Mach buffet can occur
- d. An aeroplane always flies on the optimum cruise altitude, because this is most attractive from an economy point of view

17. The optimum altitude:

- a. is the altitude up to which cabin pressure of 8000 ft can be maintained
- b. increases as mass decreases and is the altitude at which the specific range reaches its maximum
- c. decreases as mass decreases
- d. is the altitude at which the specific range reaches its minimum

18. A lower airspeed at constant mass and altitude requires:

- a. less thrust and a lower coefficient of lift
- b. more thrust and a lower coefficient of lift
- c. more thrust and a lower coefficient of drag
- d. a higher coefficient of lift

19. The point at which a tangent out of the origin touches the power required curve:

- a. is the point where drag coefficient is a minimum
- b. is the point where the lift to drag ratio is a minimum
- c. is the maximum drag speed
- d. is the point where the lift to drag ratio is a maximum

20. In relation to the speed for maximum range cruise (MRC), the long range cruise speed (LRC) is:
- Lower
  - Dependent on the OAT and net mass
  - Dependent on density altitude and mass
  - Higher
21. The maximum horizontal speed occurs when:
- the thrust is equal to minimum drag
  - the thrust does not increase further with increasing speed
  - the maximum thrust is equal to the total drag
  - the thrust is equal to the maximum drag
22. Under which condition should you fly considerably lower (4000 ft or more) than the optimum altitude?
- If at the lower altitude either more headwind or less tailwind can be expected
  - If at the lower altitude either considerably less headwind or considerably more tailwind can be expected
  - If the maximum altitude is below the optimum altitude
  - If the temperature is lower at the low altitude (high altitude inversion)
23. The optimum cruise altitude is:
- the pressure altitude up to which a cabin altitude of 8000 ft can be maintained
  - the pressure altitude at which the TAS for high speed buffet is a maximum
  - the pressure altitude at which the best specific range can be achieved
  - the pressure altitude at which the fuel flow is a maximum
24. Maximum endurance for a piston engine aeroplane is achieved at:
- the speed that approximately corresponds to the maximum rate of climb speed
  - the speed for maximum lift coefficient
  - the speed for minimum drag
  - the speed that corresponds to the speed for minimum rate of descent
25. On a long distance flight the gross mass decreases continuously as a consequence of the fuel consumption. The result is:
- the speed must be increased to compensate the lower mass
  - the specific range increases and the optimum altitude decreases
  - the specific range decreases and the optimum altitude increases
  - the specific range and the optimum altitude increase
26. A jet aeroplane is climbing at constant Mach number below the tropopause. Which of the following statements is correct?
- IAS decreases and TAS decreases
  - IAS increases and TAS increases
  - IAS decreases and TAS increases
  - IAS increases and TAS decreases

27. Why are 'step climbs' used on long distance flights?
- a. Step climbs do not have any special purpose for jet aeroplanes; they are used for piston engine aeroplanes only
  - b. ATC do not permit cruise climbs
  - c. To fly as close as possible to the optimum altitude as aeroplane mass reduces
  - d. Step climbs are only justified if at the higher altitude less headwind or more tailwind can be expected
28. Which of the following sequences of speed for a jet aeroplane is correct? (From low to high speeds.)
- a. Maximum endurance speed, maximum range speed, maximum angle of climb speed
  - b. Maximum endurance speed, long range speed, maximum range speed
  - c.  $V_{S_1}$ , maximum angle climb speed, maximum range speed
  - d.  $V_{S_1}$ , maximum range speed, maximum angle climb speed
29. The pilot of a jet aeroplane wants to use a minimum amount of fuel between two airfields. Which flight procedure should the pilot fly?
- a. Maximum endurance
  - b. Holding
  - c. Long range
  - d. Maximum range
30. Long range cruise is selected as:
- a. the higher speed to achieve 99% of maximum specific range in zero wind
  - b. the speed for best economy (ECON)
  - c. the climbing cruise with one or two engines inoperative
  - d. specific range with tailwind
31. The optimum long range cruise altitude for a turbojet aeroplane:
- a. is only dependent on the outside air temperature
  - b. increases when the aeroplane mass decreases
  - c. is always equal to the powerplant ceiling
  - d. is independent of the aeroplane mass
32. Maximum endurance:
- a. is the same as maximum specific range with wind correction
  - b. can be flown in a steady climb only
  - c. can be reached with the 'best rate of climb' speed in level flight
  - d. is achieved in unaccelerated level flight with minimum fuel consumption
33. For a piston engine aeroplane, the speed for maximum range is:
- a. that which gives the maximum lift to drag ratio
  - b. that which gives the minimum value of power
  - c. that which gives the maximum value of lift
  - d. 1.4 times the stall speed in clean configuration

- 34. The speed for maximum endurance:**
- a. is always higher than the speed for maximum specific range
  - b. is always lower than the speed for maximum specific range
  - c. is the lower speed to achieve 99% of maximum specific range
  - d. can either be higher or lower than the speed for maximum specific range
- 35. The intersections of the thrust available and the drag curves are the operating points of the aeroplane:**
- a. in unaccelerated climb
  - b. in unaccelerated level flight
  - c. in descent with constant IAS
  - d. in accelerated level flight
- 36. For a jet transport aeroplane, which of the following is the reason for the use of 'maximum range speed'?**
- a. Minimizes specific fuel consumption
  - b. Minimizes fuel flow for a given distance
  - c. Longest flight duration
  - d. Minimizes drag
- 37. The centre of gravity moving near to, but still within, the aft limit:**
- a. increases the stalling speed
  - b. improves the longitudinal stability
  - c. decreases the maximum range
  - d. improves the maximum range
- 38. A jet aeroplane is performing a maximum range flight. The speed corresponds to:**
- a. the minimum drag
  - b. the minimum required power
  - c. the point of contact of the tangent from the origin to the power required versus TAS curve
  - d. the point of contact of the tangent from the origin to the Drag versus TAS curve
- 39. During a cruise flight of a jet aeroplane at a constant flight level and at the maximum range speed, the IAS / the drag will:**
- a. increase / increase
  - b. decrease / increase
  - c. decrease / decrease
  - d. increase / decrease
- 40. Which of the following is a reason to operate an aeroplane at 'long range speed'?**
- a. The aircraft can be operated close to the buffet onset speed
  - b. In order to prevent loss of speed stability and tuck-under
  - c. It offers greatly reduced time costs than with maximum range speed
  - d. In order to achieve speed stability

41. Long range cruise is a flight procedure which gives:
- an IAS which is 1% higher than the IAS for maximum specific range
  - a specific range which is 99% of maximum specific range and a lower cruise speed
  - a specific range which is about 99% of maximum specific range and higher cruise speed
  - a 1% higher TAS for maximum specific range
42. The lowest point of the drag or thrust required curve of a jet aeroplane is the point for:
- minimum drag and maximum endurance
  - maximum specific range and minimum power
  - minimum power
  - minimum specific range
43. If other factors are unchanged, the fuel mileage or range (nautical miles per kg) is:
- independent of the centre of gravity position
  - lower with an aft centre of gravity position
  - higher with a forward centre of gravity position
  - lower with a forward centre of gravity position
44. To achieve the maximum range over ground with headwind the airspeed should be:
- lower compared to the speed for maximum range cruise with no wind
  - reduced to the gust penetration speed
  - higher compared to the speed for maximum range cruise with no wind
  - equal to the speed for maximum range cruise with no wind
45. When utilizing the step climb technique, one should wait for the weight reduction, from fuel burn, to result in:
- the aerodynamic ceiling to increase by approximately 2000 ft above the present altitude, whereby one would climb approximately 4000 ft higher
  - the optimum altitude to increase by approximately 2000 ft above the present altitude, whereby one would climb approximately 4000 ft higher
  - the manoeuvre ceiling to increase by approximately 2000 ft above the present altitude, whereby one would climb approximately 4000 ft higher
  - the en route ceiling to increase by approximately 2000 ft above the present altitude, whereby one would climb approximately 4000 ft higher
46. Which of the following statements is true regarding the performance of an aeroplane in level flight?
- The maximum level flight speed will be obtained when the power required equals the maximum power available from the engine
  - The minimum level flight speed will be obtained when the power required equals the maximum power available from the engine
  - The maximum level flight speed will be obtained when the power required equals the minimum power available from the engine
  - The maximum level flight speed will be obtained when the power required equals the power available from the engine