DIPLOMA IN FLIGHT OPERATIONS/DISPATCH

FLIGHT DISPATCH EWAC 01

AIRCRAFT PERFORMANCE FINAL EXAM

DURATION   -   2 HOURS

INSTRUCTION – Answer Question One and any other two questions.

Question One   (30 Marks)

i)   The first segment of the take-off flight path ends   **2 Marks**
   a. At completion of gear retraction.
   b. At completion of flap retraction.
   c. At reaching V2.
   d. At 35 ft above the runway.

ii)   ETOPS flight is a twin engine jet aeroplane flight conducted over a route, where no suitable airport is within an area of   **2 Marks**
   a. 75 minutes flying time at the approved one engine out cruise speed.
   b. 60 minutes flying time in still air at the approved one engine out cruise speed.
   c. 60 minutes flying time in still air at the normal cruising speed.
   d. 30 minutes flying time at the normal cruising speed.

iii)   The effect of a contaminated runway on the field length limit mass: **2 Marks**
   a. Decreased weight, increased V1, increased VR
   b. Decreased weight, same V1, increased VR
   c. Decreased weight, same V1, same VR
   d. Decreased weight, decreased V1, decreased VR

iv)   The main reason for using the stepped climb technique is to?   **2 Marks**
   a. Decrease sector times
   b. Increase endurance
   c. Adhere to ATC procedures
   d. Increase range

v)   A flight is planned with a turbojet aeroplane to an aerodrome with a landing distance available of 2,400 m. Which of the following is the maximum landing distance for a dry runway?   **2 Marks**
   a. 1,437 m
   b. 1,250 m
   c. 1,090 m
   d. 1,655 m

vi) Optimum altitude? **2 Marks**
    a. is the altitude up to which cabin pressure of 8 000 ft can be maintained
    b. increases as mass decreases and is the altitude at which the specific ranges reaches its maximum
    c. decreases as mass decreases
    d. is the altitude at which the specific range reaches its minimum

vii) Two identical aeroplanes at different masses are descending at idle thrust. Which of the following statements correctly describes their descent characteristics? **2 Marks**
    a. At a given angle of attack, both the vertical and the forward speed are greater for the heavier aeroplane.
    b. There is no difference between the descent characteristics of the two aeroplanes.
    c. At a given angle of attack the heavier aeroplane will always glide further than the lighter aeroplane.
    d. At a given angle of attack the lighter aeroplane will always glide further than the heavier aeroplane.

viii) At a given mass, the stalling speed of a twin engine, class B aeroplane is 100 kt in the landing configuration. The minimum speed a pilot must maintain in short final is? **2 Marks**
    a. 130 kt
    b. 115 kt
    c. 125 kt
    d. 120 kt

ix) For this question use Performance Manual CAP 698 SEP 1 Figure 2.3 provided. Using the climb performance chart, for the single engine aeroplane, determine the rate of climb and the gradient of climb in the following conditions: **5 Marks**
    Given:
      OAT at Takeoff: ISA
      Airport Pressure Altitude: 3000 ft
      Aeroplane Mass: 3,450 lbs
      Speed: 100 KIAS

x) Given the characteristics of a three engine turbojet aeroplane are as follows: **4 Marks**
Thrust = 50,000 N per engine
g = 10 m/s
Drag = 72,569 N
Minimum gross gradient (2nd segment) =2.7%
The maximum take-off mass under segment two conditions in the net take-off flight path conditions is? Show your working?

xi) With an obstacle which is 160 m above the airfield elevation and 5000 m away from the end of the take off distance. (Screen height 50 ft) what would the obstacle clearance be with a gradient of 5%? **5 Marks**

Questions Two (20 Marks)

i) On a segment of the takeoff flight path, an obstacle requires a minimum gradient of climb of 2.6% in order to provide an adequate margin of safe clearance. At a mass of 110000 kg, the gradient of climb is 2.8%. For the same power and assuming that the angle of climb varies inversely with mass, at what maximum mass will the aeroplane be able to achieve the minimum gradient? **3 Marks**

ii) Using Figure 3.4, determine the accelerate-stop distance from brake release to a full stop given an abort speed of 64 KIAS and a reaction time of three seconds. **5 Marks**
Given:

OAT: 27^0C
Pressure Altitude: MSL
Aeroplane Mass: 3,750 lbs
Tailwind component: 5 kt
Flaps 25^0
Runway: Paved, Level and Dry

iii) What is meant by balanced field available? **2 Marks**
   a. TORA = TODA
   b. ASDA = ASDR and TODA = TODR
   c. TODA = ASDA
   d. TORA = ASDA

iv) Which of the following combinations have an effect on the angle of descent on a glide? Ignore compressibility effects. **2 Marks**
   a. Configuration and mass
   b. Configuration and angle of attack.
   c. Mass and altitude
   d. Altitude and configuration

v) If a flight is performed at a higher cost index at a given mass which of the following will occur? **2 Marks**
   a. A better long range
   b. A higher cruise mach number
   c. A lower cruise mach number
   d. A better maximum range

vi) Reference point zero refers to: **2 Marks**
   a. Point where the aircraft lifts off the ground
   b. Point where the aircraft reaches V2
   c. Point where the aircraft reaches 35ft
   d. Point where gear is selected up

vii) How does the power required graph move with an increase in altitude?　**2 Marks**
    a. Straight up
    b. Straight down
    c. Up and to the right
    d. Straight across to the right

viii) An airport has 3000m long runway and a 2000m clearway at each end of that runway. For the calculation of the maximum allowed takeoff mass, the takeoff distance available cannot be greater than? Show your working.　**2 Marks**

Question Three (20 Marks)
i) The climb gradient of an aircraft after takeoff is 6.2% in standard atmosphere, no wind, at 0 ft pressure altitude. Using the following corrections:
    ± 0.2%/2,000ft field elevation
    ± 0.1%/^{0}C from standard temperature
    -1% with wing anti-ice
    -0.5% with engine anti-ice
    The climb gradient after takeoff from an airport situated at 2,000ft, 15^{0}C, QNH 1013.25 hPa, with wing and engine anti-ice operating from a functional check is?　**5 Marks**

i) For this question, use Performance Manual CAP 698 SEP 1 Figure 2.4. With regard to the landing chart for the single engine aeroplane determine the landing distance from a height of 50 ft .　**5 Marks**
    Given :
    O.A.T : ISA +15°C
    Pressure Altitude: 0 ft
    Aeroplane Mass: 2940 lbs
    Tailwind component: 10 kt
    Flaps: Landing position (down)
    Runway: Tarred and Dry

ii) A turbo-propeller aircraft is certified with a maximum take-off mass of 5600 kg and a maximum passenger seating of 10. This aircraft would be certified in?　**2 Marks**
    a. Class A
    b. Class B
    c. Class C
    d. Either Class A or Class B depending on the number of passengers carried.

iii) Following engine failure in cruise, what is the name given to the descent procedure from the cruise altitude to the one engine inoperative ceiling?　**2 Marks**
    a. Descent profile
    b. Descent procedure
    c. Driftdown
    d. Emergency descent

iv) During a glide at a constant Mach Number, the pitch angle of the aeroplane will: **2 Marks**
   a. Decrease
   b. Increase
   c. Increase at first then decrease
   d. Remain constant

v) If the TAS is 175 kt and the rate of climb is 1250 ft per minute, the climb gradient is approximately? **2 Marks**
   a. 7%
   b. 14%
   c. 12%
   d. 10%

vi) An operator shall ensure that ensure that the net takeoff flight path clears all obstacles. The half-width of the obstacle corridor at the distance D from the end of the TODA is at least: **2 Marks**
   a. -90m + 1.125D
   b. 90m + D/0.125
   c. 90m + 0.125D
   d. 0.125D

Question Four (20 Marks)

i) Refer to CAP 698 Figure 2.1. What is the Gross TODR for an aircraft in the following conditions: **5 Marks**
   A/C TOM 1,591 kg,
   Field Elevation 1,500ft (QNH 1013),
   OAT IS +18 Deg. C,
   16 kts Headwind Component,
   1% downhill slope,
   Paved, dry surface,
   Not stopway or clearway

ii) How is wind considered in the take-off performance of the aeroplane operations Manuals? **2 Marks**
   a. Unfactored headwind and tailwind components are used
   b. Not more than 80% headwind and not less than 125% tailwind
   c. Since take-offs with tailwind are not permitted, only headwinds are considered
   d. Not more than 50% of headwind and not less than 150% of the tailwind

iii) The landing field length required for the turbojet aeroplanes at the destination in wet condition is the demonstrated distance available distance plus: **2 Marks**
   a. 67%
   b. 70%
   c. 43%
   d. 92%

iv) Give the correct order for the following: **2 Marks**
   a. Vmcg, VR, V1, V2
   b. Vmcg, V1, VR, V2
   c. V1, Vmcg, VR, V2
   d. Vmcg, V1, Vmca, VR, V2

v) Two identical turbojets are at the same altitude and same speed and have the same specific fuel consumption. Plane 1 weighs 130,000 kg and fuel flow is 4,300kg/hr. If plane 2 weighs 115,000kg, what is the fuel flow?   **3 Marks**

vi) If the climb speed schedule is changed from 280/.74 to 290/.74, the new crossover altitude is: **2 Marks**
   a. Unchanged
   b. Only affected by the aeroplane gross mass
   c. Lower
   d. Higher

vii) The landing field length required for multi engine class B aeroplanes at the alternate and destination aerodromes is the demonstrated or actual landing distance plus: **2 Marks**
   a. 92%
   b. 43%
   c. 70%
   d. 67%

viii) The center of gravity moving near to but still within the aft limit   **2 Marks**
   a. Increases the stalling speed
   b. Improves the longitudinal stability
   c. Decreases the maximum range
   d. Improves the maximum range

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