DIPLOMA IN FLIGHT OPERATIONS/DISPATCH

FLIGHT DISPATCH 24

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) Which statement regarding the influence of a runway down-slope is correct for a balanced take-off? Downslope... **2 Marks**
   a. increases V1 and reduces the accelerate stop distance required (ASDR).
   b. reduces V1 and increases the accelerate stop distance required (ASDR).
   c. increases V1 and increases the take-off distance required (TODR).
   d. reduces V1 and reduces take-off distance required (TODR).

iv) If the antiskid system is inoperative, which of the following statements is true? **2 Marks**
   a. It has no effect on the accelerate stop distance.
   b. Take-off with antiskid inoperative is not permitted.
   c. The accelerate stop distance increases.
   d. The accelerate stop distance decreases.

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) The absolute ceiling **2 Marks**

a. is the altitude at which the best climb gradient attainable is 5%
b. is the altitude at which the aeroplane reaches a maximum rate of climb of 100 ft/min.
c. is the altitude at which the rate of climb theoretically is zero.
d. can be reached only with minimim steady flight speed

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) The takeoff distance of an aircraft is 800m in a standard atmosphere with no wind and 0 ft pressure altitude. Using the following corrections:

±20m/1000ft field elevation
-5m/kt headwind
+10m/kt tailwind
±15m/% runway slope
±5m/°C deviation from standard temperature

Calculate the takeoff distance from an airport at 2 000 ft elevation, temperature 21°C, QNH 1013.25hPa, 2% up-slope, 5 kt tailwind. **5 Marks**

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 (2^{nd} 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) 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

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) Why are 'step climbs' used on long distance flights? **2 Marks**
   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.

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) 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**

vii) Taking into account the values given below:

Flap:	5^0	10^0	15^0
Field Limited Mass	49,850 kg	52,500 kg	56,850 kg
Climb Limited mass	51,250 kg	49,300 kg	45,500 kg

i) What would be the maximum authorized brake release mass? **2 Marks**
ii) What would be the maximum authorized brake release mass with a 10 kt tailwind? Assume 370 kg per kt tailwind. 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, 15^0C, QNH 1013.25 hPa, with wing and engine anti-ice operating from a functional check is? **5 Marks**

ii) 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**

iii) The maximum mass for landing could be limited by: **2 Marks**
a. The climb requirements with all engines in the landing configuration but with gear up.
b. The climb requirements with one engine inoperative in the approach configuration
c. The climb requirements with one engine inoperative in the landing configuration
d. The climb requirements with all the engines in the approach configuration.

iv) 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

v) 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

vi) A runway is contaminated by 0.5 cm layer of wet snow. The take-off is nevertheless authorized by a light-twin flight manual. the take-off distance in relation to a dry runway will be: **2 Marks**

a. Very significantly decreased
b. Increased
c. Unchanged
d. Decreased

vii) 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) 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

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) 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? **2 Marks**
a. Decrease/decrease
b. Increase/decrease
c. Increase/increase
d. Decrease/increase

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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