※ 考生請注意：本試題不可使用計算機。　　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

簡答題(50%)

1. **(15%)** 試述何為 positively controlled airspace, controlled airspace, uncontrolled airspace。並請分類 airspace A,B,C,D,E,G 為上述三種 airspace。

2. **(10%)** 請簡述航管人員可使用哪幾種方式為飛機進行隔離。

3. **(10%)** 試述航空公司如何運用差別費率提高承載率及獲利能力。

4. **(15%)** 以下圖航線為例(乙國客貨郵件經甲國轉運至丙國)，請問若甲國、乙國、丙國欲營運此一航線，各需要向其餘兩國取得何種航權？並請簡述所需要之航權其所賦予之權利為何。

分析題: (50%)

5. (15%)

The minimum flight speed achievable in steady-flight is called the stalling speed (V_{stall}) and is given by the formula:

$$V_{stall} = \sqrt{\frac{2mg}{\rho S C_{l\,max}}}$$

Where: m is the aircraft mass (kg), g is the gravity constant (9.81 m/s²), S is the aircraft wing area (m²), ρ is the air density (kg/m³) and C_{lmax} (dimensionless) is the maximum lift coefficient (a parameter determined by the aerodynamic capability of the aircraft). According to Federal Aviation Regulations (FAR Part 121), the approach speed of an aircraft should be 1.3 times the stalling speed.

(a) Estimate the stalling and approach speeds of a long-range, twin-engine aircraft with the following parameters:
S= 325 m², C_{lmax} = 1.3 (clean wing - no flaps), m = 220,000 kg, and g = 9.81 m/s², at sea level atmospheric conditions. (ρ= 1.225 kg/m³)

(b) The same aircraft has a value of C_{lmax} = 2.7 with the flaps fully deflected typically used during landing. Estimate the approach speed in the landing configuration at sea level condition.

(c) What is the approach speed if it is in landing configuration at 4 km above the sea level condition? (ρ= 0.8194 kg/m³)

6. (15%)

A.　What are the three axes of an airplane, and what are the rotations called that move about those axes? (5%)

B.　Name the two main types of drag.　Describe the relationship of each to a change in airspeed?　(5%)

C.　What is the difference between static and dynamic stability of an aircraft?　(5%)

7. (20%)

The Embraer Brasilia is flying is flying at 5000m density altitude for which density　$\rho = 0.7364$ kg/m^3, pressure is 5.405x10^4 N/m^2. The Pitot-static gauge reads is 9.1976 KPa. The airplane has wing span b = 19.78 m, wing area S = 39.4 m^2, mass m = 11,000 kg, and the parasite drag coefficient $C_{D0} = .022$.

(a) Calculate the flight speed of it. (10%)

(b) What is the lift coefficient C_L of it? (5%)

(a) What is the total drag force of the aircraft?　(5%)