編號： 140 **國立成功大學 105 學年度碩士班招生考試試題**

系　　所：航空太空工程學系在職專班

考試科目：航空工程概論（專班）　　考試日期：0227，節次：3

※ 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。

1. For an airplane, the amount of lift (L) is determined by the shape of the wing, the speed of airplane (V) and the angle of attack (α).

(a) Please describe the definition of lift coefficient (C_L) of a wing by using lift (L), air density ρ, speed of airplane V, and wing area S (5%)

(b) The amount of lift required depends on the weight of the airplane.　During climbing, is the lift greater or smaller than the weight of the airplane? (5%)

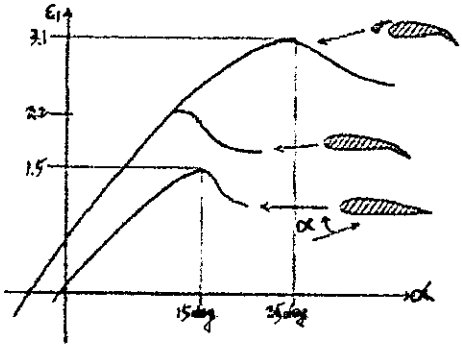
(c) What is the instrument used to measure the flying speed of an airplane? (5%)

2. The lift coefficient (C_l) curves *vs.* angle of attack (α) for an airfoil with trailing edge flap and leading edge slat are shown in the figure below

(a) Why does the lift coefficient decrease above α=15 deg for the airfoil without flap and slat? (5%)

(b) Why and how does the lift curve shift change when trailing edge flap is deflected downward? (5%)

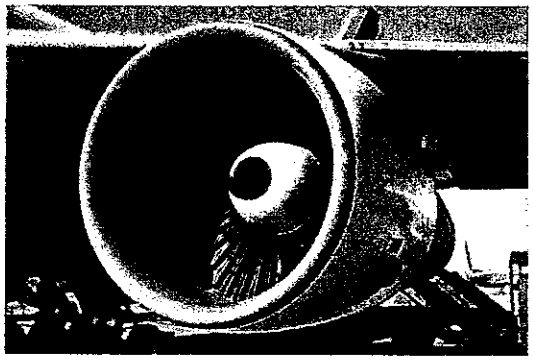
(c) Why can the lift coefficient increase until α=25 deg when leading edge slat is used? (5%)



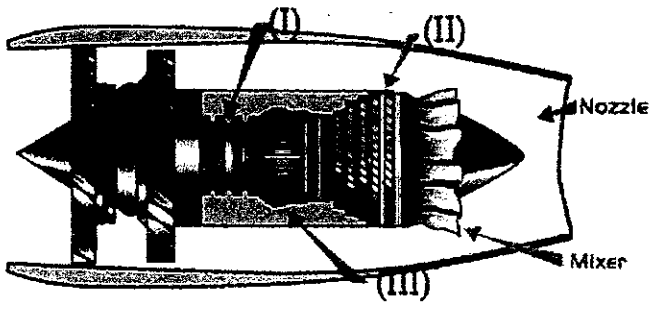
3. For aircraft turbine engine types, there are turbo shaft, turboprop engine, and turbofan engine.

(a) For Boeing 747 airplane engine shown in the figure (a), what is the type of the aircraft engine? (5%)

(b) The componets inside the Boeing 747 airplane engine is shown in the figure (b) below.　Write down the name for each component in (I), (II) and (III).　(15%)



(a)



(b)

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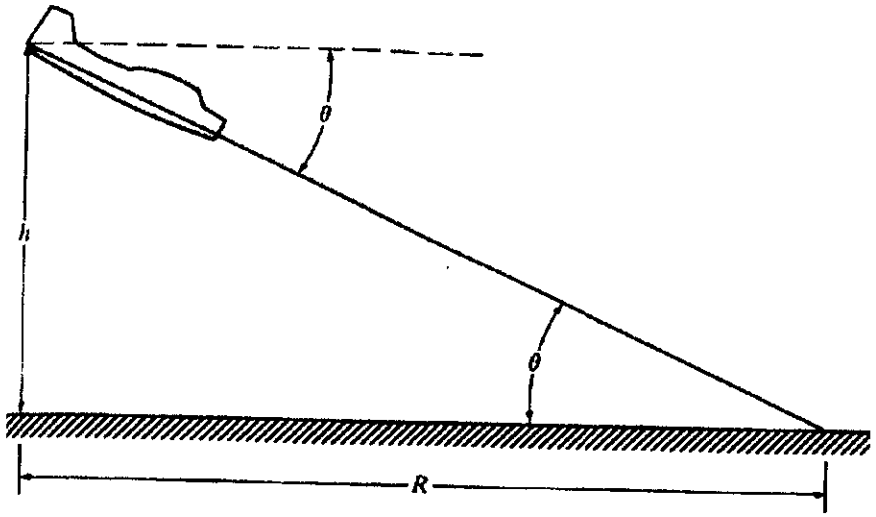
4. The fighter aircraft is designed for sustained flight at Mach 2. Its wing planform area is 19.5 m^2. Consider the fighter aircraft in steady, level flight, and assume its weight is 7262 kg_f. Calculate its angle of attack at Mach 2 when it is flying at (a) sea level and (b) 10 km. (20%)

Altitude (m)	Density (kg/m^3)	Temperature (k)	Pressure (N/m^2)
Sea level	1.23	288	1.013×10^5
10,000	0.41351	223.26	2.65×10^4

5. The maximum lift-to-drag ratio for the CP-1 is 13.6. Calculate the minimum glide angle and the maximum range measured along the ground covered by the CP-1 in a power-off glide that starts at an altitude of 10,000 ft. (15%)



6. Describe the variation of forces acting on an airplane wing when the airplane is taking off from the runway in the civil airport and mothership. (15%)