1032 機械系博士班資格考試題目

考試科目	方式	
設計製造	**Closed Book, 不可使用計算機**	**Part I**

1. Correct the following statements. (10%)

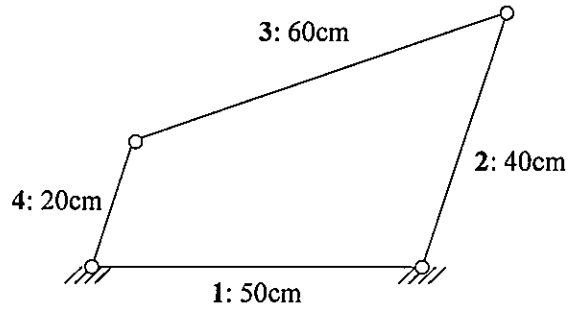
   (1) The unit of stress is 1 N/mm^2 =1MPa; and the unit of strain is *mm*.
   (2) For allowable stress, consider yielding strength S_y for brittle material, and ultimate strength S_u for ductile material.
   (3) Structure may fail when alternating stress repeats for a given number of times. This phenomenon is called "stress concentration".
   (4) When the chalk fractures under torsion, the fracture direction is at 45 degrees against the chalk axis. This is because the maximum shear stress occurs at the 45 degree plane.
   (5) Alloy steel has higher strength than low carbon steel. So it is better to use alloy steel in column applications (a structural member that carries an axial compressive load) in which buckling may occur.

2. The following figure is a simple four-bar linkage mechanism.

   (1) Why is the four-bar linkage mechanism so important? (4%)

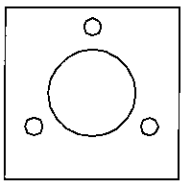
   (2) Determine which link can rotate 360° by *Grashof's rule* (3%)

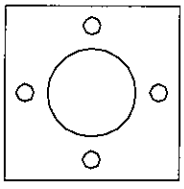
   (3) What is the name (type) of this mechanism? (3%)



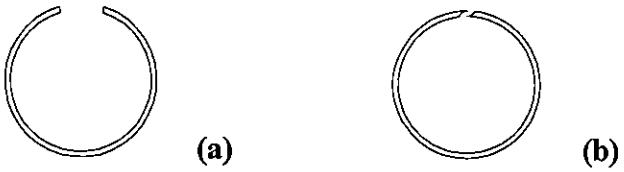
3. Consider design for assembly (DFA), which design in the following pairs is better? Why?

   (1) 5%

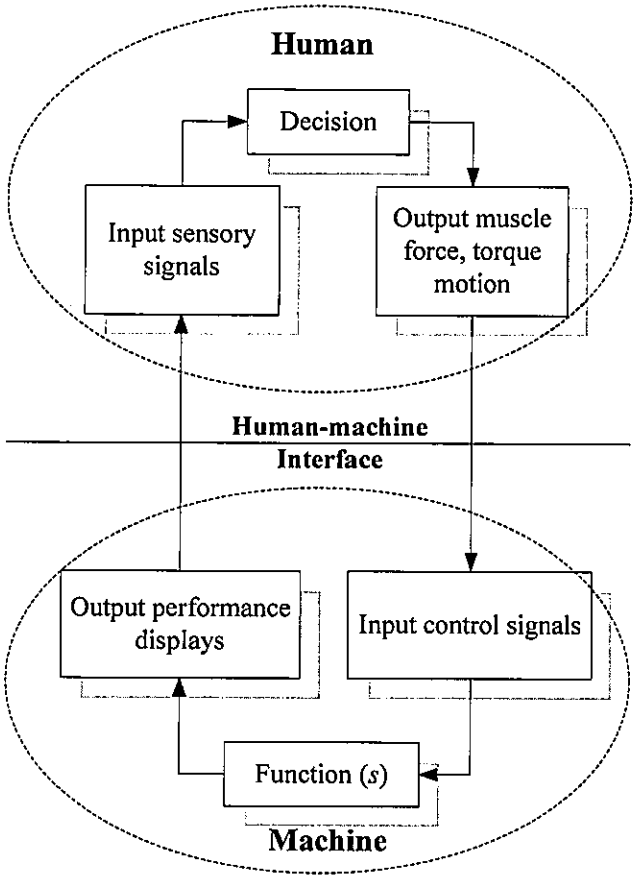

(a)


(b)

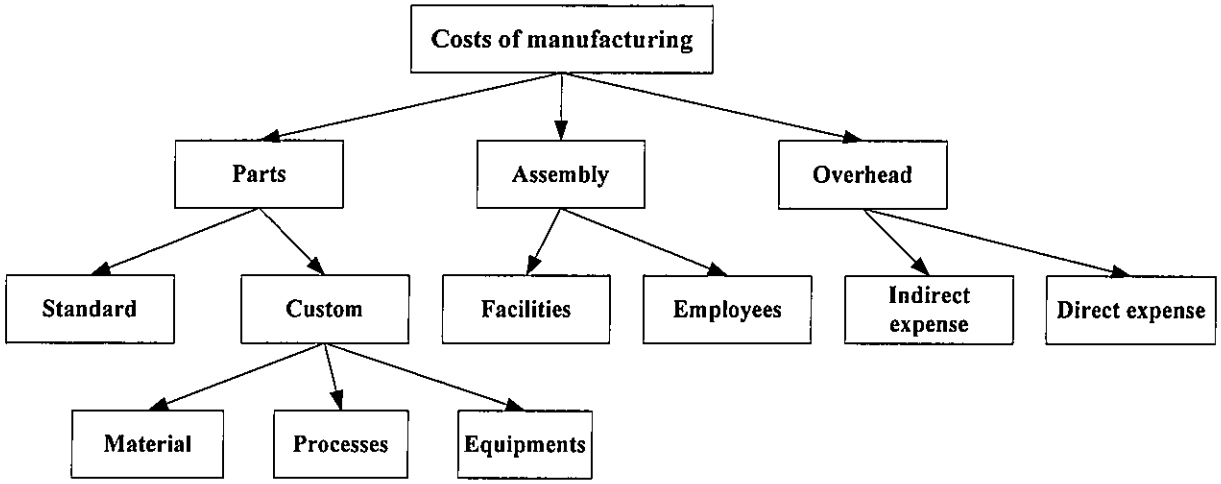
(2) 5%



4. Using the elevator in Building 3 as an example describes the following figure of a human-machine system (10%).



5. Please use egg roll （蛋餅）as an example to describe what does the each element represents and estimate the manufacturing cost of an egg roll (6%). If the manufacturing cost must be decreased, how to do from the concept of "egg roll model"? (4%)


Costs of manufacturing
Parts
Assembly
Overhead
Standard
Custom
Facilities
Employees
Indirect expense
Direct expense
Material
Processes
Equipments

1032 機械系博士班資格考試題目

考試科目	方式	
設計製造	Closed Book, 不可使用計算機	Part II

1. 請敘述精密鑄造製程並說明其優缺點 (10%)

2. 請舉二種金屬成型製程並說明之. (10%)

3. 請說明研磨製程的特色及其優缺點. (10%)

4. 請說明放電加工與電化學加工的原理. (10%)

5. 請舉例說明二種雷射在工業上的運用,並說明其原理. (10%)