

### 機械製造 (50分)

1. Give short explanations of the following: (20%)
  - (a) agile manufacturing
  - (b) life cycle of the product
  - (c) wire - EDM
  - (d) upsetting
  - (e) friction hill
2. Give the considerations which the design engineers select particular manufacturing process. (10%)
3. (a) Draw a diagram showing the process geometry (the workpiece, the tool and the chip formation) and the forces of orthogonal cutting. (6%)  
(b) Give the Taylor equation and discuss the factors influence the tool life in metal cutting. (4%)
4. Describe why wrinkling and earing occurs in deep drawing. How would you avoid them? (10%)

機械材料 (50 分)

1. 什麼是陶瓷材料 (Ceramic Materials) ? 具有哪些特性? 試舉出三種工程或是生醫上陶瓷材料的應用實例。(8)
2. 由材料之拉伸試驗可以獲得哪些材料的機械特性? 試以鑄鐵及退火中碳鋼之拉伸曲線為例作說明。(8)
3. 假設金屬原子為實體硬球模式, 且在相變前後原子大小並無改變, 請計算純金屬由 FCC 相轉變為 BCC 相時, 體積改變率之理論值。(8)
4. 舉出 4 個機械製程上使用到擴散機制的應用實例, 並略作說明。(8)
5. 常見的銲接缺陷有哪些? 略作說明。(8)
6. 解釋名詞或簡答 (10)
  - a) 靜定鋼 (Killed steel)、淨面鋼 (Rimmed steel)
  - b) 共軛溶液 (Conjugated Solution)
  - c) 鑄件 (Casting)、鑄錠 (Ingot) 與生鐵 (Pig Iron)
  - d) 再結晶 (Recrystallization)
  - e) 球化處理 (Spheroidizing)