

國立臺灣科技大學102學年度碩士班招生試題

系所組別：機械工程系碩士班戊組

科目：製造學

(總分為100分)

1. (a) What is the difference between hot working and cold working? (5 points)
(b) List 5 techniques that are used to simultaneously shape and strengthen a material by cold working. (5 points)
2. (a) State the names of three stages in an annealing process? (3 points)
(b) Briefly describe the effects of each stage on the properties of a material. (12 points)
3. List all the joining processes, both mechanical and metallurgical, used in fabrication of metal products. (10 points)
4. (a) List all the molding techniques for forming plastic polymers. (12 points)
(b) Which process is not suitable to the fabrication of thermosetting polymer? (3 points)
5. Crankshafts in automobile engines are made from medium-carbon steels. In service they are subject to cyclic loading as well as significant friction and wear. Justify the choice of medium carbon steels and recommend a surface-hardening process for wear and fatigue resistance. (10 points)
6. List and briefly describe the five steps involved in the powder metallurgy process and suggest how to reduce the sintering temperature. (10 points)
7. What are the differences between the chemical vapor deposition (CVD) and the physical vapor deposition (PVD)? (10 points)
8. Given that one of the common failure mechanisms of an integrated circuit is failure of the die bond resulting from temperature fluctuations. What properties or characteristics are important in the selection of a die-bonding material? (10 points)
9. Casting is an old but useful manufacturing process. If we cast a solid solution metal part using a square mold and the alloy solidified slowly, what do you expect the microstructural distribution, or say the grain morphologies distribution from center to surface? Draw your answer schematically and explain why. (10 points)

