

國立臺灣科技大學

九十二學年度碩士班招生考試試題

系所組別：機械工程系碩士班戊組

科目：機械製造

總分 100 分

1. In solid-state bonding during sintering of a powder-metal green compact, the linear shrinkage is 4%. If the desired sintered density is 95% of the theoretical density of the metal, what should be the density of the green compact? (20 pts)
2. In the modern high-technological industry, a lot of equipments used in the fabrication lines operated in the vacuum condition. Why is the vacuum condition required? What is the material to construct the vacuum chamber to maintain the system in low vacuum condition? Please illustrate the requirement for the choice of the material in the chamber walls of the vacuum systems. (20 pts)
3. Three metal pieces being cast have the same volume but different shapes; one is a sphere, one a cube, and the other a cylinder with its height equal to its diameter. Which piece will solidify the fastest and which one the slowest? Show the related equation and demonstrate. (20 pts)
4. For the corrosion-resistant purpose, the iron (or steel) wires are coated with a layer of zinc, and the life of the Zn coating wires is much higher than the iron wires. Please point out the processes how to coating the Zn onto the surface of the iron wires, and explain the principles behind these processes. (20 pts)
5. Metallurgical and materials engineers are often called on to design alloys having high strengths yet some ductility and toughness. Please indicate all the mechanisms of strengthening in metals and explain the theory supporting the strengthening mechanisms. (20 pts)

