University of Alberta
Department of Chemical and Materials Engineering

Lecturer: Dr. Stojan Djokić

MAT E 201
Materials Science I

Assignment No.6 **(12 marks)**
February 25, 2020
Due Date: March 6, 2020 by 3:00 pm

1. What is an intermetallic compound? How is different from other compounds? For example, other than the obvious difference in composition how is TiAl different from, for example, Al_2O_3? **(1 mark)**
2. Define the terms eutectic, eutectoid, peritectic, peritectoid and monotectic reactions. **(1 mark)**
3. Figure 1 shows a cooling curve for an Al-Si alloy. Determine: a) the pouring temperature, b) the superheat, c) the liquidus temperature, d) the eutectic temperature, e) the freezing range, f) the local solidification time, g) the total solidification time and h) the composition of the alloy. **(2marks)**
4. What is glass-ceramics? Schematically present a heat-treatment profile for a glass-ceramic fabrication. Give an example. **(2 marks)**
5. Which ceramics materials are most widely used? **(0.5 marks)**
6. What does the term "glass temperature" mean? Is it a fixed temperature for given composition of glass? **(0.5 marks)**
7. Define: a) thermoplastic, b) thermosetting plastic, c) elastomers and d) thermoplastic elastomers. **(1mark)**
8. The molecular weight of polyvinyl chloride is 150000 g/mol. If all of the polymer chains are the same length, calculate: a) the degrre of polymerization and b) the total number of chains in 5 g of polymer. **(2 marks)**
9. The degree of polymerization of polytetrafluoroethylene is 5000. If all of the polymer chains are the same length, calculate: a) the molecular weight of polymer and b) if there are $5 \cdot 10^{21}$ chains, determine the mass of polymer. **(2 marks)**