

Name.....Student I.D.....

Department of Mining and Materials Engineering
Faculty of Engineering
Prince of Songkla University

Final Examination for Semester: 2

Academic Year: 2009

Date: February 19, 2010

Time: 09.00-12.00

Subject: 237-508 Structures and Mechanical Properties of Materials

Room: S 201

Instruction

1. There are 4 problem sets. Please do all of them. Write your answers in the space provided after each problem set. If you need more space, you can write on the back of the paper.
2. Only two pieces of A4-size note are allowed. The note can be written on both sides.
3. Dictionary, calculator and stationery are allowed.
4. Text books, course notes, lecture notes and other studying materials are not allowed.
5. This final exam is counted for 30% of the total grade.

Asst. Prof. Dr. Thawatchai Plookphol

Problem No.	Full Score (points)	Student's Score (points)
1.	20	
2.	10	
3.	15	
4.	15	
Total	60	

Name.....Student I.D.....

3. Creep data of 7075-T651 aluminum alloy 200°C is shown in Figure 3 and Table 3 below.

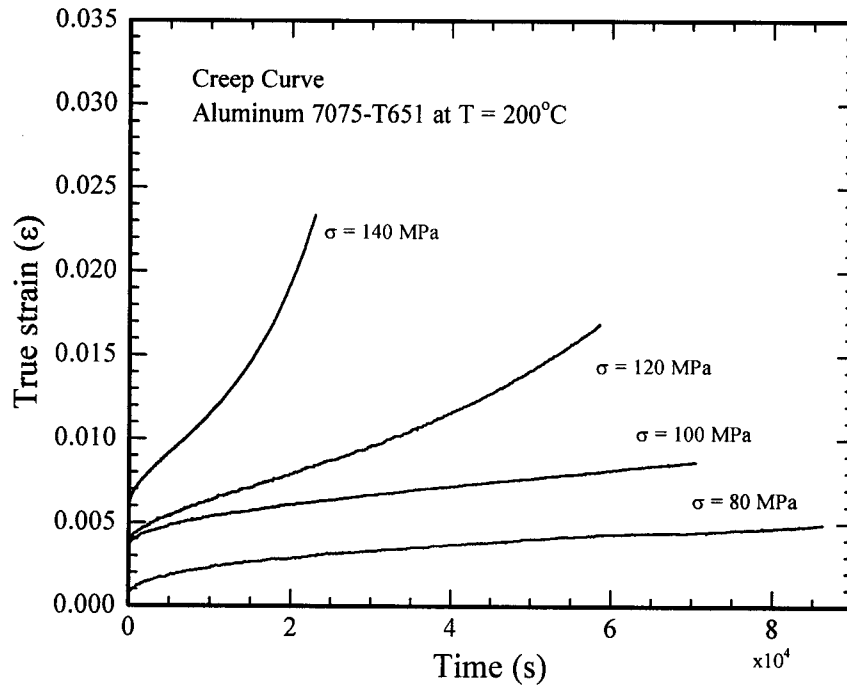


Figure 3 Creep test results of 7075-T651 aluminum alloy

Table 3 Minimum creep rate of 7075-T651 aluminum alloy

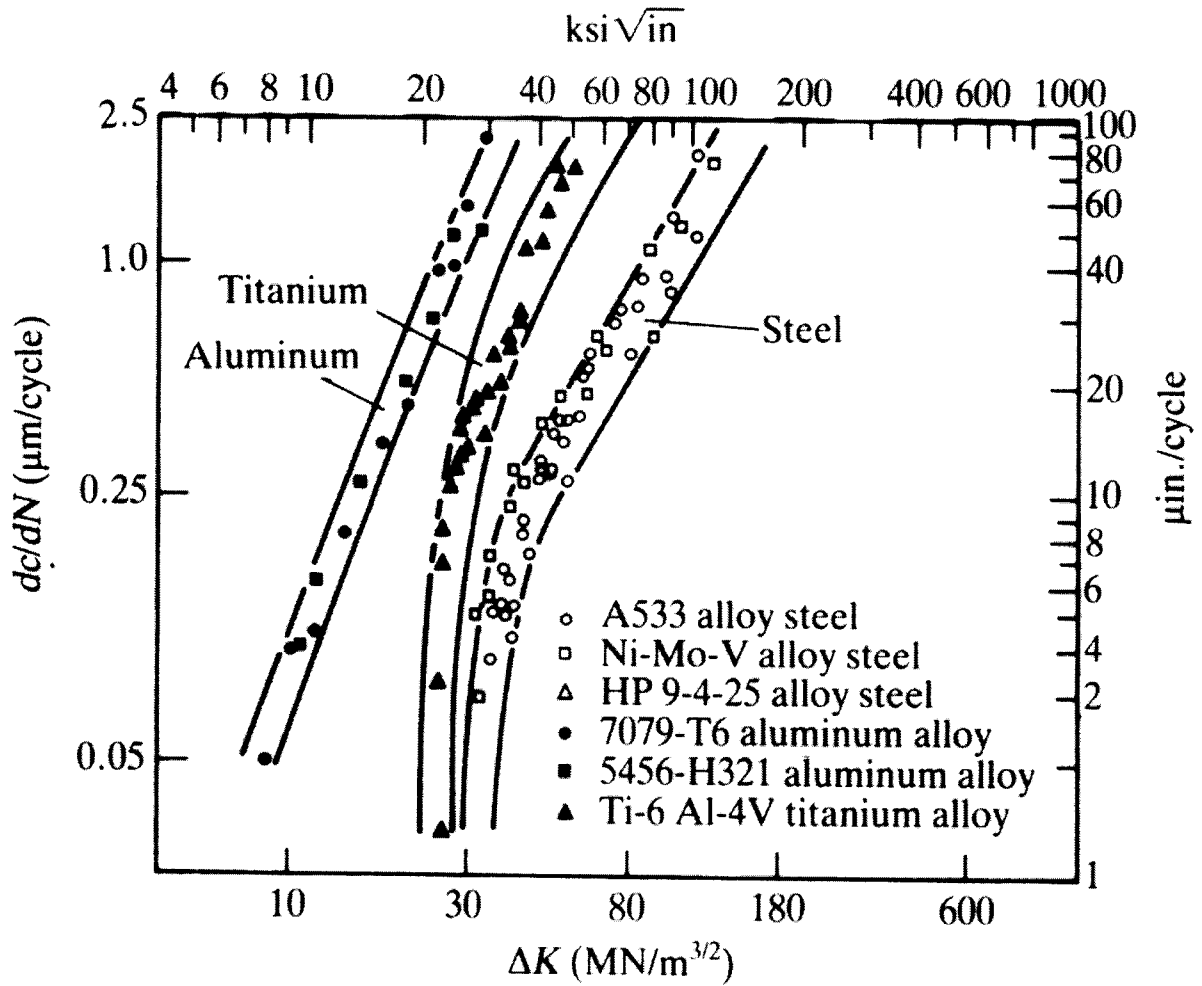
Temperature (°C)	Creep stress, σ (MPa)	Minimum creep rate, $\dot{\epsilon}_{ss}$ (s^{-1})
200	80	3.50×10^{-8}
	100	4.87×10^{-8}
	120	1.59×10^{-7}
	140	4.53×10^{-7}
	160	6.45×10^{-7}
	200	2.14×10^{-6}

3.1 Estimate the stress exponent, n from the creep data. (10 points)

3.2 What is the creep mechanism from which the experimental data is suggested? Please explain reasons to support your answer. (5 points)

Name.....Student I.D.....

4. Fatigue crack growth test results of some alloys are shown below.



According to Paris' law

$$\frac{da}{dN} = C(\Delta K)^p$$

For 7079-T6 aluminum alloy, what are the values of constants C and p ? (15 points)
