

Name: _____ Student ID No: _____

Faculty of Engineering Prince of Songkla University

การสอบกลางภาคการศึกษาที่ 1

ปีการศึกษา 2552

วัน พุธ ที่ 29 ก.ค. 2552

เวลา 13:30 – 16:30 น.

วิชา 237-322 Metallic Materials

ห้อง หัวหุ่น

คำสั่ง

- (1) เขียนคำตอบให้สมบูรณ์ทุกข้อเพื่อให้ได้คะแนนเต็ม
- (2) ให้เอา Note ขนาด A4 ที่เขียนด้วยลายมือเข้าได้ (ห้ามถ่ายเอกสาร)
- (3) ให้เอา Calculator และ Dictionary เข้าห้องสอบได้
- (4) อ่านคำสั่งให้ละเอียด และตอบทุกคำถาม

ทุจริตในการสอบโทษขั้นต่ำคือปรับตกในรายวิชาที่ทุจริตและพักการศึกษา 1 ภาคการศึกษา

Question No.	Point	Result
1	20	
2	10	
3	20	
4	10	
5	20	
6	20	
	Total	

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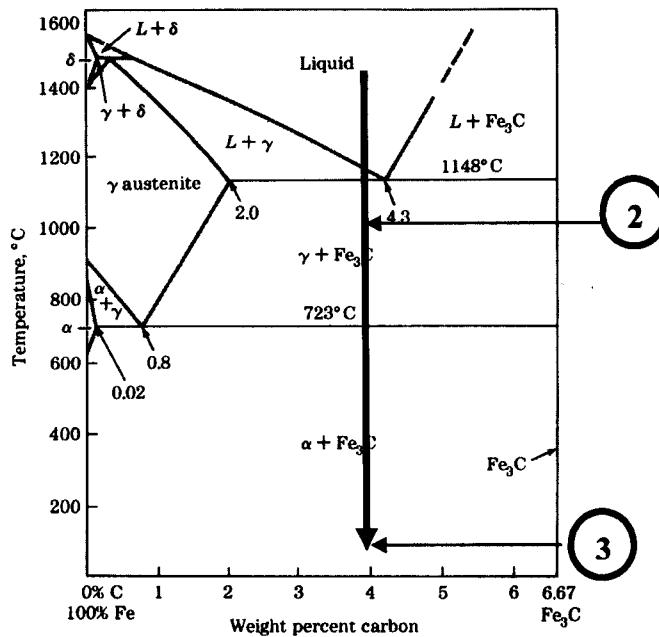
1. Clearly describe the following terms (20 points).

1.1 Maraging Steels

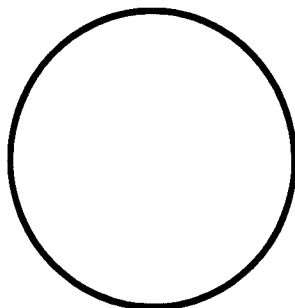
1.2 Blast Furnace

1.3 Rimmed Steel

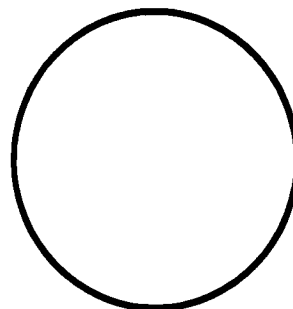
1.4 Duplex Stainless Steel



2. Draw the microstructure of the metal at points 2 and 3 when the metal is cooled down with slow cooling rates from the liquid phase to the room temperature. The metal contains some Mg and very low amount of S and P. Also identify the phases (10 points).



At Point 2



At Point 3

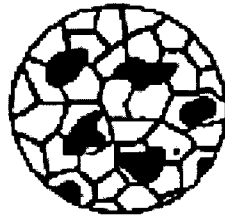
3. Concepts in Metallic Materials (20 points)

a. Explain clearly why medium carbon steel cannot be welded successfully. (5 points)

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5. Cast Irons (20 points)

Assuming that your company wants to produce a cast iron with the following microstructure (the graphite are in globular shape)



You remember that you have learned this from *237-322 Metallic Materials* that there are two types of cast irons with this microstructure.

a. What are the 2 types of cast irons? [Give the full names] (10 points)

Alloy 1 = _____

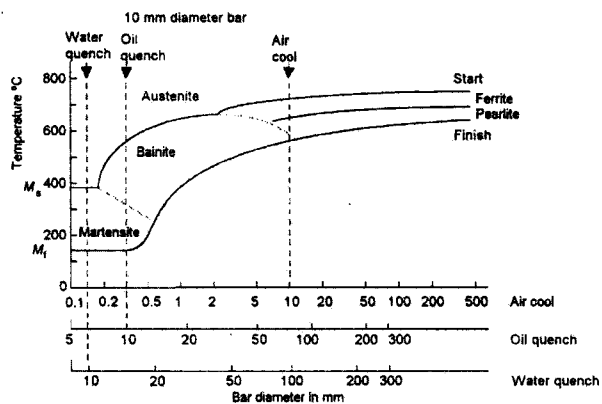
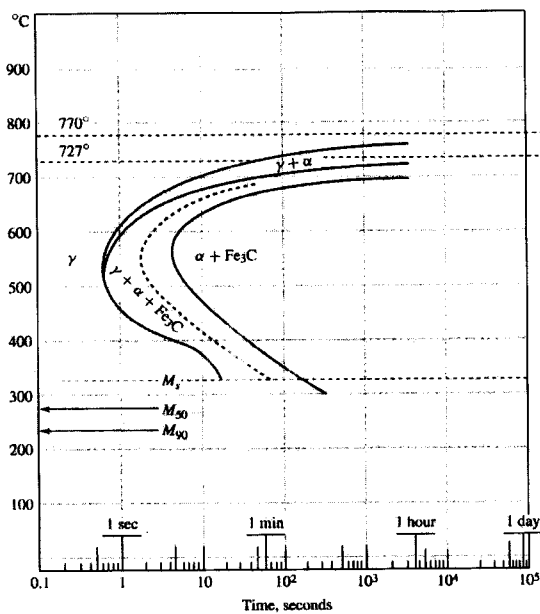
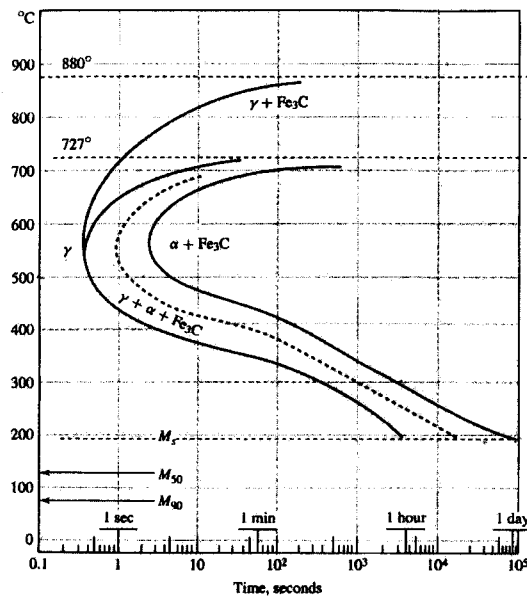
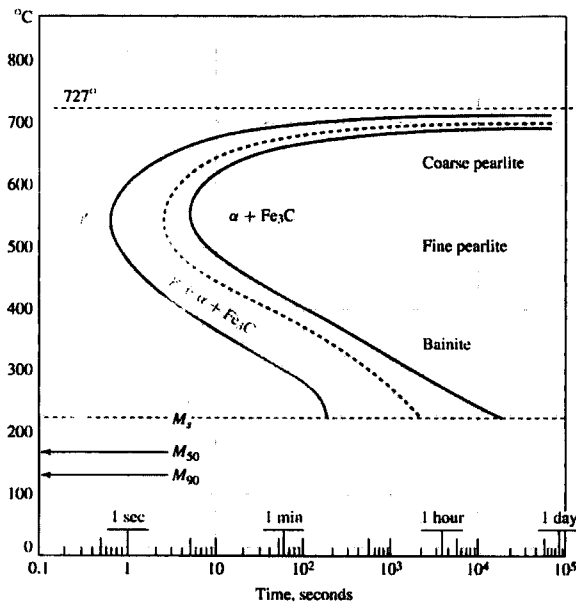
Alloy 2 = _____

b. Your boss asks you to produce these two cast irons. Explain clearly the 2 processes to produce these two cast irons. (10 points)

Method to Produce Alloy 1:

Method to Produce Alloy 2:

6. TTT Diagram. Answer using the following diagrams (20 points)



Continuous cooling transformations as a function of bar diameter of a 0.38% plain carbon steel

- a. For a 0.98% carbon steel, explain how to get a structure consisting of 50% fine pearlite, and 50% martensite. Also draw the process on the correct figure (5 points).

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- b. Your manager wants you to heat treat a 0.5% carbon steel to have the microstructure consisting of 25% fine pearlite, 25% bainite and 50% tempered martensite. Describe the heat treatment procedure clearly by selecting the right diagram given below. Draw the lines also! (15 points)

☺☺☺ Good Luck ☺☺☺