

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

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

Final Examination for Semester: 2
Date: February 24, 2006
Subject: 237-322 Metallic Materials

Academic Year: 2005
Time: 13.30-16.30
Room: R300

Instructions

1. This exam is consisted of 2 parts, part A and part B. Please do both of them, write your answers on the space provided after each problem set. If you need more space, you can write on the back of paper.
2. Only one piece of A4-size note is allowed. It can be written on both sides.
3. Dictionary, calculator, and stationery are allowed.
4. Text books and other studying materials are not allowed.
5. This exam is counted for 50% of the total grade.

Asst. Prof. Dr. Thawatchai Plookphol
Asst. Prof. Dr. Weerawan Suthisripok

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2. Which series of wrought aluminum alloys are heat-treatable? And what are their major alloying elements? (3 points)

3. Please give 3 main end-uses of aluminum alloys. (3 points)

4. Please give 5 useful properties of magnesium alloys for structural parts. (5 points)

5. Briefly explain Kroll process for production of primary Ti from rutile ore (TiO₂). (3 points)

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6. What are the alloying elements for titanium alloys?

6.1 α -stabilizers (2 points) _____

6.2 β -stabilizers (2 points) _____

7. Please give 3 main end uses of titanium alloys. (3 points)

8. Briefly describe the following copper and copper alloys and their applications:

8.1 OF Copper (2 point)

8.2 Brass (2 point)

8.3 Bronze (2 point)

8.4 Nickel silver (2 point)

9. What are the advantages of zinc die casting alloys? (5 points)

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10. Please give 3 end uses of zinc? (3 points)

11. What is lead-free soldering alloy? (2 points)

12. What are the important characteristics of lead-free solders? (6 points)

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B2. Briefly describe the following types of corrosion that may occur in stainless steel:

- Stress corrosion cracking (2 marks)

- Intergranular corrosion and briefly discuss how you would prevent or reduce the amount of intergranular corrosion in stainless steel. (3 marks)

- Pitting and briefly discuss the operating conditions that would promote amount of pitting. (3 marks)

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B3. Describe the following terms: (you may give any examples and/or their characteristics/important properties, advantages, applications) (12 marks)

- Ordered intermetallics

- Precipitation hardenable (PH) stainless steel

- SHS (Self-propagating High-temperature Synthesis)

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- Superalloys

B4. Briefly describe the term “Nitinol “ including main characteristics/important properties and give three examples of application. (5 marks)

B5. What are advantages of single-crystal over polycrystalline Ni-base superalloys?
(BONUS: 2 marks)
