

**PRINCE OF SONGKLA UNIVERSITY  
FACULTY OF ENGINEERING**

Final Examination: Semester 1

Academic Year: 2004

Date: October 5, 2004

Time: 9.00 – 12.00

Subject: 227-501 Industrial Manufacturing Technology Room: R300

ทุจริตในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียน 1 ภาคการศึกษา

**Instructions**

- There are 6 questions in 3 pages.
- Attempt all questions, write the answers in the answer book.
- All materials, books, notes, dictionaries and calculators are allowed.
- Total score is 100.

Name: .....	Student ID.....
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Question #	Full Score	Assigned Score
1	10	
2	15	
3	15	
4	20	
5	15	
6	25	
<b>Total</b>	<b>100</b>	

Asst. Prof. Somchai Chuchom

*SupP*

Question #1 (10 Marks)

List the adverse characteristics and limitations involving chip-formation machining processes. Also explain why the chipless machining processes might have greater importance in the future.

Question #2 (15 Marks)

2-1 Make a list of material-removal process (non-conventional process) that may be suitable for the following workpiece materials:-

- a) ceramics
- b) cast iron
- c) thermoplastics
- d) thermosets
- e) annealed copper

2-2 What process would you recommend to make many small holes in a very hard alloy where the holes will be used for cooling and venting? Why?

Question #3 (15 Marks)

Analyze and compare the principal concepts, process capabilities and appropriate applications of the following machining techniques.

- 3-1 Ultrasonic Machining (UM) VS. Electron Beam Machining (EBM)
- 3-2 Abrasive Jet Machining (AJM) VS. Laser Beam Machining (LBM)
- 3-3 Electrochemical Machining (ECM) VS. Electrical Discharge Machining (EDM)

Question #4 (20 marks)

An order of 1600 pieces of AISI 1020 carbon steel are to be produced by fine turning. Only one pass of cut per piece is required. The finished part is 120 mm in diameter and 360 mm in length. Apply the cermet tool with tool life follows the equation  $T = 1.74 \times 10^{7.5} v^{-2.4}$ , where  $T$  = tool life (min) and  $v$  = cutting speed (m/min).

The tool costs 650 Baht per tip, the operating cost (include labor cost) is 180 Baht/hr. The machine depreciation is calculated at 320 Baht per one hour of machining. Other expense is assumed negligible. The loading time per piece is 2.25 min. The unloading time per piece is 0.5 min. Tool change per tip is 2.0 min.

- a) calculate the optimum cutting speed;
- b) calculate the appropriate spindle speed;
- c) calculate the tool life;
- d) calculate the total machining time of the order;
- e) calculate the total cutting cost of the order.

*Smp<sup>35</sup>*

Question #5 (15 Marks)

Identify the problems in making decision on setting the cutting parameters (in turning process). What are the guidelines or steps of approaches in order to reach the effective cutting factor set-ups, demonstrate by case studies or examples.

Question #6 (25 Marks)

6-1 Specify the objective of material cutting researches in this recent years. Also predict what it is going to be within the next decade.

6-2 Why the Salomon Curve was mentioned and interested by the researchers in 1930s?

6-3 In order to obtain the minimum cost per piece in turning a workpiece, one has to form the formula and supplies all required information. Discuss on the result of this calculation.

6-4 How FMS and CIM are related?

6-5 Choose one enterprise in Thailand which you consider the most beneficial organization if turns itself to CIM. Suggest the guidelines to successfully implement CIM in this enterprise.

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Somchai Chuchom

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