

**PRINCE OF SONGKLA UNIVERSITY**  
**FACULTY OF ENGINEERING**

Midterm Examination: Semester I

Academic Year: 2007

Date: August 2, 2007

Time: 9:00-12:00

Subject: 226-409 Machining Technology

Room: A203

ทฤษฎีในการสอบ โทษชั้นต่ำคือ ปรับตกในรายวิชาที่ทฤษฎี และ พักรการเรียน 1 ภาคการศึกษา

**INSTRUCTION:**

- 1) There are 10 questions in 3 pages.
- 2) Attempt all 10 questions in the answer-book provided.
- 3) All calculators, notes and materials are allowed.
- 4) Total score is 100.

Question	Full Score	Assigned Score
Q1	5	
Q2	5	
Q3	10	
Q4	5	
Q5	10	
Q6	15	
Q7	15	
Q8	15	
Q9	15	
Q10	5	

**Assoc. Prof. Somchai Chuchom**



Q1 What properties should a cutting tool possess? (5 points)

Q2 For what application should ceramic toolbits not be used? (5 points)

Q3 In turning of medium carbon steels in general case, one factory is now applying P01 carbide tools. What would happen? Specify the problems of cutting that might be faced, and what the advice you may suggest them to solve these problems? (10 points)

Q4 "Machining is actually a shearing of work-material", Sketch a diagram to support this phrase and demonstrate where the shearing area taking place. (5 points)

Q5 If a friend came to you with a piece of metal in hand and telling that it was a part of propellers for a big ship, you roughly inspected by eye and found that it was cast and machined before and is believed to be brass. Without detail inspection and analysis but applied your experiences and evidence, please specify what type of the brass these propellers are, and their ingredients of the compound. (10 points)

Q6 In the orthogonal cutting of a workpiece using a sharp carbide tool with rake angle ( $\alpha$ ) of  $5^\circ$ , knowing that shear strength of the workpiece ( $\tau$ ) = 950 MPa, the relationship between Shear angle ( $\Phi$ ) and Friction angle ( $\beta$ ) is  $\Phi = 45^\circ - (\beta - \alpha)/2$  and the chip length ratio ( $R_l$ ) = 0.652. Calculate the power force,  $F_p$ , the thrust force,  $F_Q$ , and the Power (P) required for single edge orthogonal cutting when the chip width is 0.5 mm and the depth is 0.15 mm. (15 points)

Q7 The workpiece from AISI 1050 steel with  $\tau = 750$  MPa, was cutting in the open air using a sharp carbide tool with the rake angle of  $3^\circ$ . If the cutting was assumed to be a Single Edge Oblique Cutting with an inclination angle of  $12^\circ$ , Shear angle ( $\Phi_n$ ) =  $15^\circ$  and Friction angle ( $\beta_n$ ) =  $30^\circ$ , the depth and the width of cut were 0.25 mm and 1 mm, respectively. Calculate the maximum work velocity ( $V_w$ , m/min) if the maximum power of the machine was 7 kW. (15 points)

Q8

8-1 Explain all functions of cutting fluid in machining process.

8-2 In high speed cutting of carbon steel workpieces, the operator noticed that when cutting without any cutting fluids the roughness of the finished parts in  $R_a$  was 0.002 mm. Because of requiring the better surface finish, the operator then applied the WMF cutting fluid to the



operation, keeping the remaining cutting conditions the same. He found that the surface finish of the workpieces was 0.003 mm. Explain in academic point of view why the roughness getting high? (15 points)

Q9 When apply a cutting tool in turning 3 types of work-materials, A, B, and C, keeping all cutting conditions the same except the cutting speed, the results were reported in Table 9. If the machinability of A is 1.10 and the tool life of the cutting tool follows Taylor tool life equation, calculate the machinability of B and C. (15 points)

Table 9

Velocity (m/min)	Tool life for different work-material		
	A	B	C
120	50	40	35
250	30	18	10

Q10 Why machining is important? Give some cases to support your answer. (5 points)

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*Amir*