

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

**Final Examination:** Semester I  
**Date:** October 1, 2009  
**Subject:** 226-401 Product Design

**Academic Year:** 2009  
**Time:** 9:00 – 12:00  
**Room:** R300

**Instructions:**

1. Write your name and student ID on the exam paper.
2. This is an opened-book examination.
3. There are 9 problems and total score is 90.
4. Carefully read the problems and answer all questions in each problem.

จุดจัดในการสอบ โทษขั้นต่ำ คือ พักการเรียน 1 ภาคการศึกษา และปรับตกในรายวิชาที่จุดจัด

Problem No.	Full Score	Assigned Score
1.1	10	
2.1	10	
2.2	10	
3.1	10	
3.2	10	
4.1	10	
5.1	10	
5.2	10	
6.1	10	
Total	90	

Associate Professor Dr.Nikorn Sirivongpaisal  
Associate Professor Somchai Chuchom  
Associate Professor Wanida Rattanamanee  
Assistant Professor Dr.Napisorn Memokol  
Assistant Professor Dr.Angoon Sungkapong  
Mr.Suriya Jirasatitsin  
Instructors



**Part I**

Problem No.	Full Score	Assigned Score
1.1	10	
Total	10	

Associate Professor Dr.Nikorn Sirivongpaisal

- 1.1 Explain and sketch up 4-phases model of quality function deployment.



**Part II**

Problem No.	Full Score	Assigned Score
2.1	10	
2.2	10	
<b>Total</b>	<b>20</b>	

Associate Professor Somchai Chuchom

- 2.1 Specify various functions of 'packaging', and show an example to demonstrate each of your answer.



- 2.2 Review the product (adjustable wrench) illustrated in Figure 2.1 and describe your thoughts on
- 2.2.1 The materials that could be used, your own selection, and your reasons for it.
  - 2.2.2 Manufacturing processes and why you would select them.
  - 2.2.3 Based on your review, any design changes that you would like to recommend.



Figure 2.1 An adjustable wrench

*Handwritten signature or initials.*

### Part III

Problem No.	Full Score	Assigned Score
3.1	10	
3.2	10	
Total	20	

Assistant Professor Dr.Angoon Sungkapong

- 3.1 According to a product as shown in Figure 3.1, please specify at least 5 items for better design. (Hint: Explain clearly for each reason on aspect of ergonomic design.)

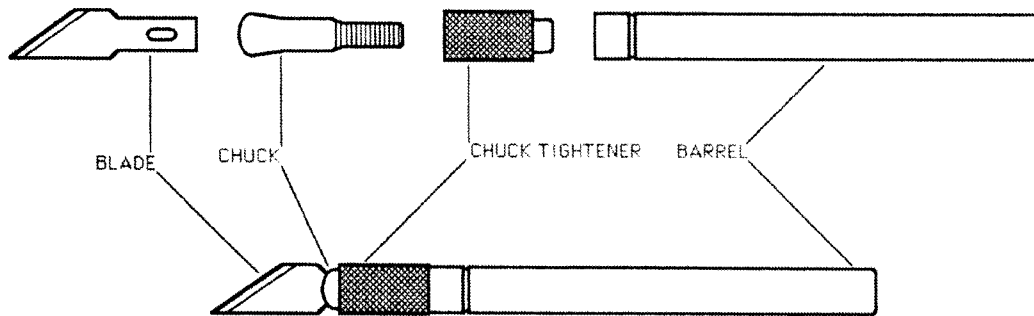


Figure 3.1 A typical craft knife

*Handwritten signature*

3.2 How did you apply the anthropometric data for the product design which was claimed as your term assignment? (10 points)

*Ans 9*

**Part IV**

Problem No.	Full Score	Assigned Score
4.1	10	
Total	10	

Assistant Professor Dr.Napisorn Memokol

- 4.1 List 10 reasons why reducing the number of parts in a product might reduce production cost. Also list some reasons why costs might increase.

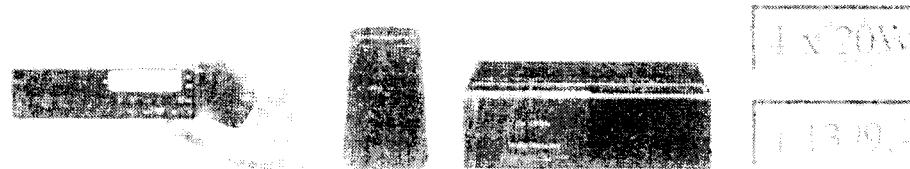
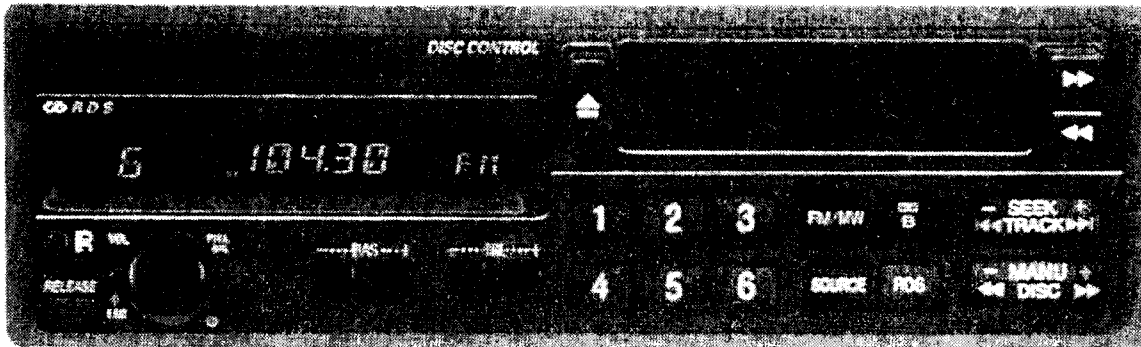


**Part V**

Problem No.	Full Score	Assigned Score
5.1	10	
5.2	10	
Total	20	

Mr.Suriya Jirasatitsin

5.1 There are many ways you could communicate a concept for a new user interface for an automotive audio system (Figure 5.1). What are the strengths and weaknesses of each approach (fill in the table)?



**B**

Profile 2

Amplifier control mode	Touch control
Remote	Present
CD changer	Absent
Indash player system	CD player
Amplifier power	4×15 Watt
Anti-theft system	Detachable front and key card
Price	NLG 999.=

Figure 5.1 The written keywords and the pictorial representation indicate the In-Dash player system available in the car stereo unit.

*AS*



Ways of Communications	Strengths	Weaknesses
Textual description of how the interface would work, with a list of each input/output device and its function.		
Two-dimensional layout of the interface (e.g., sketch or rendering on paper)		
Computer simulation in which a computer mouse is used to control the input devices.		
Comprehensive prototype, both "look like" and "works like"		

*Handwritten mark*

*Handwritten mark*

5.2 Assume that the new user interface for an automotive audio system as shown in problem 5.1 are currently sold into a market at a rate of 200,000 units per year. The product is sold through a single distributor that account for 30 percent of the sales in this category. The results from a concept test indicate a definitely-would-buy fraction of 0.20 and probably-would-by fraction of 0.20. Determine the following value: (10 points)

5.2.1 The expected number of purchases ( $N$ ) .....

5.2.2 The fraction of purchases ( $A$ ) .....

5.2.3 The probability that the product is purchased ( $P$ ) when  $C_{\text{definitely}}$  is 0.4 and  $C_{\text{probably}}$  is 0.2 .....

5.2.4 The quantity of the product expected to be sold ( $Q$ ) .....

**Part VI**

Problem No.	Full Score	Assigned Score
6.1	10	
Total	10	

Associate Professor Wanida Rattanamanee

6.1 From the tables below, compute the net present value of the cash flows. What will be happened if unit price is changed to 75 baht per unit?

**Table 6.1 A new project budgets, sales volume forecasts, and production costs.**

list	Cost (Baht)
1. Development cost	5,000,000
2. Ramp-up cost	3,000,000
3. Marketing and support cost	500,000 per year
4. Unit production cost	50 per unit
5. Sales and production volume	1,000,000 units per year
6. Unit price	70 per unit

**Table 6.2 The new project schedule.**

	Year 1			Year 2			Year 3			Year 4		
	P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3
Development	■	■	■									
Ramp-up				■								
Marketing and support				■	■	■	■	■	■	■	■	■
Production and sales										■	■	■