

Prince of Songkla University

Faculty of Engineering

Final Examination : Semester 1

Academic Year : 2007

Subject : 226 – 409 Machining Technology

Time : 9:00 – 12:00

Date : 6 October 2007

Room : R300

ทูลจريتในการสอบ โทษชั้นต่ำคือปรับตกลในรายวิชาที่ทูลจريت และพัทการเรียน 1 ภาคการศึกษา

- ห้ามใช้โทรศัพท์มือถือ หรือเครื่องมือสื่อสารใดๆ ในห้องสอบ
- อนุญาตให้นำตำรา บันทึทกโน้ตใดๆ เข้าห้องสอบได้
- สามารถนำเครื่องคิดเลขรุ่นใดๆ เข้าห้องสอบได้

Answer all the questions in the book provided. There are 6 questions in 3 pages. The full marks are 70.

1. When a cutting tool “A” is used to cut a tool material “B” the value of  $v_{60}$  is 50 m/min. and  $v_{30}$  is 75 m/min. What is the value of  $v_{20}$ ?

(10 Marks)

2. Referring to the profile in Figure Q2, given the numerical values to the vertical distances from the center line as in Table Q2. Calculate the  $R_a$ ,  $R_q$ , and  $R_t$  values. Why are the calculated  $R_a$ ,  $R_q$ , and  $R_t$  values different? Which one should be applied in practice? Why?

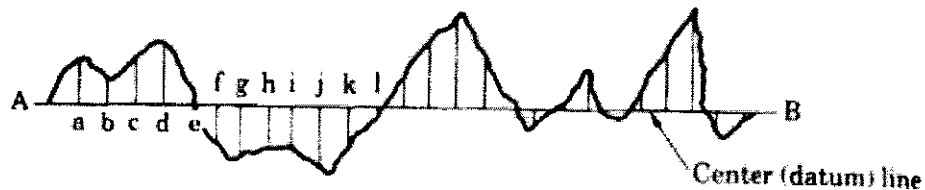


Figure Q2

**Table Q2**

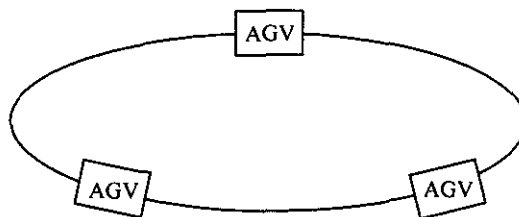
Position	a	b	c	d	e	f	g	h	i	j	k	l
Distance ( $\mu\text{m}$ )	3	2	3	5	0	3	5	4	4	7	3	1

(10 Marks)

3. Answer the following questions.

3.1 Automated guided vehicles (AGV) are arranged into 1 simple loop as shown in Figure

Q3. Explain 2 systems that can be used to prevent AGV from collision.



**Figure Q3**

3.2 Describe the basic components of an industrial robot. Sketch and briefly explain their functions in the operation.

(10 Marks)

4. Answer the following questions.

4.1 Explain the concept of CIM and its technology involved.

4.2 What is a Flexible Manufacturing System (FMS)? How does it relate to CIM?

(10 Marks)

5. Answer the following questions.

5.1 Why is the cutting forces in laser assisted machining lower than those of conventional cutting processes?

5.2 What are main problems of applying continuous mode lasers compared to pulsed mode lasers?

- 5.3 What are the two types of pulsed mode-high power lasers that widely apply in metal cutting processes?
- 5.4 Explain the problems of applying CO<sub>2</sub> laser on *Al* workpieces.
- 5.5 What type of laser that is generated by molecular vibrations?
- 5.6 What kind of gas lasant for ion laser that can generate power high enough for cutting thin sheet of materials?
- 5.7 What kind of laser that is generated from organic materials and can be tuned for several wavelengths?
- 5.8 Compare the advantages and disadvantages of Nd-YAG laser and Nd-Glass laser.
- 5.9 What is Salomon Curve?
- 5.10 Why is hi-speed cutting interesting? Specify the range of cutting speeds (m/min) that is considered a hi-speed cutting.

(20 Marks, 2 marks for each sub-problem)

6. Answer the following questions.

6.1 Describe the principles or the concepts of Electro Chemical Machining Process (ECM), also draw the diagram to demonstrate the process. Discuss on the tool and tool properties used in this process.

6.2 In calculating the minimum cost per piece for turning process of a workpiece, what are the cost factors considered in the model? What difficulties would you encounter to obtain the relevant result?

(10 Marks)

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Assoc. Prof. Somchai Chuchom

