Midterm Examination: Semester 2   **Academic Year:** 2009
Date: December 23, 2009   **Time:** 13:30-16:30
Subject: 226-431 Manufacturing Automation   **Room:** R300

....

> ทุจริตในการสอบ โทษขั้นต่ำ คือ พักการเรียน **1** ภาคการศึกษา และปรับตกในรายวิชาที่ทุจริต

Directions:

- There are 12 questions. The total score is 100.
- Write your own answer on your examination sheets.
- All materials, books, calculators are allowed.

Name.. Student ID ....

Question	Full scores	Assigned Scores
1.	5	
2.	10	
3.	10	
4.	5	
5.	10	
6.	10	
7.	5	
8.	10	
9.	20	
10.	5	
11.	5	
12.	5	
Total	100	

Assoc. Prof. Wanida Rattanamanee
Instructor
☺☺☺ Good Luck ☺☺☺

Code..............................

1. **(5 points)** What is relationship among people, equipment and procedures to accomplish the manufacturing operations in the production system?

....

....

....

....

....

....

2. **(10 points)** What is manufacturing supporting system? How many functions are there in the supporting system? Explain in detail for each function.

....

....

....

....

....

....

....

....

....

....

....

....

....

Code.............................

3. (**10 points**) Explain the relationship between the production quantity and production variety of each type of production system facilities. From Figure 1.4 (in the book), which types of plant layout is suitable for those facilities and also give the reasons and examples of each layouts?

....

....

....

....

....

....

....

....

....

....

....

4. (**5 points**) From Figure 1, explain its main idea.

Automated Manufacturing Systems

Computerized Manufacturing Support Systems

Figure 1

....

....

....

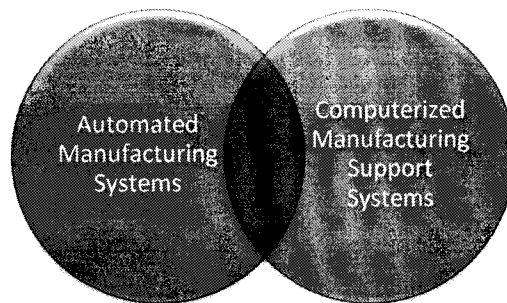...

Code.............................

5. (**10 points**) Consider an automated milling operation in which a circle-shaped geometry is generated. Assume the system is automated and that a robot is used to load and unload the work unit. The work cycle consists of the following steps:
   a. Load starting workpiece
   b. Position cutting toll prior to milling
   c. Milling
   d. Reposition tool to a safe location at the end of milling and
   e. Unload finished workpiece.

Identify the activity(ies) and process parameter(s) in each step of the operation.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

Code..............................

6. (**10 points**) A machinable grade of aluminum is to be milled on an NC machine with a 20-mm diameter four-tooth end milling cutter. Cutting speed = 120 m/min and feed = 0.08 mm / tooth. Convert these values to revolutions per minute and millimeters per minute, respectively.

....

....

....

....

....

....

....

....

7. (**5 points**) what is difference between open loop control system and closed loop control system?

....

....

....

....

....

....

Code...............................

8. **(10 points)** A stepping motor has 200 step angles. Its output shaft is directly coupled to a leadscreaw with pitch = 0.250 in. The worktable is driven by the leadscreaw. The table must move a distance of 5.00 in. from its present position at a travel speed of 20.0 in./min. Determine:
   a. BLU of the CNC
   b. How many pulses are required to move the table the specified distance?

....

....

....

....

....

....

....

....

....

....

....

....

....

....

Code...........................

9. (**20 points**) A 60" x 50" x 20" workpiece is machined. The material of the workpiece is low carbon steel. The process plan:

   a. Set the lower left bottom corner of the part as the machine zero point (floating zero programming).
   b. Clamp the workpiece in a vise.
   c. Mill the letter "U" with a 5 in. diameter (Figure 2) four flute flat end mill made of carbide. From the machinability data handbook, the recommended feed is 10 ipm, and the recommended cutting speed is 700 fpm.

Figure 2

Code.............................

Calculate spindle speed (RPM) and create NC part program

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....
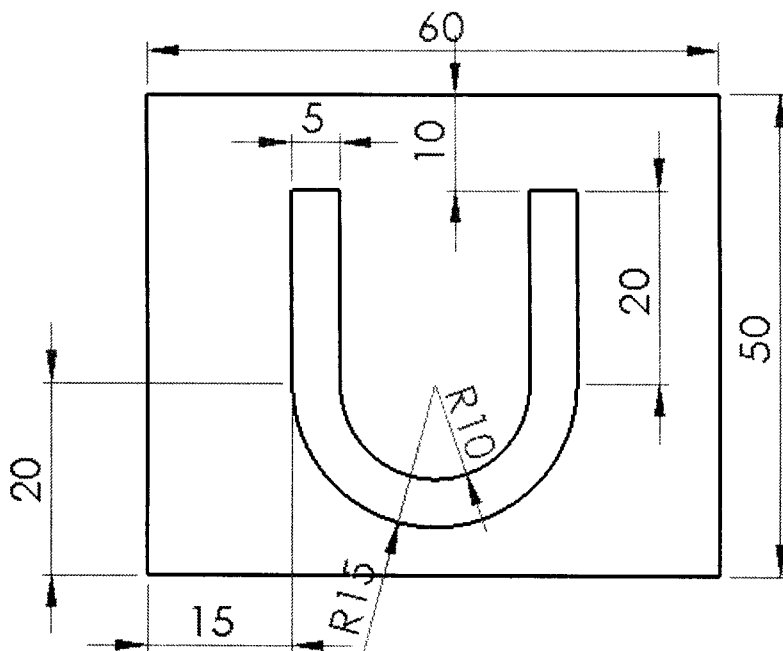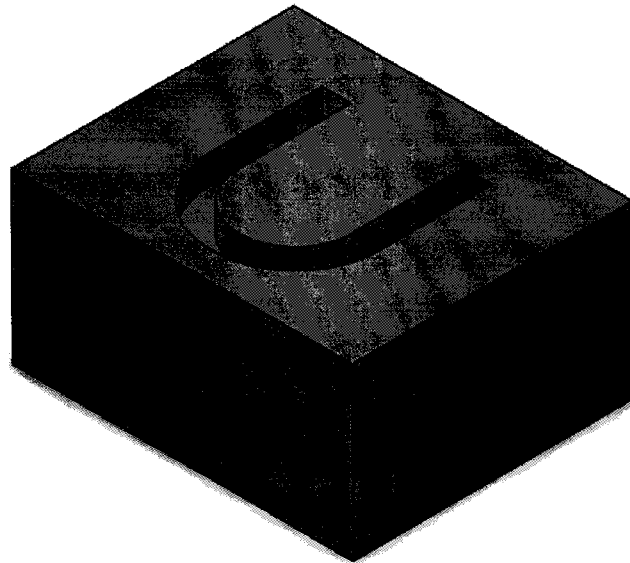
Code...........................

10. (**5 points**) From automation and manning levels, high or low values of M_i, What's meaning?

....

....

....

....

....

....

11. (**5 points**) What are the characteristics of Lean system?

....

....

....

....

12. (**5 points**) Calculate the number of containers, where;
$d = 4000$ units/day $p = 0.04$ day $a = 0.10$
$w = 0.08$ day $c = 30$ units

....

....

....

....

....

....

....

....