

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination: Semester 2
Date: December 25, 2008
Subject: 226-431 Manufacturing Automation

Academic Year: 2008
Time: 13:30-16:30
Room: R200

ทฤษฎีในการสอบ โทษขั้นต่ำ คือ พักการเรียน 1 ภาคการศึกษา และปรับตกในรายวิชาที่ทฤษฎี

Directions

- There are 10 questions. The total score is 100.
- Write your own answer on your answer book(s).
- Submit all your examination sheets and answer books.
- All materials, books, calculators are allowed.

Name.....Student ID.....

Question	Full Points	Assigned Points
1	10	
2	10	
3	5	
4	5	
5	5	
6	5	
7	15	
8	5	
9	20	
10	20	
Total	100	



Instructor: Mr.Suriya Jirasatitsin

1. Explain the relationship between the production quantity and production variety of each type of production system facilities. From Figure 1, which types of plant layout is suitable for those facilities and also give the reasons and examples of each layouts? (10 points)
2. What is a manufacturing support system? How do the manufacturing support systems relate to the production system facilities? (10 points)
3. Give the reasons why companies should take account to manufacturing automation. (5 points)
4. Explain the features of work cycle programs (part programs) used to direct the operations of an automated system. (5 points)
5. Explain the concepts of open loop control system and closed loop control system. (5 points)
6. Give advantages and disadvantages of Numerical Control. (5 points)
7. The part in Figure 2 is to be drilled on a turret-type drill press. The part is 15.0 mm thick. There are three drill sizes to be used: 8 mm, 10 mm, and 12 mm. These drills are to be specified in the part program by tool turret positions T01, T02, and T03. All tooling is high speed steel. Cutting speed = 75 mm/min and feed = 0.08 mm/rev. Use the lower left corner of the part as the origin in the x-y axis system. Write the part program in the world address format with TAB separation and variable word order. Use absolute positioning. (15 points)
8. An industrial robot consists of joints and links. Explain the characteristics of five types of joint. Also, explain the configurations of three degree of freedom robot constructed from the joint types. (5 points)
9. In the fluid filling operation of a sheet metal stamping press, a two-button safety interlock system is often used to prevent the operator from inadvertently actuating the press while his hand is in the die. Both buttons must be depressed to actuate the stamping cycle. In this system, one press button is located on one side of the press while the other button is located on the opposite side. During the work cycle, the operator inserts the part into the die and depresses both push-buttons, using both hands.
 - (a) Write the truth table for this interlock system. (5 points)
 - (b) Write the Boolean logic expression for the system. (5 points)
 - (c) Construct the logic network diagram for the system. (5 points)
 - (d) Construct the ladder logic diagram for the system. (5 points)
10. Learning by the video and activities as doing in the classroom, what do you think about the advantages and disadvantages of this kind of learning? Please feel free to express your opinion. (20 points)



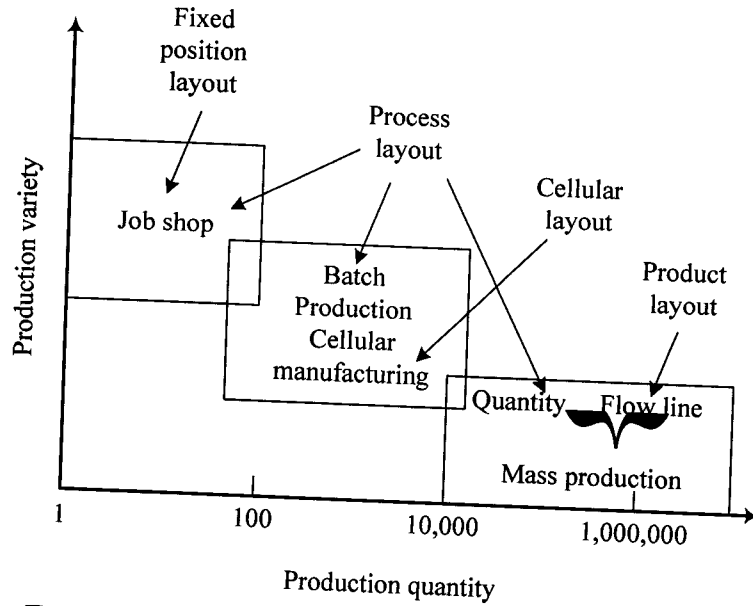


Figure 1 Types of facilities and layouts used for different levels of production quantity and product variety.

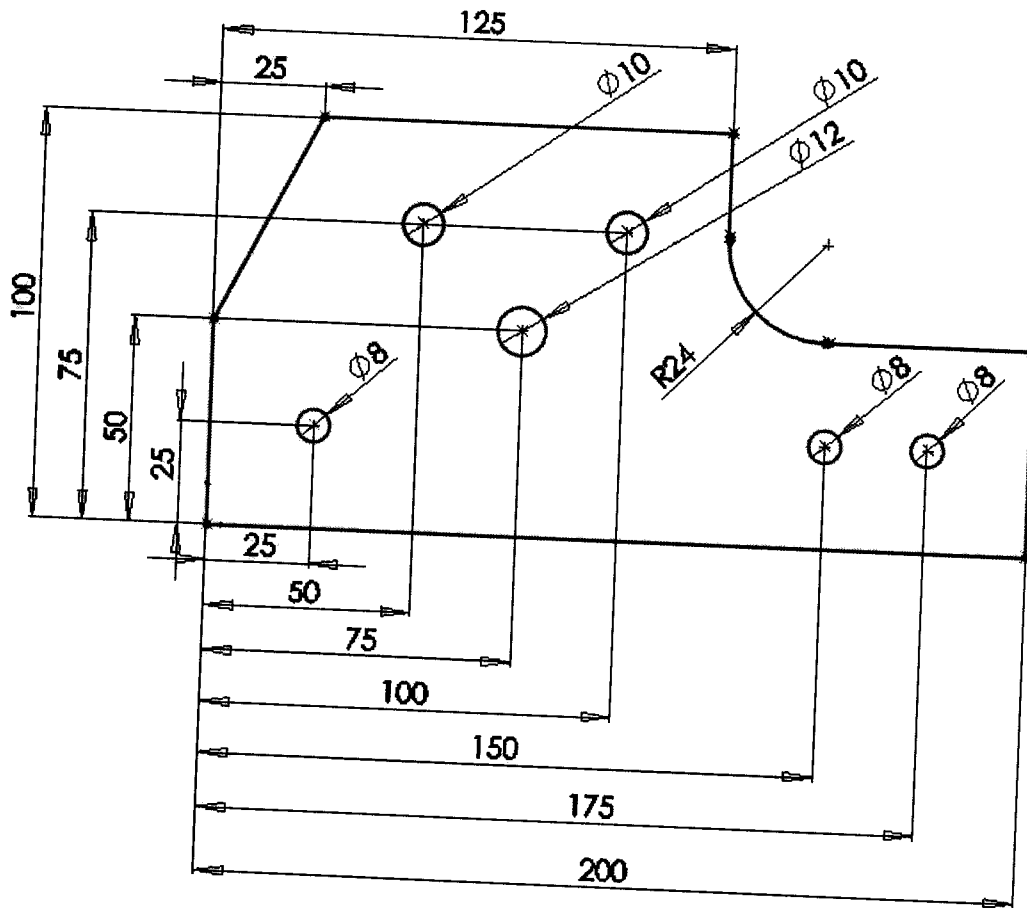


Figure 2 Part drawing for Question 7. Dimensions are in millimeters.