

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination : Semester 1

Academic Year : 2005

Date : October 5, 2005

Time : 9:00-12:00

Subject : 226-439 Logistics & Material handling system

Room : R300

Directions :

- Can take any books to the room.
- Show your solutions and method on the exam sheet.
- There are 8 problems, 80 points. You must do all of them.
- Can use any calculators.

Name.....Code

Question	Full Scores	Taken Scores
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
Total	80	

ทูลจรลใการสอบ โทษขั้ันต่ำปรลบกใรายวฒานั้
และพั้การเรลยห 1 ภาคการค้กษา

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Lecturer



1. From Fig. 1, what is kind of the robot? What material handling work is the robot appropriate for? In general, how many methods can program the robot? Explain all of them. (10 points)

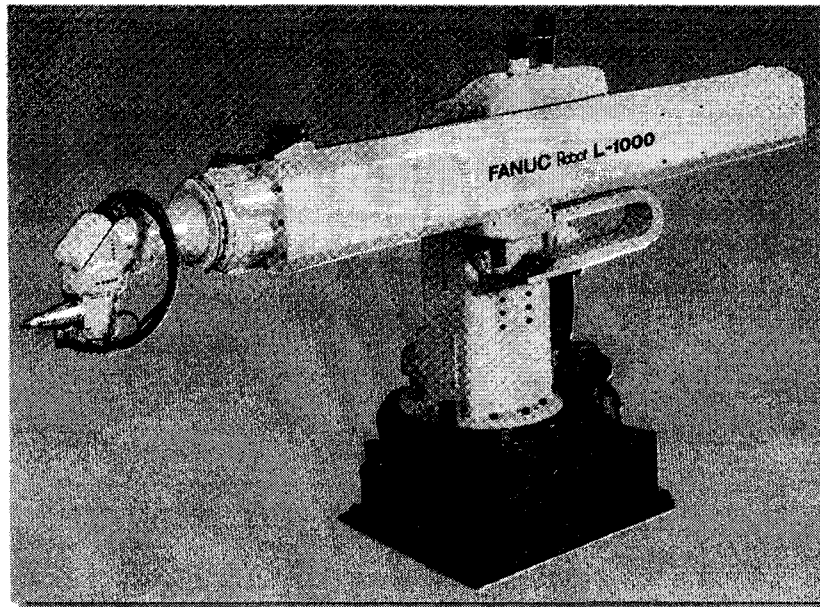


Figure 1

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2. What is AGVS? How many types of AGV are used in the manufacturing? (10 points)

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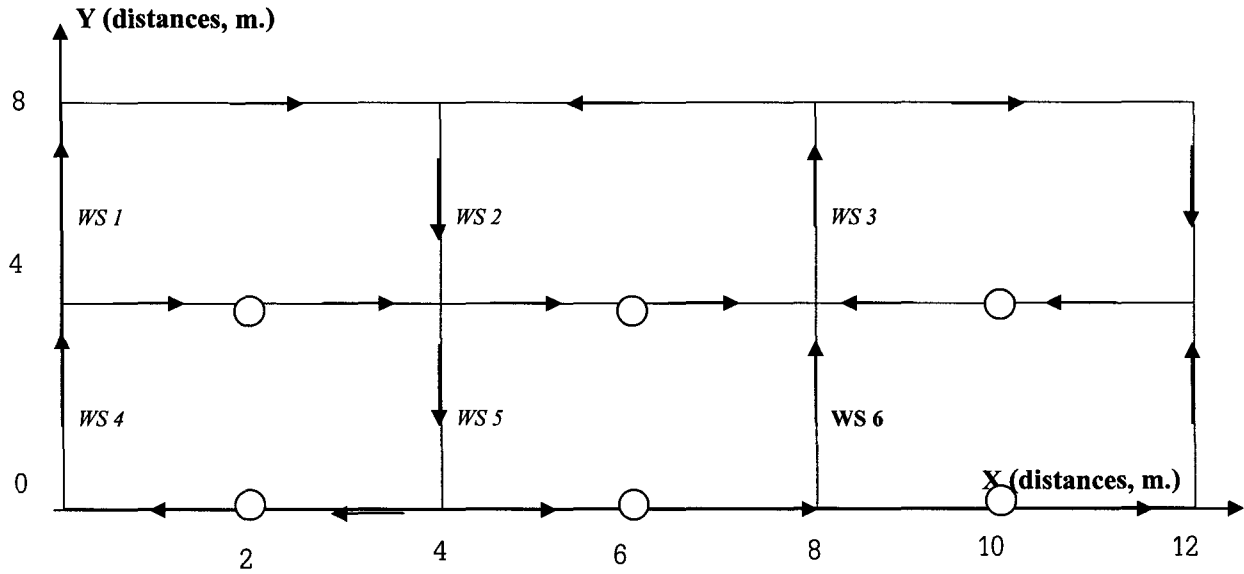
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3. In a factory, there are 6 workstations, WS 1, WS 2, WS 3, WS 4, WS 5, and WS 6. There are 4 products, A B C and D, produced in the factory by these 6 workstations. Amount, production scheduling, production capacity, and product weight of each product are shown in Table 1. The factory manager would like to apply AGV system for the production. He designed AGV guided path as shown in Fig 2. Material handling capacity of the selected AGV type is 500 kilograms per trip. Its velocity is 2 meter per minute. Its efficiency is 0.9 and it has to be charged the energy after it works for 11 hours. Pick up and drop off time is 0.5 and 0.6 respectively. If there are 10 work hours per day, how many AGV should have in the factory. (10 points)

Table 1 Detail of production

Product type	Production scheduling	Production capacity (parts/day)	Weight (kg.)/ part
A	1 → 3 → 4 → 6	2,000	0.5
B	2 → 3 → 4 → 5	5,000	0.2
C	1 → 2 → 3 → 4 → 5 → 6	1,000	0.1
D	1 → 4 → 5 → 6	3,000	0.5





○ = Pick up an drop off point

Fig 2 Guide path layout

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5. A ten aisle automated storage/retrieval system is located in an integrated factory-warehouse facility. The storage racks in each aisle are 18 m. high and 95 m. long. The S/R machine for each aisle travels at a horizontal speed of 1.5 m./sec. and a vertical speed of 0.5 m./sec. Pick up and drop off time = 20 sec. and 25 sec. respectively. Assume that the number of single command cycles per hour is one-half the number of dual command cycles per hour and that the system operates at 80% utilization. Determine the throughput rate (loads moved per hour) of the AS/RS. **(10 points).**

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6. From Fig 3., It is a work flow. What will be occurred from this situation and how can you improve material flow in the manufacturing? Explain your own idea. (10 points)

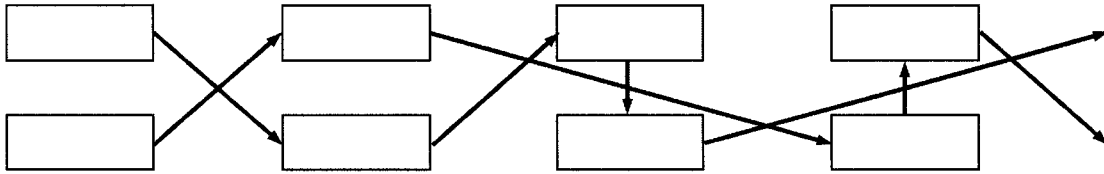


Fig 3. Interrupted flow paths

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7. Assume a truck (fork lift) is 90 inches wide, 105 inches high and 44.5 feet long. Assume your product package is 24 x 20 inches and is 12 inches high. If you were to use a pallet, what size would you use? Justify your answer including the pallet pattern and number of packages per truckload. (10 points)

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8. Make a Flow Process Chart for a process you are familiar with. (10 points)

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