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PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Midterm Examination : Semester 1   Academic Year : 2004

Date : August 2, 2004   Time : 13.30-16.30

Subject : 226-491 Sp. Tops. In MfE I (Advanced Material Handling) Room : R300

Directions :

❑ Can take any books to the room.

❑ Show your solutions and method in your answer book

❑ There are 4 problems. You must do all of them.

❑ Can use any calculators.

Question	Full Scores	Taken Scores
1	30	
2	30	
3	20	
4	20	
Total	100	

Wanida Rattanamanee

Lecturer

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1. Consider a production system with five workstations each labeled P_i, i = 1, 2, 3, 4, 5. On a floor plane with grid lines, the workstations are located at points P_1 = (10,15), P_2 = (25,60), P_3 = (75,5), P_4 = (80,50) and P_5 = (120,35). The components produced at these workstations are sent by conveyors to an assembly station where the parts are assembled together into finished products. Finished products are transported by industrial trucks to a warehouse. The volume of flow and the cost of handling a load through a distance of one unit from each of the workstations using conveyors are as given in the following table below : (30 points)

Table 1-1 The volume of flow

Station #	Daily flow volume	Cost/unit distance/volume
1	50	400
2	100	200
3	30	500
4	45	300
5	80	350

    1.1 Assuming rectilinear distance measurement is used and the objective is to minimize both the cost of transportation and the initial investment on the conveyors, where should the assembly station be located?

    1.2 Assuming the cost per unit length of the conveyor is 2500′ Baht, what is the minimum total cost of the conveyor system and what is its total length (i.e., the length of the conveyor system)? Provide a sketch of the conveyor network.

    1.3 What is the total daily transportation cost on the conveyor, excluding the fixed cost of the conveyor?

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2. Five manufacturing departments labeled A, B, C, D, and E are to be assigned among the six sites, of size 6*6 feet each as shown in Figure 2-1. Four products are processed through the five departments according to the processing sequences and frequencies of movement between department as shown in Table 2-1. (30 points)

Table 2-1 The processing sequences of each product and frequencies of movement between departments

Product	Processing Sequence	Flow Frequency
1	A,B,C,E,D	40
2	A,C,B,C,D,E	20
3	A,B,D,E,C	50
4	A,C,D,B,E	40

1	2	3
4	5	6

Figure 2-1 Sites

2.1 Develop frequencies From-to-chart and the distance From-to-chart associated with the problem, assuming material movement between departments is from centered to centered and along the aisles only.

2.2 Suppose an initial assignment of departments is below:

Dept .A located in site 2,

Dept. B located in site 4,

Dept. C located in site 3,

Dept. D located in site 1,

Dept. E located in site 6.

What is the cost associated with this assignment?

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3. The paper flow to be expected through one section of city hall consists of the following :

   10 medical records from records to marriage licenses per day

   7 certificates from printing to marriage licenses per day

   4 blood samples from marriage licenses ×to lab per day

   4 blood sample reports from lab to marriage licenses per day

   1 box of medical records from marriage licenses to records per week.

   The following load-equivalence conversions can be used :

   One medical record is equivalent to one certificate.

   One medical record is equivalent to one-half of a blood sample.

   One medical record is equivalent to one blood sample report.

   One medical record is equivalent to one-tenth of a box of medical records.

Develop a from-to chart for this section of city hall and then develop a relationship chart. (20 points)

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4. What are the trade-offs involved in parallels, perpendicular, and diagonal flow with in parking lots? (20 points)

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