

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination: Semester 2

Academic Year: 2010

Date: December 18, 2010

Time: 13:30-16:30

Subject: 225-351 Industrial Plant Design

Room: Robot, A205

ทฤษฎีในการสอบ โทษชั้นต่ำ คือ พักการเรียน 1 ภาคการศึกษา และปรับตกในรายวิชาที่ทฤษฎี

Directions:

- There are 8 questions. The total score is 80.
- Write your own answer and detail calculation on your examination sheets.
- This examination is **closed book exam**; however, the students can take these following to the exam room,
 - one A4 page with **your own note writing** and the **instructor signature**
 - A dictionary and a calculator.

Name..... Student ID Section..... Group.....

Question	Full scores	Assigned Scores
1.	3	
2.	3	
3.	6	
4.	18	
5.	15	
6.	5	
7.	15	
8.	15	
Total	80	

Assoc. Prof. Wanida Rattanamanee

Instructor

☺☺☺ Good Luck ☺☺☺

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1. (3 points) What is difference between plant design and plant layout?

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2. (3 points) What impact does plant planning have on employee moral, and how does employee morale impact operating costs?

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3. (6 points) How many types of manufacturing are there? Explain all type of manufacturing and give one example for each type.

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4. (18 points) From Figure 1, fill the value of each variable in Table 1. These variables come from Mathematical model for location planning.

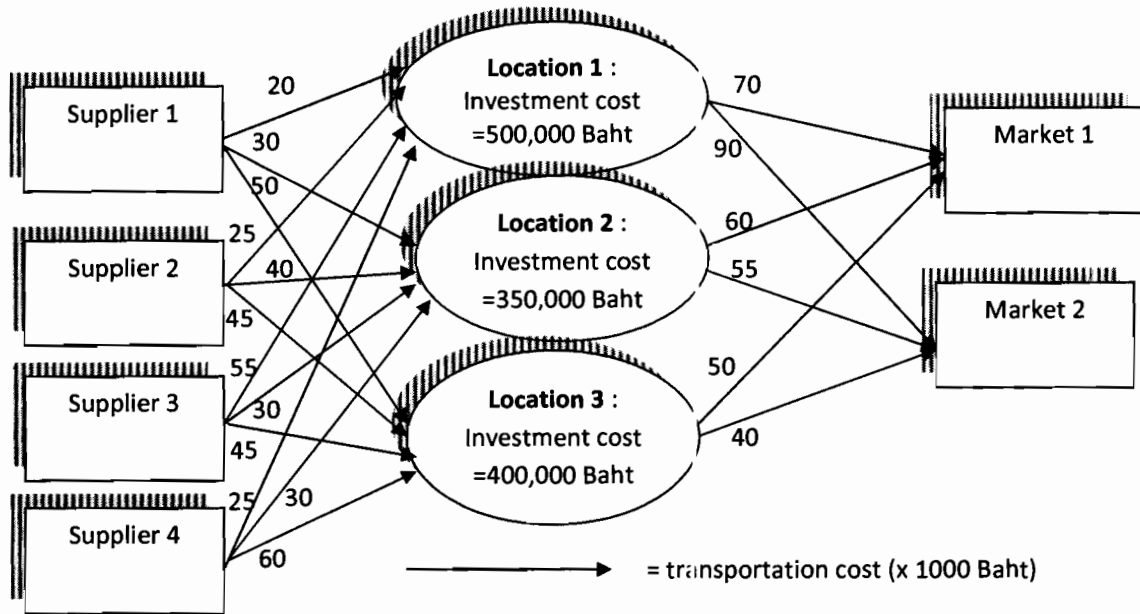


Figure 1

Table 1 Problem variables

Variable	Value
m	
n	
Number of C_{ij}	
i	
j	

Variable	Value
F_1	
F_2	
F_3	

List of C_{ij} Value (Fill in the blanks)

$C_{11} = \dots\dots\dots C_{12} = \dots\dots\dots C_{13} = \dots\dots\dots C_{\dots} = \dots\dots\dots C_{\dots} = \dots\dots\dots C_{\dots} = \dots\dots\dots$

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If location 3 is selected, list all of X_{ij} and Y_i values.

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The value of equation 2.1 (in the book) = Baht

The best location is because

5. (15 points) There are 3 locations for the plant; Satingpra, Ranode, and Hadyai. Calculate the Preference Ratio of $\frac{Satingpra}{Ranode}$, $\frac{Ranoe}{Hadyai}$, and $\frac{Satingpra}{Hadyai}$ by the following data, and where is the best location? Give the reason for the best location

- **Construction building cost** in term of Capital Recovery (Baht/year) ; Satingpra = 200,000 , Ranode = 150,000 and Hadyai = 250,000 (Weight of this factor is 4)
- **Transportation cost** (Baht/year) ; Satingpra = 150,000 , Ranode = 200,000 and Hadyai = 100,000 (Weight of this factor is 6)
- **Available profit** (Baht/year) ; Satingpra = 300,000 , Ranode = 250,000 and Hadyai = 450,000 (Weight of this factor is 6)
- **Availability of worker** ; Satingpra = 5 , Ranode = 3 and Hadya = 4 (Weight of this factor is 5)
- **Water supply** ; Satingpra = 3 , Ranode = 3 and Hadyai = 5 (Weight of this factor is 4)
- **Environment** ; Satingpra = 5 , Ranode = 5 and Hadyai = 3 (Weight of this factor is 3)
- **Disposal Management** ; Satingpra = 5 , Ranode = 5 and Hadyai = 4 (Weight of this factor is 3)

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6. (5 points) From the following table, what is shown in the table? How is it important for project planning and budgeting?

Preliminary Design 1.1.1	Jan.	Feb.	Mar.	Apr.	May
1.1.1.1 define specifications & Req.	1,500	1,000			
1.1.1.2 develop preliminary design		2,000	2,000		
1.1.1.3 review preliminary design			500	500	
1.1.1.4 incorporate comments				320	320
1.1.1.5 preliminary design complete					1,000

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7. (15 points) Give your own factory product and show your product design tools and process design tools for the product.

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8. (15 points) Calculate the number of machines required to produce Products A, B and C which have annual demand of 50,000, 40,000 and 20,000 units respectively. The factory operates 10 hours per day , 300 days per year. Additionally, there is 15%, 10%, 5% defective of product A, B and C in the production processes. Three types of machines are used in the following production rates

Machine	Product A	Product B	Product C
Lathe (min/pc)	20	12	10
Milling	10	15	5
Shaper	8	10	25

Note : Calculate the machine numbers for job shop process (share the machines for all products) and flow shop process (assign machines for each product)

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