

**PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING**

Final Examination : Semester I

Academic Year : 2006

Date : October 4, 2006.

Time : 13.30 - 16.30

Subject : 225-449 Industrial Plant Design

Room : R 201

**ทฤษฎีในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น
และพักการเรียน 1 ภาคการศึกษา**

Instructions :

1. There are 5 questions, 100 points.
2. Attempt all questions.
3. A sheet of paper note at size A4, a calculator and a dictionary are allowed.
4. Borrowing things from other students is prohibited.

Problem	Full Score	Score
1	25	
2	10	
3	15	
4	20	
5	30	
Total	100	

**Assoc. Prof. Dr. Sunchai Klinpikul
Instructor**

1. The Model J Wagon is to be assembled on a conveyor belt. Four hundred wagons are required per day. Production time per day is 8 hours, and the assembly steps and times for the wagon are given below :

Task	Task time (sec.)	Description	tasks that must precede
A	45	- Position rear axle support and hand fasten four screws to nuts.	-
B	11	- Insert rear axle	A
C	8	- Tighten rear axle support screw to nuts	B
D	50	- Position front axle assembly and hand fasten with four screws to nuts	-
E	15	- Tighten front axle assembly screw.	D
F	12	- Position rear wheel no.1 and fasten hubcap	C
G	12	- Position rear wheel no.2 and fasten hubcap	C
H	12	- Position front wheel no.1 and fasten hubcap	E
I	12	- Position front wheel no.2 and fasten hubcap	E
J	8	- Position wagon handle shaft on front axle assembly and hand fasten bolt and nut.	F, G, H, I
K	9	- Tighten bolt and nut.	J
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Balance this assembly line using COMSOAL Technique and bias selection (select the larger task first).

(20 points)

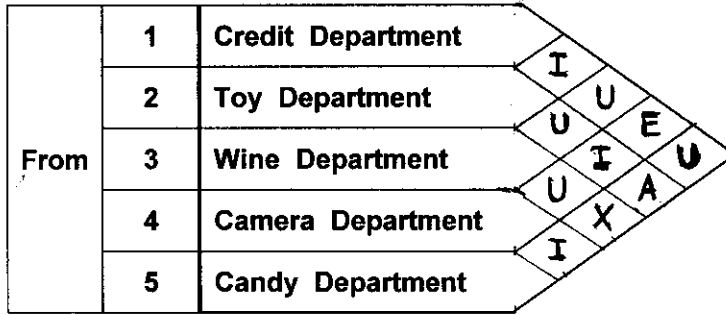
2. The Hi Octane Refining Company needs to locate an intermediate holding facility between its refining plant in Long Beach and its major distributors having coordinates as follows :

	<u>Coordinates (mile)</u>	<u>Gallons of Gasoline per month (x 1000)</u>
Plant (Long beach)	(325 , 75)	1,500
Distributor 1 (Thousand Oaks)	(25 , 450)	450
Distributor 2 (Anaheim)	(400 , 150)	250
Distributor 3 (Glendale)	(350 , 400)	350
Distributor 4 (LaHabra)	(450 , 350)	450

What should be the best location of the intermediate holding facility.

(10 points)

3. A small department store has the following relationships among five departments including area requirement.



Dept.	Area (Sq.ft.)
1	100 : (10 x 10)
2	200 : (10 x 20)
3	200 : (10 x 20)
4	100 : (10 x 10)
5	100 : (10 x 10)

Design the layout using ALDEP algorithm using the width of building 20 feet, sweep width = 1 .

(15 points)

4. Due to the scarce of labor, KST Company decided to establish a peeling shed in a small village at Ranot district. The company estimates that this peeling shed will produce 400 cubic meters of wastewater per day with an average BOD_5 of 1,500 ppm. (COD = 2,250 ppm)

Design a wastewater treatment system for this peeling shed using a facultative pond with a detention time of 12 days followed by a conventional activated sludge system. Assume other appropriate parameters for your design.

What is the sizes of the waste water treatment facilities, power requirement and the BOD_5 of the final effluent ?

(20 points)



5. Answer the following questions.

(30 points)

(1) Explain briefly about the components and functions of the refrigeration system.

(6 points)



(2) Explain the concept to design a warehouse to store chemicals and packaging materials in a food processing factory.

(6 points)



(3) Sketch the following facilities (engineering sketch). (12 points)

(a) A Sedimentation Tank (4 points)

(b) A complete set of conventional Activated Sludge System (4 points)

(c) A cyclone dust collector (4 points)



Carry Over =

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(4) Explain the following terms (6 points)

BOD₅ =

COD =

DS =

SFS =

UASB =

Carry Over =

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