

Faculty of Engineering
Prince of Songkhla University

Final Examination : Semester I

Academic Year : 2004

Date : October 3, 2004

Time : 13.30-16.30

Subject : 225-449 Industrial Plant Design

Room : R200

ทฤษฎีในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น
และพักการเรียน 1 ภาคการศึกษา โทษสูงสุดให้ออก

Instructions :

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

Problem no.	Full score	Score
1	20	
2	20	
3	20	
4	40	
Total	100	

Asso. Prof. Dr. Sunchai Klinpikul

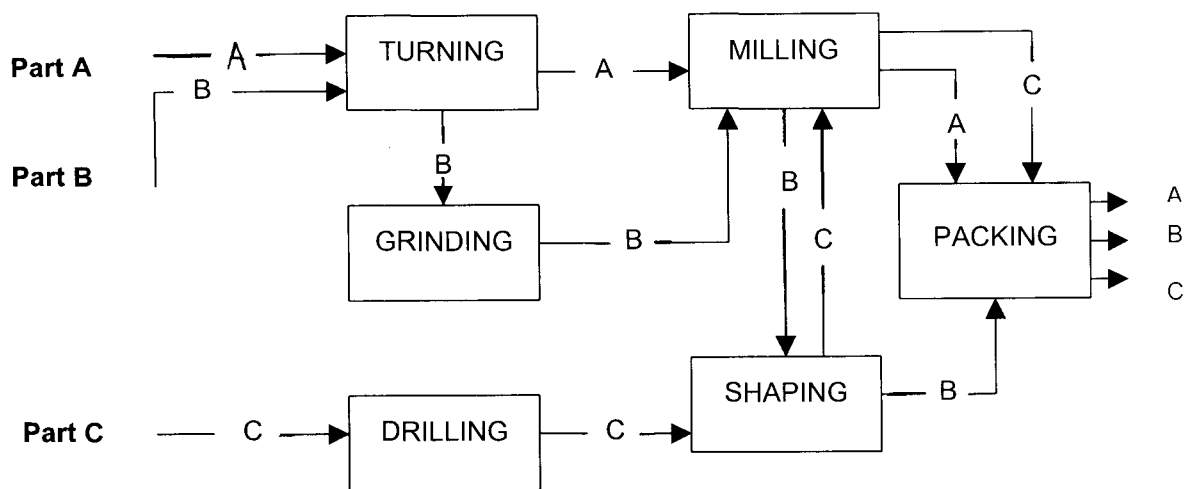
Instructor



1. A manufacturing company produces 3 types of motor bicycle spare parts with average monthly demand as follow :

Part	Monthly Demand (pieces)
A	10,000
B	15,000
C	22,000

Each part requires subsequence processes as shown below



Production rates in minutes per piece of each part at each process are listed as follow :

Process	Production Rate		
	Part A	Part B	Part C
Turning	2.8	4.5	-
Milling	3.2	2.3	4.6
Grinding	-	5.6	-
Drilling	-	-	2.5
Shaping	-	2.6	3.7
Packing	5.3	3.4	4.2

Assuming that the average fraction defectives for these parts are 1.5%, 2% and 3% for part A, B and C respectively.

Calculate the number of machines required to fulfil the demand. The company operates 8 hours per day (without overtime) and 26 days per month.

(20 points)

Benjamin

Name ID Code.....

Supper

Name ID Code.....

Suppa

2. The from-to material flow matrix for an eight-department facility is given in the table below.

		TO							
		A	B	C	D	E	F	G	H
From	A	-	302				66		68
	B		-	504	20	136	154		40
	C			-	76	352			94
	D				-				8
	E			400		-	122		282
	F						-	188	24
	G							-	296
	H								-

Note : unit flow = kilograms per hour

- (a) Construct a relationship diagram based on the material flow matrix.

(20 points)

Name ID Code.....

Sapora

3. From the result in Problem 2, given the required area of each department as :

Dept.	A	B	C	D	E	F	G	H
Area (m ²)	400	300	600	500	300	600	300	800
WxL	(20x20)	(10x30)	(20x30)	(10x50)	(10x30)	(20x30)	(10x30)	(20x40)

Design a proper layout by ALDEP algorithm using sweep width = 1 and the width of the building 60 meters.

(20 points)

Name ID Code.....

Suppr.

4. Answer the following questions :

(1) Sources of raw water consist of : (2 points)

(2) How to remove iron and manganese from underground water ? Sketch the flow diagram. (2 points)

(3) How many methods of removing hardness from raw water ? Which method is preferable ? (2 points)

(4) How to remove smell and color from raw water ? (2 points)

(5) What is BOD_L ? (2 points)

(6) Explain briefly about chemical treatment of waste water. How many processes and how does each process work ? (4 points)

(7) Explain briefly about the UASB treatment process. How does it work ? What is the detention time and efficiency ? (3 points)

(8) Sketch a flow diagram of conventional activated sludge system. (2 points)

(9) List six main types of dust collectors. (3 points)

(10) 1 Boiler horse power = BTU/hr. (1 points)

= HP (1 points)

(11) What is peak time and off-peak time of TOU (Time of Use) Rate ?
(2 points)

(12) List four types of refrigerants commonly used in industry. (2 points)

(13) Sketch a flow diagram of a refrigeration system. (2 points)

Suppr.

(14) What ministries in Thailand are responsible for safety laws and regulations in the factories. What are their main functions? (10 points)