PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Term Examination : Semester I **Academic Year :** 2006

Date : October 5, 2006. **Time :** 13.30 - 16.30

Subject : 225-351 Production Planning and Control **Room :** R300

ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น
และพักการเรียน 1 ภาคการศึกษา

PART A

Instructions :

1. **There are 4 questions, 60 points.**
2. **A sheet of paper note at size A4 is allowed.**
3. **A calculator and a dictionary are allowed.**
4. **Borrowing things from other students is prohibited.**

Problem no.	Full Score	Score
1	15	
2	15	
3	10	
4	20	
Total	60	

Assoc. Prof. Dr. Sunchai Klinpikul
Instructor

1. Quarterly data for the past two years of a publishing company was :

Period	Sales	Period	Sales
1	300	5	416
2	540	6	760
3	885	7	1191
4	580	8	760

Forecast the demand in the next year by using decomposition method.

(15 points)

2. Jason Enterprise (JE) produces video telephones for the home market. JE needs to develop an aggregate production plan for the six months from January through June. You have been commissioned to create the plan with the following information :

Demand and Working days

	Jan	Feb	Mar	Apr	May	June
Demand forecast (units)	500	600	650	800	900	800
No. of working days	22	19	21	21	22	20

Cost

Material	$ 100.00 per unit
Hiring and Training cost	$ 50.00 per worker
Layoff cost	$ 100.00 per worker
Labor hours required	4 per unit
Straight-time cost	$ 12.50 per production hours required

Inventory

Beginning inventory	200 units
Safety stock required	0 % of month demand

The production planning strategy is to produce exactly to meet demand and vary work force. JE starts hiring new workers from the first month (January).

Calculate the aggregate production plan and what is the total cost ?

(15 points)

3. Puck and Pawn Company manufactures hockey sticks and chess sets. Each hockey stick yields a profit of $ 2.00, and each chess set, $ 4.00. A hockey stick requires 4 hours of processing at machine center A and 2 hours at machine center B. A chess set requires 6 hours of machine center A, 6 hours of machine center B, and 1 hour at machine center C. Machine center A has a maximum of 120 hours of available capacity per day, machine center B has 72 hours, and machine C has 10 hours.

Formulate a Linear programming model for this company. (10 points)

4. ABC Printing Company produces packaging materials and supplies to various factories in the region. The company has developed a preventive maintenance system for core machines in the production line such as printing machines and corrugators. To measure the performance of the PM system, the company has developed a software to calculate the Machine Availability (MA), Mean Time between Failure (MTBF) and Mean time to Repair (MTTR) for the core machines. The company records the following data :

1. **Set up time of each machine (minutes)**
2. **number of set up for each machine.**
3. **Repair time of each machines (minutes)**
4. **number of repair for each machine**
5. **Actual working hours of each machine (hours)**

Draw an information flow diagram (or input - output diagram) to calculate those three parameters for the core machines.

(20 points)

Faculty of Engineering

Prince of Songkla University

Final Examination : Semester 1 Academic year 2006 (2549)

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ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น และพักการเรียน 1 ภาคการศึกษา

Part B

1. Total Examination has 3 topics , 9 pages , and 40 scores.
2. Do your examination in these papers and return all of them.
3. Write down your name , last name , student code in all the papers.
4. Show all calculation , and assumption.

	Scores	Your Scores
1	13	
2	12	
3	15	
Total	40	

Name.....

Last name.....

Student code.....

Year / Department.....

Assistant Professor Yodduang Pannara

Name..... Last name..... Student Code.....

1. From the topic of Project Management with CPM

1.1 Write down the arrow diagram from the data below.

Activity A, B, C	start the project
Activity A	starts before activity D, E
Activity B	starts before activity F, G , H , J
Activity C	starts before activity I , J
Activity D	starts before activity F
Activity E	starts before activity F, G , H , J
Activity F	starts before activity I
Activity G	starts before activity I
Activity H, I, J	starts before activity K
Activity K	is the final activity.

(7 scores)

Name..... Last name..... Student Code.....

1.2 CPM Network in figure 1.2.1 and 1.2.2 correct or not

- If it is correct, you must write down that it is correct.
- If it is not correct, you must adjust or correct it.
- If you don't write anything , your score is zero.

1.2.1

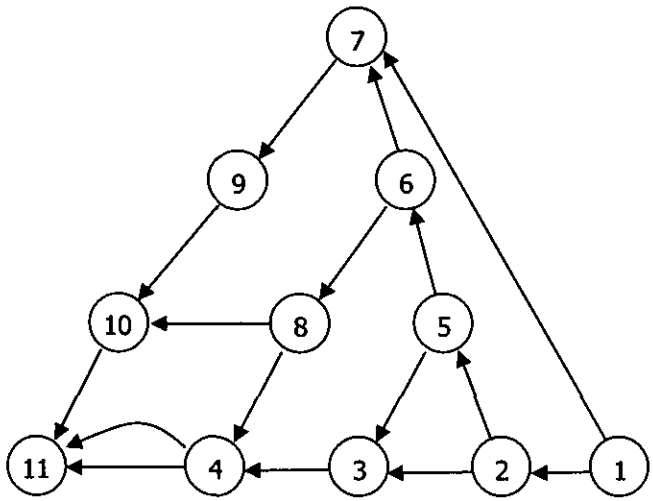

Figure 1.2.1 (3 scores)

1.2.2

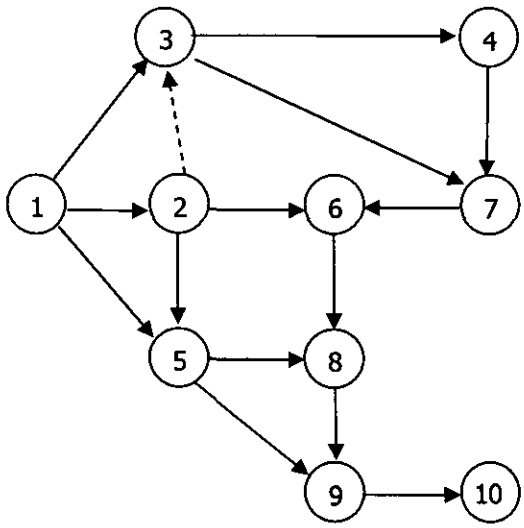

Figure 1.2.2 (3 scores)

(Total 13 Scores)

Name..... Last name..... Student Code.....

2. From the topic of Project Management with CPM

From CPM Network in figure 2.1 the number in each path or activity is time (days).

For example , the working day from model ① to node ② is 8 days

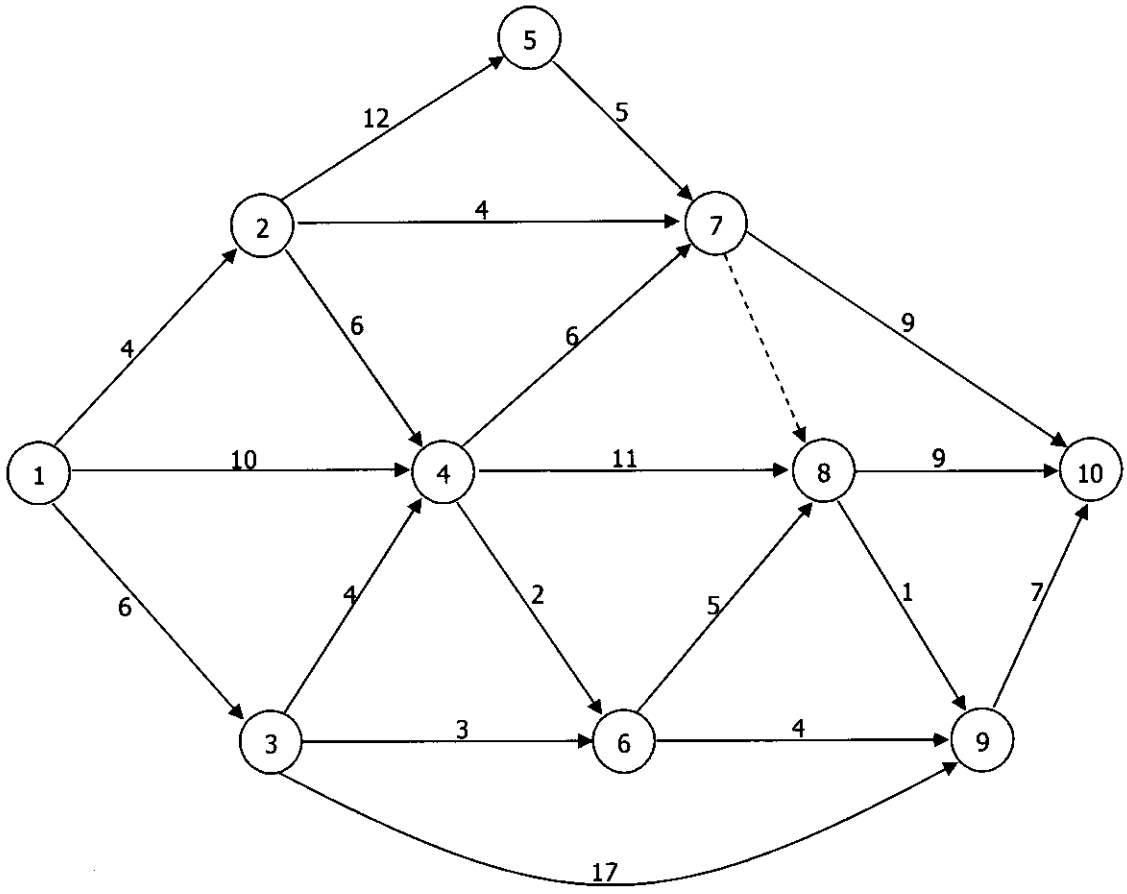

Figure 2.1

2.1 What is the meaning and benefit of critical path ? (2 scores)

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Name..... Last name..... Student Code.....

2.2 Show all calculation in figure 2.1 for

2.2.1 Which paths are the critical paths ? Show all of them. (3 scores)

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2.2.2 What is the value of the critical path ? (1 score)

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2.3 For every activity calculates

- Earliest Start (ES)
- Latest Start (LS)
- Earliest Finish (EF)
- Latest Finish (LF)
- Total Float (TF)

Show all data in figure 2.1. (5 scores)

2.4 For every node calculates

- Earliest Event Occurrent Time (EO)
- Latest Event Occurrent Time (LO)

Show all data in figure 2.1. (2 scores)

(Total 12 scores)

Name..... Last name..... Student Code.....

3. The factory has one system machine. The factory receives the orders below

Job	1	2	3	4	5	6	7
Working time (days)	40	30	27	17	22	36	28
Profit (Baht)	200	200	300	100	100	300	100
Priority	1	1	2	2	3	1	2
Priority 1 is maximum, Priority 3 is minimum.							

3.1 How many methods do they have to rearrange the ways of working ? You must concern working time, weight and priority in this problem. (Show all calculation) (2 scores)

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3.2 Rearrange the method of working to minimize mean flow time ($\overline{F}$) with priority. How many days should the maximum mean flowtime be ? How many average job in the system should it be ? How many mean flowtime with priority should it be ? (This problem does not concern with weight) (6 scores)

3.3 Rearrange the method of working to maximize weight mean flow time ($\overline{Fw}$) with priority. How many days should the maximum mean flowtime be ? How many average value of inventory in the system ($\overline{V}$) should it be ? How many weight mean flowtime with priority should it be ? (7 scores)

Remark : Draw the graph in this paper and specify the scale of each position

(Total 15 scores)

(Assistant Professor Yodduang Pannara)